

SELF-EVALUATION REPORT FOR EVALUATION OF RESEARCH ORGANIZATIONS IN THE SEGMENT OF HIGHER EDUCATION INSTITUTIONS IN YEAR 2025

HIGHER EDUCATION INSTITUTION NAME:

České vysoké učení technické v Praze – Czech Technical University in Prague

COMPANY REGISTRATION NUMBER (CRN): 68407700

THE LIST OF EVALUATION UNITS IN MODULE 3:**ORGANIZATIONAL STRUCTURE OF THE HIGHER EDUCATION INSTITUTION**

Faculty of Civil Engineering
Faculty of Mechanical Engineering
Faculty of Electrical Engineering
Faculty of Nuclear and Physical Engineering
Faculty of Architecture
Faculty of Transportation Sciences
Faculty of Biomedical Engineering
Faculty of Information Technology
Klokner Institute
MIAS School of Business
University Centre for Energy Effective Buildings
Czech Institute for Informatics, Robotics and Cybernetics
Institute of Experimental and Applied Physics

HIGHER EDUCATION INSTITUTION WEBSITE (HTML LINK): <https://www.cvut.cz/en>

THE HIGHER EDUCATION INSTITUTION CONTACT PERSON

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Position: Vice-Rector
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Signature (Rector), stamp

Introductory information about the evaluated higher education institution

The HEI briefly introduces itself. The organizational chart, the position of the HEI within the research, development and innovation system and the system of HEIs in the Czech Republic may be commented on, the mission and vision, the size of the HEI, the number and focus of the units evaluated will be briefly presented.

Maximum 500 words.

Description:

The Czech Technical University in Prague was founded in 1707 by a decree of Emperor Joseph I. Since then, it has always been a place of excellent technical education and research. It was CTU where Hans Christian Doppler formulated and published his work *Über das farbige Licht der Doppelsterne und einiger anderer Gestirne des Himmels*, where he postulated what we call today The Doppler principle.

There are 8 faculties and 5 institutes that enter this evaluation. Some of these faculties are good enough to supersede most of other (whole) Czech universities as to the number and quality of scientific results produced.

The CTU culture is based on a high degree of freedom together with responsibility. Through centuries, the faculties as well as the institutes have always had a high degree of autonomy, and they have given a high degree of autonomy to their departments and to their professors. In turn, the professors have worked hard to guide young colleagues towards excellence, to serve the community, and to obtain external funding to carry out their research. Three hundred plus years of history prove that this recipe has worked well within the Czech boundary conditions.

SWOT ANALYSIS

Strengths An established university with a long tradition, a wonderful location, and good standing. A major element in the Prague research cluster. Strong in basic and applied research, experienced researchers and Ph.D. supervisors. Broad coverage of technical disciplines. Strong ties to industry in many fields and departments. Established research teams capable of acquiring external funding (projects, contracts). Well-educated and skilled people able to respond to society's needs. A culture based on excellent individuals and subsidiarity.	Weaknesses Tradition slows down the changes. Continuing inefficient division of labour – professors carry out teaching and research under a high administrative load. Inability to increase salaries at a time when an extremely hungry labour market sucks in young scientists and leaders. Weak cooperation with industry in some fields and in some departments. Low motivation (on both sides) to transfer the effective habits of excellent teams to less-performing groups.
Opportunities Take the lead in newly opening fields (AI, quantum communication/computing, sustainable mobility, chip design). Take on new challenges to society. Attract more women to STEM fields. Cooperate internationally with excellent research units. Promote Prague as a scientific research hub. Revitalize nuclear energy in the Czech Republic and ensure safe operation of nuclear facilities. Seek solutions to society's needs and challenges, e.g., the quest for carbon-neutral energy sources, novel methods of medical diagnostics and treatment, and other opportunities when emerging.	Threats Low interest in STEM subjects and careers among young people, an unprecedentedly low level of knowledge delivered by secondary schools. Research driven by evaluation metrics. Unstable and often changing rules of R&D funding in the Czech Republic. Decrease in the share of the Czech budget aimed at research. Political pressure aiming at 'excellent' research in each district of the country.

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: Faculty of Civil Engineering

FORD: 2 - Engineering and technology

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

Our faculty is built on the pillars of tradition, quality, and perspective. With a rich three-hundred-year heritage, our objective is to be an exemplary institution that delivers top-notch education in civil engineering, architecture, and geodesy. Our graduates are not only well-educated but also equipped with promising career prospects in their respective fields.

In addition to providing quality education, our faculty is deeply committed to scientific research, development, innovation, as well as artistic and creative endeavours. Through these activities, we actively contribute to the advancement of science and the development of cutting-edge technical solutions. We are proud to be one of the few Czech faculties that stand shoulder-to-shoulder with Europe's and the world's leading institutions in both fundamental and applied research. Our state-of-the-art laboratories in building structures and materials, water engineering, and the unique underground laboratory Štola Josef, along with our own observatory and engaging architectural studios, provide an excellent environment for student education, scientist training, and the implementation of our research projects.

The third pillar of our activities are services provided to governmental and municipal authorities (expert and consultancy activities) as well as various activities targeting the general public (popularization activities, university of the third age).

The Faculty of Civil Engineering (FCE) at the Czech Technical University (CTU) in Prague is one of the largest faculties within the university. The organization structure includes several key components:

- **Dean:** The head of the faculty, responsible for overall management and strategic direction.
- **Vice-Deans:** Appointed by the Dean, each Vice-Dean oversees specific areas such as education, research, development, and international relations.
- **Academic Senate:** A legislative body elected by the academic community, responsible for democratic control and management, including the election of the Dean.
- **Scientific Board:** Composed of faculty representatives and industry experts, this board directs the development and content of teaching and research activities.
- **Departments:** The faculty is divided into various departments, each specializing in different areas of civil engineering, architecture, and geodesy. These departments ensure high-quality instruction and research.

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

The faculty offers a wide range of study programs, including 13 Bachelor's, 21 Master's, and 24 Doctoral degrees in Civil Engineering, Architecture, Geodesy, and related fields with more than 3000 students enrolled (2400 bachelors, 690 masters, 350 PhDs). The faculty employs a significant number of academic and administrative staff to support its operations and educational activities, including 58 full professors, 103 associate professors, 201 assistant professors, and 70 researchers in other categories. The increasing number of early career researchers (105 FTE) is helping to build the next generation of academic leaders and ensures the continuity of high-quality research and education at our faculty.

The key long-term research directions defined in the FCE Strategic Plan include:

- Integrated design of building structures;
- Reliability, durability and optimization of building materials and structures;
- Sustainable life cycle management of buildings, construction companies and sites and environmental aspects of the construction industry;
- Modelling of complex multi-physics processes and their applications in engineering;
- Digitalization and robotics in construction;
- Integrated water management and flood protection in sustainable development;
- Revitalization of water systems in landscapes and cities burdened by significant anthropogenic changes;
- Comprehensive technology innovation in geodesy and cartography;
- Geoinformation technologies - optimization of methods for the collection, use and presentation of geodata in surveying, landscape and urban engineering.

In 2023, government funding accounted for 62% of our total income, while research projects contributed 27%, and contracted research activities made up 11%. Regarding the distribution of research activities, basic research constituted 23%, applied research 58%, and contractual research 19% (source: 2023 FCE Annual report). The faculty has established long-term cooperation and partnerships with industry, including large construction companies, national bodies, and SMEs.

The national evaluation of the research institutions clearly shows that the research output of FORD 2.1 Civil Engineering at CVUT is on par with the EU and international standards. The Faculty of Civil Engineering is responsible for most of these outputs, with 61% of publication results indexed in Q1 journals and 81% in Q1+Q2 journals. Additionally, the publication productivity in Q1 publications is at 120% of the national level in this field (source: Bibliometrical Report, Research, Development and Innovation Council, [Hodnocení výzkumu RVVI](#)).

In the 2025 QS World University Rankings by subject, CVUT is ranked between 151-200 for Engineering - Civil & Structural, with a major contribution from the FCE. For Architecture and Built Environment, CTU is positioned between 151-200, a ranking achieved through a shared contribution with the Faculty of Architecture (source: [QS World University Ranking by Subject 2025](#)).

Table 3.1.1 - Staffing per FTE²

Academic/ Professional position	Total / Of which women					
	2019	2020	2021	2022	2023	Total
Professor	49.2/6.10	48.2/5.6	50.2/6.1	52.5/8.710	54.3/8.10	254.2/33.0
Associate Professor	103.4/18.7	101.6/18.7	104.0/19.2	103.4/18.2	95.8/16.2	508.2/90.8
Assistant Professor	221.4/76.1	206.1/73.2	211.3/73.3	200.5/71.0	194.0/68.0	1033.4/361.6
Assistant	3.0/2.0	3.5/2.0	3.5/2.0	3.9/2.0	3.9/2.0	17.8/10.0

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

R&D Personnel ³	105.1/62.7	88.6/53.1	82.3/46.3	81.5/41.5	77.5/40.1	435.0/243.6
Researchers in other categories ⁴	66.5/20.3	71.5/22.2	80.5/26.0	82.0/24.9	78.5/23.4	378.9/116.8
Technical and economic staff ⁵	106.0/68.7	112.1/72.8	114.8/75.8	119.7/75.7	125.6/83.0	578.2/376.0
Scientific, research and development staff involved in teaching activities	373.8/97.3	355.2/94.0	364.6/95.1	357.2/92.8	346.4/90.8	1797.2/469.9
Early career researchers ⁶	151.3/44.1	131.3/38.2	127.8/39.1	125.7/38.4	113.3/34.9	649.5/194.8
Total ⁷	654.6/254.5	631.7/247.6	646.5/248.6	643.4/240.4	629.4/240.6	3205.7/1231.7

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁸

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	1	1	12	2	11	0	19	3	16	1
Associate Professor	0	0	9	0	39	6	31	5	23	9	23	1
Assistant Professor	2	0	106	33	90	21	35	19	30	14	7	4
Assistant	1	0	2	2	0	0	0	0	0	0	0	0
R&D Personnel ⁹	21	9	32	13	20	12	23	20	27	18	18	7
Researchers in other categories ¹⁰	48	17	50	16	9	2	5	0	5	0	5	0

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

Technical and economic staff ¹¹	0	0	0	0	2	0	5	2	1	1	1	0
Scientific, research and development staff involved in teaching activities	4	0	124	36	143	30	77	24	72	26	46	6
Early career researcher ¹²	51	17	168	52	0	0	0	0	0	0	0	0
Total ¹³	72	26	200	65	172	43	110	46	105	45	70	13

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁴

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	13	3	15	2	16	1	18	3
Associate Professor	0	0	5	0	32	3	23	4	29	8	20	3
Assistant Professor	0	0	63	20	99	24	33	16	33	18	8	4
Assistant	0	0	5	2	0	0	0	0	0	0	0	0
R&D Personnel ¹⁵	15	5	24	5	28	12	20	15	10	8	9	4
Researchers in other categories ¹⁶	30	7	65	23	22	3	3	2	3	0	3	1
Technical and economic staff ¹⁷	1	0	0	0	1	0	4	2	2	1	1	0
Scientific, research and development staff involved in teaching activities	0	0	77	22	149	31	71	22	78	27	46	10
Early career researcher ¹⁸	30	7	138	45	0	0	0	0	0	0	0	0

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

Total ¹⁹	46	12	162	50	195	45	98	41	93	36	59	15

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students

Type of study	2019		2020		2021		2022		2023		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate	1999	793	2105	830	2333	893	2239	875	2482	985	11158	4376
Master's ²⁰	908	368	853	349	778	320	717	306	694	286	3950	1629
Doctoral	398	147	403	137	388	132	360	117	349	116	1898	649
Lifelong Learning Courses	212	143	381	278	337	204	431	306	437	306	1798	1237
Total	3517	1451	3742	1594	3836	1549	3747	1604	3962	1693	18804	7891

Table 3.1.5 - Study programmes in Czech/English

Type of study programme	Total ²¹ / Of which professional study programmes											
	2019		2020		2021		2022		2023		Total	
Undergraduate	8/1	2/0	10/2	2/0	11/2	2/0	9/2	2/0	9/1	2/0	47/8	6/0
Master's	8/1	0/0	10/1	0/0	9/1	0/0	9/2	1/0	17/3	1/0	53/8	2/0
Doctoral	20/5	0/0	29/7	0/0	38/13	0/0	39/9	0/0	36/10	0/0	162/44	0/0
Lifelong Learning courses	9/0	0/0	16/0	0/0	14/0	1/0	15/0	1/0	14/0	2/0	68/0	4/0
Total	45/7	2/0	65/10	2/0	72/16	3/0	72/13	4/0	76/14	5/0	330/60	12/0

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
1. Natural Sciences	1.1 Mathematics	3.60	Balanced basic and applied research	13.54
	1.2 Computer and information sciences	1.63	Applied Research	

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

	1.3 Physical sciences	1.24	Applied Research	
	1.4 Chemical sciences	0.17	Applied Research	
	1.5 Earth and related environmental sciences	6.72	Applied Research	
	1.6 Biological sciences	0.00	Zvolte položku.	
	1.7 Other natural sciences	0.18	Applied Research	
2. Engineering and Technology	2.1 Civil engineering	60.08	Balanced basic and applied research	78.74
	2.2 Electrical engineering, Electronic engineering, Information engineering	0.67	Applied Research	
	2.3 Mechanical engineering	0.90	Applied Research	
	2.4 Chemical engineering	0.05	Applied Research	
	2.5 Materials engineering	12.94	Balanced basic and applied research	
	2.6 Medical engineering	0.03	Applied Research	
	2.7 Environmental engineering	2.80	Applied Research	
	2.8 Environmental biotechnology	0.00	Zvolte položku.	
	2.9 Industrial biotechnology	0.00	Zvolte položku.	
	2.10 Nanotechnology	0.05	Applied Research	
	2.11 Other engineering and technologies	1.22	Applied Research	
3. Medical and Health Sciences	3.1 Basic medicine	0.00	Zvolte položku.	0.36
	3.2 Clinical medicine	0.00	Zvolte položku.	
	3.3 Health sciences	0.00	Zvolte položku.	
	3.4 Medical biotechnology	0.36	Applied Research	
	3.5 Other medical sciences	0.00	Zvolte položku.	
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries	1.64	Applied Research	1.64
	4.2 Animal and Dairy science	0.00	Zvolte položku.	
	4.3 Veterinary science	0.00	Zvolte položku.	
	4.4 Other agricultural sciences	0.00	Zvolte položku.	
5. Social Sciences	5.1 Psychology and cognitive sciences	0.11	Applied Research	1.96
	5.2 Economics and Business	0.59	Applied Research	
	5.3 Education	0.64	Applied Research	
	5.4 Sociology	0.01	Applied Research	
	5.5 Law	0.23	Applied Research	
	5.6 Political science	0.00	Zvolte položku.	
	5.7 Social and economic geography	0.22	Applied Research	
	5.8 Media and communications	0.16	Applied Research	
	5.9 Other social sciences	0.00	Zvolte položku.	
6. Humanities and the Arts	6.1 History and Archaeology	0.64	Applied Research	3.74
	6.2 Languages and Literature	0.00	Zvolte položku.	
	6.3 Philosophy, Ethics and Religion	0.01	Applied Research	
	6.4 Arts (arts, history of arts, performing arts, music)	2.61	Balanced basic and applied research	
	6.5 Other Humanities and the Arts	0.48	Applied Research	
Total		100 %	-	100 %

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

Many faculty members are distinguished experts in various disciplines. This is documented by selected prestigious awards and elected memberships in international organizations and bodies:

- Prof. Jan Vítek has been active in the International Federation for Structural Concrete (fib) since 1995. In the period 2010–2023 he was convenor of the Task Group on Serviceability of Concrete Structures. For the periods 2016–2020 and 2020–2023 he was elected for two 4-year terms as convenor of Commission 2 - Analysis and Design. In 2021 he was awarded the title of “Honorary Life Member of fib”.
- Prof. Petr Hájek, received the Medal of Merit (2020) from the International Federation for Structural Concrete (fib).
- Prof. František WALD, was elected President of the European Convention for Constructional Steelwork, ECCS Brussels, 2023.
- Prof. Ivan Vaníček, served as the Vice-President for Europe in the [International Society for Soil Mechanics and Geotechnical Engineering](#) (ISSMGE), 2019–2023.
- Prof. Lena Halounová, has been elected President of ISPRS (International Society for Photogrammetry and Remote Sensing, www.isprs.org), as the first woman and the first citizen from the former Eastern block to hold this important position, 2022–2026.
- Doc. Jan Pruška, represented the Czech Republic in ELGIP (European Large Geotechnical Platform), 2021 – 2023.
- Dr. Martin Vonka and Mgr. Michal Horáček, working on the theme of factory chimneys as an endangered type of cultural heritage and trying to bring it to the attention of the general public, have won the “Patrimonium pro futuro” award in the presentation and popularization category, awarded by the National Heritage Institute.

Faculty members served on the editorial boards of recognized international scientific journals (>50) and delivered invited lectures at international conferences and institutions (58). At the same time, more than 30 invited lectures were given at our faculty by recognized international experts. Several faculty members received recognition from national funding agencies (GACR, TACR) for excellent projects (8).

Many have participated as evaluators of national or European programme calls (>30), as illustrated by selected examples in Table 3.2.5 below.

The Faculty actively supported the scientific community by organizing several national and international scientific events, including

- IABSE Symposium Prague 2022, jointly organized by the Czech Group of IABSE and FCE, 2022, <https://www.iabse.org/prague2022>
- iiSBE Forum of Young Researchers in Sustainable Building, organized by FCE under auspices of iiSBE A&R Forum, 2019, 2022, <https://cesb.cz/yrsb/>
- Central Europe towards Sustainable Building 2019: co-organized by FCE under auspices of iiSBE, 2019, <https://19.cesb.cz/>
- International Colloquia on Stability and Ductility of Steel Structures 2019, organized by FCE, 2019.
- 14th International Conference on Local Mechanical Properties 2019, co-organized by FCE, 2019, <http://lmp-conference.cz/>

- International Conference on Lightweight Structures Architecture 2020, co/organized by FCE, 2020, <https://alk-20.wixsite.com/alk20?lang=en>

As a notable service to the research community, faculty members maintain the largest creep and shrinkage database for structural concrete, covering 1,468 creep tests and 3,569 shrinkage tests since 1936. It is used by the community for benchmarking and model calibration (<https://doi.org/10.5281/zenodo.8150176>).

The Faculty is the publisher of the open-access Civil Engineering Journal (CEJ, ISSN: 1210-4027, indexed in ESCI & SCOPUS), since 2002. This journal serves as a platform for international scientific communication and result dissemination (<https://lfgm.fsv.cvut.cz/CivilEngineeringJournal/index.html>).

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
Martin Kružík, prof. RNDr., Ph.D.	Senior Research Fellow (2022)	The Erwin Schrödinger International Institute for Mathematics and Physics (ESI)
Martin Doškář, Ing., Ph.D.	CEACM Young Researcher Award for the best Ph.D. thesis (2019)	Central European Association in Computational Mechanics
Marek Tyburec, Ing., Ph.D.	Joseph Fourier Prize for Computer Sciences – Special IT4Innovations Prize (2022)	Embassy of France, Atos, IT4 innovations
Martin Ladecký, Ing., Ph.D.	Dr.-Klaus-Körper Prize (2023)	German Association of Applied Mathematics and Mechanics (GAMM)
Petr Hájek, prof. Ing., CSc.	Medal of Merit (2020)	fib - International Federation for Structural Concrete
Jan Vitek, prof. Ing., CSc.	Honorary life member of <i>fib</i> (2021)	International federation for structural concrete (<i>fib</i>)
Rostislav Šulc, Ing., Ph.D.	TACR Award 2023 in the BUSINESS category for cooperation on the Autonomous Robotic Building System project TH04010329	Technology Agency of the Czech Republic (TAČR) https://tacrgov.cz/den-ta-cr-2023-veda-neni-sci-fi/
Petr Konvalinka, prof. Ing., CSc., FEng.	Werner von Siemens Gold Medal (2019)	Siemens ČR
Martin Vonka, doc. Ing. Ph.D and Michal Horáček, Mgr.	Patrimonium pro futuro (2022)	National Heritage Institute
Jiří Cajthaml, prof. Ing., Ph.D. et.al.	Award of the Academy of Sciences of the Czech Republic for outstanding results in research, experimental development and innovation (2019).	Academy of Sciences of the Czech Republic

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of scientific journal, ISSN

Josef Křeček, doc. Ing., CSc.	International Soil and Water Conservation Research, ISSN: 2095-6339, https://www.keaipublishing.com/en/journals/international-soil-and-water-conservation-research/editorial-board/ , IF 7.3
Milan Jirásek, prof. Ing., DrSc.	Cement and Concrete Research., ISSN: 0008-8846, https://www.sciencedirect.com/journal/cement-and-concrete-research/about/editorial-board , IF 10.9
Petr Kabele, prof. Ing., Ph.D.	Cement and Concrete Composites, Print ISSN: 0958-9465 Online ISSN: 1873-393X, https://www.sciencedirect.com/journal/cement-and-concrete-composites/about/editorial-board , IF 10.8
Lena Halounová, prof. Ing., CSc.	ISPRS Journal of Photogrammetry and Remote Sensing, ISSN 0924-2716, https://www.isprs.org/news/newsletter/default.aspx , IF 10.6
Karel Kabele, prof. Ing., CSc.	Energy & Buildings, ISSN 0378-7788 and 1872-6178, https://www.sciencedirect.com/journal/energy-and-buildings/about/editorial-board , IF 6.6
Jaroslav Kruis, prof. Ing., Ph.D.	Advances in Engineering Software, ISSN 0965-9978, https://www.sciencedirect.com/journal/advances-in-engineering-software/about/editorial-board , IF 4.0
František WALD, prof. Ing., CSc.	Journal of Constructional Steel Research, ISSN 2093-6311, https://www.sciencedirect.com/journal/journal-of-constructional-steel-research/about/editorial-board , IF 4.0
Jaromír Dušek, prof. Ing., Ph.D.	Journal of Hydrology and Hydromechanics, ISSN 0042-790X, http://www.uh.sav.sk/jhh/Journal-information/Associate-Editors , IF 2.3
Bořek Patzák, prof. Dr. Ing.	Computers & Structures, Elsevier, ISSN 0045-7949 , https://www.sciencedirect.com/journal/computers-and-structures/about/editorial-board , IF 4.4
Jan Zeman, prof. Ing., Ph.D.	Acta Mechanica, Springer Nature, ISSN 0001-5970, https://link.springer.com/journal/707/editorial-board , IF 2.3

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
Martin Kružík, prof. RNDr., Ph.D.	Derivation of von Kármán Plate Theory in the Framework of Three-Dimensional Viscoelasticity	Conference on Calculus of Variations in Schiermonnikoog 2019	2019
Michal Jandera, prof. Ing., Ph.D.	Resistance of Eccentrically Connected Gusset Plates in Compression	Structures Congress 2022. Reston, Virginia: ASCE	2022
Jan Zeman, prof. Ing., Ph.D.	Wang Tiles for Exploring and Manufacturing Modular Metamaterials	ECCOMAS Congress 2022, Oslo, Norway	2022
Petr Hájek, prof. Ing., CSc.	Changing Climate and Sustainability of Built Environment	IABSE Congress 2023 – Delhi, India	2023
Pavel Krejčí, doc. RNDr., CSc.	A Tumor Model Represented as a Multicomponent Deformable Porous Medium	PHase field MEthods in applied sciences PHAME 2022, Rome, Italy	2022
Ivan Vaniček, prof. Ing., DrSc.	Present Demands on Earth Structures in Transport Engineering in Europe	Chicago - online: 4th Int. Congress on Transportation Geotechnics (Illinois edu) + ISSMGE	2021

David Stránský, doc. Ing., Ph.D.	Sustainable Stormwater Management – Blue-Green Infrastructure, (on-line)	Lund University, Sweden	2021
Lukáš Fiala, Ing., Ph.D.	Application of Zero Cement in Civil Engineering Materials	National Ilan University, Taiwan	2023
Vojtěch Bareš, Ing., Ph.D.	How Can Urban Water Management Benefit from High Coverage by Cellular Networks?	Symposium on the hydrometeorological usage of data from commercial microwave link networks, Karlsruhe Institute of Technology	2019
František WALD, prof. Ing., CSc.	Component Based Finite Element Design of Steel Joints	Ernst und Sohn on line seminars, 29 October 2020 www.ernst-und-sohn.de/en/stco-seminar	2020

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year
Daya Reddy, prof.	University of Cape Town, South Africa	Some mathematical aspects of models of strain-gradient plasticity	2020
Zdeněk P. Bažant, prof.	Northwestern University, Evanston, USA	Dependence of Fracture Size Effect and Projectile Penetration on Fiber Content of FRC	2019
Ulisse Stefanelli, prof.	University of Vienna, Austria	Existence results for a morphoelastic model	2021
Martin Brokate, prof. Dr.	TU München, Germany	Hysteresis Operators (series of 10 lectures)	2021-2022
Ippei Maruyama, prof.	The University of Tokyo	Irradiated Concrete	2023
Pavel Trtík, Assoc. prof.	Paul Scherrer Institute, Switzerland	Experimental Investigation of nonhomogeneity of materials using a bundle of a neutrons	2020
Lorenzo Marchi, Dr.	IRPI, Padova, Italy	Debris flow	2020
Jan Hensen, prof.	Eindhoven University of Technology, Netherlands	Building Performance Simulation Challenges and Opportunities	2022
John Schwartz, prof.	University of Tennessee in Knoxville, USA	Stream restoration in USA	2021
Peter Fiener, prof.	University Augsburg, Germany	Microplastics in soils	2019

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the research project/programme call	Name of the contracting authority/guarantor of the project/programme call	Year

Milena Pavlíková, prof. Ing., Ph.D. Tomáš Vogel, prof. Ing., CSc. Michal Dohnal, doc. Ing., Ph.D. Milan Jirásek, prof. Ing., DrSc. Jaroslav Kruis, prof. Ing., Ph.D. Jan Vorel, doc. Ing., Ph.D. Pešková, Zuzana, prof. Ing. arch., Ph.D., prof. Ing. Ph.D.	Evaluation panel members (P104, P105)	Czech Science Foundation (GAČR)	2019-2023
František WALD, prof., Ing., CSc. Pavel Ryjáček, prof. Ing. Ph.D. Michal Jandera, prof. Ing. Ph.D. David Stránský, doc. Ing. Ph.D.	VEGA Commission for Civil Engineering	VEGA, Slovakia	2021, 2023
František WALD, prof., Ing., CSc.	RFCS Steel v6, v9	EU/RFCS	19-24
František WALD, prof., Ing., CSc.	GRF / ECS	Research Grants Council (RGC), Hong Kong	20,22,24
Michal Jandera, prof. Ing. Ph.D.	Marie Skłodowska-Curie Postdoctoral Fellowships (MSCA-PF)	European Commission	2023-4
Václav Matoušek, prof. Dr. Ing.	Vici	Dutch Research Council (Netherlands)	2021
Petr Kabele, prof. Ing. Ph.D.	ERC-2019-STG	European Commission	2019
Karel Kabele, prof. Ing., CSc., FEng.	BUS-GoCircular	EU H2020-LC-SC3-2018-2019- 2020 / H2020-LC-SC3- EE-2020-2	2021-2023
Jaroslav Kruis, prof. Ing. Ph.D. Jan Zeman, prof. Ing., Ph.D.	National evaluation of research organizations according to Methodology 17+	Ministry of Education, Youth and Sports	2020-2023
Petr Bílý, doc. Ing., Ph.D.	Théta, Sigma, OPSEC, Delta, Prostředí pro život, TREND, Doprava 2020+	Technology Agency of the Czech Republic	2022- 2023

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the period of 2019–2023²³. This should be done from the full list in annex tables (Table 3.3.1-3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

EU H2020 project **Geo-harmonizer**: The EU-wide automated mapping system for the harmonization of Open Data based on FOSS4G and Machine Learning, aimed to reduce problems with national geographic data by using seamless, comprehensive datasets covering the entire EU and harmonizing them using open source software with machine and

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

deep learning methods. The project was funded by the European Commission under the CEF Telecom programme. FCE coordinated the project, working with other European partners (OpenGeoHub (NL), Mundialis (DE), MultiOne (CRO), Terrasigna (RO)). The main objective was to create a fully automated system for importing and harmonizing geodata, especially in the areas of environmental data, land use and climate change. The project solution involved close collaboration with national authorities and NGOs, including existing EU-funded systems such as Copernicus. New datasets covering the territory of EU Member States, such as land use change between 2000 and 2019, temporally aggregated LUCAS (the Land Use / Cover Area frame Survey) data, climate change indicators, environmental quality maps, or predictions of potential natural vegetation, were created and made available within the project. The created datasets are available as open data. In addition, a geoportal (<https://ecodatacube.eu/>) has been created to allow easy access to the data through an interactive web mapping application. Another output of the project is the ST_LUCAS system, enabling automated import of LUCAS data, harmonization and spatiotemporal aggregation. The project contributed to the mission of the evaluated unit, especially in the area of open science and support for geodata interoperability. The interdisciplinary aspects of the project included a combination of geoinformatics, remote sensing and environmental sciences. As a result, Geo-harmonizer presented the potential for widespread use of harmonized open geodata in public administration, academia and the private sector, contributing to the further development of open geospatial infrastructure in Europe, 2019-2022, total budget 376k EUR.

The European H2020 project **Achieving Wider Uptake of Water-Smart Solutions (WIDER UPTAKE)**, coordinated by SINTEF (Norway), with participants including NTNU (Norway), HIAS IKS, HIAS HOW2O AS, STORM AQUA AS, IVAR IKS, GRONN VEKST AS, SIRKULA IKS, TERRAMARINE AS (Netherlands), TU Delft, STICHTING WATERNET, NPSP BV (Netherlands), FCE CTU, VŠCHT, Prazska vodohospodarska společnost (CZ), AS; Università Degli Studi Di Palermo, AMAP SPA (Italy); Council for Scientific and Industrial Research, Sewerage Systems Ghana (Ghana). CTU focused mainly on testing treated wastewater for irrigation of public greenery through pilot units installed at the central wastewater treatment plant. The results of the project fulfill CTU's mission of environmentally sustainable solutions in water management in urbanized areas. The project addressed water reuse across the sectors of civil engineering (new materials), agriculture (irrigation, nutrient recycling), energy (biochar energy recovery) and environment (closing water and substance cycles), 2020-2024, FCE total budget 624k EUR.

Czech Science Foundation project **Non-periodic pattern-forming metamaterials: Modular design and fabrication**. The project aimed to create an integrated framework for computational simulation, optimal design, robot-assisted fabrication, and centimeter-scale self-assembly of modular mechanical metamaterials. These non-periodic architected materials can be assembled from a limited number of repeating blocks (modules), similar to a jigsaw puzzle, to achieve a desired response. This proposal received funding from the Czech Science Foundation (CSF)'s first EXPRO call, launched by CSF in 2018 to support high-risk, high-gain research ideas in the spirit of European Research Council (ERC) grants. The PERFORM team tackled these challenges by developing efficient computational schemes, modular topology optimization for simultaneous module and assembly design, passive centimeter-scale self-assembly via magneto-mechanical principles, and robotic fabrication pipeline validated on optimized samples. The project also pioneered polynomial optimization techniques in structural design and variational methods. The results appeared in 31 leading peer-reviewed journals. Two Ph.D. theses earned international prizes, the first from FCE, and one thesis was co-supervised with TU/e. Post-project funding includes an ERC.cz grant, two CSF projects, and the five-year [ROBOPROX](#) project, integrating top Czech researchers in robotics, informatics, optimization, and materials science. Aligned with FCE's scientific mission in integrating simulation and optimization of materials and structures, modeling of multi-physics processes and robotics and automation, PERFORM led to the creation of the Open Mechanics Group (<https://openmechanics.fsv.cvut.cz>), as a joint effort between the Department of Mechanics and the Experimental Center, and the lab space located at the Czech Institute of Robotics and Cybernetics (CIIRC). This environment proved particularly beneficial to junior team members, from whom four became Assistant Professors at FCE, one at TU/e, and one at the University of Palermo, 2019-2023, FCE total budget 1,354k EUR.

EU H2020 project **Automated Solutions for Sustainable and Circular Construction and Demolition Waste Management (RECONMATIC)**. The transition towards a zero-waste construction industry in Europe implies the entire life-cycle of construction and demolition waste (CDW) management. The project aims to design innovative tools, solutions, and techniques to connect CDW prevention and management with the European waste reduction goals. The project is working on an integrated decision-making approach – one that considers all aspects of CDW generation. As such, it develops, tests and demonstrates automated, digital and robotic solutions for construction industry stakeholders' collaboration and waste traceability. RECONMATIC in the first two years assessed existing practices in CDW management, from the prevention and minimization of waste to its effective reuse throughout the life-cycle and identify markets to support supply chains and circular economies. To allow more efficient and automated sorting of mineral waste, an AI-based CDW classification software utilizing low-cost sensors' inputs was prepared. In this project task the aim is to use appropriate ML models in combination with variant sensor types to identify solutions to achieve the best possible sorting

of the individual material components, which will allow better use of higher value-added recycling solutions, contributing to the mission of FCE in sustainable life-cycle management. At the same time, attributes that describe the waste and recycling-related aspects of materials, components and other 3D geometry captured within digital models (WASTEie) have been developed to enhance the non-graphical information in BIM models. Coordinated by CTU, bringing together 23 partners from 7 countries (5 EU+UK+China, total budget 6,091k EUR, 2022-2026, <https://www.reconmatic.eu/about>).

EU H2020 project **Engineering barrier 200C**: The aim of the project is to critically evaluate the durability of the bentonite barrier of a nuclear waste repository at higher temperatures through a long-term in-situ experiment and accompanying research. So far, the only safe and technically feasible way is to build a deep repository that will safely separate high-level waste and spent nuclear fuel from the environment for hundreds of thousands of years. The repository system is based on a multi-barrier principle, where the inhibited waste is progressively surrounded by a series of repository casings and a bentonite sealant layer - the so-called engineered barrier. The final barrier is the host environment itself. Safety will be improved through better input to the safety analysis-important insights will be gained into the behavior of both the system and the engineered barrier materials. These insights will be relevant to both current and high-temperature designs. The principal investigator is CTU (FCE) in cooperation with Charles University, Czech Geological Survey and Teramed. The application guarantor of the project is SÚRAO. The project is multidisciplinary and has seven planned deliverables, including Physical High Temperature Storage Site Model, Operation of an advanced high temperature barrier, Expert study on the mineralogical composition of the bentonite used and its changes during the experiment, Geomicrobiological study of the behaviour of microbial colonisation at high temperatures in a rock environment, Numerical model of the THM behaviour of bentonite, Expert study on the hydro-mechanical properties of used bentonite when exposed to temperatures above 150 °C, Database of material characteristics of bentonite reflecting changes when exposed to temperatures above 150 °C. The project started in 2018 and the in-situ experiment was installed and started in the Josef underground laboratory in autumn 2019 and operated until mid-2024, when it was dismantled, 2018-2025, total budget 945k EUR.

Ministry of Culture project Vltava River - changes in the historical landscape due to floods, dam construction and changes in land use with links to cultural and social activities in the vicinity of the river. The project dealt with changes in the historical landscape around the Vltava River in connection with the construction of the cascade of dams. This topic required the elaboration of thousands of old maps, plans, historical photographs and other archival materials and the creation of a comprehensive information system about the old Vltava River. A 3D digital model of the flooded valley was created along the entire length of the river, including models of important buildings around the river. The results were visualized in the form of a 2D and 3D web mapping application. The project also resulted in a highly appreciated book publication (e.g., CTU Rector's Award). At the end of the project, the results were presented in the form of an exhibition, which allowed to visualize the historical Vltava valley in the areas of the Lipno, Orlik and Slapy dams in the form of large-format physical models (4 by 1 metre), large-format floor prints of the entire historical river course and more than 50 exhibition panels. The application potential of the project lies primarily in the huge amount of processed archival material that can be used by other researchers. In addition to the principal investigator (FCE), the Faculty of Science of Charles University also participated in the project. The resulting informative map portal was awarded the Map of the Year Award of the Czech Cartographic Society in the category of Digital Cartographic Products and Internet Applications. This result is aligned with FCE mission in Geoinformation technologies. CTU's share in the project was approximately 75%, 2018-2022, total budget 704k EUR.

TAČR Epsilon project TH04010329 Autonomous Robotic Construction System. Project coordinated by industrial partner (DEK a.s.) with FCE as a sole partner. The project has developed a working prototype of an autonomous robotic construction system that enables precise and fast construction production with reduced number of construction workers. The solution has been focused on additive manufacturing (load-bearing and non-load-bearing walls), precision mortar masonry (foundations, load-bearing walls and partitions), insulation and surface painting. The autonomous system provides export of the digital building model to the control interface of industrial robots, essentially enabling automated robot planning and production, demonstrating FCE's competence of in digitalization and robotics. The results have been demonstrated on sample objects at realistic 1:1 scale. The winning project of the 2023 TAČR Awards in the Business category, (<https://www.youtube.com/watch?v=4XmYAPAaf2M>), 2019-2021, FCE total budget 207k EUR.

FCE collaboration with Radioactive Waste Repository Authority (SÚRAO) in the frame of contracted research focused on issues related to the end of the fuel cycle of nuclear fuel and its disposal in a deep repository for radioactive waste. The unique faculty underground workplace, the Josef Underground Laboratory, is used to demonstrate and validate project solutions. These complex tasks are solved in multidisciplinary team, including partners from Faculty of Nuclear Sciences (FJFI), Technical University Liberec (TUL) and commercial subjects. In this activity, basic research questions are addressed, in-situ experimental activities are carried out to support safety verification and support mathematical modelling, but also design activities are carried out. This multidisciplinary work contributes to a construction of a safe and sustainable deep

repository in the Czech Republic and the disposal of the first radionuclides in a deep repository in 2050, aligned with FCE long-term research directions in advanced modeling and life-cycle and environmental management. The total amount of FCE contracted work in period 2019-2023 with SURAO is 1,460k EUR.

FCE contracted research with Road and Motorway Directorate (ŘSD) included Elaboration of Technical Conditions for Pavement design for roads, Design of maintenance and repairs of non-rigid pavements, Paving for road structures and Technical quality conditions for Compacted asphalt layers, Evaluation of immovable property of the Road and Motorway Directorate of the Czech Republic on the basis of price indicators, assessment of the technical solution of cost-important bridge structures in terms of investment intensity and expected operating costs, consultancy services related to use of modified asphalt binders (PMB, CRMB) and recycling of existing ones containing carcinogenic polycyclic aromatic hydrocarbons (PAUs). The total amount of FCE contracted work in period 2019-2023 with ŘSD is 450k EUR.

The FCE maintains a long-established and close collaboration with the Railway Administration of the Czech Republic. Their joint efforts are centered around evaluating existing structures and bridges, relevant regulations, and internal processes, alongside consultation and methodological activities. FCE provides expert services in areas such as new project preparations, the development of expert opinions, and assessments, including identifying the initiation and propagation of structural defects, determining their causes, and offering recommendations for their mitigation. Another significant area is the long-term monitoring of bridges, encompassing both safety monitoring and the evaluation of the interaction between bridges and contactless tracks. The insights gathered from this monitoring are then used to systematically prepare requirements for future high-speed railways in the country. The total amount of FCE contracted work in period 2019-2023 with Railway Administration was 450k EUR.

In Table 3.3.1 we use following shortcuts to indicate provider: Ministry of Education, Youth and Sports (MSM), Ministry of the Interior (MVO), Ministry of Foreign Affairs (MZO), Ministry of Culture (MKO), Czech Science Foundation (GAO), Technology Agency of the Czech Republic (TAO), European Union (EC), European Space Agency (ESA).

Table 3.3.1 Projects supported by public funds

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
MSM	The effect of input data quality and computation method on soil loss determination in rural landscape	96/3787				
MSM	Application of municipal sewage sludge ash in production of eco-efficient construction materials	96/3787	96/3787	96/3787		
MSM	Compound rejuvenating effects on aged bitumen from reclaimed asphalt material by bio-waste additives	179/7041	5/178	5/178		
MSM	Using UAVs to assess surface runoff and soil erosion		82/3235	82/3235		
MSM	Salt transport, storage and crystallization in renovation plasters – combined computational and experimental study		60/2367	60/2367	60/2367	
MSM	UHPRFC for application for severe conditions		80/3156	56/2209	80/3156	
MSM	Acceleration of soil erosion from arable land following climate and land management change		84/3314	82/3235		
MSM	The effect of landscape structure and patchiness on soil erosion, sediment transport and retention capacity				74/2903	74/2903

²⁵ If the provider is from abroad, please indicate the provider's country of origin in brackets. For the determination of the country of origin of the provider, the place of residence of the provider is decisive.

²⁶ Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

MSM	Progressing understanding of landscape hydrology by ecohydrological modeling in Czech and Austrian watercourse catchments					80/3156
MSM	Advancement and standardization of European rain simulation facilities					106/4181
MSM	Synergy of multiscale Modelling and machine Learning: Strategy for biomedical sciences and battle against cancer					63/2465
MSM	Membership of Czech representative in IWA/IAHR Joint Committee on Urban Drainage	95/3762				
MSM	Ecosystem services of mountain forests in catchments of drinking water reservoirs affected by the acid atmospheric deposition and climate change.	383/15089	316/12475			
MSM	The effects of land use changes on soil erosion, sediment transport, water quality and runoff conditions	845/33333	653/25759			
MSM	Connectivity of sediment transport within intensively-used rural catchments		690/27219	840/33136	1780/70217	1736/68481
MSM	Development of a special cementitious composite suitable for 3D robotic processing		423/16682	713/28126	770/30375	
MSM	The stain limit for advanced modelling of steel structures – deterministic and probabilistic approach					703/27747
MSM	The Effect of Chemical Composition of Concrete on Its Long-term Performance in Extreme Environment	1220/48126	944/37239			
MSM	Splash erosion - the initial stage of erosion processes		158/6233			
MSM	Splash erosion - the initial stage of erosion processes			158/6233		
MSM	Land degradation through soil erosion - from mean to extreme				171/6726	
MSM	Soil erosion - threat for our future					238/9369
MVO	Development and research of validated fire and occupant evacuation models and their practical application in building fire safety assessment	3870/152663				
MVO	Research, development, testing and performance assessment of critical infrastructure parts	550/21696	550/21696			
MVO	Resistance Improvement of Dams and Reservoirs as Key Elements of Water Infrastructure	939/37041	1643/64813	1499/59132	387/15266	
MZO	Antecedent saturation and design rainfalls as factors of hydrological response in small catchments	3210/126627	3520/138856	3516/138698	3370/132939	
MKO	Interior thermal insulation systems for the architectural-heritage domain	3870/152663	2610/102959			
MKO	Conservation, reparations and monitoring of historical pond dams as our cultural heritage	2608/102880	2535/100000			
MKO	Evaluation of stability and technical conditions of the Broumov group of churches and proposal of remediation of this unique Europe culture heritage	1567/61815	1630/64300			
MKO	Documentation, registration, presentation and proposals of smokestacks conversions as an endangered group of heritage of industrial monuments in the Czech Republic	2140/84418	1713/67574			
MKO	Research and development of materials, processes and techniques for restoration, preservation and strengthening of historic masonry structures, surfaces and systems for preventive care of heritage buildings exposed to anthropogenic and natural risks	4928/194406	4595/181270			
MKO	Analysis and presentation of the values of modern architecture of the 1960s and 1970s as part of the national and cultural identity of the Czech Republic.	963/37988	973/38383			
MKO	Czech Historical Atlas	1848/72899	1848/72899			
MKO	Methods for ensuring the sustainability of steel bridge structures of industrial cultural heritage	2454/96821	2114/83402	2057/81152	3596/141854	
MKO	Documentation and presentation of technical cultural heritage on the Elbe-Vltava Waterway	2533/99921	2212/87258	2283/90059	2313/91243	
MKO	Sustainable management of cultural heritage buildings	2639/104103	2649/104497	2639/104103	4852/191400	
MKO	Traditional urban construction and building crafts at the turn of the 19th and 20th centuries	3104/122446	3351/132189	3635/143393	4128/162840	
MKO	Development of a progressive rehabilitation procedure for the restoration and conservation of military fortress buildings from the 1930s.	2739/108047	2768/109191	2686/105957	2720/107298	
MKO	Vltava River - changes in the historical landscape due to floods, dam construction and changes in land use with links to cultural and social activities in the vicinity of the river	3585/141420	4239/167219	3255/128402	3562/140513	

MKO	Tools for the preservation of historical values and functions of arch and vaulted bridges		2883/ 113728	3402/ 134201	3126/ 123314	
MKO	Building stone surface topography and its application in the field of stone features restoration		1492/ 58856	1909/ 75306	1779/ 70178	
MKO	Historical cultural landscape in danger and vision of its development in the context of current landscape changes					1634/ 64458
MKO	Restoration of hard-plaster facades from the first half of 20th century					4177/ 164773
MKO	Two centuries of railways in the Czech lands. Cultural, socio-economic and transport technical aspects of the development of Czech (Czechoslovak) railways					1272/ 50178
MKO	Vltava II – transformations of historical landscape, the river as a connection and a barrier					1079/ 42564
MKO	Active preservation of the immovable industrial heritage by new reuse					2959/ 116726
MKO	Architectural and festive lighting in the context of historic buildings and spaces					2323/ 91637
MKO	Boundaries as a cultural-historical phenomenon. Analysis, specification, comparison and interpretation					2361/ 93136
MKO	Historical Architectural Member Design and Proportioning Procedures – reconstruction and application					622/24536
OTH	MOVDP - Determination of technology and methodology for rapid runway/RWY repairs after attack by anti-surface conventional tactical munitions, including assessment of available assets and materials					3314/ 130730
GAO	Modelling and experimental verification of the effect of freeze-thaw cycles on the degradation of porous building materials	1418/ 55937				
GAO	Thermal insulation composites containing waste plastic fillers	1080/ 42604				
GAO	Cement composite for radionuclide encasement	2224/ 87732				
GAO	Performance of concrete subjected to blast and subsequent fire loading	1283/ 50611				
GAO	Kinetic energy of rainfall as driving force of soil detachment and transport	2121/ 83669				
GAO	Research into possibilities of utilizing micronized recycled concrete to be used as filler with binding capacity	1118/ 44103				
GAO	Analysis of the relations between the microstructure and macroscopic properties of ultra-high performance concretes	1408/ 55542				
GAO	Nonlinear stability and strength of slender structures with nonlinear properties.	928/36607				
GAO	Quantification of hydrological variables from microwave propagation in cellular networks in atmospheric boundary layer	2154/ 84970				
GAO	Analysis of the impact of explosions in enclosed and semi-enclosed spaces	991/39093				
GAO	Reliable two-scale Fourier/finite element-based simulations: Error-control, model reduction, and stochastics	2408/ 94990				
GAO	Small-scale fracturing of amorphous and crystalline materials assessed with nanoindentation and FIB	2427/ 95740				
GAO	Water flow and solute transport in structured soils	1598/ 63037				
GAO	Interior plasters with enhanced moisture accumulation capability	1227/ 48402	1275/ 50296			
GAO	Properties, durability and performance of lightweight mortars with mineral admixtures	2086/ 82288	2086/ 82288			
GAO	Comprehensive study on physicochemical interaction and related phenomena between bitumen and mineral aggregate by advanced experimental methods	1621/ 63945	1544/ 60907			
GAO	Probabilistic material identification of transport parameters based on non-invasive experimental measurements	1920/ 75740	1920/ 75740			
GAO	Fire resistance of glued laminated timber beams including uncertainties	1471/ 58028	1471/ 58028			
GAO	Mechanical characteristics of polymer adhesive joints in civil engineering applications	823/32465	764/30118			
GAO	Multilevel modelling of mechanical properties of heterogeneous materials and structures on PC clusters	795/31361	795/31361			
GAO	Unfired and rammed clay for construction	1061/ 41854	1051/ 41460			

GAO	Bacterial induced calcification for self-healing of cementitious composites	1586/ 62564	1548/ 61065			
GAO	The effects of methylxanthine-based biocides on the properties of constructional timber	1351/ 53294	1391/ 54872	1486/ 58619		
GAO	Effect of Biofilms on Hygrothermal Performance of Building Facades Materials	1020/ 40237	995/39250	1011/ 39882		
GAO	Influence of fillers on the structure and properties of calcium sulphate composites	975/38462	987/38935	1000/ 39448		
GAO	High performance concrete with enhanced self-healing capability	1032/ 40710	1013/ 39961	988/38974		
GAO	Non-periodic pattern-forming metamaterials: Modular design and fabrication	6505/ 256607	7405/ 292110	7765/ 306312	10989/ 433491	7860/ 310059
GAO	Concrete slurry - hazardous waste or secondary raw material?	1598/ 63037	1623/ 64024	1635/ 64497		
GAO	Design and advanced modelling of forced-entry and bullet resistant glass structures	1938/ 76450	1880/ 74162	1824/ 71953		
GAO	Compression tests with confinement for analysis of concrete columns	1385/ 54635	1310/ 51677	1297/ 51164		
GAO	Time dependent behavior of thermoset polymers with application to anchor	1681/ 66312	1679/ 66233	1677/ 66154		
GAO	Shrinkage-induced deformations and microcracking in structural concrete - monitoring, modeling and identification	1362/ 53728	1302/ 51361	1290/ 50888		
GAO	Modelling of intense collisional sediment transport with turbulent suspension	2125/ 83826	2100/ 82840	2075/ 81854		
GAO	Performance of structures with timber fire protection – multi-physics modelling	1536/ 60592	1794/ 70769	1783/ 70335		
GAO	Characterization of composite materials based on surface-modified rapeseed straw and environmentally-friendly adhesives		1347/ 53136	1415/ 55819	1377/ 54320	
GAO	Application of fuzzy control theory in thermal design of residential buildings		1278/ 50414	1233/ 48639	1158/ 45680	
GAO	Hydration stoppage techniques for cement, lime and gypsum		1130/ 44576	1117/ 44063	1123/ 44300	
GAO	Controlled modification of mineralogical composition of ceramic body for improvement of its utility properties		1323/ 52189	1371/ 54083	2788/ 109980	
GAO	Analysis of influence of electromagnetic field on behaviour of fibre reinforcement in cementitious composite		832/32821	928/36607	1364/ 53807	
GAO	Underrepresented processes affecting the water balance of forest catchments in headwater areas of temperate zone		1236/ 48757	1260/ 49704	2468/ 97357	
GAO	Physical and chemical processes in low-cement heat-resistant		1986/ 78343	1911/ 75385	1886/ 74398	
GAO	Fungal growth on the surface layer of wood-based materials under dynamic boundary conditions		1021/ 40284	1034/ 40789	2647/ 104418	
GAO	Spatial rainfall estimates using improved observations from commercial microwave links and statistical data fusion		1606/ 63361	1699/ 67030	1920/ 75740	
GAO	Process modeling for 3D printing and other additive technologies		1544/ 60907	1656/ 65325	1292/ 50966	
GAO	Upgrade in Design of Energy Dissipators for Spillways		945/37278	945/37278	945/37278	
GAO	Hysteresis modeling in mathematical engineering		1483/ 58501	1471/ 58028	2026/ 79921	
GAO	Global analysis methods for slender structures of stainless steels and other steels with non-linear stress-strain diagram		1264/ 49862	1511/ 59606	862/34004	
GAO	Characterization of modified isocyanate-based adhesives for engineered wood products			945/37278	1963/ 77436	1914/ 75503
GAO	Chemical and physical interactions of basalt-based reinforcement with cementitious matrix			1197/ 47219	1269/ 50059	1215/ 47929
GAO	Experimental and computational analysis of transport, accumulation and crystallization of salts in non-hydrophobic plaster mortars			1206/ 47574	2354/ 92860	2366/ 93333
GAO	Thermo-hygro-mechanical model of concrete pavements			1126/ 44418	1837/ 72465	1795/ 70809
GAO	Lattice discrete particle model for thermoset polymers used in rebar connections and heavy-duty anchoring			1930/ 76134	1930/ 76134	1930/ 76134
GAO	Charring of timber under fully developed natural fire – stochastic modeling			1067/ 42091	1408/ 55542	1231/ 48560
GAO	Microstructural investigation and simulation of coupled physical fields in concrete due to electromigration treatments			1358/ 53570	3252/ 128284	3242/ 127890
GAO	Polynomial optimization in the design of globally optimal frame structures under dynamic loads				2936/ 115819	4221/ 166509

GAO	Utilization of water sediments for building materials design				2000/ 78895	2108/ 83156
GAO	Mass transfer in porous construction materials suitable for application in nuclear waste repositories				1418/ 55937	1454/ 57357
GAO	Functional characteristics and environmental impact of lime plasters with natural additives for historical building renovation				1444/ 56963	1462/ 57673
GAO	Microbiologically induced calcite precipitation for production of carbon-negative building materials from recycled concrete				2362/ 93176	2627/ 103629
GAO	Performance of steel-concrete composite structures subjected to blast loading				1837/ 72465	1933/ 76252
GAO	SUMO: Sustainable design empowered by materials modelling, semantic interoperability and multi-criteria optimization.				2497/ 98501	2556/ 100828
GAO	Advanced approaches for determination and understanding of asphalt mix fatigue behavior				1717/ 67732	1742/ 68718
GAO	Data-driven calibration and validation of critical state constitutive models for soils and associated uncertainties				2590/ 102170	2590/ 102170
GAO	Multifunctional cementless composites with low environmental impact for special construction applications				1014/ 40000	894/35266
GAO	Experimental study and advanced modelling of multilayer glass panels exposed to explosive blasts and ballistic impact				2040/ 80473	2290/ 90335
GAO	Possibilities of using natural fibers for the production of hybrid textile reinforcement in concrete				2360/ 93097	3042/ 120000
GAO	Alternatives of thermally activated lower grade clays as a partial cement replacement				661/26075	882/34793
GAO	Hydrological performance of multi-layered constructed soils				2344/ 92465	2403/ 94793
GAO	Nanomechanical performance of cementitious composites under radiation impact and variable environmental actions					2870/ 113215
GAO	Structure and dynamics of multi-species bed load transport above erodible plane bed in open channel					1708/ 67377
GAO	Physical and chemical processes in alkali activated ceramics exposed to high temperatures					1440/ 56805
GAO	Smart and programmable housing and living – energy storage systems are hidden everywhere in our buildings within basic construction components					2755/ 108679
GAO	Research of heavy metals immobilization in alternative low-carbon composites					2558/ 100907
GAO	Impact of C3A on the early strength of cement					1246/ 49152
GAO	Prediction of mechanical behaviour of structures 3D printed based on alloy of titanium with betastructure					2950/ 116371
GAO	Directed electromagnetic orientation of dispersed fibre reinforcement for optimal stress resistance in concrete structural members					2013/ 79408
GAO	Surface treatment of glass and its influence on the reliability of adhesive bonding for glass structures at elevated temperatures					2539/ 100158
GAO	Ductility and strength demands for connecting plates and bolts in bearing type connections of normal and high-strength steels					789/31124
TAO	Finishing cycle structures for a multi-purpose demountable precast material- and energy-efficient building system	1770/ 69822	1770/ 69822			
TAO	Subtle Concrete Furniture and Small Structures for the Railways Stations	2630/ 103763				
TAO	Optimization of 3D-printed trabecular structures for use in implant dentistry and their mechanical analyses	1280/ 50493				
TAO	Atlas HYDROLOGY - a modern tool for sediment and runoff calculating and anti-erosion measures dimensioning	1700/ 67061				
TAO	Advanced procedures of steel and composite structure connections design and production	1632/ 64390				
TAO	Advanced design of joints with steel elements in timber structures	1092/ 43093				
TAO	Engineering barrier 200C	7191/ 283657	3432/ 135367	3437/ 135580	3453/ 136219	3518/ 138775
TAO	Progressive design of bridge structures for transport infrastructure with regard to modern construction methods	3684/ 145325	3017/ 119014	2979/ 117515		
TAO	Home Town UNESCO: Material and Immaterial Public Space of Towns of Special Heritage Protection, Pilot Project - Town of Telc	3072/ 121172	2669/ 105273	3001/ 118368		
TAO	Plasterboard with increased resistance to biological degradation	1007/ 39707	1189/ 46922			
TAO	Physical and hydrogeological soil properties of the Czech Republic	1388/ 	2282/ 	1528/ 		

		54753	90004	60276		
TAO	Influence of small water reservoirs on the groundwater level and hydrological balance with emphasis on dry periods	683/26941	2884/ 113769	1948/ 76844	775/30568	538/21224
TAO	Method of determining the value of non-residential buildings in the government sector.		1199/ 47278			
TAO	Use of higher amounts of reclaimed material in asphalt mixtures with PmB bitumen		788/31065	788/31065	2353/ 92824	2447/ 96524
TAO	Land administration in time and space		1388/ 902/35582	3095/ 54753	122091	
TAO	Utility and risk of irrigation over the Czech Republic in changing climate		495/19539	678/26754	2242/ 88427	2574/ 101530
TAO	Using remote sensing to assess negative impacts of rainstorms		469/18510	810/31960	2281/ 89995	2295/ 90514
TAO	Development of chemical admixtures for concrete incorporating energy by-products		1411/ 55641	2194/ 86564	873/34445	
TAO	Development of Coupling Details for Concrete Containers for Radwaste and Spent Fuel and Modeling of Their Long-Term Performance		948/37396	1822/ 71874	1031/ 40688	
TAO	Mobile recycling line for processing construction waste from mineral thermal insulation materials and use of recycled material including possibility of direct application on construction		704/27771	1449/ 57164	2088/ 82359	
TAO	Long-term monitoring of track construction at tram crossings focusing on shallow crossings in order to optimize their maintenance and reduce noise		619/24423	1303/ 51410	999/39413	
TAO	Design of advanced stainless steel structures		766/30229	1105/ 43602	344/13590	
TAO	Shape optimization of the hydraulic structures using parametric models of structures and CFD		495/19518	1189/ 46886	785/30978	
TAO	Advanced methodology for static modelling of scaffolds made of prefabricated components		364/14376	513/20234	245/9655	
TAO	Development of efficient tools to minimize production of construction and demolition waste, its monitoring and reuse			1325/ 52249	4835/ 190720	3633/ 143331
TAO	Partial improvement of navigation conditions on the regulated Elbe between Ústí nad Labem and the state border of the Czech Republic / Germany			1059/ 41760	1065/ 42006	
TAO	Adaptation of the French method of evaluation of track substructure for high-speed lines into the Czech Republic conditions			1600/ 63116	2410/ 95069	2410/ 95069
TAO	Increased reliability and tunnel lining lifetime by using information models and new approaches			1803/ 71116	1883/ 74272	1883/ 74272
TAO	Deep-Learning-Enabled On-Demand Design of Composite Microstructure: Application to Mechanical Metamaterials			1597/ 62983	5223/ 206034	3802/ 149987
TAO	The enhancement of the fatigue strength of the high strength steel welded details for new and temporary bridges and their renovation				2168/ 85523	3400/ 134122
TAO	Materials for circular economy - industrial waste based geopolymers composites with hybrid reinforcement				1759/ 69385	2950/ 116364
TAO	Effective design control of stormwater management systems in urban areas				985/38854	1071/ 42249
TAO	Intelligent acquisition methods and analysis of digital data for bridge inspections				8748/ 345091	
TAO	Substances depleting the ozone layer and fluorinated greenhouse gases in the construction sector of the Czech Republic.					535/21089
TAO	Research and development of innovative methods and materials for fire safety design of tunnel structures					2799/ 110422
TAO	Centre for Effective and Sustainable Transport Infrastructure (CESTI)	19767/ 779775				
EC	Concepts of the Building faculty of CTU for Prague 2017	10593/ 417883	9542/ 376417			
EC	Innovation of the existing doctoral programme in Architecture and Civil Engineering and creation of new architectural programmes	1866/ 73604	982/38737			
EC	Development of a research-oriented study programme in Physical and Materials Engineering	691/27263	164/6486			
EC	Support for the accreditation of the research-oriented study programme Civil Engineering	1385/ 54634	367/14479			
EC	Development of research-oriented study programmes in the field of water and environmental engineering	675/26608	319/12601			
EC	Risk management and safety of complex technological objects	2046/ 80711	1215/ 47939			
EC	Smart equipment for the Postgraduate Student Incubator	1067/ 42103	39039/ 1540004			

EC	Establishment of infrastructure for an innovative doctoral programme in Physical and Materials Engineering	1657/ 65353	179/7058			
EC	Provision of research infrastructure for the needs of the newly accredited modified Geodesy and Cartography programme	3773/ 148829	768/30310			
EC	Provision of research infrastructure for the needs of the newly accredited modified programme Construction and Transportation Engineering	7627/ 300848	873/34432			
EC	Innovated Laboratory and Testing Infrastructure for the Doctoral Programme in Civil Engineering	7324/ 288912	910777/ 35928079	1450/ 57192		
EC	Upgrading and complementing the infrastructures of research-oriented programmes in the field of water management and environmental engineering	13494/ 532324	6394/ 252225	11082/ 437151		
EC	Renovation of the laboratory infrastructure of the CTU Faculty of Civil Engineering	35295/ 1392288	2367/ 93355	1475/ 58185		
EC	Renewal and optimisation of the location of remote sensing infrastructure	1594/ 62865	314/12384	2/91		
EC	Strengthening of existing masonry buildings		2513/ 99132			1202/ 47416
EC	AUTOMATED SOLUTIONS FOR SUSTAINABLE AND CIRCULAR CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT				72801/ 2871834	
EC	Geo-harmonizer: EU-wide automated mapping system for harmonization of Open Data based on FOSS4G and Machine Learning	13223/ 521617		5023/ 198146		16905/ 666864
EC	Advanced structures design - fire safety guideline for V4	336/13254				
EC	Opportunistic Precipitation Sensing Network				2640/ 104142	1811/ 71440
OTH	Cooperating towards Advanced Management Routines for land use impacts on the water regime in the Danube river basin, CAMARO-D	1449/ 57160	1007/ 39724			
OTH	Sasko-Český management povodňových rizik II	720/28402	2334/ 92071			
OTH	Strengthening professional capacities in the field of hydropower 2021			1239/ 48873		
Total		254427/ 10036564	1105401/ 43605553	132969/ 5245338	231927/ 9148979	149137/ 5883124
In the role of another participant						
Provider ²⁷	Project name	Support (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
MSM	Mathematical Frontiers in Large Strain Continuum Mechanics	12/473	12/473	11/450		
MSM	Hysteresis in hypo-plastic models			3/119	95/3747	
MSM	Research Infrastructure for Geothermal Energy	202/7968				
MSM	Fire effects on soils		741/29231	955/37673	923/36410	341/13452
MPO	Application of brick microparticles at the building	1633/ 64418	842/33215			
MPO	Intelligent composite anchor	1120/ 44181				
MPO	Research and development of mobile protective and ballistic barrier made up of composite board and water infill	1066/ 42036				
MPO	Database of Digital Material Microstructures for Additive Manufacturing	1500/ 59172	1140/ 44970			
MPO	Lightweight masonry materials based on micro-milled mineral by-products with controlled utility properties	1090/ 42998				
MPO	Application of high-value cement composites for the reconstruction of concrete buildings	1500/ 59172	750/29586	600/23669		
MPO	Recycled eco-bricks based on mineral materials and admixtures from by-products	1875/ 73964				

²⁷ Ibid.

MPO	Development of a passporting and monitoring system for geotechnical risk management	1775/ 70020	1730/ 68245	1160/ 45759		
MPO	Possibilities of utilization of coal-ash from power stations stored at stock piles	1445/ 57002	1445/ 57002			
MPO	The application of the magnetoelastic method for increasing the reliability and durability of existing and newly built prestressed concrete structures.	554/21854	554/21854			
MPO	Plasterboard recycling towards production of materials with added value	1313/ 51795	862/34021			
MPO	Utilization of recycled tires for the production of acoustic insulating elements	720/28387	1330/ 52481	1320/ 52087	1310/ 51692	
MPO	Innovation of the production technology of lightened brick body for thin-walled brick blocks	817/ 32229	1502/ 59250	1502/ 59250	1482/ 58462	
MPO	Expansion of Management System Product "Intelligent House"	1950/ 76923	2050/ 80868	2020/ 79684	2000/ 78895	
MPO	Control and optimization of selected wastewater treatment units based on inline rheological properties of batch measurement focused on the development of innovated thickening and dewatering equipment	305/12032	610/24063	610/24063	610/24063	
MPO	Knowledge transfer in the field of dental implants	408/16098	1059/ 41793			
MPO	Analysis and optimization of technology for automatic collection of road communication 3D data with extremely high global height accuracy together with securing the strictest security standards for the road transport	645/25425	568/22399			
MVO	The advanced technology of rapid determination of bridges deformation by radar interferometry and its use in diagnostics	505/19908	1020/ 40251	1075/ 42420	1009/ 39786	
MVO	Protection of soft targets in the Czech security environment	228/8995	429/16905	440/17339	401/15820	
MVO	Innovation and development tools in the field of cause of fire investigation		2006/ 79138	2006/ 79138	1874/ 73930	1847/ 72846
MVO	Autonomous vehicle for conducting pyrotechnic exploring in extremely dangerous areas				7142/ 281742	7142/ 281742
MZO	Development of automated tools for optimizing monitoring erosion of agricultural land using remote sensing methods	875/34517				
MZO	Creation of a national database of parameters of the mathematical simulation model Erosion 3D and its standardization for routine use in the Czech Republic	848/33452	848/33452	809/31913		
MZO	Ways of soil erosion protection on the farm level after glyphosate ban	985/38856	1080/ 42604	1083/ 42722		
MZO	Use of new soil protection technologies in agricultural practice				1235/ 48718	1235/ 48718
MZO	Assessment of the share of sediments in the eutrophication of reservoirs and the possibility of corrective measures				995/39250	1005/ 39645
MKO	A Transformation of Rural Architecture with Emphasis on the Development of the 19th and 20th Centuries	734/28955	561/22130			
MKO	Identification and presentation of heritage potential of historic cultural landscapes in the Czech Republic	941/37120	945/37278			
MKO	Water towers - identification, documentation, presentation, new use	1656/ 65325	1861/ 73412	2358/ 93018	1477/ 58264	
MKO	VISKALIA – Virtual open air museum of the vernacular architecture		1064/ 41972	1177/ 46430	1166/ 45996	
MKO	Practical approaches to territorial conservation of historical cultural landscape		1045/ 41223	1222/ 48205	1167/ 46036	
GAO	Research and development of high performance composites containing biomass ash	874/34477				
GAO	Function Spaces and Approximation	461/18185	255/10059			
GAO	Monastic settlement as a socio-economic phenomenon in early Islamic Northern Mesopotamia	563/22209	504/19882			
GAO	Reactive magnesia cements-based composites with selected admixtures and additives	13245/ 522485	1276/ 50335	1276/ 50335		
GAO	Geopolymers for smart applications in civil engineering	1011/ 39882	1036/ 40868	998/39369		
GAO	Alkali activated aluminosilicate composites based on ceramic precursors	1216/ 47968	1216/ 47968	47968		
GAO	Efficient computational methods for limit analysis and plastic collapse in geotechnical applications	494/19487	506/19961	518/20434		

GAO	Experimental and computational analysis of salt transport, accumulation, and crystallization in non-hydrophobized rendering mortars		996/39290	996/39290	996/39290	
GAO	Heat transfer in the surface boundary layers of building envelopes and its effect on the energy performance of buildings				1108/43708	1094/43156
GAO	Inactivation of mould growth on surfaces of building materials using low temperature atmospheric plasma				1218/48047	1290/50888
GAO	Advanced lithium silicate sealers: on the way to sustainable building materials				736/29034	680/26824
GAO	Thermoelectric properties and energy harvesting ability of electrically enhanced alkali-activated aluminosilicates				665/26233	862/34004
GAO	Effect of surface treatments on the performance of silicon-based secondary materials in cementitious composites					1229/48481
TAO	Development and industrial optimisation of manufacturing process of construction materials from coal ash for transport construction	1708/67363				
TAO	Integrated bentonite sealing for prevention of negative effect of hydrogeological wells on underground water	870/34320	346/13649			
TAO	Hierarchical additive fabrication of composite components with functionally oriented filling	1467/57857				
TAO	Design of technical measures for slopes stabilization and soil erosion prevention	1892/74635	1892/74635			
TAO	Advanced design of strengthening of steel structures under loading	1008/39763				
TAO	Modular external fixation apparatus for electronic distraction and continuous biomechanical stimulation accelerating the new bone tissue formation	870/34320	902/35582			
TAO	Response of reinforced and prestressed concrete structures of WWER 1000 units to extreme dynamic actions for selected scenarios of severe accidents	1000/39448				
TAO	Strengthening competitiveness by increasing features of prefabricated components made of Ultra-High Performance Concrete	812/32032				
TAO	Significant economic and material savings in the construction of underground line structures due to incorporating fly ash and secondary waste into the concrete tunnel lining	1176/46391	1116/44024			
TAO	Airfield concrete panel	1616/63748	236/9310			
TAO	Application of image analysis for geotechnical purposes	1468/57898				
TAO	CeSTaR - Computer simulation and experimental validation - complex service for flexible and efficient design of pre-cast concrete columns with innovative multi-spiral reinforcement	1500/59172				
TAO	ConSlag - research and verification of construction applications with increased added value in case of steel slag	526/20753				
TAO	Industrial research facilities for the treatment of Morbus Peyronie	1428/56331	1543/60868	1428/56331		
TAO	Extending service life of concrete road pavements using mineral admixtures and blended cements	1350/53254	1400/55227			
TAO	Research and development of 3D printers for use in construction industry	287/11334	673/26542			
TAO	Hidden Connection of Laminated Glass Panes	295/11645	289/11408			
TAO	Numerical modelling and laboratory characterization of bentonite barrier in nuclear waste repositories in the Czech Republic	895/35318	895/35318	889/35066	392/15465	
TAO	Technology for the permanent disposal of non-solid radioactive waste	980/38650	2939/115950	2939/115950	2939/115950	2939/115950
TAO	Autonomous Robotic Building System	1723/67962	1759/69382	1759/69382		
TAO	Nano insulating materials for automotive, aviation and aeronautics.	960/37870	960/37870	960/37870	960/37870	
TAO	Waste clay composite as a substitute for tamponage mixtures for low-potential heat pumps	883/34832	947/37357	1170/46154	588/23195	
TAO	Research and development of a high-load bearing deformation block and its production process in order to increase the traffic safety	1539/60715	770/30357	1539/60715		
TAO	3D PRINTER FOR BUILDINGS AND PREFABRICATED COMPONENTS FOR CONSTRUCTION 4.0	1131/44615	1065/42012	840/33136		
TAO	Innovative technology for the use of inorganic industrial waste materials or by-products	1020/40237	1020/40237	924/36450	876/34556	
TAO	System for permanent monitoring of material degradation in civil structures	1538/60667	1538/60667	1538/60667		

TAO	Silent tunnels	2028/ 80000	810/31953	513/20237		
TAO	Innovative design of compact Kaplan micro-turbine	475/18737	475/18737	453/17869		
TAO	Recreational purposes of Vltava river cascade and its economical potential under the climate change	357/14070	395/15595	385/15169	346/13644	
TAO	Development of Tools and methods improving Estimation of annual EvaporationN balance	296/11657	512/20197	207/8166		
TAO	Energy Efficiency of Buildings and Housing Affordability Regarding Its Economics and nZEB Implementation	480/18932	720/28391	414/16316	96/3787	
TAO	Advanced and innovative processing technologies for strategic utilization and storing of coal combustion products (CCPs)		3549/ 139995	3549/ 139995	3549/ 139995	3564/ 140594
TAO	Microstructural modifications of self-compacting concrete to reduce formwork pressures		1904/ 75089	1904/ 75089	1904/ 75089	1904/ 75089
TAO	Development of fibre optic measurement instruments for underground constructions and retaining structures		1914/ 75483	2284/ 90079	2351/ 92742	2351/ 92742
TAO	Reducing material demands and enhancing structural capacity of multi-spiral reinforced concrete columns - advanced simulation and experimental validation		2500/ 98619	2500/ 98619	2500/ 98619	
TAO	Advanced design of structural joints/members by machine learning		1845/ 72781	1845/ 72781	1845/ 72781	1845/ 72781
TAO	Floor coverings on geopolymer basis		1007/ 39719	1283/ 50592	1215/ 47929	
TAO	Non-hazardous surfaces originated from recycled rubber granulate		1388/ 54734	1581/ 62377	1581/ 62377	258/10158
TAO	Machine Learning Approach Using Cloud Computing and Water Quality Prediction to Reduce Emmisions to the Water Ecosystems		657/25931	979/38613	958/37804	
TAO	Water research center		518/20414	1408/ 55554	3350/ 132160	2855/ 112633
TAO	Modelling the significance of pollution sources by phosphorus and proposals for effective measures to meet the objectives of the Nutrient Reduction Strategy for the Elbe River Basin			1100/ 43393	1200/ 47337	1200/ 47337
TAO	Criterial method for evaluating the noise emission of expansion joints after installation			1438/ 56706	1463/ 57692	1438/ 56706
TAO	Optimization of bridge construction and durability, using new composite solution for UHPC and conventional concrete, mineralized admixtures and secondary materials			2150/ 84813	2230/ 87968	2230/ 87968
TAO	Recycling and transformation of construction plasterboard waste into new products for construction and value-added applications			1575/ 62130	1721/ 67899	1609/ 63462
TAO	Development and research of advanced materials for the protection and repair of concrete structures			671/26460	676/26682	693/27348
TAO	Measures for reducing microbial contamination of the indoor environments of low-energy and passive residential buildings and extending their durability			821/32396	1266/ 49926	1254/ 49482
TAO	New generation sandwich constructions for increasing the safety of critical infrastructure objects			2697/ 106402	2697/ 106402	2697/ 106402
TAO	Drywalls with high resistance to mechanical damage			1518/ 59893	1613/ 63621	1575/ 62130
TAO	Development of sound-absorbing concrete for interior applications			1425/ 56213	1414/ 55779	1420/ 56016
TAO	Integration of the monitoring system into protective barriers BALBAR and increase of their resistance			1778/ 70118	1727/ 68121	
TAO	KIDDON - A therapeutic combined disability children's wheelchair for 24/7 use in wide spectra of activities			2545/ 100385	2545/ 100385	2545/ 100385
TAO	Diagnostics and quality evaluation of railway substructure with the help of georadar			143/5632	796/31396	650/25636
TAO	Extension of the HiStruct platform by optimisation of global stability and analysis of design combinations				675/26627	675/26627
TAO	Development of pavement construction layers with optimized gradation to replace deficient aggregate fractions				670/26430	670/26430
TAO	Use of mathematical methods for optimization of computational procedures for determining the capacity of spiral roundabouts				322/12702	368/14517
TAO	Analysis of changes in the water regime of land and watercourses in the territory of the Krkonoše National Park caused by the network of land roads				95/3743	258/10183
TAO	Implementation of a new technology of monolithic tunnel lining with TBM in civil engineering				2408/ 94970	2533/ 99901

TAO	Implementation of new methodological procedures in soil protection against erosion				450/17751	450/17751
TAO	Updating concept of the tolerable soil loss from arable land				855/33728	855/33728
TAO	System for defect and collapse state mitigation for line structures based on fiber-optic sensors					2173/ 85729
TAO	Identification and monitoring of progressive corrosion and non-corrosion deterioration of steel bridges using IoT platform					4654/ 183606
TAO	New generation carbon lamellas with enhanced fire resistance to reinforce existing structures					1995/ 78714
TAO	Development of composite dowel bars combining a basalt core and polymer outer layer along with design guidelines of their applications in concrete pavements					2237/ 88228
TAO	Optimization of variable speed PAT					2583/ 101874
TAO	Universal transport packaging with safety structures for the transport of radioactive waste, including non-solid ones					1773/ 69946
TAO	Virtual prototyping for green concrete structural design—new multi-spiral reinforced concrete column and steel beam structures					185/ 7283
TAO	Digital twin of Temelín NPP containment for aging management within LTO					1020/ 40237
TAO	The use of solid alternative fuels to reduce the burden on the environment in the production of heat and electricity in traditional sources					2751/ 108510
TAO	Research and development of a pontoon hydraulic modular system and a universal electric drive system for a pontoon system					960/37862
TAO	Adaptation of urban areas to flash floods and droughts					832/32809
TAO	Residents Owned Heat Cooperatives To Push Urban Decarbonisation					185/7283
TAO	Smart Regions - Buildings and Settlements Information Modelling, Technology and Infrastructure for Sustainable Development	4721/ 186233				
EC	Ultralight load-bearing structure of the wheelchair for severely disabled children	348/13745	485/19129			
EC	New generation vibrating tables	530/20907	161/6366		1156/ 45609	
EC	Research and development of new effective structural systems for ensuring stability of earth bodies		191/7532	582/22970	340/13395	334/13171
EC	Ground Radar Interferometry for ensuring the critical energy infrastructure of the Czech Republic			610/24071	993/39179	1614/ 63683
EC	Composite materials for the production of tempered paving elements with NOx degradation capability				918/36216	543/21408
EC	Development and optimization of a robust navigation system for automated differential road milling using low-cost GNSS equipment				348/13745	762/30040
EC	Research and development of UHPC application for main structural elements of civil engineering structures in traffic				398/15701	5117/ 201851
EC	Development of complete software for design optimization and assessment of roof and ceiling structures.					1237/ 48783
EC	Development and Demonstration of monitoring strategies and technologies for geological disposal		677/26706			
EC	Cement-based materials, properties, evolution, barrier functions	431/17002	2136/ 84260			
EC	Quality management for building performance - improving energy performance by life cycle quality management		143/5641			
EC	Advanced Networking for Nuclear Education and Training and Transfer of Expertise		340/13412	46/1811		
EC	Multi-scale Composite Material Selection Platform with a Seamless Integration of Material Models and Multidisciplinary Design Framework		2060/ 81262	445/17564		
EC	Innovative training schemes for retrofitting to nZEB-levels		169/6667			
EC	Bentonite Mechanical Evolution	1533/ 60473	844/33294		900/35503	
EC	Soil Hydrology research platform underpinning innovation to manage water scarcity in European and Chinese cropping systems		3120/ 123077		918/36213	1740/ 68639
EC	Setting up national qualification and training scheme for craftsmen in the Czech Republic and developing the further offer of training courses in Slovakia, Austria and Bulgaria				260/10256	
EC	European Joint Programme on Radioactive Waste Management		1847/ 72860	1907/ 75236	2596/ 102406	13920/ 549112

EC	ACHIEVING WIDER UPTAKE OF WATER-SMART SOLUTIONS (WIDER UPTAKE)		9386/ 370256		4755/ 187574	1684/ 66430
EC	Towards effective radiation protection based on improved scientific evidence and social considerations - focus on radon and NORM		2008/ 79211		1576/ 62170	
EC	Towards Improved Assessment of Safety Performance for LTO of Nuclear Civil Engineering Structures		3810/ 150296		1839/ 72544	855/33728
EC	Macro and Microplastic in Agricultural Soil Systems			4251/ 167700		
EC	An experimentally-validated multi-scale materials, process and device modeling & design platform enabling non-expert access to open innovation in the organic and large area electronics industry			4508/ 177823		2281/ 89980
EC	Constructionskills project on EE with Circular Construction Skills as a Driver			915/36090		115/4536
EC	Transforming Unsustainable management of soils in key agricultural systems in EU and China. Developing an integrated platform of alternatives to reverse soil degradation			8324/ 328383		4148/ 163629
EC	The Integrator-centric approach for realising innovative energy efficient buildings in				4280/ 168836	
EC	Build up Skills (BUS) initiative in CZ and SK - Rebooting the National qualification platforms and Roadmaps towards implementation of nearly Zero Energy Buildings and support for Renovation Wave				462/18225	772/30454
EC	Valorisation of knowledge for European pre-QUALified steel JOINTS	624/24615		181/7126		
EC	Steel cladding systems for stabilization of steel buildings in fire	1546/ 60986		1001/ 39484		
EC	Valorisation of knowledge for FREE from DAMage steel connections		444/17515	92/3646		451/17791
EC	Mitigation of the risk of progressive collapse in steel and composite building frames under exceptional events		235/9270	5/209	314/12387	
EC	Fire and Seismic performances of Hybrid fire WALLs in case of single-storey industrial and commercial steel buildings			667/26326		451/17791
EC	Accompanying measure for Dissemination, Valorisation and Collaborative Exploitation of circularity of constructional steel products					357/14083
ESA	Support for Galileo/EGNOS Performance Monitoring Activities					218/8600
OTH	EGNOS Service Performance Monitoring Support					299/11795
OTH	Soil erosion in Austria - from mean to extreme					68/2682
OTH	Metrology for multi-scale monitoring of soil moisture					803/31677
Total		87875/ 3434227	98382/ 3880966	98041/ 3867490	99935/ 3942206	3051063/ 120357527

Table 3.3.2 - Contract research activities

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
SÚRAO	Engineering barriers - fillings, plugs - long-term research in deep storage				6885/ 271583	3667/ 144636
SÚRAO	Interactive physical models in-situ in PVP Bukov	1935/ 76331	443/17493	298/11759	2695/ 106327	3395/ 133914
Správa železnic	Diagnostics and static assessment of bridges with prestressed load-bearing structures in the district of Prague Municipal Office		3904/ 154005	3926/ 154870		
SÚRAO	Dismantling in-situ experimentu MOCK-UP-JOSEF				229/9015	5470/ 215793
Správa železnic	Diagnostics and static assessment of bridges with overstressed supporting structures	2607/ 102833	2883/ 113735			
PBS GROUP	Bezděkov Castle near Klatovy	1295/ 51088	3515/ 138652			
Správa železnic	Safety monitoring of the bridge at km 3.706 on the track section Prague Vyšehrad-Vyšehrad		1501/ 59226	822/32421	1348/ 53166	220/8672
AKIT	Development of FFP2 respirators with an emphasis on material properties and ergonomics			3798/ 149840		

²⁸ If the client is from abroad, indicate in brackets the country of origin of the client.

Správa železnic	Diagnostic survey and access to critical points on the bridge - railway bridge at km 3.706 on the Prague Vyšehrad-Vyšehrad railway section					3600/ 142004
BPC Group	Development of composite materials using recycled waste (PET)			3513/ 138580		
Správa železnic	Monitoring, diagnostics and static assessment of the bridge ev. km 35,529 on the line Brno - H.Brod			1151/ 45409	1075/ 42405	1244/ 49069
Hlavní město Praha	Analysis of the Botič area with a significant flood risk within the territorial jurisdiction of Prague			1360/ 53636	2048/ 80794	
SÚRAO	DOPAS - EPSP experiment, extension of operation		1101/ 43432	1287/ 50769	124/4872	507/19984
GEOSAN GROUP	Expert survey		3000/ 118343			
STRABAG RAIL	Modernization of the Veselí n.L. line - Doubí u Tábora, 2nd stage Soběslav - Doubí				2398/ 94614	173/6810
S2O DESIGN AND ENGIN. (USA)	Construction and testing of a physical model to evaluate actual surf wave function			2500/ 98619		
ProSpon	Device for controlled lengthening of long bones			722/28481	900/35512	745/29393
Letiště Václava Havla Praha	Construction technology. assessing the resistance of buildings from the point of view of statics and the dynamic effect of the shock wave	373/14723	46/1825	1688/ 66571		
Tilian	Prague voucher for IP - Comprehensive system of manual purchase and selection of logs			2003/ 78996		
S2O DESIGN AND ENGIN. (USA)	Construction and testing of a physical model to evaluate actual surf wave function		100/3961	1900/ 74935		
Hlavní město Praha	Creation of a document - Standardization of rainwater management in the metropolitan area. of Prague		1320/ 52065	660/26032		
Technická správa komunikací	Material and production analysis of bonded and steel welded and bolted structures on bridge structures according to the contract					1963/ 77420
SÚRAO	MOCK-UP-JOSEF experiment - continuous monitoring and evaluation of in-situ loaded bentonite layer	0/0	1932/ 76194			
Ředitelství vodních cest ČR	Bělov lock - physical hydraulic model research of the lock				256/10085	1653/ 65205
GEOSAN GROUP	Revision assessment of final thesis					1899/ 74911
Správa železnic	Diagnostics and recalculations of strategic bridging in the district of the Ostrava Regional Office - I. stage				410/16179	1430/ 56405
SÚRAO	Design and production of a mixture of bentonite pellets 2	876/34563	924/36443			
Technická správa komunikací	Conducting a diagnostic survey of the Čech bridge			1281/ 50518		
ALIMEX S.R.O.	Centralized integrated automated system of online continuous long-term monitoring of building objects		511/20148	1239/ 48885		
Ředitelství silnic a dálnic	D47(motorway) fault analysis Skrečůň - Bohumín bypass		1633/ 64418			
Velvyslanectví Japonska	Embassy of Japan reconstruction project					1626/ 64149
Technická správa komunikací	Analysis of the condition of steel riveted bridges and structures TSK Praha		631/24898	964/38021		
Ředitelství silnic a dálnic	Development of the methodology for the static design and assessment of the underground work - tunnel section	1563/ 61665				
Technická správa komunikací	Hlavakaš bridge in Prague - assessment of the effect of temperature and recommendations for the reconstruction project		1550/ 61144			
GEOSAN GROUP	Final thesis no. 340-23 - FN Motol, Modrý pavilon - price changes and effects of the event					1499/ 59132
ČEZ	Research on the biodegradation of asphalt concrete in the location of the Dlouhé Stráně power plant		22/859	968/38197	488/19234	
Správa železnic	Amendment of the regulation	1435/ 56599				

S2O DESIGN AND ENGIN. (USA)	Woodfin Whitewater Wave on the French Broad River				952/37568	474/18684
Exprojekt	Static calculations of railway bridge structures in the area of the Brno Regional Office		5/193	1407/55492		
GEOSAN GROUP	Kladno General Hospital - reconstruction of block C2					1400/55227
Ředitelství silnic a dálnic	Verification of SMA technology for strengthening the bridge - Desná in the village of Petrov nad Desnou	1376/54284				
PROMSTAL ENGINEERING	Advanced solution for steel halls			431/17007	889/35064	
Špráva železnic	Reconstruction of the bridge at km 21,502 of the Rumburk (outside)-Sebnitz (DBAG) line			699/27594	402/15876	124/4891
PONTEX	Carrying out diagnostics of bridges serial no. DO-205..1, DO-205..2, DO-207..1 and DO207..2				156/6164	1055/41600
PONTEX	Řehlovice Bridge		215/8486	991/39108		
Krajská zdravotní	Děčín Hospital - new Emergency pavilion					1190/46943
RČVUT	Research support for deep storage project solution - ZL010	27/1075	1141/44992			
Ředitelství silnic a dálnic	Processing of an expert opinion on the issue of the load capacity of the bridge SO A210 Prackovick flyover on the construction site D8 0805				571/22543	579/22822
Ministerstvo zemědělství	Independent expert opinions on individual investment actions implemented within the NPO				181/7129	922/36390
SAMSON PRAHA	d1(motorway) - detailed diagnostic survey of the bridge item no. D-147(motorway)		1100/43393			
Inženýring dopravních staveb	Expert opinion			1090/43018		
Povodí Ohře	Study of complex water management. balance of heating residual pits after the end of brown coal mining in the Ústí Region	46/1826	986/38884			
SÚRAO	Operation of the MOCK-UP-JOSEF experiment and provision of dismantling cooperation				1015/40039	
Technická správa komunikací	Technical cooperation for the use of UHPC in the reconstruction of the Barrand bridge				680/26821	320/12627
VÚMOP	Preparation of sheets of measure A sites of agricultural pollution	994/39210				
Velvyslanectví Japonska	Feasibility study for the renovation of the embassy building				994/39199	
OHLA ZS	Modernization of the line Sudoměřice - Votice, SO 73-20-10, 13, 14			314/12394	256/10089	423/16685
Špráva železnic	Contract for work		0/0	990/39045		
SÚRAO	Ensuring the operation of the Experiment for the necessary time and providing the necessary cooperation				985/38844	
Povodí Vltavy	Determining the extent of the Úhlava floodplains	956/37695				
ÚJV Řež	Research support for security evaluation of technical solutions of deep storage				245/9656	688/27140
ADELARDIS	Processing of project documentation at the level of DSP, PDPS for the implementation of the repair of the North-South bridge in the area of PZ Škoda in Pilsen		448/17688	464/18288		
POHL CZ	Opatovice-bridge, Waagner Biro - experimental and expert activity					899/35480
GEOSAN GROUP	Expert evidence			890/35108		
Ředitelství silnic a dálnic	Evaluation of the real estate of the ŘSD CR on the basis of price indicators				882/34793	
Špráva železnic	Long-term monitoring of the track solution of the bridge at km 32.544 on the line Ostrava Kunčice - Ostrava Vítkovice				124/4901	756/29835
Hlavní město Praha	VD Hostivař, capacitation of the safety overflow, physical model	864/34084				

TSK	Expert activity in the framework of the design of the strengthening of the supporting structure of the Bridge in ul. Průmyslové X512.3, no. action 1000107					853/33667
Krajská zdravotní	Děčín Hospital - new Emergency pavilion including operating theatres, sterilization center and ICU					810/31949
TOP CONSERVIS	Reconstruction of the bridge Kaštice - Kadaň			809/31915		
ČEZ energetické produkty	Research on the stability conditions of the slopes of the residual pit and the future lake			263/10357	537/21201	
Sweco	Dam Pařížov, reconstruction of lower dike outlets + MVE reconstruction and modernization		800/31558			
Centrum dopravního výzkumu	Diagnostic survey of the Ostrovské bridge in Karlovy Vary			800/31542		
FIRESTA-Fišer	Static and dynamic load test of the bridge		795/31361			
Správa železnic	Diagnostics and static assessment of bridges at the Ústí nad Labem Municipal Office 2021			0/0	787/31026	
POZEMNÍ KOMUNIKACE BOHEMIA	Research and consulting services in the development and implementation of the production of 3E asphalt mixture	520/20513	250/9862			
ÚJV ŘEŽ	Exp. assessment of gas permeability of deep storage engineering barriers	770/30356				
KNAUF INSULATION	Durability testing of adhesive tapes			758/29909		
Prague CBD	Expert evidence			750/29586		
Sweco	A study of the economic benefits of linking Lake Libouš and the Nechanice reservoir					744/29330
Škoda Auto	Evaluation of microclimatic conditions	735/28974				
Česká asociace pojišťoven	Methodology for calculating the unit price of typified types of buildings and indexation values for selected purpose-built buildings				670/26430	60/2367
Česká geologická služba	Assessment of the crack width of the wall of the cooling tower and the storm water ditch in Bruntálsk		5/209	175/6906	550/21682	
ROECHLING ENGINEERING (DEU)	Shell element for solving plastic containers		714/28172			
SUDOP	Expert activity in the framework of the design of the reconstruction of arched bridges SO 201 and SO 202					702/27707
Statutární město Ostrava	Measurement and analysis of the contribution of vibrations from the tram line at ul.28. October in Ostrava			700/27613		
ČEZ	Hydraulic conditions in the forefield of the inlet to the suction of reversible systems					692/27298
GEOSAN GROUP	expert activity			691/27254		
Správa železnic	Static recalculation and determination of the load capacity of the bridge - line Hanušovice - Staré město			0/0	670/26430	
GEOSAN GROUP	Project Modernization D1(motorway), section 12	650/25641				
STRABAG RAIL	Long-term monitoring SO 91-20-01 Railway bridge over the Elbe				123/4849	516/20357
Povodí Ohře	Water management solutions for the ČSA and Vršany residual pit sites in relation to other residual pits			47/1869	586/23125	
RFB	Impact assessment carried out at VD Ružbašská Milava	625/24641				
Ministerstvo zemědělství	Support for water retention in the landscape - ponds and water reservoirs	5/196	283/11150	329/12959		
Lankhorst Engineered Prod.(NLD)	Experimental tests					609/24013
PROMSTAL ENGINEERING	Research and development of a modular mobile diagnostic station for the installation and testing of aircraft components			88/3459	512/20210	
Sweco	Physical model research of the lock - Kamýk nad Vltavou			600/23669		
STRABAG ČR	Multifunctional football stadium Hradec Králové					600/23665

Povodí Labe	Krounka, Kutřín, polder construction - verification of the basic properties of concrete	599/23625				
ADELARDIS	Diagnostic survey - North-South bridge in the area of PZ Škoda in Pilsen	592/23353				
Správa železnic	Installation of measuring profiles in the Mezno and Zvěrotický tunnels, long-term monitoring and data evaluation			531/20951	39/1558	
ČEZ	Assessment of navigation conditions by mathematical modeling after the implementation of the plan "Modernization of EOR TG1-TG4"				557/21964	
Povodí Moravy	Multicriteria analysis of VD Skalička variant evaluation	5/180	54/2127	497/19587		
Inženýring dopravních staveb	expert evidence		550/21696			
TESIA speciální tech.práce	Static recalculation of railway bridges 2021			550/21696		
Správa železnic	Carrying out a diagnostic survey - a bridge in Jindřichov Hradec		549/21637			
Výzk.ústav vodohospodářský	Pilot study and establishment of erosion monitoring of target locations	27/1056	60/2361	453/17885		
PKS STAVBY	Expert evidence				180/7097	360/14193
PROSPON	Dental implants		537/21183			
Ing. Václav Jelen	Corrosion survey of elements after exposure on the X Wilsonova bridge, Prague 1			530/20907		
Vodohosp. rozvoj a výstavba	Territorial study of the landscape - Liberec	528/20848				
Město Kutná Hora	Analysis and proposal for a solution to the state of the indoor pool and outdoor swimming pool Kutná Hora Klimeška					512/20206
PROSPON	Dental implants	512/20197				
Povodí Vltavy	Physical model research on fish passage				53/2077	454/17923
TOP CON SERVIS	Reconstruction of the bridge in Loket			504/19880		
DIAMO	expert evidence		500/19724			
Ředitelství silnic a dálnic	Elaboration of design principles				500/19724	
Metrostav Infrastruktury	Diagnostic survey of elements ŽM16 and ŽM60			500/19722		
PKS STAVBY	expert evidence				500/19720	
G4D	Design of measuring equipment for efficient and optimized data collection					499/19684
GEOSAN GROUP	Construction of a new Psychiatric Clinic pavilion					498/19645
GEODROM	Combining mobile mapping and profilometer to improve the height component of mobile data. mapping			492/19408		
Statutární město Plzeň	expert evidence		490/19329			
Povodí Labe	Study - Adaptation of the dam Rozkoš to climate change			488/19247		
Město Čelákovice	Monitoring in the watershed and sewage network of the city of Čelákovice	486/19172				
Stavby mostů	Reinforcement of SMA - Captain Jaroš's bridge		109/4294	377/14868		
LIKAL	Innovation vouchers, challenge VI. - Experimental testing of new composite sliding dowels, computational analysis of dowels and simulation of their placement in a cement-concrete slab construction				485/19132	
Správa železnic	Amendment of sample sheet Ž1, revision of related standards			485/19132		
TSK	Underpass at the main station - Sokolská, Kolbenova - carrying out a diagnostic survey	483/19053				
TSK	Carrying out a diagnostic survey of the bridge X-514..1,2 (Želivka)		478/18856			

Metrostav Infrastruktur e	Diagnostics and recalculations of strategic bridging in the area of the OŘ Prague - Stage II					476/18770
Metrostav Infrastruktur e	Monitoring WT - highway D2 - repair of Ladrná rest stop - left		136/5356	340/13394		
AirView	Development of an online software application for working with data			475/18745		
ČEZ	Revision of technical calculations, summary reports for EDS locations, ESL methods of flow measurement, consultation				470/18540	
TSK	Conducting major bridge inspections of bridges after repair	469/18501				
TSK	V-028 bridge to Císařská louka, carrying out a diagnostic and corrosion survey		463/18264			
ÚJV Řež	Transport of radionuclides from storage-Transport3	456/17996				
TSK	X540 Wilsonova - assessment of the load capacity and condition of the anchor seats of VO masts		452/17830			
G.L.ARCHITE KTI	Verification of the shape solution of the pools of the Arctic Exposition of the Prague Zoo	450/17751				
Kanska	Multi-generation inactive trackers		448/17683			
TSK	Carrying out extraordinary inspections of bridges according to the contract			444/17507		
WATRAD	Multi-generation inactive trackers	440/17357				
The Steel Constructio n Inst. (GBR)	Structural tests of stainless steel profiles			15/585	424/16738	
AQUATIS	VD Kryry - pre-project preparation				430/16963	
TECHTEST	Footbridge at the Švihov reservoir				20/799	405/15994
Fakulta dopravní ČVUT	Processing of an expert opinion on the FD's expert opinion				422/16663	
Správa železnic	Amendment of TKP SSD Chapter 18 - Concrete bridges and structures		0/0	420/16568		
CHLÁDEK A TINTĚRA	Design work - North-South bridge in the area of PZ ŠKODA in Pilsen			410/16174		
LIKAL	Design and development of quality control of composite mandrels - defectoscopic part of the line verifying the uniformity of the coating on the steel core of the mandrel					409/16115
FUTTEC	Professional consultation - 3D photogrammetric scanning of holes, proposals for structural solutions		405/15975			
ČEZ	Analysis of the Gibson method at the Dlouhé stráně and Slapy power plants			400/15779		
Sweco	Project documentation of the Arctic - polar bears exhibition					400/15779
GEOSAN GROUP	Revision expert examination - time to move the date of handover of the construction Exposition of lions, gibbons and ungulate macaques					399/15740
Hlavní město Praha	expert evidence		398/15700			
Krajská zdravotní	Professional expertise - assessment and answering of the range of questions according to the assignment					398/15700
PONTEX	Surveys - Tram garage Strešovice - ships II, III and IV					396/15611
ROECHLING ENGINEERIN (DEU)	Creation of Work and License Agreement	394/15555				
FIRESTA	Repair of bridge structures on the Brno-Jihlava line, bridge at km 56,462				390/15396	
SÚJB	Evaluation of the effect of a forced ventilation system with an enthalpy heat exchanger on the value of the volume activity of radon in buildings	384/15160				
SÚRAO	Ensuring the operation of the MOCK-UP-JOSEF experiment			382/15058		
1. elektrárensk á	Diagnostic survey of the footbridge at the Pobebrady power plant			280/11062	94/3698	
G4D	Prague voucher for Innovation projects - Creation of 3D virtual models			370/14596		
GISAT	Development of the satellite radar interferometry method for the detection of distributed reflectors from time series of satellite measurements			368/14517		

NEN (NLD)	Development of new Eurocodes "Grant Agreement SA/CEN/GOW/EFTA/515/2017-08"	50/1954	14/556	301/11859		
Skanska	Conducting tests - verification of new cements for CBK concretes				77/3037	287/11307
Považská cementárň	Demonstration of increased fire resistance of H-CEMENT for fire protection	363/14317				
S2O DESIGN AND ENGINEERING (USA)	Construction and testing of a physical model to evaluate actual surf wave function		360/14201			
SUPER-KRETE CZECH	geodetic survey of the bridge and forecourt, DSPS, ML, HMP	28/1085	333/13116			
ÚJV Řež	Research support for safety assessment of deep. storage-Transport 8	350/13795	10/391			
SUDOP PRAHA	Construction engineering survey for recalculation of existing steel bridges			357/14085		
PROSPON	Application - dental	351/13846				
VPÚ DECO PRAHA	Diagnostic survey - I/26 Sulkov	347/13676				
Povodí Ohře	The Dam Křimov - 3rd operational closure SV DN 800 - processing of hydrotechnical calculations - measurement curve of safety overflows and broth function - top-up					344/13570
Statutární město Liberec	Expert opinion on the construction and technological state of the municipal swimming pool in Liberec				338/13318	
Euro GV	Prague voucher for Innovation projects - Measurement in the field, implementation of data into BIM			338/13314		
TSK	Y 509 Bohdalec - carrying out an extraordinary bridge inspection	0/0	337/13294			
Ústav výzkumu glabální změny	Analysis of retention curves of delivered samples for pedological probes from the Želivka basin			333/13138		
Kloknerův ústav	Diagnostic survey of bridges		325/12821			
Krajská správa silnic	Engineering and consulting activities			323/12730		
FIRESTA	Revision expert examination - embankment in Ostrava					320/12623
DIPONT	Reconstruction of the bridge at km 118,121 - Stará Paka - Liberec			1/32	319/12575	
DIAMO	expert evidence		319/12584			
FIRESTA	Exploratory and static works - reconstruction of the bridge in km 21.502 of the Rumburk - Sebnitz line		314/12370			
PONTEX	Diagnostics and recalculations of strategic bridging in the district of OŘ Plzeň - II. phase					310/12224
KERAMOST	Testing the Bentonite product PressBent				304/11992	
Letiště Václava Havla Praha	Geological survey and static assessment of the APC facility, Prague Ruzyně Airport			300/11834		
Správa železnic	Complex search processing				300/11834	
TechSim.Labs	Providing knowledge to support the development of software for monitoring production machines			300/11834		
GEOSAN GROUP	Expert opinion - FN Plzeň project, construction of a new Psychiatric Clinic pavilion				300/11826	
Povodí Vltavy	Processing of maps of hydrotechnical characteristics of Úhlava	299/11795				
Povodí Vltavy	Update of ZU Mladotický stream in km 0.0-12.9	5/205	294/11590			
St.pokladna Centrum sdíl.služeb	expert evidence		299/11787			
Povodí Labe	Děčín-KVD		298/11740			
Východoslov. vodárenská spol.	Elaboration of a study of the use of hydropower potential of waterworks facilities					297/11712
PIPELIFE CZECH	Measurement and evaluation of capillary systems			295/11637		
Statutární město Karlovy Vary	Study of water management measures - Spa forests of Karlovy Vary			31/1219	264/10418	

SUPER-KRETE CZECH	X 661 Vysočanská - Liberecká, processing of RSD project documentation	294/11598				
Povodí Ohře	MVE Terezín - design and solution of MVE in the flap weir profile - feasibility study				292/11519	
Považská cementárň	Demonstration of increased fire resistance of H-CEMENT for fire protection		290/11442			
Stavby mostů	Tensometric measurement of tie rods - road bridge across the Elbe between Valy and Mělice		290/11440			
IDEA STATICA	Probabilistic evaluation of the reliability of selected spruce wood					289/11381
AFRY CZ	Research support - update of findings related to FEPs- DZ02				286/11290	
Pražské služby	Expert analysis of a sorting line for mixed plastics					285/11243
Stavby mostů	Performing a dynamic load test - road bridge across the Elbe between Valy and Mělice		284/11203			
PROJEKT servis	Diagnostic survey - Reconstruction of train station Malá Skála			141/5547	139/5467	
GEOSAN GROUP	expert evidence		279/11006			
Povodí Ohře	Feasibility study of the modernization of MVE Březová				33/1296	242/9552
Vodohosp. rozvoj a výstavba	Vrchlice reservoir basin - water resources					
LUPOFYT	Documentation for issuing a decision on the location of the construction of the Lišany irrigation reservoir	2/77	273/10762			
AGRA RISUTY	Implementation of new and innovative technologies of precision agriculture in cultivation systems		274/10789			
Lankhorst Enineered Prod.(NLD)	Experimental tests	269/10606				
ŘSD	Expert assessment of the RSD technical solution			127/5014	139/5487	
Povodí Ohře	the dam Křimov - 3rd prov. closure SV DN 800 - processing of hydraulic calculations - measurement curve of safe overflows and broth function the dam Křimov				263/10375	
Správa železnic	Performing diagnostics of the dynamic behavior of steel bridge structures at speeds of 160-200 km/h.				263/10375	
Pražská vodohosp.společnost	Assessment of the landfill object with a hydraulic model as part of the PVS event				261/10296	
Letiště Václava Havla Praha	Long-term temperature monitoring in selected airport roadway structures	255/10041				
Povodí Ohře	Comprehensive water management solution of new storage reservoirs in the Rakovnické potok and Blšanka basins		254/10036			
KRKI ONE SE	Development of paper-based materials and inert components			250/9862		
SUDOP EU	Reconstruction of the track in the section Kyjice - Chomutov		250/9862			
GLOBALICA	expert activity				249/9822	
ŘSD	l/38 Jihlava-Stonařov-assessment of bridge variants		249/9822			
KŠ PREFA	Prototype tests of railway sleepers			248/9795		
Regionální muzeum Mělník	Revitalization of the grounds of the former Capuchin monastery - Mělník Regional Museum					248/9794
Správa železnic	Diagnostics of riveted constructions of island platforms ŽST Hradec Králové hl.n.					248/9783
Kovové profily	nnovation voucher	246/9709				
PROSPON	Dental implants - proposed solution of the gyroid structure and its mechanical and micromechanical tests, 3D modeling		246/9704			
Ředitelství silnic a dálnic	Elaboration of the closed drainage/pipeline inspection methodology				244/9632	
G.L.ARCHITE KTl	Mathematical verification of the shape solution of the Arctic Exposition pool - polar bears		243/9586			
SÚJB	Update of the manual Radon - building context		240/9454			
Škoda Auto	BRAND 2022 TH bei optimal.Steuerung				240/9448	
ČPS	Analysis of steel samples from V450 and V052 line masts				239/9424	

Röchling Industrial SE (DEU)	Implementation of the RITA-CHOLMOD interface					238/9389
TSK	Carrying out a diagnostic survey to verify the condition of the concrete of the bridge deck slab - Křížová	238/9389				
Ředitelství silnic a dálnic	D11(motorway) 1108 Jaroměř - Trutnov security audit		235/9282			
Sweco	Assessment of the SVL distribution facility in two configurations - ÚČOV - reconstruction of the existing water line			235/9269		
Ředitelství silnic a dálnic	Technical inspection of roads I/33 and I/37 in connection with the opening of the D11 highway			235/9254		
TENSAR INTERNATIONAL	Measurement of laboratory models of a mechanically stabilized layer with geogrids		233/9191			
Ředitelství silnic a dálnic	D11 (motorway)1109 Trutnov - state border CR/PR security audit		231/9103			
VP Projekt	The dam Křimov - reconstruction and capacity building of the waste trough and Img profile			93/3663	137/5410	
Agentura ochrany přírody a krajiny	Study - method of determining the retention potential of water retention measures in the landscape					230/9073
TENSAR INTERNATIONAL	Measurement of railway construction with multiaxial geogrid			230/9073		
TENSAR INTERNATIONAL	Measurement of Geogrid 190L sample			230/9073		
TENSAR INTERNATIONAL	Measurement of the railway structure without a geogrid under the track bed				230/9073	
TENSAR INTERNATIONAL	Measuring railway structure and NXLA geogrids under the track bed				230/9073	
TENSAR INTERNATIONAL	Measuring railway structure and NXLA geogrids under the track bed				230/9073	
ČEZ	Revamping of the mathematical flow model - Dlouhé stráně power plant			225/8876		
Jan Šinták	MVE Liběchov - measurement of water behavior in the drive with evaluation				225/8876	
Ředitelství silnic a dálnic	Assessment of cost-significant bridge objects of construction D35 Staré město - Mohelnice		224/8840			
Vodohosp. rozvoj a výstavba	Territorial study of the landscape - Pilsen	224/8836				
AFRY CZ	Research support - update of findings related to FEPs- DZ02					224/8830
PONTEX	Measurement of 3D deformations in a trio of rigged wells in the Nebozízek locality		32/1256	64/2513	64/2513	64/2513
Stavby mostů	Expert opinion state.-tech. state of the bridge structure - Prackovice			220/8679		
Ředitelství silnic a dálnic	Consulting and advisory activities in the field of design, implementation and operation of roads				219/8619	
Ředitelství silnic a dálnic	Independent control and supervision I/29 Podolsko, bridge ID no. 29-003	0/0	25/990	89/3516	47/1838	57/2238
Ministerstvo pro místní rozvoj	Processing and evaluation of the physical behavior of the model building					207/8166
TSK	X005 footbridge Královka - carrying out a corrosion survey, recalculation of load capacity		207/8166			

University of Natural Res. (AUT)	Numerical solver for particle models		206/8145			
Ústav informatiky AV ČR	Collection of spatial geodata on energy properties of buildings		206/8121			
GEOSAN GROUP	expert activity, ZP no. 303-19	200/7890				
Ředitelství silnic a dálnic	Reference project of bridge SO 201, I/27 Plasy - bypass					200/7890
Ředitelství silnic a dálnic	D11 (motorway) 1109 Trutnov - st. border of the Czech Republic/PR opposing opinion of the geotechnical monitoring project					200/7890
Rezidenční park Baarova	expert evidence	200/7890				
REMING CONSULT (SVK)	Modernization of the Púchov - Žilina railway line	199/7850				
TENSAR INTERNATIONAL	Static and dynamic board test		199/7850			
P3 LOVOSICE PARK	Inspection and consulting activities - P3 Parks Lovosice		198/7823			
Povodí Vltavy	Sport culverts					197/7787
FIRESTA	Removal of the emergency condition of the bridge at km 142.475 on the Břeclav - Brno line, implementation of SZZ on the arches					197/7773
Plzeňský kraj	Price analysis for the event - Křimická-Karlovarská urban circuit section					197/7771
Škoda Auto	Architectural solution of the ŠKODA AUTO area		197/7771			
Ředitelství silnic a dálnic	D10 (motorway) modernization, exit 0 - exit 46, PK security audit - 1st phase			195/7700		
HV ateliér	Prague voucher for Innovation Projects		195/7692			
Stat. město České Budějovice	Diagnostic survey of the Long Bridge, ID No. CB-002	195/7692				
REALACTIVA	Expert activity in the framework of the design of the construction solution of icebreakers and swimming pool - MOLO Lipno Bazén					195/7683
Vodohosp. rozvoj a výstavba	Analysis of areas with a significant flood risk, PPO proposals	191/7546				
PHOENIX lékárenský velkoobchod	Expert opinion			190/7495		
Centrum dopravního výzkumu	Diagnostic survey - Most ev. no. no. 230-014 near Třebele					186/7349
Povodí Vltavy	Determination of the lower boundary condition for the needs of assessing the safety of VD Štěchovice during the passage of Q10000					186/7337
CENTRAL GROUP	technical study of the feasibility of an underpass under the railway line - ul. Mlýnská, Prague 6				185/7298	
ERGON	technical study of the feasibility of an underpass under the railway line - ul. Mlýnská, Prague 6				185/7298	
MGR. Jindřich Kukačka	technical study of the feasibility of an underpass under the railway line - ul. Mlýnská, Prague 6				185/7298	
SNP šumava	Field measurement and mapping of beaver dams in the Křemelná basin					185/7298
SUDOP EU	Reconstruction of the track in the section Kyjice - Chomutov			182/7179		
SÚJB	Development of the Methodology for the optimization of anti-radar measures			182/7172		

VP PROJEKTING	Hydrotechnical calculations - MVE Ratowice		180/7101			
Cenrum výzkumu Řež	Complementary assessment of the geological and tectonic conditions in the area where the LVR-15 reactor is located					180/7101
Sweco	Areas with significant flood risk - Vltava	178/7010				
TSK	Most, V013, ČECHŮV MOST, Čechův, PRAGUE 1 - processing of a single-stage PD for the replacement of handrail consoles				177/6974	
TOP CONSERVIS	Diagnostic survey - bridge over river Ohře in Cheb	175/6915				
PONTEX	Diagnostics and static assessment of bridges with a prestressed supporting structure		175/6903			
SUDOP PRAHA	Experimental verification of blasting and corrosion removal methods on the bridge under Vyšehrad	172/6793				
TU v Liberci	Assessment of barriers - Research support for the safety assessment of the technical solution of deep storage VVZ 354205				168/6622	4/164
Ústav informatiky AV ČR	Collection of spatial geodata on energy properties of buildings	170/6719				
VINTEGRA	Static and dynamic monitoring of bridge structures-tech. Help	169/6664				
STRABAG RAIL	Static and dynamic load test - railway bridge 003B, analysis of the bridge using an exciter			168/6607		
STRABAG RAIL	Static and dynamic load test - railway bridge 003B, simulation of system operational failures			168/6607		
BM CONSTRUCTION	RDS Čechova mostu - railing			166/6564		
SÚJB	Study of the applicability of anti-radon measures on heritage-protected buildings					165/6520
UK Přírod.fakulta	Isotope analyzes of hydrogen and oxygen in water samples			165/6520		
BORABELA	Bearing capacity of connections of cold-formed steel profiles			165/6515		
VaK Mladá Boleslav	Monitoring rain gauge campaign - Luštěnice, Chotětov			165/6509		
Ústav informatiky AV ČR	Collection of spatial geodata on energy properties of buildings and their surroundings			163/6410		
Povodí Vltavy	A comprehensive water management solution for anti-flood measures in the Klabava basin					162/6396
NKÚ	Evaluation of bids submitted by bidders in the procurement procedure for the selection of the contractor for the construction of the SAO headquarters		160/6292			
VODNI DILATBD	Stability assessment of the ZAHESI concrete gravity dam				159/6273	
Povodí Vltavy	Štvanice waterworks - interactive model		159/6260			
Povodí Vltavy	Water management solution of the multi-purpose reservoir Klabava na Klabava					158/6249
Městská část Praha 6	Use of rainwater in Královka park - study		158/6215			
PREDITEST	Tensometric measurement of the tension forces in the ropes of the flare at the construction of Basrah ? Iraq			155/6121		
Považská cementárna	Tests of cement with a higher content of belite				28/1085	126/4989
GEMA ART International	Expert consulting for the client's monument projects in Iraq, studies, architectural designs	154/6059				
Povodí Ohře	Water management solutions for sites of residual pits after brown coal mining for the expected termination of mining in 2030 and 2038				154/6059	
Ředitelství silnic a dálnic	I/9 - Revision of performed diagnostic surveys	154/6059				
Vinařství LUDWIG	Evaluation of the isotopic hydrological situation of natural waters in the locality of the streams of South Moravia			153/6031		
TOP CONSERVIS	Diagnostic survey - SŽDC Pilsen bridges	153/6025				

Státní fond podpory investic	Determination of limits for determining reasonable operating costs for the purposes of the calculation model for the maximum amount of support in the Rental housing program					152/6015
ADELARDIS	Technical supervision of the investor - the North-South bridge in the area of PZ Škoda in Pilsen			151/5940		
ELZACO	Research and development of spiral Kaplan turbine			150/5917		
Hlavní město Praha	Clarification of doubts raised by the participant in the proceedings regarding the plan - Construction of a water supply system for the boiler room of the New Town Hall					150/5917
Hlavní město Praha	Professional cooperation in the creation of films/videos on the topic of rainwater management in the territory of the capital. m. of Prague					150/5917
L. Klíma Automatické mlýny Křesín-Libochovice	Carrying out a CFD analysis of water flow in the sub-reservoir under specified boundary conditions		150/5917			
Ředitelství silnic a dálnic	Assessment of the condition of the bridge before the start of construction modifications, I/12-most 12-020d	150/5917				
Ředitelství silnic a dálnic	expert evidence	150/5917				
TESIA speciální tech.práce	Supervision of facilities - Modernization of the line Brno - Přerov, Blažovice-Vyškov, Vyškov-Nezamyslice				150/5917	
SKANSKA	Long-term monitoring of Whitetopping				103/4081	46/1825
Ředitelství silnic a dálnic	Assessment of bridge variants - I/42 Brno, MÚK Ostrava radial			149/5893		
Správa železnic	Diagnostics of bridges in the district of OŘ Brno - track section 2001	149/5878				
Jihomoravský kraj	Processing of the study - Hevlín - wetland on Černá Strouza			148/5838		
ČAS	Adoption of the technical standard by translation of task no. 73/0100/21				147/5799	
Ředitelství silnic a dálnic	D47, building I/67 Skrečůň - Bohumín bypass, SO 201 - supervision of the repair project		3/109	143/5650		
Povodí Ohře	MVE Terezín - feasibility study	146/5752				
Povodí Vltavy	New Greek rafts - evaluation of the influence of proposed manipulations	145/5720				
Povodí Vltavy	Water management solutions for the Římov water reservoir and the prospective Chlum water reservoir			142/5586		
Lankhorst Engineered Prod.(NLD)	Experimental tests	141/5547				
OHLA ŽS	Tests of shotcrete				140/5523	
TSK	X 672 Underpass at Hl.N. - Sokolská - load capacity recalculation	140/5523				
FIRESTA	I/38 Havlíčkův Brod, bypass - SO 209, SO 211					139/5479
LUPOFYT	Study of the main tank	135/5325				
Povodí Vltavy	Water management solution of the Hracholusky reservoir.				134/5302	
VUT BRNO	Advanced materials to improve grounding in lightning and surge protection systems	134/5302				
Komerční železniční výzkum	DPK measurement with the Krab measuring truck on the line Prague hl.n.-Prague Běchovice			133/5260		
Ústav výzkumu globální změny	Analysis of retention curves on supplied samples		133/5249			
TSK	SO28 European - execution of an extraordinary inspection	129/5089				
Ústav výzkumu globální změny	Analysis of data from external long-term experiments				129/5086	
TRIGEMA	Assessment of the quality of the BRK environment				72/2842	56/2211

Povodí Ohře	VD (waterworks) Křímov - 3rd operational closure SV DN 800 - processing of hydrotechnical calculations of lower outlets				128/5049	
Letiště Václava Havla Praha	Measurement of PVV RWY's in 2021 and 2022			71/2785	57/2256	
Sweco	Areas with significant flood risk - Ohře	127/5026				
JEAN PAUL WHITECASTLE	Production of test plates from UHCP manufactured according to the recipe of patent no. 304478				127/5011	
Lankhorst Engineered Prod.(NLD)	Experimental tests	47/1839	80/3160			
PONTEX	Boreholes for control monitoring-Petřín Cable Car	127/4999				
OBEC SRBSKO	Diagnostic survey of the footbridge over Berounka			125/4936		
Česká zemědělská univerzita	Derivation of design rainfall maxima for surface water bodies		125/4931			
SUDOP PRAHA	Double-tracking of the Branický most - Praha Krč line - inspection and measurement on the bridge facility				123/4868	
WIENERBERGER	The quality of the indoor environment in a family home			123/4845		
Ředitelství silnic a dálnic	Safety audit - D35 Úlibice - Hořice, update			123/4832		
Škoda Auto	Urban planning solution Starý závod ŠA				120/4734	
TPA ČR	Tests to determine the residual strengths of fiber concrete - with a notch					120/4734
Ústav informatiky AV ČR	Collection of landcover spatial geodata for the model domain in the wider vicinity of the capital city. of Prague			120/4734		
Škoda Auto	Urban planning solution Starý závod ŠA				119/4694	
Velvyslanectví Japonska	Feasibility Study - 2 Paperwork				40/1596	75/2964
ČAS	Adoption of an international standard			18/724	45/1787	52/2040
Povodí Ohře	Modernization of PAT TG4 - MVE Jesenice - stage I - study					115/4536
Ředitelství silnic a dálnic	Expert study of materials for anti-noise walls		115/4536			
Statutární město Plzeň	Faltus House - Corrosion Survey	115/4536				
STRABAG RAIL	Static and dynamic load test - railway bridge 003B		115/4536			
Ředitelství silnic a dálnic	I/9 - Revision of performed diagnostic surveys	114/4497				
Vodohosp.inženýrské služby	Use of gray water in the project - Sustainable water supply Škoda Auto plant Kvasiny		114/4497			
Vodohosp. rozvoj a výstavba	Territorial study of the landscape - Hradec Králové	113/4440				
Škoda Auto	Processing of the study - IC hub	112/4418				
Státní fond podpory investic	Evaluation of loan applications according to Government Regulation no. 284/2011 Coll. as amended	19/754	11/420	69/2739	12/489	
STYL 2000	Performing laboratory tests on the supplied samples - VIBRO S2K RAIL PU2			111/4359		
SUDOP PRAHA	Optimization of the line section Děčín výchád-Děčín-předřetí Žleb	1/52	109/4303			
EXPECT-IT	Provision of experimental data and consultation				109/4319	
ÚJV Řež	Pilot corrosion experiment in PVP Bukov			0/0	10/384	99/3903
Ministerstvo zemědělství	Support for flood prevention V, program 129,500 - activity of a strategic expert					108/4246
LANKHORST ENGINEERING (NLD)	Experimental tests	2/82	105/4144			
Lafarge	Cooperation in the field of research	107/4219				

DOOSAN BOBCAT EMEA	Evaluation of the exploitability of the soil on the CPG		42/1657	52/2049	12/487	
Městská část Praha 6	Technical study of the feasibility of an underpass under the railway. track - Mlýnská street, Prague 6			105/4142		
Nadace dřevo pro život	Analysis of existing approaches to fire safety solutions for wooden buildings in selected countries	104/4100				
Vodohosp. rozvoj a výstavba	Regional strategy of adaptation measures of the Pilsen region for retaining water in the landscape			83/3272	21/818	
Institut plán. a rozvoje hl.m.Prahy	PPO ZOO Prague and Bubeneč - analysis of costs and benefits			103/4063		
DP hl.m.Prahy	Material tests of multifunctional silicate composite MSK		100/3945			
DP hl.m.Prahy	Development of the design and verification of mixtures in the rehabilitation of failures of concrete elements and structures - metro Prague				100/3945	
FILAMOS	Tests of shotcrete	100/3945				
Monika Hoffmanová	expert evidence				100/3945	
ING. František Pospíšil	Expert valuation of real estate, Holečkova 440/15, Prague 5					100/3945
LOVOCHEMI E	Possibilities of using calcium salt in the technology of preparation of inorganic binders		100/3945			
Stavby mostů	Technical assistance in tension measurement of tie rods - road bridge across the Elbe between Valy and Mělice		100/3945			
TENSAR INTERNATIONAL	Conducting experimental penetration tests on structures	100/3945				
VŠCHT	Measurement of mechanical properties of corrosion products using the nanoindentation method					100/3945
Ředitelství silnic a dálnic	Assessment of cost-significant bridge objects of construction I/44 Zábřeh - bypass		100/3929			
Povodí Ohře	MVE Jesenice - modernization of TG4 - technical proposal					99/3918
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BACH KVALITE	Static load test of the ceiling		99/3905			
Město Příbram	Aquapark Příbram - total reconstruction	99/3886				
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Považská cementárna	Demonstration of increased fire resistance of H-CEMENT for fire protection			97/3833		
PSG CONSTRUCTION	Independent assessment of the extension of the deadline for the completion of the work due to defects in the project documentation					97/3826
Povodí Ohře	Water management balance of lakes Libouš and Bilina in the operating mode enabling their flow - I. stage				96/3787	
Povodí Vltavy	Water management solution for the storage function of the Klíčava reservoir in Klíčava			96/3787		
BM CONSTRUCTION	Technical assistance in solving railings - Čechův most				40/1578	55/2178
Institut plán. a rozvoje hl.m.Prahy	Expert opinion - solution for an underground tram line as part of tram.tandenta in the section Mazurská-Pod Hrachovkou in Prague				95/3748	

Obecc Těrlíčko	Implementation of the construction time model Rehabilitation of the T pavilion					95/3748
Ředitelství silnic a dálnic	Determination of the real distribution of the non-stationary temperature field - I/27 Alžbětín, most ev. no. 27-117			95/3748		
TENSAR INTERNATIO NAL	Model 02/2023					94/3717
TopKeshop	Nanotechnological protection of bridge concrete structures		93/3657			
MATTONI 1873	Project - Hydropower plants, OS220					92/3629
Povodí Vltavy	Water management solution of the water reservoir Nýrsko na Úhlava				91/3598	
ATELIER PROMIKA	Road diagnostic surveys for 2022				90/3550	
Centrum dopravního výzkumu	Recalculation of bridge load capacity 421-012		90/3550			
ČAS	Adoption of the technical standard by translation of task no. 73/0105/20			90/3550		
EXPECT-IT	Provision of experimental data and consultation			90/3550		
MM Akademie Polná	Expertní posudek nemovitosti - posouzení památkové hodnoty, Strašnice				90/3550	
Pražské vodovody a kanalizace	Calibration of 15 rain gauges		90/3550			
TSK	Conducting tours-B 002 Podolské embankment, 003 Neklan's old vault, B 004 Neklan's new vault	90/3550				
Ústav chemických procesů AV	Pilot application of incineration cinders in road construction - Zevo Malešice					90/3550
Komíny Schiedel	Determination of ventilation intensity and indicative noise measurement in a demonstration family house		90/3550			
Povodí Moravy	Assessment of the protective function of the Žichlínek polder			90/3535		
Tým dopravního inženýrství	Assessment of bridge-track interaction on the bridge TÚ 2071 Žďár nad Sázavou-Tišnov		90/3535			
LANKHORST ENGINEERE D (NLD)	Experimental tests					89/3518
Architektóni cký ateliér Aleš	Residential project Jeseniova 38, update no. 2				89/3511	
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ČEPS	Evaluation of steel samples			88/3487		
REMING CONSULT (SVK)	Modernization of the Púchov - Žilina railway line	88/3471				
Město Vodňany	Expert assessment of DZS - Škorna campus	88/3459				
VRV	Territorial study of the landscape - Nový Bydžov	87/3442				
Letiště Václava Havla Praha	Measurement of runway anti-skid properties		87/3440			
Povodí Moravy	Study of the modernization of MVE Luhačovice					87/3432
Povodí Vltavy	Assessment of the number of inhabitants at risk and potential damage in the area at risk of special floods VD Kamýk			87/3432		
Šinták Jan	VD Josefův Důl - hydrotechnical calculations of pipelines			87/3432		
Povodí Vltavy	Water management solution for the storage function of the reservoir Švihov na Želivce		86/3408			
Povodí Vltavy	Water management solution for the storage function of the Žlutice na Střele reservoir			86/3408		
STATOTEST	Construction of two GNSS receiver prototypes for static measurement				86/3395	

CHLÁDEK & TINTĚRA	Expert opinion				86/3388	
AF-CITYPLAN	Support for the processing of the project, construction of the bridge ID no. 16-045a	86/3387				
KORADO	Concept study of technical solutions for heating and ventilation systems using the KORADO product		85/3353			
Řím.f. u kostela Panny Marie Královny míru	Exp. opinion on the proceedings on the proposal to register a cultural monument - the Church of Our Lady of Peace in Prague			85/3353		
TUFA	Study of restoration of water supply for agricultural irrigation in the Lipno - Markvarec area		85/3353			
Velvyslanectví Japonska	Architects Documentation and Activities					85/3353
VITRABLOK	Verification of load-bearing structures made of Vetropieno glass blocks	3/118	82/3235			
Správa železnic	Framework contract - performance of expert and laboratory activities during the implementation of constructions					84/3332
SATRA	PS 2-Update of the life cycle schedule of the deep repository in connection with the adoption of the terms of the Taxonomy					84/3318
PONTEX	Theoretical modal analysis of the footbridge over ul. Ocelkova	84/3314				
PVK	Calibration of PVK rain gauges					84/3314
Ministerstvo spravedlnosti	Expert opinion on PD for the construction of the new Judicial Complex in Ústí nad Labem		83/3254			
Úřad pro zast.st. ve věcech majet.	An extraordinary inspection of the Lipno bridge, a comprehensive proposal for a diagnostic survey		83/3254			
Centrum dopravního výzkumu	Cooperation on the project Critical analysis of new materials and shapes of soundproof walls		82/3224			
Lankhorst Engineered Prod.(NLD)	Experimental tests					82/3219
TENSAR INTERNATIONAL	Model 01/2023					82/3215
Ministerstvo zemědělství	SE reviews for assessing PPO-program 129260	81/3190				
VUT BRNO	Carrying out a fatigue test on reinforced test beams			80/3160		
ADVAMDENTAL	Design of gyroid structure solution and its mechanical and micromechanical tests		80/3156			
AVERS	Expert opinion on the event - SZ Krásný Dvůr - restoration of the Neo-Gothic temple			80/3156		
Kraj Vysočina	expert evidence	80/3156				
Libštejnské lesy	expert evidence		80/3156			
METROPROJEKT PRAHA	Expert assessment - reconstruction of the dispatch building in České Budějovice				80/3156	
Národní kult.památk a Vyšehrad	Background study - measurement and evaluation of the visual comfort of the visitor in the existing lighting of the NKP Vyšehrad				80/3156	
Letiště Václava Havla Praha	Measurement of PVV characteristics of RWY's 2023					79/3131
Vinařství LUDWIG	Consultation and measurements for the description of the isotopic hydrological situation of natural waters in J. Moravia for the years 2020/2021				79/3130	
Sweco	Creating an assessment of the economic effectiveness of flood protection Neratovicko					79/3116
Úřad městské části Praha 7	Experimental tests			79/3109		
Středočeský kraj	Design of the operational background of Bohumil Hrabal's cottage in Kersk				79/3097	

Lesy ČR	Assessment of plans on the Měkynecká stream for the municipalities of Bílinsko and Měky nec - flood prevention program					78/3093
Ředitelství silnic a dálnic	Assessment of bridge variants - 139-I/11 Oava Komárov, southern bypass			78/3089		
FIRESTA	Odstranění havarijního stavu mostu v km 142,475 na trati BřRemoval of the emergency condition of the bridge at km 142.475 on the Břeclav - Brno line, evaluation of the SZZ on the archeseclav - Brno, vyhodnocení SZZ na klenbách					78/3077
Agentura ochrany přírody a krajiny	Evaluation of the sedimentation of the Dobroměřické Pond	77/3032				
AFRY CZ	PPP Feasibility Study - Nemanicee-Ševětín Project					75/2959
FORTIS BOHEMIA	expert evidence				75/2959	
JACOBS CLEAN ENERGY	Assessment of the impact of erosion, sediment deposition and the occurrence of flood sediments on the Hněvkovice Watershed and the Kořensko discharge facility				75/2959	
METROSTAV	Reconstruction of the Imperial Baths		75/2959			
METROSTAV	Identification of the location of the seepage of the VD Orlík construction pit by the ADCP method					75/2959
Ředitelství silnic a dálnic	I23 Vladislav, bypass - assessment of bridge variants		75/2947			
Ředitelství silnic a dálnic	I/34 Tower - Skála			75/2947		
Ředitelství silnic a dálnic	Assessment of technical solutions of cost-important bridge objects from the point of view of investment demands-I/50 Bučovice bypass			75/2947		
Město Slaný	Construction and technical survey of the fencing of the sidewalk along the BENAR park				74/2919	
VUT BRNO	Compilation of specific methods for basic testing of materials for masonry sewer shafts	74/2916				
Centrum dopravního výzkumu	Processing of the diagnostic survey of the bridge: III/34526 Bezlejev - bridge ID no. 34526-2				74/2903	
Vodohosp. rozvoj a výstavba	Territorial study of the landscape - Nová Paka	74/2899				
Ředitelství silnic a dálnic	D1109 Rest areas Bernartice and Královec - safety audit		73/2872			
SUDOP EU	Diagnostic survey of the bridge at km 57.255 (Vrskmaň flyover)		72/2856			
STRABAG RAIL	Scanning and evaluation of the imperfections of the NK beam					72/2856
TO SYSTEM	Static load test of the ceiling of ZŠ Smidary				72/2842	
JEAN PAUL WHITECAST LE	Production of test plates from UHCP manufactured according to the recipe of patent no. 304478				72/2836	
Město Vimperk	Expert opinion - Water sports complex Vimperk		70/2768			
Krajská správa silnic	Engineering and consulting activities				70/2761	
LHOTKA LIVING	Assessment of the proposed method of securing the foundation pit - apartment building in Lhotka		70/2761			
Povodí Labe	Expert opinion for determining the accounting reserve for the costs associated with the implementation of insurance. work during floods					70/2761
Povodí Moravy	Expert opinion of the accounting reserve for the costs associated with the implementation of insurance. work during floods					70/2761
Povodí Odry	Expert opinion for determining the accounting reserve for the costs associated with the implementation of insurance. work during floods					70/2761

Povodí Ohře	Expert opinion for determining the accounting reserve for the costs associated with the implementation of insurance. work during floods					70/2761
Povodí Vltavy	Expert opinion for determining the accounting reserve for the costs associated with the implementation of insurance. work during floods					70/2761
Muzeum Českého krasu	Architectural study of improvements to the area of the Museum of the Czech Karst					69/2714
PORR	Measuring the width of cracks in the bridge item no. D1-2020, right and left bridge		69/2705			
MYMOBILE+ LTD (GEO)	Isotope analyzes of hydrogen and oxygen in water samples				68/2669	
Město Neratovice	PPO Neratovick - update of the technical and economic solution		67/2643			
SKANSKA	CBK monitoring on the construction site D137 Přerov - Lipník nad Bečvou			0/0	67/2641	
STRABAG RAIL	Securing underpass heights on the Vltava waterway Ia. Stage: Vraňansko - Hořínský canal					67/2639
AMPeng	Computer simulation of the movement of people for the Horácká multifunctional arena			66/2608		
OM CONSULTING	Thermal imaging of the electrical wiring of the Cube and DHL buildings in the CTPark Cheb area					66/2604
DHI	Determination of the amount of sediments captured in the cascade of small water reservoirs in the Amálie locality	65/2569				
Česká zemědělská univerzita	Determination of the amount of sediments captured in the cascade of small water reservoirs in the Amálie locality				65/2564	
Krajská správa a údržba silnic	Assessment of the repair of the bridge No. 125-034 over the Elbe in Kolín			65/2564		
LIBERTY Ostrava	Making an assessment of mine steel reinforcement					65/2564
Ředitelství silnic a dálnic	D11 SSÚD Stráž - security audit		65/2564			
ÚJV Řež	Research support for safety assessment of deep. Repository-Final Report	64/2540				
Městská část Praha 7	Project management and professional supervision of the contracting authority within the project "River of sidewalks in Janovského Street, Prague 7!	39/1542	25/982			
PKB	Provision of a software application to optimize the repair of asphalt layers		64/2525			
TSK	Most X540, Wilsonova - bridging Masaryk station			64/2525		
Ředitelství silnic a dálnic	D35 Sadová - Plotěš, Strážetice rest area - security audit	64/2513				
DEKONTA	Conducting hydrophysical analyzes of substrate samples for green roofs				64/2509	
SUDOP EU	Diagnostic survey of the bridge at km 59,483		63/2472			
SUDOP PRAHA	I/20 Chválenice, construction overlay - DÚR + IČ			26/1026	34/1339	2/84
PVK	Static rain gauge calibration and 10 dynamic rain gauge calibrations			62/2446		
SKANSKA TRANSBETON	Concrete temperature measurement test				62/2446	
Západočeská univerzita v Plzni	Geophysical survey for the needs of archaeological research - Landscape as knowledge			62/2445		
AGC GLASS EUROPE (BEL)	Conducting tests	62/2426				
GMF AQUAPARK PRAGUE	Assessment of water vapor from the water surface in Aquapark Praha	61/2417				

Advokátní kancelář Němec, Bláh a a Navrátilová	Expert assessment and consultation on the issue of the price of multiple works on the sewage system project	60/2367				
AVERS	expert evidence	60/2367				
DIAMO	Expert opinion - Feasibility study of house repairs - Dolní Pochlovice	60/2367				
Město Vyšší Brod	Professional expertise - static assessment of the former school in Vyšší Brod					60/2367
Nemocnice Třinec	Implementation of the construction time model Rehabilitation of the T pavilion					60/2367
PUDIS	I/27 Klatovy, bridge ID no. 27-094, replacement of elastomer bearings - DSP+IČ, PDPS, AD			60/2367		
Česká zemědělská univerzita	Analysis of elements in liquid samples of surface runoff by the method of atomic absorption spectrometry		60/2364			
OH LA ŽS	Long-term monitoring of railway bridges SO 73-20-10, SO 73-20-13, SO 73-20-14 after damage by underfilling					60/2360
Městská část Praha 6	Preparation of a verification study of the functional use of the territory of the Císařské mlýn and the grounds of the Provost's Court for educational purposes				60/2356	
Nad.fond Svatovítské varhany	Measurement of deformations in the area of the western kruchta sv. Welcome to Prague Castle				60/2347	
PRVNI STATICKA	Building technical survey - Opatovská garage			59/2336		
Česká zemědělská univerzita	Special subsequent analysis of biochar - isotopic analysis of hydrogen and oxygen		59/2323			
PROMSTAL ENGINEERING	Carrying out tests and evaluating the bearing capacity of steel hinges in accordance with ČSN EN 1990				58/2297	
VÚ monitoringu a ochrany půdy	Amendment TP 53 - anti-erosion measures on road slopes - processing of chapter 4					58/2288
Správa železnic	Measuring the platform surface with a pendulum - Ústí nad Labem, Jaroměř			58/2285		
STRABAG RAIL	Fitting and measuring with strain gauges the deformation of the HNK bridge					58/2280
Centrum dopravního výzkumu	Diagnostic survey of the bridge ID no. 210-002 behind the village of Krsy					57/2249
GEMA ART INTERNATIONAL	Documentation of historic objects, targeting with a laser scanner and photogrammetrically creating 3D models					56/2220
Správa národního parku	Assessment of the condition and bearing capacity of dynamic barriers in terms of fire damage					56/2193
Centrum dopravního výzkumu	Processing of the diagnostic survey of the bridge: III/34520 Jeřišno - bridge ID no. 34520-1				55/2178	
Jan Brodský	Estimation of the usual market value of real estate - plot no. 345/1 and 345/2 in the cat. area Krč, Prague					55/2170
JRD	Measurement of temperature and relative air humidity at several points in the space at the same time in both apartments and outdoors	55/2170				
ARCELORMITTAL CONSTR. (SVK)	Development of static tables for TR85					54/2130
DHI	Measurements on soil samples		54/2119			
Krajská správa silnic	Carrying out an expert assessment of the PDPS documentation of the bridge 290-023 Poniklá		53/2103			
TENSAR INTERNATIONAL	Testing the propagation of shock waves in the environment of aggregates 8-31.5 mm		53/2091			

Městská část Praha 7	Project management and expert supervision of the client within the Revitalization of Ověnecká Street project	34/1331	19/752			
CASTINGO	Test of concrete in compression according to ČSN EN 12930-3 and in tension under bending according to ČSN EN 12390-5 on the supplied samples					53/2071
CZECH PAN	Static load tests of I-OSB beams	52/2063				
Správa železnic	Inspection of steel supporting structures of bridges					51/2017
TBG METROSTAV S.R.O.	Tests - equilibrium moisture, hygroscopicity of dried sample, determination of volcanic and desorption curve, relationship between gravimetric and CM method				51/2012	
Jan Šinták	New retention tank at WWTP + ČKV Sever, Prague airport	50/1981				
ARCELORMITTAL CONSTR. (SVK)	Processing of profile bearing capacity tables	50/1972				
ELZACO	Technical consultation in the design of the concept of a simple propeller turbine with a fixed radial distributor in a fountain arrangement				4/157	46/1815
Fakultní nemocnice Plzeň	expert evidence		50/1972			
GEOSAN GROUP	expert evidence		50/1972			
Hlavní město Praha	expert evidence	50/1972				
Hlavní město Praha	expert evidence	50/1972				
Jihomoravský kraj	Úprava textu učebnice Vliv člověka na koloběh vody	50/1972				
Veronika Miláčková	Editing of the text of the textbook Human influence on the water cycle		50/1972			
NKÚ	Expert opinion on the Optimized design of the SAO headquarters building	50/1972				
PUDIS	Carrying out diagnostics of the bridge I/32,32-001e with evaluation of tests		50/1972			
Severní energetická	Height measurement of the control points of the purpose-built leveling network of the Ore Mountains 2023					50/1972
SKANSKA	Trial analyses	50/1972				
Společnost pro obnovu Mariánského sloupu v Praze	Processing of 3D documentation of the original statues from the Marian Column in Prague's Old Town Square				50/1972	
STRIX CHOMUTOV	Proposal for the location of the ballistic protection of the large excavator rollers in the Bílina mine	50/1972				
Others, each below 50k CZK		2055/81079	2052/80965	1543/60875	775/30577	2672/105391
Total		36138/1425544	53415/2107116	65646/2589598	48638/1918665	62600/2469444

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁹, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which

²⁹ See Terms definition.

the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

VLTAVA Changes in the Historical Landscape, 2022, ISBN 978-80-01-07084-0.

The book documents the changes in the historical landscape around the Vltava River in a unique and systematic way. It provides an interpretation of the various aspects of landscape transformation, whether in the form of physical changes, or in the form of socio-economic impacts on the population living around the river. The individual phenomena associated with the Vltava - timber floating, the transport function of the river, tourism and tramping are described. New information is revealed and presented using new methods such as unmanned aerial vehicle surveys and sonar measurements of the river bottom. The book also includes a section dedicated to specific extinct sites around the Vltava. In terms of social relevance, the impact of the book is mainly in the areas of society and culture, and partly in the environmental field. Knowledge of changes in the historical landscape is essential for understanding the processes associated with major interventions such as the construction of the Vltava Dam Cascade or the displacement of the German population. The book is supplemented with a series of maps and photographs. The book is unique in its comprehensive treatment of the historical landscape surrounding the river. Such a treatment is unique even on the world scale. The uniqueness also lies in the cooperation of several experts in technical fields and social sciences. Maintaining information about the old landscape is one of the key issues in today's river revitalisation and improvement. Locating sites and individual phenomena on maps and historical photographs helps society realize the symbiosis of man and landscape. The book has been very well received in the geographic and cartographic community and is almost sold out.

European Design Guide for the Use of Weathering Steel in Bridge Construction, Brussels: ECCS European Convention for Constructional Steelwork, 2021. ISBN 978-92-9147-171-3.

On 86 pages, this comprehensive guide book covers the latest state-of-the-art knowledge and includes results of the latest research in the area of weathering steel. The importance of weathering steel is rising because of the increasing demands for sustainable materials with low maintenance and circular solutions for bridges. The weathering steel can be used without painting during the life cycle. If properly done, designs that exploit weathering steel can strongly reduce emissions from the painting and blasting of coating (usually done 4x in the bridge lifetime), reduce the emissions from traffic restrictions during bridge paintings, and thus significantly contribute to sustainable development (see, for example, <http://www.designlife-cycle.com/corten-steel-1>). The author team comprises 22 well-known experts in the area, who bring in the experience of the European bridge community. Nowadays, this book is the most recent document on the use of weathering steel in practice. It is promoted and cited on the websites of most of the steel research institutes, such as ECCS, Constructalia, Stålbyggnadsinstitutet, SSAB, librosingenieria, Teräsrakenneyhdistys.

Czech historical atlas (Český historický atlas), Software, 2020.

The web map portal Czech Historical Atlas (<https://cha.fsv.cvut.cz>) provides a comprehensive view of Czech history in the context of Central Europe in the form of interactive maps, using almost 200 map applications. The portal is unique on the global level, because historical maps are usually presented only in their static form. The processing of the maps has been very well prepared by erudite experts in the fields of history and historical geography. Cartographically, the maps are processed in the form of web map applications in Czech and English versions. The use of new web mapping technologies, such as the use of time sliders or object interactivity, provide new perspectives on historical events and can better shape the view of Czech history. From a professional point of view, the portal shows how historical information can be transferred to the web and presented appropriately. In 2020, the web map portal was awarded the Map of the Year prize in the Digital Cartographic Products category by the Czech Cartographic Society (<https://geomatics.fsv.cvut.cz/en/cesky-historicky-atlas-ziskal-titul-mapu-roku-2020/>). It is a unique project that enables society to better understand history and allows visualization of previously unpublished phenomena. The social impact of such a portal on society is thus enormous. The portal has had more than 80 thousand unique accesses on the Internet in the last 3 years, of which approximately 10 thousand are foreign.

Methodology for the evaluation and protection of buildings from the second half of the 20th century (with a focus on the architectural heritage of the 1960s and 1970s) regarding their (possible) monument protection, 2020.

The methodology approved by the Ministry of Culture (MK 25708/2020 OVV) was the main result of the project DG16P02R007, implemented within the NAKI II programme, funded by the Ministry of Culture of the Czech Republic. The aim was to establish a methodological procedure for research, identification, documentation, registration and evaluation of architecture of buildings and building units designed and constructed in the second half of the 20th century in the Czech lands of the former Czechoslovak Socialist Republic. The methodology is based on research into the architecture of the 1960s and 1970s, but its basic procedures are generally applicable to 20th century architecture. The aim is to contribute to general

awareness of the values of the hitherto overlooked architectural heritage in the Czech Republic and to general information about the possibilities of its protection. The methodology builds on the project database of buildings and complexes examined, together with an expert interactive map, publicly accessible in the open application of the Monument Catalogue within the Integrated Information System for Monument Protection (PK IISPP) of the National Monument Institute where, through keywords, address, fulltext or map searches, experts as well as the general public can obtain essential information and use it in the evaluation of selected buildings and building complexes. The intended users are the staff of the monument care in both the professional and executive components, i.e., employees of the professional institution National Heritage Institute and officials of the monument care units of regional authorities and municipalities with extended competence. <https://www.yumpu.com/cs/document/read/65069406/metodika-hodnoceni-a-ochrany-staveb-2-poloviny-20-stoleti>.

Benchmark cases for advanced design of structural steel connections - Third extended edition, Prague, CTU Publishing House, 2019. ISBN 978-80-01-06565-5.

This publication describes, on 245 pages, the newly developed Component-based method of finite element design. This method combines analytical models of components, bolts, welds and anchor bolts with finite element analysis of steel plates. It allows users to simulate the behaviour of steel structures using a model of joints with shell elements with reasonable accuracy. Open section joints are solved by material nonlinear analyses with imperfection using the assumption of small strains, while the analyses of hollow section joints consider large strains. The method is used in 86 countries and, due to its generality, replaces the previous analytical models. Implementation of FEA models allows one to properly analyze and design generally loaded joints with complex geometries. Engineers can thus quickly and accurately assess the buildability and safety of steel projects, regardless of the complexity of steel connections. Benchmark cases for validation and verification procedures of structural steel joints are described in the last chapters. The validation and verification hierarchy is prepared for welded and bolted connections as well as for column bases. Each benchmark case starts with a task description and includes results of prediction by an analytical model according to EN 1993-1-8, references to experiments, a validated model and numerical experiments, results of prediction by Finite Element Analyses described in terms of global behavior, and verification of resistance. The readers can check their calculations for benchmark cases prepared for particular joints. This publication is used worldwide to teach the new design method and by at least five software manufacturers to prepare their programs and verify their appropriate use. The readers are structural engineers and fabricators involved in steel projects.

Open-source, multi-physics, parallel finite element code OOFEM.

OOFEM, originally developed and actively maintained at FCE, has advanced and unique features, including state-of-the-art models for nonlinear fracture and damage mechanics of quasi-brittle materials, advanced models for linear and nonlinear statics and dynamics, stationary and transient (linear and nonlinear) heat transfer and coupled heat and mass transfer problems and transient incompressible flow analyses. The code is used worldwide in many academic and research organizations (e.g., Chalmers University, VUT Brno, Northwestern University, University of Glasgow, University of British Columbia, University of Sassari) and has been applied to commercial problems (CEZ – long term analysis of NPP containment, HILTI – anchor design, Metrostav – condensation in tunnels, FKS BVBA – design of steel profiles, Lafarge – prediction of hydration kinetics, European Space Agency – throttle design). Developed and actively maintained since 1993 with more than 600 registered users on the OOFEM user forum, 2019-2023, www.oofem.org.

Heritage procedure for diagnostics, inspection and assessment, renovation and strengthening of industrial heritage bridges. Procedure for the survey, assessment, repair and strengthening of industrial heritage bridge structures, which provides a common platform for communication between the professional professions and the heritage authorities. It is intended for designers who propose diagnostic methods necessary for the structural assessment of a historic bridge, methods for bridge repair and reconstruction, and for heritage professionals who supervise survey, design and implementation work on listed buildings. It provides designers with information on the basic principles of decision-making in conservation. For conservationists, it presents an overview of diagnostic methods and procedures for repairing and strengthening historic steel bridge structures, including information on their capabilities and limitations. The goal is to find survey procedures and methods that ensure the highest quality of information obtained about the structure and its materials while minimizing the negative impact on its heritage value. The heritage procedure respects the heritage values of historic metal bridges and provides procedures leading to minimal intervention on the structure during the diagnostic survey and a basis for restoration design, thereby helping to preserve these heritage assets for future generations. The economic impact resulting from the extension of service life is in the order of tens of millions of CZK. The gender dimension can be estimated as balanced. The procedure was created in 2022 with the support of the Ministry of Culture of the Czech Republic within the Programme for Support of Applied Research and Experimental Development of National and Cultural Identity within the project "Methods for Ensuring Sustainability of Steel Bridge Structures of Industrial Cultural Heritage" with reg. no. DG18P02OVV033.

Regulation for Building Information Modeling (BIM) for transport infrastructure - Data standard. The regulation is used in the preparation and implementation of road, railway and waterway constructions provided by the departmental investor organisations (Railway Administration, Waterways Directorate) on selected construction sites. In the years 2021-2023, there

were about 35 projects with an investment value of over 1 billion EUR. The regulation is used to digitalize these projects, i.e. to streamline the preparation and implementation of infrastructure constructions, including their environmental impact. The Code has been used by the ministerial investor organisations as part of the terms of reference for the selection of designers or contractors. This regulation was issued by the State Fund for Transport Infrastructure and certified by the Central Commission of the Ministry of Transport. The code was also approved in two rounds by the so-called Technical Drafting Team and the SFDI BIM Council, where practitioners are represented through associations such as CACE, SVS, SPS and ARI. The Rules of Procedure and the Certified Code itself are publicly available (<https://sfdi.gov.cz/bim/>) and therefore for use by the general professional public. The use of the regulations can be traced on the publicly available contracting authority portals for specific projects and framework contracts. A number of suppliers have implemented the Code in their software for the preparation of digital models of buildings (e.g. AutoCAD Civil 3D, Bentley Road and Rail Designer and Roadpac). The text of the regulation avoids gender stereotypes and uses language that respects gender equality. The regulation is intended to improve the quality of infrastructure construction projects and to make the preparation and implementation of such projects more efficient through digitalization.

Certified methodology for protecting soil from erosion through climate - and environmentally friendly agricultural practices, 2021. The methodology is based on more than 400 measurements of soil loss by erosion using a rain simulator on the most common crops and their cultivation technologies in Czechia. It evaluates methods of erosion control on farms that will be effective and feasible without the use of glyphosate and that will not compromise the competitiveness of Czech agriculture. In line with the objectives of the Common Agricultural Policy, the anti-erosion effect for the most widespread technologies was evaluated. A comprehensive compilation of the vegetation protection factor values as well as a list of verified crops with intermediate values of the sediment removal ratio is provided. In practice, the erosion hazard assessment is part of all land improvement projects and is a necessary component in the subsidy applications from EU programmes. The outputs are useful both for policy setting and as an advisory tool, as the continuous pattern of vegetation protection factor values allows the determination of the soil protection effect depending on the time of sowing, harvesting and the occurrence of hazardous rainfall according to the real conditions. Currently, the maximum soil loss in the Czech Republic is estimated at approximately 21 million tonnes of topsoil annually, which can be expressed as a loss of at least 170 million EUR per year. It should be stressed that this is not a quantification of property damage, but only a financial expression of soil loss based on the price of the soil. If these costs are also included, the damage is estimated to be up to 400 million EUR per year (Ministry of Agriculture). Therefore, reducing erosion damage leads to significant savings.

Stone Prague. Stoneworking of Historical Buildings of the Capital City of Prague.

The publication, covering almost 680 pages, presents unique results of fifteen years of research on the stone surface working in the historical area of Prague. It captures the thousand-year history of the development of the stonemason craft and puts it in the worldwide development context. The monograph was written by 14 experts in various fields, ranging from technical and natural sciences to historical sciences, which makes the publication unique. Besides the identification of the tool traces on about 600 stone blocks and artifacts made of it, the stonemason's tools used have been identified on the basis of traceological analysis and the working procedure has been described for each of them. All the results obtained about the tools used and the individual working stages are illustrated. Each stone element has its own unique detailed card describing its location in the object and how it was created. In the text part of the book, the individual historical objects are briefly introduced by describing their construction and historical development, and each stone element is characterized in terms of material composition, with an indication of its current state. It also documents the available sources of building stone in a given historical period. Traces of historic working methods are an integral part of the value of any monument, evidencing the story of its origin. This publication is therefore a unique tool for workers of monument care, from building historians to restorers, who can use it routinely in their practice. At the same time, the book is also enriching in its content for the general reader, as it presents aspects that an ordinary person misses when visiting monuments and brings a new perspective on their perception,

2022

(https://www.researchgate.net/publication/369998112_Praha_kamenna_Kamenicke_opracovani_historickych_staveb_Hlavniho_mesta_Prahy).

Table 3.4.1 - Overview of research results in the period under evaluation

Type of result ³⁰	Year of application	Name
Book	2022	VLTAVA Changes in the Historical Landscape (VLTAVA proměny historické krajiny), ISBN 978-80-01-07084-0.

³⁰ Specify the specific type of result. Add rows as needed.

Design guide	2021	European Design Guide for the Use of Weathering Steel in Bridge Construction, Brussels: ECCS European Convention for Constructional Steelwork, ISBN 978-92-9147-171-3.
Software	2020	Czech historical atlas (https://cha.fsv.cvut.cz/en/)
Approved Methodology	2020	Methodology for the evaluation and protection of buildings from the second half of the 20th century (with a focus on the architectural heritage of the 1960s and 1970s) with regard to their (possible) monument protection.
Book	2019	Benchmark cases for advanced design of structural steel connections - Third extended edition, Prague, CTU Publishing House, ISBN 978-80-01-06565-5.
Software	2019-2023	Open-source, multi-physics, parallel finite element code OOFEM (www.oofem.org).
Heritage procedure	2022	Heritage procedure for diagnostics, inspection and assessment, renovation and strengthening of industrial heritage bridges
Data standard	2021	Regulation for Building Information Modeling (BIM) for transport infrastructure - Data standard
Certified methodology	2021	Certified methodology for protecting soil from erosion through climate- and environmentally-friendly agricultural practices.
Book	2022	Stone Prague. Stoneworking of Historical Buildings of the Capital City of Prague.

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)³¹, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).³²

Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

Self-assessment:

The faculty has a well-structured system for technology transfer. This system combines services provided at the university level with local services to support the transfer of knowledge and scientific results into practical applications. Here are some key components:

- The University Centre for Technology Transfer provides specialized services and support in the realm of Intellectual Property (IP) and its commercialization. It assists with IP management, protection, and application both within the Czech Republic and internationally.
- The InQbay Incubator offers a range of services to support startups and spin-off companies, including Legal, Accounting, Marketing and Consultation services.
- Faculty Services include an Advisory Board for Commercialization that assists with business and legal aspects, a patent search service, and a dedicated technology transfer support office.
- The Motivation System encourages and recognizes authors of successful technology transfers.

FCE has fostered enduring collaborations and partnerships with various sectors, including major construction firms, national organizations, and small to medium-sized enterprises. The unit actively engages in and hosts numerous networking events and platforms to identify industry needs and provide tailored solutions. Through these efforts, in addition to personal connections, the comprehensive multidisciplinary expertise and resources offered by FCE and CTU play a pivotal role in the acquisition of new clientele. These partnerships often commence with joint research projects that deliver applied outcomes aligned with client requirements. Typical beneficiaries of FCE's work include construction companies of all scales (via licensing) as well as national and municipal authorities (through methodologies, standards, etc.).

A common scenario involves outcomes stemming from collaborative projects with industrial partners. These joint results are then utilized by the industrial partner, generating future license fees. However, FCE possesses numerous results with commercial potential, which are not yet at a sufficient Technology Readiness Level (TRL) for direct commercial application. To bridge this gap, additional effort and funding are required, which FCE finds challenging to support through its own resources. Additionally, there is a shortage of companies or institutes that can serve as a bridge between academia and industry to facilitate this transition.

The most substantial contributions (gifts) within a reporting period have been provided by industrial partners such as Hochtief CZ (59k EUR) for student activities, competitions, support for gifted students, and teaching room equipment. Metrostav, a.s. (53k EUR) supports science and education, while VINCI Construction CS, a.s. (22k EUR) also contributes to student activities, competitions, support for gifted students, and teaching room equipment. Syner s.r.o. (16k EUR) supports student activities and competitions.

Selected examples of successful commercialization of R&D&I results include

³¹ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

³² If the commercialisation of R&D&I results is carried out in this way.

- License “Hybrid beam made of glass and steel”, sold to OGB, s.r.o. (8k EUR),
- Research and development of a “Mobile protective and ballistic barrier consisting of a composite plate and water filling” for STRIX Chomutov (6.1k EUR),
- License “Multifunctional high-value cementitious composite with increased impact resistance” sold to Stachema CZ (4.0k EUR),
- License “Ultra-high strength fiber concrete” sold to JEAN PAUL WHITECASTLE, spol. s r.o. (2.9k EUR).

The Faculty is registered expert institution providing expert assessment in the following fields: Civil Engineering, Geodesy and Cartography, Economics, and Design. The Faculty has been a long-standing member of the Chamber of Court Experts of the Czech Republic.

Through this membership, the Faculty is part of the multinational organization EuroExpert (<https://euroexpert.org/>), which brings together more than 50,000 forensic specialists, experts, and professionals from the EU. During the evaluation period, the GEOSAN Group represented the main client, both in terms of frequency and volume of assignments.

Additionally, the FCE **Accredited Testing Laboratory** provides a wide range of accredited commercial testing services. The most important client for the laboratory in the period in question is the Road and Motorway Directorate. The laboratory carried out a number of evaluations during the period, both on structures (bridges, tunnels, retaining and frame walls) and materials (concretes, asphalt mixtures, ashes, aggregates, soils).

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

Type of revenue	Revenue (in thousands CZK/EUR)				
	2019	2020	2021	2022	2023
Gifts	<u>1261/49744</u>	<u>314/12387</u>	<u>411/16213</u>	<u>1041/41065</u>	<u>1141/45009</u>
Licences sold	<u>151/5957</u>	<u>70/2761</u>	<u>121/4773</u>	<u>38/1499</u>	<u>40/1578</u>
Accredited Testing Laboratory	6445/254240	7866/310296	7893/311360	6572/259250	8251/325483
Expert Assessments	1440/56805	5525/217949	2861/112860	1493/58895	8350/329388
Total	9297/366745	13775/543392	11286/445207	9144/360710	17782/701460

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

FCE is dedicated to popularizing, disseminating, and communicating knowledge in the field of civil engineering. Popularization and Dissemination Activities include Public Seminars and Workshops, where FCE regularly organizes public seminars and workshops that focus on various civil engineering topics. These events provide opportunities for the public to learn about the latest advancements, research, and best practices in the field. The faculty hosts popularization events, such as open days and public lectures, aimed at increasing awareness and interest in civil engineering among the general public. FCE also actively participates in large-scale public events, such as science festivals and exhibitions. These events allow faculty to showcase its research, projects, and innovations to a broader audience. FCE actively cooperates with secondary schools to promote civil engineering education and FCE competencies. This cooperation includes organizing educational programs, workshops, and lectures for students. FCE is a partner school of the Secondary school of Civil Engineering in Dušní Street in Prague.

FCE engages in the University of the Third Age (U3V), offering courses and activities for senior citizens who are interested in continuing their education. These programs cover various civil engineering topics and aim to make lifelong learning accessible to older adults.

FCE actively engages with the media to disseminate information about its research, projects, and events. This includes the posting of press releases, conducting interviews, and working in collaboration with journalists to ensure that the public is informed about the latest developments in civil engineering.

Selected examples of the popularization of R&D&I and communication with the public:

- Hall of the Year – FCE has been organizing this competition since 1986. The task of competitors is to design and produce a model of the building structure according to a specific assignment and to subject it to a load test. Since 2007, high school students have also competed in the special Junior category, and since 2023, the international Advanced category for doctoral students has been opened. The competition is supported by many industrial partners, including Hochtief, Wienerberger, Saint-Gobain, Gemo, Syner, and the Directorate of Roads and Highways. (<https://halarokuakademik.fsv.cvut.cz/en/>).
- Inspireli Awards – FCE is a founding member and active organizer of Inspireli Awards competition, the world's largest global student contest in Architecture, Urban Design and Landscape, and Interior Design, with participants from more than 40 countries (<https://www.inspireli.com/en/>).
- FCE Technical Thursdays – regular, open events for the public, students, professionals to meet over unique projects, implementations and technologies with invited guests. The recordings are also available online on YouTube and Facebook.
- FCE Participation in Children's University - The aim of this project is to arouse children's interest in technical fields. Children will have the opportunity to experience the university way of education and get acquainted with various technical fields in an engaging way. We believe that the activities within the university will motivate children to take further interest in STEM subjects and later to pursue university education in this area.
- FCE annual participation in World Water Day – targeted at the professional public, offering presentations of FCE researchers dealing with water about their projects and results, and providing guided tours of FCE unique facilities and running experiments at FCE Water Management Experimental Centre (<https://www.fsv.cvut.cz/den-vody-na-fakulte-stavebni-cvut-2024/>).
- National Construction Centre (NSC 4.0) - plays a key role in bringing the latest technologies in the construction industry closer to the general public and professionals. With its emphasis on digitization, sustainability and automation, it helps popularize modern construction technologies such as BIM modeling, 3D printing in construction and the use of artificial intelligence. NSC connects academia with industry, supporting the transfer of innovations to the real environment. In terms of communication with the general public, NSC 4.0 has many activities for the general public, such as Building Literacy, influence awareness of modern construction through public presentations, conferences or media coverage of research results. FCE is a founding member of this platform (<https://www.ncs40.cz/>).
- GISDAY - As part of the annual Global GIS Day, FCE is organizing a series of lectures and presentations on GIS applications in diverse fields with an informal atmosphere, open to the general and professional public (<https://www.fsv.cvut.cz/gisday-2024/>).
- FCE Gallery, founded in 2018 and accessible to the general public, is located in the central area of the faculty, where students, teachers and visitors to the faculty pass. The gallery's program includes exhibitions from various art disciplines, art photography, architecture and design. Exhibitions of professional artists alternate with exhibitions of talented young authors, and students of the faculty also find opportunities here. The gallery thus contributes to the education of young technical experts into personalities with a broad general and cultural outlook, but at the same time welcomes all other fans and lovers of architecture and art. A total of 31 public exhibitions took part in the evaluation period (<https://galerie.fsv.cvut.cz/>).

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

Recommendation: A greater percentage of high-level research projects, funded e.g. by the ERC, would be beneficial to the international reputation of the Faculty of Civil Engineering. It is recommended to reduce the number of small industrial projects. At the same time, efforts should be made to attract larger projects. This would give more freedom to stimulate more research-oriented activities. It is also recommended to increase the percentage of revenues from EU-funded projects. The level of this percentage is frequently used as an indicator of the quality of research.

Since the last evaluation, FCE has significantly increased its involvement in EU and other international research projects. The number of projects with FCE as a beneficiary has risen from 6 to 22, while its role as a participant has risen from 13 to 37. This growth has led to a significant increase in international project funding, from 2.74M EUR in the previous reporting period to 51.86M EUR in the current period (as a sum of the relevant records in Tables), which represents an almost 19-fold increase.

A key achievement during the current period was the FCE's transition to a coordinating role for larger projects. While no EU research projects were coordinated in the previous evaluation period, FCE has since coordinated two H2020 projects (Geo-harmonizer and RECONMATIC). In addition, one ERC Starting proposal progressed to the second evaluation round and, after receiving a final score of "B," secured two years of equivalent national funding through the ERC.cz scheme.

In direct response to the recommendations of the previous evaluation committee, FCE has adopted three strategic incentives to attract more high-level projects:

- Personalized grant support: Since 2022, FCE has provided an individual, long-term mentoring program to help researchers prepare competitive project proposals. As of 2024, this initiative has already helped early-career researchers secure 1.5M EUR in funding.
- "What will my next project be about?" initiative: Launched in 2023, this program offers weekly informal meetings to foster the development of research ideas and to refine existing proposals. Initially a faculty-level activity of FCE, it has now been extended to the entire CTU.
- FCE initiation fund: This funding scheme directly supports young researchers in preparing high-impact project proposals by covering personnel costs, grant preparation services, and networking with internationally recognized researchers.

Through these focused initiatives, FCE has broadened its funding sources and enhanced its competitiveness for highly selective local and global grants.

Recommendation: Starting already from a high level, the output would further increase in the coming years if the research profile was further sharpened by defining clear research foci. A necessary condition for this is a close link to industry, including fundamental research activities, serving as the basis for future application-oriented research.

The FCE's strategic plan outlines the faculty's key research directions, as detailed in Section 3.1, in a top-down manner. These directions are strategically aligned with national priorities and address the evolving needs of industrial partners, ensuring a strong connection between fundamental research and application-driven innovation.

At the same time, FCE cultivates a dynamic bottom-up research culture to encourage the development of independent and emerging research topics. This goal is primarily supported by the above-mentioned targeted initiatives for early-stage researchers and young scientists, allowing them to explore transformative research ideas that could serve as the basis for future industry-driven applications.

Recommendation: The revenues from licences increased by a factor of about 2. The overwhelming majority of revenues from non-public sources in the period 2014-2018 comes from gifts. Altogether, these revenues are not very significant. Efforts are required to improve this situation. The output of filed and granted patents in the reported time period is very good. However, no spin-offs were launched in this time period. Moreover, the amount of revenues from sold licences is not known. It is recommended to develop a strategy for stimulating spin-offs from applied research activities.

Since the last reporting period, CTU has established a Technology Transfer Unit (TTU) to enhance support for commercialization, industrial cooperation, and spin-off development. While CTU has one registered spin-off (Mob-bars, s.r.o., 2016) operated by FCE staff, no additional spin-offs have been launched since 2016. However, CTU is now providing targeted consultancy and support services, which are expected to improve this situation in the upcoming evaluation period.

Regarding technology transfer income, FCE's income from sold licenses rose from 6.8k EUR to 16.5k EUR. However, absolute revenues remain modest, and further efforts are required to scale up licensing activities. A key obstacle is the absence of intermediary institutions or industry partners that can bridge academia and commercial applications.

To partially address these challenges, the CTU has established an incentive system for researchers contributing to successful technology transfers.

Recommendation: The better the quality of the research carried out by the evaluated research unit, the greater the probability of an increase in acknowledgments. In connection with this, personal acquaintances, made at international congresses and conferences, play a great role. The average duration of doctoral studies should be reduced. The same should be done with the involvement of researchers in administrative activities.

To enhance the efficiency of doctoral studies, the CTU has internally set the maximum duration to six years, as a reduction of the national limit of seven years. Additionally, FCE has incentivized PhD supervisors whose students finish their studies in four years or less, to promote the timely completion of Ph.D. training.

FCE actively supports international networking to increase research visibility, foster collaborations, and enhance recognition. During the reporting period, FCE co-organized and participated in numerous international events, for instance:

- Six major international conferences, including the iiSBE Forum of Young Researchers in Sustainable Building (2019) and the IABSE Symposium Prague (2022).
- 16 national conferences and workshops, fostering collaboration between the academic and industrial communities.
- 10 additional international events, further strengthening global research connections.

FCE established the Project Administration and Support Department in 2022 to reduce the administrative burden on researchers. This department provides comprehensive project management support, covering proposal preparation up to sustainability phases. It manages more than 45 projects, including 13 international projects (8 Horizon Europe and 5 other international projects) and large national-scale research initiatives.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)
Bibliometrical Report, Research, Development and Innovation Council	3.1	https://hodnoceni.rvvi.cz/hodnoceni2023/biblio-obory
QS World University Ranking by Subject 2025	3.1	https://www.topuniversities.com/subject-rankings
International Society for Soil Mechanics and Geotechnical Engineering	3.2	https://www.issmge.org/
International Society for Photogrammetry and Remote Sensing	3.2	www.isprs.org
IABSE Symposium Prague	3.2	https://www.iabse.org/prague2022
iiSBE Forum of Young Researchers in Sustainable Building	3.2	https://cesb.cz/yrsb/
Central Europe towards Sustainable Building 2019	3.2	https://19.cesb.cz/

International Conference on Local Mechanical Properties 2019	3.2	http://lmp-conference.cz/
International Conference on Lightweight Structures Architecture	3.2	https://alk--20.wixsite.com/alk20?lang=en
largest creep and shrinkage database for structural concrete	3.2	https://doi.org/10.5281/zenodo.8150176
Civil Engineering Journal	3.2	https://lfgm.fsv.cvut.cz/CivilEngineeringJournal/index.html
TACR Award 2023 in the BUSINESS category	3.2.1	https://tacr.gov.cz/den-ta-cr-2023-veda-neni-sci-fi/
International Soil and Water Conservation Research	3.2.2	https://www.keaipublishing.com/en/journals/international-soil-and-water-conservation-research/editorial-board/
Cement and Concrete Research	3.2.2	https://www.sciencedirect.com/journal/cement-and-concrete-research/about/editorial-board
Cement and Concrete Composites	3.2.2	https://www.sciencedirect.com/journal/cement-and-concrete-composites/about/editorial-board
ISPRS Journal of Photogrammetry and Remote Sensing	3.2.2	https://www.isprs.org/news/newsletter/default.aspx
Energy & Buildings	3.2.2	https://www.sciencedirect.com/journal/energy-and-buildings/about/editorial-board
Advances in Engineering Software	3.2.2	https://www.sciencedirect.com/journal/advances-in-engineering-software/about/editorial-board
Journal of Constructional Steel Research	3.2.2	https://www.sciencedirect.com/journal/journal-of-constructional-steel-research/about/editorial-board
Journal of Hydrology and Hydromechanics	3.2.2	http://www.uh.sav.sk/jhh/Journal-information/Associate-Editors
Computers & Structures	3.2.2	https://www.sciencedirect.com/journal/computers-and-structures/about/editorial-board
Acta Mechanica	3.2.2	https://link.springer.com/journal/707/editorial-board
Geo-harmonizer project	3.3	https://ecodatacube.eu/
Roboprox project	3.3	https://roboprox.eu/
the Open Mechanics Group	3.3	https://openmechanics.fsv.cvut.cz
RECONMATIC project	3.3	https://www.reconmatic.eu/about
Autonomous Robotic Construction System demo	3.3	https://www.youtube.com/watch?v=4XmYAPAf2M
Czech historical atlas, Software, 2020.	3.4	https://cha.fsv.cvut.cz
Map of the Year prize in the Digital Cartographic Products category by the Czech Cartographic Society	3.4	https://geomatics.fsv.cvut.cz/en/cesky-historicky-atlas-ziskal-titul-mapa-roku-2020/
OOFEM: open source FE solver	3.4	www.oofem.org

Rules of Procedure and the Certified Code	3.4	https://sfdi.gov.cz/bim/
Stone Prague. Stoneworking of Historical Buildings of the Capital City of Prague.	3.4	https://www.researchgate.net/publication/369998112_Praha_kamenna_Kamenicke_opracovani_historickych_staveb_Hlavniho_mesta_Prahy
Czech historical atlas	3.4.1	https://cha.fsv.cvut.cz/en/
OOFEM software	3.4.1	www.oofem.org
Euroexpert	3.5	https://euroexpert.org/
Hall of the year competition	3.6	https://halarokuakademik.fsv.cvut.cz/en/
Inspireli award	3.6	https://www.inspireli.com/en/
World Water Day	3.6	https://www.fsv.cvut.cz/den-vody-na-fakulte-stavebni-cvut-2024/
National Construction Centre	3.6	https://www.ncs40.cz/
GIS days	3.6	https://www.fsv.cvut.cz/gisday-2024/
FCE gallery	3.6	https://galerie.fsv.cvut.cz/
<i>Personalized grant support</i>	3.7	https://portal.fsv.cvut.cz/en/vvc/pp.php
<i>"What will my next project be about?" initiative</i>	3.7	https://roboprox.eu/news/seminar-what-will-my-next-project-be-about/
<i>FCE initiation fund</i>	3.7	https://portal.fsv.cvut.cz/vvc/projekty/inicfond.php

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: Faculty of Mechanical Engineering, Czech Technical University in Prague

FORD: 2 - Engineering and technology

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

The Faculty of Mechanical Engineering of the Czech Technical University in Prague has a long history more than 160 years of dedicated teaching of mechanical engineering and corresponding tradition to accumulate the knowledge and to provide that to students and industry. **The mission of FME that was being fulfilled during this long period can be formulated as**

- to develop new knowledge, expand and preserve the acquired knowledge in engineering fields, especially mechanical ones (improvement of products through the application of new design principles, new technologies and manufacturing process organization development through including additive, digital, data-driven, machine learning, AI approaches)
- enable access to, and carry out higher mechanical engineering education
- contribute to the development of the economy and life quality in the Czech Republic (CR)
- play an active role in the public debate on social and ethical issues of technology
- sustain and develop international cooperation.

The vision of FME is to sustain and improve its position from various points of view. FME

- is an international center of excellence in the fields of engineering and industrial sciences, creative activity and education
- attracts the best students from CR and gifted students from abroad to study at FME
- brings stimuli for new basic&applied research, these research results are applied in practice for the development of the economy and life quality in the Czech Republic

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

At the same time, FME plays multiple roles, each of which should be seen from the point of view of a university and simultaneously from the point of view of a company striving for sustainability. The roles are teaching (university point of view is education x company point of view is income from students), research (science and research x grant income from funding agency), contracts (know-how transfer x contract with company), patents and spin-off (support of economy x sales and business), knowledge (service to society x sales to public), sourcing and providing people (social function x acquiring students and offer of graduates), entertainment and cohesion of society around campus (social function and service to society x PR and sales to public).

The fulfilment of FME mission and vision can be visible from the facts that FME

- is developing knowledge in all fields of mechanical engineering
- is teaching all fields of mechanical engineering
- conducts R&D in all fields of mechanical engineering
- cooperates with industry
- is recognized by industry (e.g., participating in 6 National Competence Centers)
- offers and applies technology for improvement of life quality in CR
- provides knowledge and social service to society

Over the past 20 years, FME has built up in many areas what is today called an ecosystem of university-industrial cooperation. The ecosystem requires a university R&D and teaching/learning background comprising academic knowledge, often a unique instrument and experimental base, and study programs aimed at educating students in their chosen specialization. However, to create an ecosystem, it is necessary to have the entire sequence from basic science through applied science to industrial R&D. The aim of ecosystem building is to enable industrial enterprises already active in CR to be globally competitive. This will provide benefits for the Czech economy, will raise the standard of living and will make the CR a sought-after attractive country for R&D and for producing new high-tech products. Ecosystems have been created for the automotive, machine tool, aerospace, energy, and manufacturing industries.

These ecosystems were established based on difficult decisions about the conflict between usefulness for industry and economy of the Czech Republic and the risk of sustainability and the simple reproduction of costs to FME. FME has managed these conflicts so far, and the goal is now to sustain and offer acquired infrastructures for usage by industrial companies.

FME is constantly making decisions about how much resources are devoted to basic and how much to applied research and development. The FME vision is that the basic research provides generalization the industrial practice problems into theoretical level and/or by asking curious questions and/or by carrying out experiments and/or by innovative concepts. Solving the arisen basic research problems leads thus to scientific results and/or innovative proposals for applied research or innovative applications. The results of applied research are used and this closes the circle. The basic research is supported by grants or by institutional funds. The collaborative applied research is mostly based on public support, contractual research based on company contract. The ratio between basic and applied research is approximately 1:2.

FME consists of 17 departments, two of them have divisions and three research centers that cover all knowledge areas needed for mechanical engineering (Technical Mathematics, Physics, Mechanics, Biomechanics and Mechatronics, Fluid Dynamics and Thermodynamics, Designing and Machine Components, Materials Engineering, Manufacturing Technology, Machining, Process Planning and Metrology, Instrumentation and Control Engineering, Production Machines and Equipment, Energy Engineering, Automobiles, Combustion Engines and Rail Vehicles, Aerospace Engineering, Environmental Engineering, Process Engineering, Management and Economics, Foreign Languages). FME, at 2023 had 27 full professors, 35 associate professors, 154 Assistant Professors, 309 PhD students, 494 Master students, and 955 Bachelor students. FME has just one bachelor study

programme as it is a belief that the fundamentals of mechanical engineering are indivisible, however the bachelor study programme offers 16 focuses. FME offers 13 Master Study programs with multiple specializations that cover the whole mechanical engineering except for sea ship design and textile machinery. Then FME offers 5 PhD Study programmes in the main research areas at FME (Applied sciences in Mechanical engineering, Design engineering and mechatronics, Production and material engineering, Energy and process engineering, Machine and process control), each in Czech and English versions. These areas of PhD study are also the main areas of research at FME.

FME is a technical university with clear mission and vision, fulfills the goals and tasks from its mission and vision, contributes to the competitiveness of Czech industry and thus Czech economy in global markets, is trying to carry out basic research for solution of current problems in society such as transportation, energy&environment, circular economy, safety and security, is trying to contribute to ethical and social stability in society.

 Table 3.1.1 - Staffing per FTE²

Academic/ Professional position	Total / Of which women					
	2019	2020	2021	2022	2023	Total
Professor	27,0 / 0,4	26,8 / 0,4	27,2 / 0,4	26,7 / 0,3	27,5 / 0,3	135,2 / 1,8
Associate Professor	37,7 / 2,9	37,2 / 2,9	37,4 / 2,9	37,1 / 2,9	35,5 / 2,9	184,9 / 14,5
Assistant Professor	168,5 / 23,2	163,5 / 21,1	158,0 / 21,5	156,4 / 21,5	154,5 / 21,5	800,9 / 108,8
Assistant	25,8 / 1,0	29,7 / 2,0	30,0 / 2,0	30,2 / 2,0	29,6 / 2,1	145,3 / 9,1
R&D Personnel ³	106,3 / 35,9	105,1 / 34,3	104,1 / 30,3	107,0 / 33,5	102,5 / 29,6	525,0 / 163,6
Researchers in other categories ⁴	65,5 / 9,3	68,2 / 10,3	74,4 / 10,1	90,6 / 11,6	107,2 / 12,3	405,9 / 53,6
Technical and economic staff ⁵	105,5 / 59,6	103,9 / 58,7	94,3 / 53,6	88,2 / 52,9	74,2 / 50,1	466,1 / 274,9
Scientific, research and development staff involved in teaching activities	281,4 / 27,5	276,6 / 27,0	270,0 / 27,3	267,3 / 27,2	262,9 / 26,3	1358,2 / 135,3
Early career researchers ⁶	135,5 / 12,0	119,6 / 11,5	114,6 / 10,0	119,0 / 11,8	120,4 / 12,2	609,1 / 57,5
Total ⁷	536,3 / 132,3	534,4 / 129,7	525,4 / 120,8	536,2 / 124,7	531,0 / 118,8	2663,3 / 626,3

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁸

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	3	0	9	0	10	0	25	2
Associate Professor	0	0	2	0	20	1	6	2	10	1	21	1
Assistant Professor	7	0	69	6	77	10	26	3	15	7	12	1
Assistant	15	0	12	0	1	1	1	0	0	0	1	0
R&D Personnel ⁹	37	11	47	11	24	9	10	6	13	6	11	0
Researchers in other categories ¹⁰	39	9	43	5	8	0	5	0	4	0	3	1
Technical and economic staff ¹¹	31	6	26	4	4	1	1	0	2	0	2	0
Scientific, research and development staff involved in teaching activities	27	1	111	7	103	12	42	5	35	8	59	4
Early career researcher ¹²	61	9	126	11	0	0	0	0	0	0	0	0
Total ¹³	129	26	199	26	137	22	58	11	54	14	75	5

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁴

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	4	0	6	0	7	0	26	1
Associate Professor	0	0	1	0	15	1	11	1	9	3	17	0
Assistant Professor	0	0	32	1	81	8	38	8	20	6	14	2
Assistant	5	0	21	1	5	1	1	0	2	1	1	0
R&D Personnel ¹⁵	16	1	46	9	31	13	12	6	10	4	14	2
Researchers in other categories ¹⁶	67	11	67	9	21	1	6	0	4	0	5	1
Technical and economic staff ¹⁷	2	0	4	0	6	1	0	0	0	0	1	0
Scientific, research and development staff involved in teaching activities	5	0	72	4	112	10	57	9	38	10	58	3
Early career researcher ¹⁸	72	11	121	11	0	0	0	0	0	0	0	0
Total ¹⁹	90	12	171	20	163	25	74	15	52	14	78	6

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students

Type of study	2019		2020		2021		2022		2023		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate	1405	123	1371	101	1223	85	968	57	955	64	5922	430
Master's ²⁰	793	81	731	76	727	79	601	54	494	39	3346	329
Doctoral	276	44	302	50	313	47	301	50	309	51	1501	242
Lifelong Learning Courses	60	57	431	170	120	39	183	61	311	110	1105	437
Total	2534	305	2835	397	2383	250	2053	222	2069	264	11874	1438

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

Table 3.1.5 - Study programmes in Czech/English

Type of study programme	Total ²¹ / Of which professional study programmes											
	2019		2020		2021		2022		2023		Total	
Undergraduate	6/2	0/0	6/2	0/0	6/2	0/0	9/1	0/0	11/1	0/0	38/8	0/0
Master's	18/2	0/0	26/5	0/0	27/5	0/0	26/4	0/0	24/3	0/0	121/19	0/0
Doctoral	2/1	0/0	12/1	0/0	14/3	0/0	17/5	0/0	19/7	0/0	64/17	0/0
Lifelong Learning courses	6/0	1/0	27/0	0/0	12 / 0	1/0	10/0	1/0	16/0	2/0	71/0	5/0
Total	30/5	1/0	71/8	0/0	59/10	1/0	62/10	1/0	70/11	2/0	294/44	5/0

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
1. Natural Sciences	1.1 Mathematics	5,09 %	Balanced basic and applied research	11,77 %
	1.2 Computer and information sciences	1,32 %	Balanced basic and applied research	
	1.3 Physical sciences	4,17 %	Basic Research	
	1.4 Chemical sciences	0,56 %	Basic Research	
	1.5 Earth and related environmental sciences	0,37 %	Applied Research	
	1.6 Biological sciences	0,06 %	Balanced basic and applied research	
	1.7 Other natural sciences	0,20 %	Balanced basic and applied research	
2. Engineering and Technology	2.1 Civil engineering	1,54 %	Balanced basic and applied research	85,89%
	2.2 Electrical engineering, Electronic engineering, Information engineering	7,57 %	Applied Research	
	2.3 Mechanical engineering	59,68 %	Balanced basic and applied research	
	2.4 Chemical engineering	2,18 %	Balanced basic and applied research	

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
	2.5 Materials engineering	10,28 %	Balanced basic and applied research	
	2.6 Medical engineering	0,61 %	Applied Research	
	2.7 Environmental engineering	3,33 %	Balanced basic and applied research	
	2.8 Environmental biotechnology	0,01 %	Applied Research	
	2.9 Industrial biotechnology	0,25 %	Applied Research	
	2.10 Nanotechnology	0,00 %	Zvolte položku.	
	2.11 Other engineering and technologies	0,44 %	Balanced basic and applied research	
3. Medical and Health Sciences	3.1 Basic medicine	0,02 %	Applied Research	0,86 %
	3.2 Clinical medicine	0,29 %	Applied Research	
	3.3 Health sciences	0,00 %	Zvolte položku.	
	3.4 Medical biotechnology	0,52 %	Applied Research	
	3.5 Other medical sciences	0,00 %	Zvolte položku.	
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries	0,01 %	Applied Research	0,01 %
	4.2 Animal and Dairy science	0,00 %	Zvolte položku.	
	4.3 Veterinary science	0,00 %	Zvolte položku.	
	4.4 Other agricultural sciences	0,00 %	Zvolte položku.	
	4.5 Other agricultural sciences	0,00 %	Zvolte položku.	
5. Social Sciences	5.1 Psychology and cognitive sciences	0,00 %	Zvolte položku.	1,50 %
	5.2 Economics and Business	1,24 %	Applied Research	
	5.3 Education	0,12 %	Applied Research	
	5.4 Sociology	0,00 %	Zvolte položku.	
	5.5 Law	0,14 %	Applied Research	
	5.6 Political science	0,00 %	Zvolte položku.	
	5.7 Social and economic geography	0,00 %	Zvolte položku.	
	5.8 Media and communications	0,00 %	Zvolte položku.	
	5.9 Other social sciences	0,00 %	Zvolte položku.	
6. Humanities and the Arts	6.1 History and Archaeology	0,00 %	Zvolte položku.	0 %
	6.2 Languages and Literature	0,00 %	Zvolte položku.	
	6.3 Philosophy, Ethics and Religion	0,00 %	Zvolte položku.	
	6.4 Arts (arts, history of arts, performing arts, music)	0,00 %	Zvolte položku.	
	6.5 Other Humanities and the Arts	0,00 %	Zvolte položku.	
Total		100 %	-	100 %

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

CTU FME is a well-known and respected entity in the research and professional community both in the Czech Republic, and in Europe and the world, which results on the one hand from tradition (it was founded more than 160 years ago and is among the oldest civil technical universities in the world), on the other hand from the high-quality research carried out by individual departments and teams of the faculty in their fields. Two researchers at CTU FME, in the monitored period were among the *World's Top 2% Scientist according to Stanford University*. Professor of CTU FME, Jan Macek, was awarded the *Gold medal of the 63rd International Engineering Fair* for his lifelong creative technical work and innovative achievements. Some of our exhibits were also awarded medals at various years of this fair. The leader of the team that created the S.A.W.E.R – the Solar air water earth resource, doc. Tomáš Matuška received the *Professional Award in Science* of the Federation of European Heating, Ventilating and Air-conditioning Associations, that represents 100,000 experts from 28 European countries. Our young colleagues and students were awarded the Werner von Siemens Prize or the Best Paper Award of ASME Turbo Expo 2019. CTU FME itself received the *Honorary Award of the jury for the Visionaries 2019* innovation competition for comprehensive support of socially beneficial applied research and implementation of innovations in the field of mechanical engineering.

Many of our academics serve on the editorial and scientific boards of international scientific journals and major scientific conferences. Many contribute to the quality of the publication peer review process as opponents in their specific fields.

CTU FME is a collective member of *ERCOTAC - a global association of research, education, and industry groups, supporting joint efforts of Research Institutes and Industries who are active in all aspects of Flow, Turbulence and Combustion* and *EIT Manufacturing - a public-private partnership, one of the nine Knowledge and Innovation Communities (KIC) supported by the European Institute of Innovation and Technology (EIT)*. Through the *Czech Society for Mechanics* and *Central European Association for Computational Mechanics (CEACM)*, we are collective members of the *European Community on Computational Methods in Applied Sciences ECCOMAS*. Academicians of CTU FME are members and work in other scientific and research (*The von Karman Institute for Fluid Dynamics, Federation of European National Statistical Societies FENStatS, Working Party on Mixing of the European Federation of Chemical Engineering, The Society for the Advancement of Material and Process Engineering SAMPE, Knowledge Center on Organic Rankine Cycle technology, International Union of Pure and Applied Chemistry*) and professional (*The international membership organization for the technology of mobility community FISITA, American Society of Heating, Refrigerating and Air-Conditioning Engineers ASHRAE, International Energy Agency, International Standardization Organization ISO ...*) institutions. In the Czech Republic, CTU FME is a member of national organizations

- the *Confederation of Industry* and the *Association of Small and Medium-sized Enterprises*. Recognition by the scientific community can also be illustrated by the fact that prominent academic staff are members of the highest bodies in several dozen national scientific, expert and professional organizations. During the monitored period, invited lectures by several foreign scientists and experts from both academic and non-academic institutions were held at CTU FME, as well as several of our colleagues gave lectures at partner institutions abroad. The topics of the lectures cover a wide range of mechanical engineering problems, from design, production technologies, process engineering, energy, biomechanics, to applied engineering mathematics, physics, and mechanics. CTU FME staff are members of bodies of institutions and agencies that provide support for science and research activities and participate in the evaluation of submitted projects and the progress of provided grants in the role of opponents, rapporteurs and members of evaluation panels or higher bodies of the institutions.

Distinguished professors and associate professors serve on scientific councils, professional advisory bodies, and councils of doctoral study programmes at domestic and foreign universities. Many experts also serve on advisory bodies of government ministries and other public organizations or boards of directors of foundations supporting science and research.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
Navid Aslfattahi, Ing., Ph.D.	Top 2 % Scientists Worldwide 2022 by Stanford University	Stanford University and Elsevier
Tomáš Matuška, doc. Ing., Ph.D.	Professional Award in Science	European Heating, Ventilating and Air-conditioning Associations REHVA
Jan Macek, prof. Ing., DrSc.	Gold medal of the 63rd International Engineering Fair 2022 for his lifelong creative technical work and innovative achievements	Confederation of Industry of the Czech Republic + BUT + Veletrhy Brno, a.s.
Matěj Sulitka, Ing., Ph.D.	Gold medal of the International Engineering Fair 2021 for Multifunctional grinder BUD100	Confederation of Industry of the Czech Republic + BUT + Veletrhy Brno, a.s.
Pavel Zeman, doc. Ing., Ph.D.	Bronze medal at the 15th International Fair of Inventions and Innovations INTARG Katowice 2022	International Federation of Inventors' Associations
Pavel Ditl, prof. Ing., DrSc.	Awarding a significant personality who contributed to the development of the chemical industry	Association of the Chemical Industry of the Czech Republic
P-D Refractories CZ a.s. + CTU FME	Industry 4.0 Award 2023	Confederation of Industry of the Czech Republic
Jan Čížek, doc. Ing., Ph.D.	Werner von Siemens Award for the Most Significant Result in Basic Research	Siemens
Marek Pátý, Ing.	Best Paper Award, ASME Turbo Expo 2019	ASME

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
CTU FME	Jury of innovation competition Visionaries 2019 honorary award for the comprehensive support of socially beneficial applied research and implementation of innovations in the field of mechanical engineering	CzechInno

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of scientific journal, ISSN
Navid Aslfattahi, Ing., Ph.D.	International Journal of Energy Research, ISSN: 1099-114X
Matej Daniel, prof. RNDr., Ph.D.	Scientific Reports, ISSN: 2045-2322 (online)
Michael Valášek, prof. Ing., DrSc.	Multibody system dynamics, ISSN: 1384-5640
Jan Hensen, prof. Dr. Ir.	Journal of Building Performance Simulation, ISSN: 1940-1493
Jan Papuga, Ing., Ph.D.	International Journal of Fatigue, ISSN: 0142-1123
Matej Daniel, prof. RNDr., Ph.D.	Journal of Mechanics, ISSN: 1727-7191 (Print), 1811-8216 (Online)
Michael Valášek, prof. Ing., DrSc.	Vehicle system dynamics, ISSN: 0042-3114
Jaromír Fišer, doc. Ing., Ph.D.	Kybernetika, ISSN: 0023-5954
Navid Aslfattahi, Ing., Ph.D.	Frontiers in Energy Research-Solar Energy, ISSN: 2296-598X
Pavel Zeman, doc. Ing., Ph.D.	MM Science Journal, ISSN: 1803-1269

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
Tomáš Bodnár, doc. Mgr. Ing., Ph.D.	Numerical Simulations of Johnson-Segalman Viscoelastic Fluids in Shear-Thinning Setting	Institute of Turbomachinery (ITU) at the University of Rostock / International Workshop on Flow-Induced Blood Damage in Rotating Systems 2022	2022
Tomáš Halada, Ing.	Smoothed Particle Hydrodynamics method and Template Numerical Library-a way to implement numerical methods	Max Planck Institute for molecular biology and genetics	2023
Václav Dostál, doc. Ing., Sc.D.	Effect of real gas properties on modelling of gas systems	Cambridge University/SAFE-G summer seminar on advanced modelling techniques	2023
Petr Špatenka, prof. RNDr., CSc.	Thermoplastics composites prepared by rotomolding technology	7th International Conference on Advanced Plasma Technologies (ICAPT-7)	2019

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
Michal Vojtíšek, prof. Ing., Ph.D.	Applying lessons learned from diesel exhaust to brake wear nanoparticle measurements and regulation	PAREMPI seminar, Lund University, Lund, Sweden	2023
Jan Papuga, Ing., Ph.D.	Responsible Fatigue Design of Components under Multiaxial Loading	Fatigue Design Conference 2023, Senlis, France	2023
Matej Daniel, prof. RNDr., Ph.D.	Additive manufacturing in medicine	National Taiwan University of Science and Technology	2023
Tomáš Vyhliďal, prof. Ing., Ph.D.	Time delay controllers and compensators for vibration suppression-neutrality, spectral design and applications	7th IFAC Symposium on Systems Structure and Control and 15th IFAC Workshop on Time Delay Systems, 9-11 September 2019, Sinaia, Romania	2019
Matěj Sulitka, Ing., Ph.D., FEng.	Digital twins of machines and processes for smart manufacturing (key note)	The Korean Society for Precision Engineering / International Conference on Precision Engineering and Sustainable Manufacturing (PRESM2023)	2023
Michael Valášek, prof. Ing., DrSc.	Mechatronic stiffness	GMMME2023 Global Meet on Mechanical and Mechatronics Engineering	2023

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year
Josezs Kovacs, prof.	McGill University, Canada	Task-Driven Dynamics and Modelling of Mechanical and Mechatronic Systems	2022
Raffaella Sesana, Ph.D.	Politecnico di Torino	Stresses And Thermal Effects: Engineering Research Applications	2019
Fabrizio Scala, prof.	Universita degli studi di Napoli Federico II	An Introduction to Fluidized Bed Combustion of Solid Fuels	2022
Lars Penter, Dr. Ing.	Technical University Dresden, Institut of Mechatronic Engineering, Chair of Machine Tools Development and Adaptive Controls	Measurement methods in forming machine acceptance tests	2023
Paolo Nespoli, MSc.	European Space Agency	Human Space Endeavours: Today, Tomorrow, After-Tomorrow, After-after Tomorrow	2023
Nejat Olgac, prof.	University of Connecticut, USA	Active Noncollocated Vibration Absorption	2022

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year
Mojtaba Ahmadi, prof.	Carleton University, Canada	Robotics and Controls with Application to both Aerospace, Biomedical, and Manufacturing	2022
Adam Nieslony, prof.	Opole University of Technology	Multiaxial Vibration Fatigue Analysis	2022
Gregor Primc, Assoc. prof., Ph.D.	Jozef Stefan Institute, Slovenia	Non-Equilibrium Plasma for Improving Surface Properties of Materials	2022
Nirupam Chakraborti, prof.	Indian Institute of Technology Kharagpur, India	Development of Evolutionary Data-driven Modeling Algorithms	2022

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the research project/programme call	Name of the contracting authority/guarantor of the project/programme call	Year
Jan Macek, prof. Ing. Dr.Sc.	Panel of Experts: EPSILON Panel No. 10	Technology Agency of the Czech Republic (TAČR)	2017-2021
Tomáš Vampola, prof. Dr. Ing.	Panel P101 (Mechanical engineering)	Czech Science Foundation (GACR)	2019-2023
Tomáš Vyhlídal, prof. Ing., Ph.D.	Panel P101 (Mechanical engineering)	Czech Science Foundation (GACR)	2019-2020
Antonín Kříž, prof. Dr. Ing.	Jan Amos Comenius Operational Programme - 1.1. Development and strengthening of research and innovation capacities and introduction of advanced technologies 1 - Research and development. Chairman of the evaluators' committee.	Ministry of Education, Youth and Sports	2023-2025
Jiří Plešek, Ing., CSc.	Member of the board of Technology Agency of the Czech Republic	Technology Agency of the Czech Republic (TAČR)	
Miroslav Španiel, doc. Ing., CSc.	Panel of Experts: THETA Panel No. 3	Technology Agency of the Czech Republic (TAČR)	2019-2023
Matej Daniel, prof. RNDr., Ph.D.	Panel P108 (Organic materials and biomaterials science and engineering)	Czech Science Foundation (GACR)	
Jan Hošek, prof. Ing., Ph.D.	National Sustainability Program I (member of the agency's evaluation body)	Ministry of Education, Youth and Sports	2021

Name, surname and title(s) of the evaluated unit's staff member	Name of the research project/programme call	Name of the contracting authority/guarantor of the project/programme call	Year
František Hrdlička, prof. Ing., CSc.	Member of the supervisory board of agencz	Czech Science Foundation (GACR)	2022-2025
Jan Hrdlička, prof. Ing., Ph.D.	Clean Energy Transition Partnership	European Commission	2022-2023

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the period of 2019–2023²³. This should be done from the full list in annex tables (Table 3.3.1–3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

Bozek Vehicle Engineering National Center of Competence – BOVENAC (2023-2028) a **Josef Bozek National Center of Competence for Surface Vehicles** - (JOBNAC) (2019-2022) are applied research projects in the program of National Centers of Competence of the Czech Republic, whose main goal and benefit is the research and development of means of sustainable mobility by road and rail vehicles and their integration into transport systems. Both projects follow each other in the monitored period, their main investigator is the FS CTU, and they operate as consortia of >30 entities that use the synergy between related fields with similar development problems as well as the synergy of cooperation between academic (TUL FS, UPCE DFJP, VŠB FS, BUT FS, UČU FS UK), research (VÚKV, VZÚ, ...) and industrial (e.g., Škoda Auto a.s., ŠKODA TRANSPORTATION a.s., Garrett Motion Czech Republic s.r.o., Siemens Mobility, s.r.o., Eaton Elektrotechnika s.r.o., ...) partners, and are focused on crucial problems applicable to the market of future means of transport and sustainable mobility. Research and development responds to changes in the vehicle industry in trends of environmental friendliness and competitiveness of purpose-optimized products in the areas of: Electrification of vehicles at various levels; Digitization of research in key technologies (KET) covering thermodynamic, aerodynamic, mechanical, electrical and control areas in combination with testing of individual innovations and entire systems; IT tools for connecting vehicles with mobility and autonomous driving systems; Environmental friendliness of vehicles throughout their life cycle; Competitiveness of final products on global markets; HMI with AI impact and communication in V2X systems; Life cycle analyses of new vehicle concepts. Of the 265 results registered in the national NCCJB database, academic institutions

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

are the originators of 240. 128 of these results come from the FS CTU, of which 11 articles, 23 software, 16 functional samples (e.g., Optimized gas ICE for vehicle decarbonization), 48 articles in proceedings. One European patent application was filed within the center, one habilitation was defended, two doctoral theses were defended, and four invited lectures were delivered.

Center of electron and photonic optics-CEPO (2018-2022) and **Centre of Advanced Electron and Photonic Optics – CAEPO** (2023-2028) are consecutive projects of applied research (NCC 1,2 programme of TACR) dealing with R&D and technology transfer in electron microscopy and lithography, optical microscopy and spectroscopy, laser and fiber technologies, optical and quantum metrology, ultraprecise optical manufacturing and sophisticated optical systems. The main participant of both centres is Institute of Scientific Instruments of CAS. It unites 15 key academic (CTU FME, CTU FCE, BUT CEITEC, MU CEITEC, UP PF), research (institutes of CAS, ...) and industrial (Meopta s.r.o., Compo Tech PLUS, spol. s r.o., ...) players in Czech Republic.

Faculty has participated in the subproject "Advanced Design of Opto-Mechanical Systems". This subproject focuses on the design of diffraction-limited optical assemblies with advanced mechanical design and sub micrometer precision positioning of optical components. We are developing methods for simulations of optical and mechanical components (parasitic stress in optics, prediction of aberrations from temperature, vibrational behaviour of assemblies). Other activities focus on stress-free mounting of optics, coupling of optics to mechanics by soldering, high-precision positioning, automation of alignment, reduction of vibration effects, and application of composite materials in the support structures of opto-mechanical assemblies.

FME contributed: Functional sample *Active vibration suppression* that was later applied in utility model *A feedback system for the active compensation of vibrations of Twyman-Green interferometer*; Functional sample *Centred turning head* enabling to increase the current production of milled and short lenses preserving manufacturing quality. New generation - *2DOF Rotary Tilting Adjustment Fixture* was recently developed; Verified technology *Adaptive control system for active absorption implemented on the low-cost control hardware platform*; A methodology focused on replacement of classical structural frames from granite or isotropic metals with composite or hybrid composite – metal ones, that potentially reduces weight while maintaining or improving the frame dynamic behaviour.

The **National Centre of Competence ENGINEERING - NCCE 1** (2019-2022) and NCCE 2 (2023-2028) are consecutive projects of applied research (NCC 1 program of TACR) focused on research and development activities necessary for enhancing the competitiveness of the Czech (mechanical) engineering companies within the segment of manufacturing and light industries by increasing the performance and precision of machines and equipment, energy consumption reduction, material consumption decreasing, production processes automation, environmental impact reduction and, digitalization of processes within Industry 4.0 principles.

NCCE united 33 academic (ČVUT FS, ZČU FS, TUL FS, VŠB FS, VUT FSI) and industrial (TAJMAC-ZPS, a.s., TOS VARNSDORF a.s., Wikov Gear s.r.o., ...) subjects, with the main participant - R&D company VÚTS, a.s. In the scope of the Centre were delivered totally 158 results, 28 particularly by FME CTU mainly in the fields of machine tool design, control and operation, green and digital transformation in machine tools. FME CTU in Prague was involved in 10 sub-projects. The major volume of applied results (prototypes, functional samples, verified technologies) and their subsequent market implementation means a kind of technology transfer with related financial benefit for CTU FME. The minor volume of results are journal publications publishing selected principles and novel findings. Example functional sample *Machining Centre Thermal Error Compensation with Automatic Recalibration* embodies approximation of spindle rotation impact regarding both heating and cooling phases and ambient temperature changes influence using software compensation model based on transfer functions and inter-process calibration. The model is part of control system extension TOS Control, that highlights the high level of the research finalized with the applied results. Intensive close collaboration with five

leading companies also provides additional inputs and experience to improve collaboration with other companies within production engineering in the Czech Republic and in foreign countries.

The [National Competence Center for Mechatronics and Smart Technologies for Mechanical Engineering](#) MESTEC is focused on the areas of Advanced Materials, Additive Technologies, Mechatronics, Transport Phenomena and Energy, Tribology and Surfaces, Energy-Saving Technologies and Materials for Sustainable Development. It combines multidisciplinary research specializations (construction, mechanics, electrical engineering, chemistry, biology, sensors, materials engineering, virtual design, etc.) directed towards three interconnected technological areas (new materials, virtual design and prototyping, mechatronics and control) primarily aimed at mechanical engineering for the 21st century. In the period 2019 - 2022, the centre consisted of the workplaces of 6 research organizations and 19 companies, successfully fulfilled its research agenda and was extended for the period 2023-2028. Currently it consists of 5 research organizations and 25 companies. Activities have been organized as particular research projects between a research organization and an industrial enterprise.

The main beneficiary of the project is BUT Brno, CTU is in the position of another participant.

The CTU FME participated in the field of advanced functional materials, the projects of which represented a combination of three different approaches to new and at the same time practically applicable materials and their processing methods. Individual topics (electrically conductive plastics, biomaterials and semi-intelligent composite containers) are aimed at the use of renewable resources, increasing efficiency, material utilization and extending their functionality.

As well CTU participated in the field of mechatronics. The particular projects were focused on mechatronic vibration control, both for efficient vibration generation for vibration testing and for efficient vibration damping to accelerate production cycles, and on various uses of artificial intelligence in 21st century industry. One use is to monitor the flawless progress of a production process, and the second use is to use artificial intelligence to recognize, classify and reuse production documentation from the archives of industrial companies.

The [Center for Advanced Aerospace Technologies - CAAT](#) (2017-2022) was established in the call for Excellent Research from ESIF funds as a center of international excellence engaged in problem-oriented interdisciplinary research in the field of simulation of degradation processes of individual components and their influence on the functionality of aircraft engines and aircraft structures with an original practical impact in the form of experimental development of parts of a new turboprop engine and their assembly into a functional unit achieving parameters that overcome recent ones in a given performance category.

The goal of the project is to develop service life monitoring systems for the individual engines and entire aircraft, extending their life cycle, functionality, safety, and economic efficiency. The main areas of research included both effective modeling and effective data processing and use, and the new production technologies. Specifically, it was the development of degradation processes effective simulation and lifelong monitoring of the functionality of aircraft structures methods, and the development of new materials and procedures for the production, assembly, and maintenance of components and assemblies of aircraft structures.

The building of a test facility system that allows integral testing of aircraft engines (core test facility, dynamometric test facility, two propeller test facilities, and an experimental aircraft as a flying test facility) was the demanding part of the project as well as purchasing experimental engines on which research and development was conducted. To meet this, the CTU FME established a collaborative research cooperation agreement with GE Aviation Czech, providing knowledge and completing the development of the new Catalyst turboprop engine during the project period. The main beneficiary of the project was FME CTU, the only other participant was BUT Brno. The project involved most FME departments, covering a wide range of technologies needed for new aircraft engines.

The [Research centre for low-carbon energy technologies](#) – BIO-CCS/U is the only integrated research platform in the Czech Republic that systematically focusses on the CCS/CCU technologies with a special emphasis on biomass as the primary energy source. The centre is coordinated by the Faculty of Mechanical Engineering of the CTU and integrates three departments - Energy Engineering, Process Engineering, and Environmental Engineering. Several other research institutions are involved. Within the CTU it is the Faculty of Nuclear Sciences and Physical Engineering, and outside the CTU it is Brno University of Technology, VŠB-Technical University Ostrava, and Institute of Thermomechanics of the Czech Academy of Sciences. Members of the research Teams were experts from abroad, e.g. TU Wien (Austria), University of Naples Federico II (Italy), Wroclaw University of Science and Technology (Poland), Lodz University of Technology (Poland), University of Limerick (Ireland) or TU Dresden (Germany). Energy research activities are coupled with oxyfuel combustion technology. One of the most significant achievements of the centre is the development and completion of the experimental oxyfuel fluidized bed combustion system. It is a technology that allows to obtain highly concentrated CO₂ from energy conversion of biomass within a single process. In the fluidized bed, oxyfuel combustion technology is investigated further sub-processes focusing on the separation of unwanted components in the CO₂ in order to retain its quality for further utilisation. An integral part of the centre's focus are activities for optimisation of oxygen production for the oxyfuel system and investigation of the CO₂ utilisation processes in the biorefinery concept, like catalytic conversion to methane or methanol, or its application in photobioreactors. These activities are also strongly experimentally based and are supported by numerical simulations that are used for modelling of the individual processes and their optimisation. At the Faculty of Mechanical Engineering, the project results were published in more than 100 articles in peer-reviewed journals and several patents were filed.

The [Mechanical engineering of biological and bio-inspired systems](#) – MeBioSys (2023-2028) project was established in the call for Excellence in Research from ESIF funds, the JAK operational program. The main contribution is the development of new technologies for mechanical engineering as a convergence of biological and technological evolution. The aim is to achieve progress in the research and development of a new generation of technological, manufacturing and material solutions for demanding engineering applications with high added value. The research agenda consists of two research plans dedicated to bioinspired mechatronic systems in materials (development of materials based on theoretical approaches and bioinspiration, superlubricity of machine elements inspired by biosystems, development of SMART material structures and bioinspired metamaterial systems) and mechatronic systems for biomedical engineering (hybrid and composite biomaterials, modification and nanostructuring of biomaterial surfaces, mechatronic systems for biomedicine).

The main beneficiary of the project is BUT Brno, CTU is in the position of another participant together with 5 research organizations, the investigator is the Department of Mechanics, Biomechanics and Mechatronics, where biomechanics and mechatronics are combined. The CTU participates in the development of mechatronic systems for biomedical engineering. Research is being carried out on systems with distributed actuators and sensors. It is used to develop biomechatronic systems using distributed actuators and sensors in layers of artificial veins with actively controlled stiffness, including actuation for research on blood circulation and the function of artificial lungs. Specifically, the design of a new peristaltic pump as an actively controlled tubular biomechatronic structure and the development of advanced methods for its control are being carried out so that it achieves the optimal physiological shape of the pressure and flow wave in the patient's extracorporeal blood circulation depending on his current condition.

The [You can also reduce emissions](#) – uCARE (2019-2022) is a project funded by the European Union (H2020, Programme Societal challenges - Smart, Green And Integrated Transport) with the aim to reduce the overall pollutant emissions of existing combustion engine vehicles by providing drivers with simple and effective tools to decrease their individual emissions. It also supported those interested in local air quality in selecting feasible intervention strategies that lead to reduced emissions.

The uCARE united 13 academics (AUTH, TU Graz, Empa, VUB, CTU, University of Leeds, TsingHua University), research (IVL, VTI ICCT), and private subjects, with the main participant – research organisation TNO. Project delivered totally 31 results, mainly documents and reports. prof. Vojtíšek from CTU FME was leading author of all 5 peer-reviewed articles.

Contribution of the FME CTU in Prague was in real-world emissions measurements using portable measurement systems and in transferring the results into practical recommendations. It included topics: Effect of driving conditions on nanoparticles from brake wear the emissions of which are becoming important. A combination of high initial speed and high deceleration rate has resulted in especially high emissions; Citizen science measurements of NO₂ concentrations in urban air; On-road detection of high NO_x emitters to examine (by using FTIR analyzer to remotely measure NO_x emissions from over 250 trucks traveling on the D1 motorway during one week) the extent of the manipulation of SCR systems; On-road measurement of emissions of key reactive nitrogen species using a portable FTIR analyzer; Measurement of real-world emissions from diesel locomotives and railcars; Measurement of real-world emissions of mopeds and small motorcycles; Low-cost instrumentation for testing presence and integrity of diesel particle (less than 100 EUR), has been designed as an alternative to the measurement of non-volatile particle number (nvPN) in a diploma thesis.

The [Innovative Demonstrator for hybrid-Electric Regional Application](#) - AMBER project was created under the Clean Aviation call as an ambitious EU Horizon project, with the main benefit being the development of a hybrid aircraft propulsion demonstration to reduce the environmental impact of aviation.

The AMBER project aims to develop, integrate, and validate key technologies necessary for a megawatt class hybrid electric propulsion system powered by hydrogen fuel cells.

The Clean Aviation project will study the integration of hybrid electric components - including a fuel cell engine/generator, power converters, power transmission systems with the advanced GE Catalyst turboprop engine. The architecture is assumed to be parallel hybrid configuration of a turbine and an electric engine with a common propeller propulsion.

A hybrid-electric propulsion system for regional aircraft is seen as a promising step towards a more sustainable aviation industry. The EU-funded AMBER project will address the challenge of climate change and will seek to mature, integrate and validate key technologies necessary for a megawatt-class hybrid electric propulsion system powered by hydrogen fuel cells. This will significantly reduce greenhouse gas emissions and fuel consumption by at least 50% compared to state-of-the-art regional aircraft by 2020.

The main contribution of CTU to the AMBER project is the modification of the propeller test cell and the testing of the hybrid drive demonstrator. The first phase of testing is the power supply of the electric motor from the electrical network and in the second phase its power supply with a hydrogen fuel cell. In addition, CTU is involved in the simulation optimization of the concept of the entire hybrid aircraft drive.

The main beneficiary of the project is Avio Aero, CTU is in the position of another participant together with 20 research organizations and industrial enterprises. The investigator is the CTU FME Center for Aviation and Space Research.

Collaboration of CTU FME with Škoda auto a.s. - examples of contract-based R&D:

a) Research of efficient Cooling of Automotive Components Using Synthetic Jets found that selected components used in the automotive environment can be cooled using synthesized flows with higher efficiency than using standard fans. Moreover, it is a solution without rotating parts with lower production costs and lower failure rates. The results were experimentally verified.

b) Methods of categorization of road dust for the purpose of vehicles air filters have been validated, and other simpler methods have also been proposed and tested.

- c) Compilation and evaluation of measurements made by Skoda-Auto personnel on test tracks in Spain, the U.S.A., Russia and India have been done at the same time resulting in 6 reports, 3 articles in progress and one diploma thesis that has received the highest award of the VW group.
- d) Ensuring the modification of the intake system of hybrid cars to meet the GILSCH test focused on the separation of droplets generated by the previous car on wet roads. The reasons for the failure of the test were investigated and a new element for the separation of droplets, which can be easily fixed in the intake system, was developed. Explanation of the phenomena that occurs when a car enters water, e.g., a ford, because of a water hammer.
- e) Research into the weldability of deep-drawing and high-strength steel sheets used for the production of automotive body components, in particular by resistance spot welding and of LITECOR sandwich material, consisting of two steel sheets (HC220Y + ZE), between which a polymeric material (PE / PA) is placed.
- f) The research of the formability of LITECOR® sandwich material mainly focused on bending behavior, deep drawing, and cohesion of surface sheet with a plastic core.

Table 3.3.1 Projects supported by public funds

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
TA CR	Additive manufacture of high value joint replacement ? reliability, performance, individuality (2016–2019)	2290 / 90336	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Precise initialization of water turbine blade geometry using panel methods and vortex wake (2017–2019)	2046 / 80711	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Optimization and testing of unmanned aerial vehicles of new concepts (2017–2019)	2636 / 103985	610 / 24064	0 / 0	0 / 0	0 / 0
TA CR	Development of a unit for recovering waste heat from extrusion and pressing of oilseeds (2017–2019)	795 / 31361	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	NOx reduction by SNCR for bubbling fluidized bed boilers (2017–2019)	1217 / 48008	0 / 0	0 / 0	0 / 0	0 / 0

²⁵ If the provider is from abroad, please indicate the provider's country of origin in brackets. For the determination of the country of origin of the provider, the place of residence of the provider is decisive.

²⁶ Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
TA CR	Study of influence of surface treatment of polymers and metals on strength of polymer-metal joints with potential use in composite systems (2018–2019)	1326 / 52308	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Managing migration with a special focus on Ukraine as a tool for reducing the workforce deficit and increasing the competitiveness of Czech industry (2018–2020)	2713 / 107022	2008 / 79212	0 / 0	0 / 0	0 / 0
TA CR	Local sources of heat and electricity in the municipal environment with possibility of island mode operation (2018–2025)	2739 / 108048	2803 / 110572	2888 / 113926	2964 / 116924	3047 / 120198
TA CR	Research and development of advanced boiler for non-wooden biomass II (2018–2022)	2930 / 115582	2948 / 116292	2950 / 116371	1635 / 64498	0 / 0
TA CR	Development and verification of sonic thermal metallic spraying to extend the service life of components of incinerators, heating plants and power plants for their intended lifetime (2019–2021)	2688 / 106036	2699 / 106470	2739 / 108048	0 / 0	0 / 0
TA CR	Development of tools for optimal building demand response to smart grid requirements and their economical and environmental impact (2019–2022)	1119 / 44143	2660 / 104931	2432 / 95937	1280 / 50494	0 / 0

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
TA CR	Increasing the Effectiveness of Rotary Regenerative Heat Exchangers (2019–2022)	927 / 36569	1413 / 55740	1391 / 54872	682 / 26904	0 / 0
TA CR	Latent Thermal Energy Storage in the form of heat or cold within intra-day applications (2019–2025)	1853 / 73097	3444 / 135858	2684 / 105878	2276 / 89784	2283 / 90060
TA CR	Bragg grating based measurement devices for transport infrastructure monitoring (2020–2022)	0 / 0	1711 / 67496	2780 / 109665	867 / 34202	0 / 0
TA CR	Thermodynamic model of thermal cycles of fusion power plants with gas-cooled reactor (2020–2025)	0 / 0	1317 / 51953	3754 / 148087	3738 / 147456	3456 / 136332
TA CR	Low-emission technologies of energy conversion of biomass and alternative fuels (2020–2025)	0 / 0	666 / 26273	4362 / 172072	5143 / 202880	5633 / 222210
TA CR	Optimised expanders for small-scale distributed energy systems (2020–2024)	0 / 0	0 / 0	4405 / 173768	15757 / 621578	13670 / 539251
TA CR	Tool for assessment of personal characteristics and external factors to improve efficiency and collaboration of the team during a long-time stay in “Integrated Collaboration Environment (ICE)” (2021–2023)	0 / 0	0 / 0	2583 / 101894	4010 / 158186	1205 / 47535
TA CR	Utilization of condensing heat from flue gases of biomass boilers (2022–2025)	0 / 0	0 / 0	0 / 0	1362 / 53728	1707 / 67338
TA CR	Methodology for smart thermal grid	0 / 0	0 / 0	0 / 0	1949 / 76884	3513 / 138580

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
	planning: exemplary scenarios and coordination tools for Power2Heat system integration at the municipal level (2022–2024)					
TA CR	Development of a new generation of rotary regenerative heat exchanger (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	1606 / 63354
TA CR	Research of additive methods for corrosion and deposit suppression in biomass-fired fluidized bed boilers (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	1418 / 55937
TA CR	Developing tool for prediction and verification of safety and endurance of small arms during impact tests (2017–2019)	478 / 18857	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Innovative in-line CNC woodworking centers, including automatic multifunctional cell. (2017–2020)	3200 / 126233	2010 / 79290	0 / 0	0 / 0	0 / 0
TA CR	Competence Center - Manufacturing Technology (2012–2019)	26560 / 1047732	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Advanced technologies for heat and electricity production (2012–2019)	20917 / 825129	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Josef Bozek National Center of Competence for Surface Vehicles (2019–2022)	53259 / 2100947	78833 / 3109784	48355 / 1907496	20936 / 825878	0 / 0
TA CR	Božek Vehicle Engineering National Center of Competence (2023–2028)	0 / 0	0 / 0	0 / 0	0 / 0	101279 / 3995227

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
TA CR	Functional materials (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	61264 / 2416726
TA CR	Applied molecular genetics and biology - IMG (2020–2021)	1050 / 41421	0 / 0	0 / 0	0 / 0	0 / 0
Min Int CR	Protection of persons against explosion (2018–2021)	2678 / 105642	2656 / 104774	1756 / 69271	0 / 0	0 / 0
Min Health CR	Additive manufacturing of NiTi alloys for applications in orthopaedics and traumatology (2023–2026)	0 / 0	0 / 0	0 / 0	0 / 0	3942 / 155503
Min Health CR	Use of lymphocytes of hypersensitive patients for preclinical testing of advanced titanium-based materials modified by ion beam (2019–2022)	1716 / 67693	3245 / 128008	3027 / 119409	2300 / 90730	0 / 0
Min Edu Youth Sports CR	Development of Vehicle Centre of Sustainable Mobility (2014–2019)	7404 / 292072	0 / 0	0 / 0	0 / 0	0 / 0
Min Edu Youth Sports CR	Bioresorbable materials for additive manufacturing of vascular replacements and their biomechanical characterization (2022–2025)	0 / 0	0 / 0	0 / 0	479 / 18896	995 / 39251
Min Edu Youth Sports CR	Estimation of fatigue life from thermal measurements of additively manufactured samples with the application of artificial intelligence to reduce the costs (2022–2024)	0 / 0	0 / 0	0 / 0	229 / 9034	486 / 19172
Min Edu Youth Sports CR	A generative design method for support structures subject to extreme stiffness requirements and uncertain boundaries:	0 / 0	0 / 0	0 / 0	151 / 5957	604 / 23827

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
	application to the Future Circular Collider (FCC), CERN (2022–2024)					
GA CR	Active multidimensional vibration absorbers for complex mechanical structures based on delayed resonator method (2017–2019)	1816 / 71638	0 / 0	0 / 0	0 / 0	0 / 0
GA CR	Effect of axial prestretch on mechanical response of nonlinearly elastic and viscoelastic tubes (2018–2020)	1261 / 49744	1119 / 44143	0 / 0	0 / 0	0 / 0
GA CR	Modelling and measurements of fluid-structure-acoustic interactions in biomechanics of human voice production (2019–2021)	2579 / 101736	2561 / 101026	2600 / 102565	0 / 0	0 / 0
GA CR	Mechatronic tensegrities for energy efficient light robots (2020–2022)	0 / 0	1847 / 72860	2749 / 108442	2662 / 105010	0 / 0
GA CR	Model of fibre segregation in dependence on rheological properties of fresh HPC (2021–2023)	0 / 0	0 / 0	2070 / 81657	2366 / 93334	2139 / 84379
GA CR	Active non-collocated vibration absorption for robots and mechanical structures (2021–2023)	0 / 0	0 / 0	2302 / 90809	2544 / 100356	2571 / 101421
GA CR	Life assessment of mechanical components under multiaxial thermo-mechanical loading with variable amplitude (2021–2023)	0 / 0	0 / 0	2086 / 82288	1867 / 73649	1860 / 73373

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
GA CR	Functionally biomimetic exoskeleton of human upper limb for selective muscle augmentation (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	2425 / 95661
GA CR	Procedure for fatigue estimation in contacts: Local multiaxial analysis of stress-related and tribological effects (2023–2026)	0 / 0	0 / 0	0 / 0	0 / 0	1485 / 58580
ESF through Prague Municip	Large-volume transport and temporary storage of mixed municipal waste (2018–2019)	5020 / 198028	0 / 0	0 / 0	0 / 0	0 / 0
ESF through Min Edu Youth Sports CR	Center of Advanced Aerospace Technology (2016–2022)	41045/1619133	97385/3841618	153726/6064143	0 / 0	0 / 0
ESF through Min Edu Youth Sports CR	Modernization of laboratory classes in Bachelor's and Master's degree programs CTU in Prague (2017–2021)	82005,4984 / 3234931	27256,08704 / 1075191	28805,19612 / 1136300	27478,04756 / 1083947	0 / 0
ESF through Min Edu Youth Sports CR	Research centre for low-carbon energy technologies (2018–2022)	130400/5143985	50000/1972387	57198/2256332	39952/1576016	0 / 0
ESF through Min Edu Youth Sports CR	Machine Tools and Precision Engineering (2019–2022)	16000/631164	18000/710060	18000/710060	3852 / 151953	0 / 0
(other foreign provider)	Young Manufacturing Leaders (2022–2022)	0 / 0	0 / 0	137 / 5405	439 / 17318	369 / 14557
Total		422668 / 16673291	307192 / 12118002	355780 / 14034695	146919 / 5795596	216957 / 8558472
In the role of another participant						
Provider ²⁷	Project name	Support (in thousands CZK/EUR)				

²⁷ Ibid.

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
		2019	2020	2021	2022	2023
TA CR	High-speed and lightweight reducer of Electric Vehicle using composite materials (2017–2019)	3264 / 128758	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Development of new technology for common application of electrophoretic paint systems (2017–2019)	797 / 31440	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Turbine profile cascades for supersonic flow fields (2017–2020)	746 / 29429	746 / 29429	0 / 0	0 / 0	0 / 0
TA CR	Implementation of multi-physics numerical analysis into the development process opto-mechanical systems (2016–2020)	1841 / 72624	810 / 31953	0 / 0	0 / 0	0 / 0
TA CR	Advanced Analytical Tools for Severe Accident Simulations (2017–2020)	520 / 20513	520 / 20513	0 / 0	0 / 0	0 / 0
TA CR	Innovation of key structural nodes of water turbine (2017–2019)	1240 / 48916	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Modeling of CHF-boiling crisis by using CFD computer codes (2017–2019)	1000 / 39448	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Research of NOx reduction in flue gas within the oxyfuel combustion CCS technology (2017–2020)	1714 / 67614	1805 / 71204	0 / 0	0 / 0	0 / 0
TA CR	POLYBET - Development of technological line for waste thermoplastic and recycled	465 / 18344	0 / 0	0 / 0	0 / 0	0 / 0

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
	construction waste recovery for production of polymer concrete building components (2017–2019)					
TA CR	Sensor for measuring of operational parameters of deep core drilling (2017–2019)	1207 / 47614	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	High performance polymer implants with bioactive surface (2017–2020)	1750 / 69034	1775 / 70020	0 / 0	0 / 0	0 / 0
TA CR	Intelligent diagnostic unit of street lighting poles (2017–2019)	750 / 29586	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Advanced system for vehicle rear view monitoring with protection against damage and dirt (2017–2019)	1510 / 59567	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Headstock HS180 for horizontal boring machines (2017–2019)	372 / 14675	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Increase of multi-functional turning machining centre accuracy (2017–2020)	2040 / 80474	2070 / 81657	0 / 0	0 / 0	0 / 0
TA CR	Robotic machine head (2017–2020)	2454 / 96805	546 / 21539	0 / 0	0 / 0	0 / 0
TA CR	UL-LSA STOL class aircraft „KITPLANE“ – development, prototyping and testing of novel aircraft (2017–2020)	980 / 38659	322 / 12703	0 / 0	0 / 0	0 / 0
TA CR	Acoustic optimization of induced draft cooling towers (2017–2020)	1910 / 75346	647 / 25523	0 / 0	0 / 0	0 / 0
TA CR	The development of new generation of devices for long-bone	1383 / 54557	1347 / 53137	1331 / 52505	0 / 0	0 / 0

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
	osteosynthesis (2018–2021)					
TA CR	Novel ways to dry extruded feeds (2018–2021)	1300 / 51283	1300 / 51283	1300 / 51283	0 / 0	0 / 0
TA CR	Truboprop engine performance improvement via development of advanced finishing technologies (2018–2019)	1529 / 60316	1276 / 50336	0 / 0	0 / 0	0 / 0
TA CR	Landfills leachate water reduction (2018–2020)	1530 / 60356	960 / 37870	0 / 0	0 / 0	0 / 0
TA CR	Research and development of the electroformed biomimetic materials with gradient and composite composition for biomedical applications and smart manufacturing (2018–2019)	651 / 25681	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Gradient functionally structured hip implant with a long life span (2018–2021)	906 / 35740	906 / 35740	906 / 35740	0 / 0	0 / 0
TA CR	Development & Validation of Control Algorithms of High Speed Electric Machines (2018–2020)	840 / 33137	780 / 30770	0 / 0	0 / 0	0 / 0
TA CR	Conditions and resources for the sustainable development of the quality of working life in the Czech Republic in the era of the emerging industrial revolution (2018–2021)	457 / 18028	457 / 18028	207 / 8166	0 / 0	0 / 0

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
TA CR	Gyroscopic Simulator of Vehicle Crashes (2018–2019)	740 / 29192	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Epicyclic Continuously Variable Transmission (2018–2020)	750 / 29586	500 / 19724	250 / 9862	0 / 0	0 / 0
TA CR	Efficiency Increasing of Turbine Wet Steam Last Stages (2018–2021)	5098 / 201105	5596 / 220750	2600 / 102565	0 / 0	0 / 0
TA CR	Reduction of Hg, HCl and HF concentrations from large industrial sources (2018–2020)	1420 / 56016	1383 / 54557	0 / 0	0 / 0	0 / 0
TA CR	Conceptual design of safety-important components of helium-cooled fast demonstration reactor ALLEGRO (2018–2025)	1316 / 51914	1401 / 55267	1417 / 55898	1425 / 56214	1490 / 58778
TA CR	Optimal use of renewable energy sources in transport (2018–2020)	223 / 8797	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Design of mixer optimized for water purification and water treatment processes (2019–2020)	1027 / 40513	1313 / 51795	0 / 0	0 / 0	0 / 0
TA CR	3D PRINTER OF BUILDINGS AND OTHER PREFABRICATED COMPONENTS IN THE FRAMEWORK OF CONSTRUCTION 4.0 (2019–2021)	2541 / 100237	2115 / 83432	1420 / 56016	0 / 0	0 / 0
TA CR	3D PRINTER OF BUILDINGS AND OTHER PREFABRICATED COMPONENTS IN THE FRAMEWORK OF CONSTRUCTION 4.0 (2019–2021)	2541 / 100237	2115 / 83432	1420 / 56016	0 / 0	0 / 0
TA CR	Automatic ultrasonic manipulator for	1636 / 64537	1485 / 58580	1343 / 52979	0 / 0	0 / 0

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
	inspection of composite material defects (2018–2021)					
TA CR	The preparation of a TiNbTa powder alloy designated for manufacturing of joint implants with trabecular osseointegration surface by the 3D printing (2019–2022)	598 / 23590	900 / 35503	929 / 36647	900 / 35503	0 / 0
TA CR	Advanced actuation system for VT - Valvetrain with electro-mechanical actuation (2018–2022)	1596 / 62959	1155 / 45563	2466 / 97279	2296 / 90572	0 / 0
TA CR	Car door limiter with integrated door protector (2019–2021)	1467 / 57870	1482 / 58462	1539 / 60711	0 / 0	0 / 0
TA CR	Means of safety of road transport vehicles, infrastructure and processes, automation methods of traffic information validation (2019–2022)	1792 / 70691	5927 / 233807	5792 / 228482	1420 / 56016	0 / 0
TA CR	Development of integrated joints of composite profiles (2019–2021)	1566 / 61776	1769 / 69784	512 / 20198	0 / 0	0 / 0
TA CR	Energy Well - Design solution for a demonstration unit of a small modular reactor cooled by fluoride salts (2019–2024)	600 / 23669	1200 / 47338	1171 / 46194	1200 / 47338	1174 / 46312
TA CR	Development of a new ceramic chimney pipes joint system (2020–2022)	0 / 0	1519 / 59922	1519 / 59922	1519 / 59922	0 / 0
TA CR	Development of shape complicated pressing tools production technology (2020–2022)	0 / 0	1238 / 48837	1238 / 48837	1238 / 48837	0 / 0

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
TA CR	Additively Fabricated Polymer-Metal Composites for Biomedical Applications and Smart Manufacturing (2020–2022)	0 / 0	677 / 26707	677 / 26707	339 / 13373	0 / 0
TA CR	Development of connecting rods with threaded end-pieces (2020–2022)	0 / 0	1523 / 60079	1783 / 70336	1583 / 62446	0 / 0
TA CR	Development of Beta-Titanium based individual implants produced by Additive Manufacturing processes (2020–2022)	0 / 0	941 / 37121	1897 / 74833	2063 / 81381	0 / 0
TA CR	Hybrid Diesel-Electric powertrain for mining suspended monorail locomotive (2020–2023)	0 / 0	2849 / 112387	4207 / 165957	4373 / 172505	2065 / 81460
TA CR	Application possibilities of the multifunctional grinding machine BUD 100 (2020–2023)	0 / 0	4040 / 159369	4414 / 174123	4555 / 179685	4573 / 180395
TA CR	Development of spindle head with increased parameters (2020–2022)	0 / 0	1796 / 70849	1424 / 56174	1486 / 58620	1248 / 49231
TA CR	Containerizing of planting stock of forest trees using the PostCont technological system (2020–2023)	0 / 0	1986 / 78344	1493 / 58896	1176 / 46391	976 / 38501
TA CR	Conceptual Design of an Innovative Safety System for Gas-cooled Nuclear Reactors (2020–2024)	0 / 0	555 / 21894	2287 / 90217	2285 / 90139	2274 / 89705
TA CR	Spindle units with condition monitoring (2020–2022)	0 / 0	518 / 20434	1496 / 59014	1646 / 64931	833 / 32860

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
TA CR	Energy utilization of brownfield sites in Usti Region (2020–2023)	0 / 0	306 / 12072	817 / 32229	823 / 32466	412 / 16253
TA CR	Applied research and development of long-term small joint replacements based on additive manufacturing (2021–2023)	0 / 0	0 / 0	650 / 25642	1700 / 67062	1700 / 67062
TA CR	Development of design principles and additive manufacturing of multi-material medical devices (2021–2024)	0 / 0	0 / 0	1050 / 41421	1800 / 71006	0 / 0
TA CR	Electric Bus Drive Project with IoT System for City and Intercity Transport. (2021–2023)	0 / 0	0 / 0	778 / 30691	834 / 32900	611 / 24103
TA CR	Smart automatic warehouse, including optimization of CNC machining centers (2021–2024)	0 / 0	0 / 0	1951 / 76963	1854 / 73137	2048 / 80789
TA CR	Dynamic model of water infrastructure operation (2021–2023)	0 / 0	0 / 0	2060 / 81263	2374 / 93649	2227 / 87851
TA CR	Research and development of technology for purification and recycling of used cooking oils, including the system of their collection (2021–2024)	0 / 0	0 / 0	1088 / 42920	1420 / 56016	1365 / 53847
TA CR	Modular and digitized series of vertical machining centers (2021–2024)	0 / 0	0 / 0	3592 / 141697	3833 / 151204	3713 / 146470
TA CR	Smart machine tool in a digital factory environment (2021–2024)	0 / 0	0 / 0	3402 / 134202	4084 / 161105	3688 / 145484

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
TA CR	Surface Grinder TOS Hostivar (2021–2023)	0 / 0	0 / 0	1590 / 62722	1378 / 54359	1541 / 60789
TA CR	The research of Hg distribution in absobrem wet method desulphurization (2022–2024)	0 / 0	0 / 0	0 / 0	640 / 25247	1558 / 61460
TA CR	Research and development of a hydrogen bus (2022–2024)	0 / 0	0 / 0	0 / 0	1538 / 60671	1837 / 72466
TA CR	Complex system for process automation from configurable product design to technical preparation of production and production itself. (2022–2025)	0 / 0	0 / 0	0 / 0	1609 / 63472	1744 / 68797
TA CR	Model support for clean and sustainable mobility in the Czech Republic (2022–2024)	0 / 0	0 / 0	0 / 0	655 / 25839	756 / 29823
TA CR	SPD processed Beta-titanium alloys (2022–2024)	0 / 0	0 / 0	0 / 0	1176 / 46391	1224 / 48285
TA CR	Smart Flexible Manufacturing Planning and Monitoring System (2022–2024)	0 / 0	0 / 0	0 / 0	2638 / 104064	2563 / 101105
TA CR	Research and Development of Stabilizing Anchoring Systems for Locked Intramedullary Osteosynthesis (2023–2026)	0 / 0	0 / 0	0 / 0	0 / 0	1578 / 62249
TA CR	Applied research and development of the use of titanium scrap as a primary charge in the production of products with higher added value (2023–2024)	0 / 0	0 / 0	0 / 0	0 / 0	2790 / 110060

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
TA CR	Cloud platform for energy data analysis using artificial intelligence (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	1910 / 75346
TA CR	ESO - Vehicle of category N1 powered by hydrogen cells (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	4002 / 157870
TA CR	A new generation of composite beams for high dynamic production machines (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	2754 / 108640
TA CR	New machine tool integrating Industry 4.0 features (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	2894 / 114162
TA CR	Fluidized bed technology for decentralized energy utilization of dried sewage sludge (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	1319 / 52032
TA CR	Research on increasing the integrity of castings from high melting temperature alloys by low-pressure casting into ceramic shells. (2023–2024)	0 / 0	0 / 0	0 / 0	0 / 0	1673 / 65997
TA CR	Upscale 3D printing technology for commercial use in Construction 4.0 (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	3924 / 154793
TA CR	Application of probabilistic safety assessment for small modular reactors in the activities of the state office for nuclear safety in the Czech Republic (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	812 / 32032
TA CR	Heat storage technology based on PCM glauber salt (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	1198 / 47259

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
TA CR	Competence Center of Railway Vehicles (2012–2019)	2000 / 78896	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Research center of surface treatment (2014–2019)	2912 / 114872	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Advanced Aerostructures Research Centre (2015–2019)	1892 / 74636	0 / 0	0 / 0	0 / 0	0 / 0
TA CR	Center of electron and photonic optics (2018–2021)	7336 / 289389	11429 / 450849	6789 / 267811	2805 / 110651	0 / 0
TA CR	National Competence Centre of Mechatronics and Smart Technologies for Mechanical Engineering (2019–2022)	5842 / 230454	11892 / 469113	6699 / 264261	2168 / 85523	0 / 0
TA CR	National Centre for Energy (2019–2022)	5115 / 201776	11585 / 457002	6437 / 253926	2598 / 102486	0 / 0
TA CR	National Competence Centre for Aeronautics and Space (2019–2022)	7224 / 284971	8191 / 323117	6308 / 248837	3234 / 127574	0 / 0
TA CR	National Centre of Competence ENGINEERING (2019–2020)	2699 / 106470	27406 / 1081105	10208 / 402683	4998 / 197160	0 / 0
TA CR	National Centre for Energy II (2023–2028)	0 / 0	0 / 0	0 / 0	0 / 0	8044 / 317318
TA CR	Centre of Advanced Electron and Photonic Optics 2 (2023–2028)	0 / 0	0 / 0	0 / 0	0 / 0	10649 / 420079
TA CR	National Competence Centre for Aeronautics and Space TN02000009/06 Composite integral fuel tank for pressurised hydrogen (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	4091 / 161381
TA CR	National Centre of Competence ENGINEERING (2023–2028)	0 / 0	0 / 0	0 / 0	0 / 0	22080 / 871006

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
Min Int CR	Research and development of the device for efficient searching and securing of dactyloscopic traces (2017–2019)	477 / 18817	0 / 0	0 / 0	0 / 0	0 / 0
Min Int CR	Safety improvement of extension ladders for firefighters (2016–2020)	623 / 24576	488 / 19251	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	The Development of the Impeller for Turbomachine Wheel with the Cover Discs for a Turbomachine (2016–2019)	1426 / 56253	0 / 0	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Development of a new interpolator of the Czech CNC system for production machines (2016–2019)	1735 / 68442	0 / 0	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Innovation of an unconventional ultralight all-composite airplane (2016–2020)	820 / 32348	780 / 30770	300 / 11835	0 / 0	0 / 0
Min Ind Trade CR	Development of processes applicable to development and production of components for the space industry (2016–2019)	1075 / 42407	0 / 0	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Development of design and production technology of molds for refractory vibrocasted materials (2016–2019)	1060 / 41815	0 / 0	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Development of technology for production of ceramic chimney pipes to improve their utility properties and reduce production costs. (2016–2019)	1280 / 50494	0 / 0	0 / 0	0 / 0	0 / 0

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
Min Ind Trade CR	Development of new cleaning technology, sterilization and surface functionalization of materials (2016–2020)	320 / 12624	230 / 9073	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	The research of increase shape accuracy wax pattern of castings stracionary turbochargers and gas turbines. (2016–2020)	1200 / 47338	606 / 23906	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Termovision system for non-destructive testing of weld joints (2016–2019)	579 / 22841	0 / 0	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Biofilter with dielectric heating (2016–2019)	850 / 33531	0 / 0	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Additive nad hybrid manufacturing technology without the use of laser (2017–2020)	3780 / 149113	0 / 0	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Laser technology designed for additive nad hybrid metals manufacturing (2017–2019)	2360 / 93097	0 / 0	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Research and development of high-speed, high-pressure pumps (2017–2020)	1390 / 54833	675 / 26628	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Development of technological accessories for machine tools (2017–2019)	1640 / 64695	0 / 0	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	The modular system of knee joint replacement to enable reconstruction of large defects using porous augmentation and individual replacement for the extreme deformity of bone tissue. (2017–2021)	1600 / 63117	1600 / 63117	800 / 31559	0 / 0	0 / 0

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
Min Ind Trade CR	Design and manufacturing process development of primary aircraft parts of advanced shapes of reinforced thermoplastics (2018–2020)	1000 / 39448	900 / 35503	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Research and development of a higher efficiency electric traction system for an electric bus (2018–2020)	1380 / 54438	848 / 33452	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Development of a new generation of nails for osteosynthesis of long bones of the lower limb (2018–2020)	730 / 28797	730 / 28797	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Energy efficient cover for advanced production machines (2018–2021)	1405 / 55425	1405 / 55425	1455 / 57397	0 / 0	0 / 0
Min Ind Trade CR	Vertical milling center of medium size with increased precision (2018–2020)	1980 / 78107	990 / 39054	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Smart machine tool (2018–2021)	3050 / 120316	2830 / 111638	1060 / 41815	0 / 0	0 / 0
Min Ind Trade CR	Heavy Duty Grinder TOS Hostivař (2018–2020)	2880 / 113610	1920 / 75740	1060 / 41815	0 / 0	0 / 0
Min Ind Trade CR	Development of a sampler for grain sampling (2018–2021)	1450 / 57200	1000 / 39448	550 / 21697	0 / 0	0 / 0
Min Ind Trade CR	Laser technologies for microstructuring of bionic and functional surfaces of advanced materials (2018–2021)	1100 / 43393	1100 / 43393	1100 / 43393	0 / 0	0 / 0
Min Ind Trade CR	Advanced Leveling and Stabilization System for Active Floating Mobile Modular System (APMMS) for the transport of large	1214 / 47890	1124 / 44340	0 / 0	0 / 0	0 / 0

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
	structures. (2018–2020)					
Min Ind Trade CR	Automatic Field Infiltration Measuring Two-Ring Device (2018–2020)	1782 / 70296	975 / 38462	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	Development of new homogenization technology high viscous dispersion of the non-newton type (2018–2020)	1148 / 45286	841 / 33176	0 / 0	0 / 0	0 / 0
Min Ind Trade CR	New high precision CNC machining and finishing technologies for opto-mechanical assemblies (2019–2022)	2064 / 81421	1957 / 77200	1860 / 73373	850 / 33531	0 / 0
Min Ind Trade CR	Evaluation of degraded steels for the construction of turbines and superheaters of power boilers (for the need to predict residual service life time and local repairs) (2019–2022)	950 / 37476	950 / 37476	950 / 37476	950 / 37476	0 / 0
Min Ind Trade CR	Control and optimization of selected wastewater treatment units based on inline rheological properties of batch measurement focused on the development of innovated thickening and dewatering equipment (2019–2022)	660 / 26036	1360 / 53649	1320 / 52072	1107 / 43669	0 / 0
Min Ind Trade CR	INTELLIGENT GRAPHIC BASED TEXTILE (2019–2021)	840 / 33137	840 / 33137	840 / 33137	0 / 0	0 / 0
Min Ind Trade CR	Efficient design and manufacture of high efficiency compressor wheels for	928 / 36608	1428 / 56332	1308 / 51598	1201 / 47377	0 / 0

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
	turbochargers (2019–2022)					
Min Ind Trade CR	New generation of cutting tools made from advanced materials with the usage of laser technology during their production (2019–2022)	947 / 37358	1377 / 54320	1696 / 66904	1464 / 57752	0 / 0
Min Ind Trade CR	Development of high power propulsion unit of electric ducted fans with application in aircraft industry (2019–2022)	885 / 34912	2870 / 113215	2375 / 93689	1950 / 76924	0 / 0
Min Ind Trade CR	Advanced fuel cell materials for sustainable energetics (2019–2021)	1282 / 50572	1282 / 50572	1282 / 50572	0 / 0	0 / 0
Min Ind Trade CR	Boundary layer passive control as the tool for the performance improvement of the aircrafts made from composite materials. (2019–2022)	653 / 25760	1458 / 57515	584 / 23038	942 / 37160	0 / 0
Min Ind Trade CR	Composite materials for non-pressure technology (3D printers and rotary sintering) (2019–2022)	282 / 11125	606 / 23906	618 / 24379	336 / 13255	0 / 0
Min Health CR	The study of new materials used as articulation surface of joint replacement (2015–2019)	481 / 18975	0 / 0	0 / 0	0 / 0	0 / 0
Min Health CR	Comprehensive pre-clinical evaluation of lateral lumbar spine fusion with hybrid biodegradable nanocomposite porous implant. (2017–2020)	991 / 39093	740 / 29192	0 / 0	0 / 0	0 / 0
Min Health CR	Development and comprehensive	623 / 24576	635 / 25050	603 / 23787	0 / 0	0 / 0

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
	evaluation of novel injectable, resorbable, porous bone substitute with controlled release of antimicrobial agents (2018–2021)					
Min Health CR	Biomechanically defined absorbable materials for cardiovascular surgery (2020–2023)	0 / 0	609 / 24024	911 / 35937	918 / 36214	907 / 35780
Min Health CR	Implantable sensors for early detection of infection and bacterial colonization (2020–2023)	0 / 0	407 / 16056	652 / 25720	607 / 23945	607 / 23945
Min Health CR	Changes in vascular density, physical and histopathobiochemical properties of ligamentum flavum in lumbar spine based on spinal segment levels and anatomical localization and presence of lumbar spinal stenosis (2021–2024)	0 / 0	0 / 0	478 / 18857	640 / 25247	648 / 25563
Min Health CR	Influence of UHMWPE type of polyethylene on the lifetime of knee replacements and relationship with the implant surfaces design (2021–2024)	0 / 0	0 / 0	483 / 19054	795 / 31361	795 / 31361
Min Edu Youth Sports CR	ADAR - Accelerator Driven Advanced Reactor (2019–2022)	255 / 10060	581 / 22920	606 / 23906	371 / 14636	0 / 0
Min Agr CR	New orchard concept using technology 4.0 (2021–2025)	0 / 0	0 / 0	727 / 28679	935 / 36884	937 / 36963
GA CR	Evaluation and modelling of thermal field during machining of non-metallic materials (2017–2019)	658 / 25957	0 / 0	0 / 0	0 / 0	0 / 0

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
GA CR	Computational design of hydrogel cell scaffolds. (2017–2019)	619 / 24419	0 / 0	0 / 0	0 / 0	0 / 0
GA CR	Mechanisms of toxicity of gasoline engine emissions in 3D tissue cultures and a model bronchial epithelial cell line (2018–2020)	847 / 33413	372 / 14675	0 / 0	0 / 0	0 / 0
GA CR	Influence of Complex and Cyclic Loading Modes on Lifetime of Machine Parts Made by Additive Manufacturing (2019–2021)	661 / 26075	629 / 24813	598 / 23590	0 / 0	0 / 0
GA CR	Bioaccessibility and environmental interaction of antimony near busy traffic nodes (2019–2021)	710 / 28008	283 / 11164	249 / 9823	118 / 4655	0 / 0
GA CR	Mechanics of arterial delamination and crack propagation (2020–2022)	0 / 0	1103 / 43511	1226 / 48363	1188 / 46864	0 / 0
GA CR	Improved osseointegration of bone implants with the use of ferroelectric coatings (2020–2022)	0 / 0	951 / 37515	951 / 37515	841 / 33176	110 / 4340
GA CR	Novel concepts for analysis and design of nonlinear controllers and compensators of flexible and chained mechanical systems (2021–2023)	0 / 0	0 / 0	1467 / 57870	1518 / 59882	1515 / 59764
GA CR	Study of methods for modification of mechanical properties of collagen matter (2021–2023)	0 / 0	0 / 0	1099 / 43354	1269 / 50060	1256 / 49547
GA CR	Formation of droplets in rapid expansions: Between unary,	0 / 0	0 / 0	0 / 0	796 / 31401	824 / 32505

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
	binary, and heterogeneous paths (2022–2024)					
GA CR	Mechanical and structural properties of additively manufactured AlSi10Mg alloy with effect of powder recycling (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	1878 / 74083
GA CR	Identification and compensation of imperfections and friction effects in joints of mechatronic systems (2023–2025)	0 / 0	0 / 0	0 / 0	0 / 0	1291 / 50928
ESF through Min Ind Trade CR	Development of advanced engine brake for diesel trucks engines (2016–2019)	5358 / 211361	3514 / 138620	0 / 0	0 / 0	0 / 0
ESF through Min Ind Trade CR	Research and development of diesel aircraft engines (2015–2019)	4568 / 180198	0 / 0	0 / 0	0 / 0	0 / 0
ESF through Min Ind Trade CR	Development optalmo endoscope (2017–2020)	1341 / 52900	4387 / 173058	0 / 0	581 / 22920	0 / 0
ESF through Min Ind Trade CR	Development of Hybrid Drive System for the Aerospace Industry (2020–2022)	0 / 0	0 / 0	1162 / 45839	1191 / 46983	2733 / 107811
ESF through Min Ind Trade CR	The new generation of universal center lathes of the FLEXI series (2021–2023)	0 / 0	0 / 0	0 / 0	3191 / 125878	0 / 0
ESF through Min Ind Trade CR	SMART Hestego - Parameterization of new products and automation of the process of development, design and introduction into production (2021–2023)	0 / 0	0 / 0	0 / 0	2678 / 105642	2313 / 91243
ESF through Min Ind Trade CR	Development of high performance electric propulsion unit for CS-	0 / 0	0 / 0	0 / 0	1340 / 52860	7921 / 312466

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
	23 class aircraft (2021–2023)					
ESF through Min Ind Trade CR	Linear hydraulic actuators for demanding applications (2021–2023)	0 / 0	0 / 0	0 / 0	1510 / 59567	4521 / 178344
ESF through Min Ind Trade CR	Variable Valve Actuation for Heavy Duty Diesel Engines (2021–2024)	0 / 0	0 / 0	0 / 0	1324 / 52229	0 / 0
ESF through Min Ind Trade CR	Energetically effective covering 2: Lamination cover with flexibly bound motion and telescopic covering with fluid support (2021–2023)	0 / 0	0 / 0	0 / 0	1368 / 53965	2759 / 108837
ESF through Min Ind Trade CR	Automated wear determination of machine tool during variable process conditions (2021–2023)	0 / 0	0 / 0	0 / 0	0 / 0	4471 / 176371
ESF through Min Ind Trade CR	New generation of universal cylindrical grinders of BUB series (2021–2023)	0 / 0	0 / 0	0 / 0	456 / 17989	6056 / 238896
ESF through Min Ind Trade CR	Milling center prototype with an inprocess monitoring and tool lifetime prediction (2021–2023)	0 / 0	0 / 0	0 / 0	0 / 0	314 / 12387
ESF through Min Edu Youth Sports CR	The innovative system for coke oven wastewater treatment and water recovery with the use of clean technologies (2016–2019)	571 / 22525	-254 / -10019	0 / 0	0 / 0	0 / 0
EC	Implementation of Powertrain Control for Economic and Clean Real driving emission and fuel Consumption (2016–2019)	30 / 1184	0 / 0	0 / 0	0 / 0	0 / 0

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
EC	Future Research, Advanced Development and Implementation Activities for Road Transport (2016–2019)	254 / 10020	175 / 6904	0 / 0	0 / 0	0 / 0
EC	ADvancing user acceptance of general purpose hybridized Vehicles by Improved Cost and Efficiency (2017–2019)	1821 / 71835	1707 / 67338	0 / 0	0 / 0	0 / 0
EC	TURBOmachinery RETrofits enabling FLEXible back-up capacity for the transition of the European energy system (2017–2020)	1160 / 45760	1355 / 53452	0 / 0	0 / 0	0 / 0
EC	City Air Remote Emission Sensing (2019–2022)	115 / 4537	227 / 8955	353 / 13926	386 / 15227	194 / 7653
EC	You can also reduce emissions (2019–2022)	217 / 8561	807 / 31835	768 / 30296	411 / 16214	0 / 0
EC	InnovAtive DeMonstrator for hyBrid-Electric Regional Application (2023–2026)	0 / 0	0 / 0	0 / 0	0 / 0	1975 / 77910
EC	Innovation in Supercritical CO ₂ Power generation systems (2023–2026)	0 / 0	0 / 0	0 / 0	0 / 0	185 / 7298
EC	Young Manufacturing Leaders (2020–2020)	0 / 0	441 / 17397	0 / 0	0 / 0	0 / 0
EC	Safety of GFR through innovative materials, technologies and processes (2020–2024)	0 / 0	163 / 6430	745 / 29389	1729 / 68206	1105 / 43590
(other foreign provider)	Shaping the Next Generation of manufacturing professionals II (2021–2021)	0 / 0	0 / 0	718 / 28324	836 / 32979	576 / 22722

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
(other foreign provider)	Education programs development in RIS countries (2021–2022)	0 / 0	0 / 0	636 / 25089	996 / 39290	0 / 0
(other foreign provider)	Simulation Enhanced/Enabled Nuggets for Learning and Mastering Manufacturing for Lightweighting (2021–2022)	0 / 0	0 / 0	929 / 36647	309 / 12190	0 / 0
(other foreign provider)	Influence of the specimen geometry on quality of temperature measurement during dynamic loading (2021–2021)	0 / 0	0 / 0	114 / 4498	0 / 0	0 / 0
Total		165192 / 6516506	185061 / 7300285	135090 / 5329037	110765 / 4369463	157229 / 6202357

Table 3.3.2 - Contract research activities

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
SKODA AUTO,A.S.	Analysis of coated electrodes.	0 / 0	115 / 4537	0 / 0	0 / 0	0 / 0
	Analysis of gears in serial production	0 / 0	0 / 0	0 / 0	0 / 0	198 / 7811
	Automated Measurement Center	239 / 9417	0 / 0	0 / 0	0 / 0	0 / 0
	BWA 16961-MeasurementEquipment	0 / 0	0 / 0	0 / 0	450 / 17740	0 / 0
	BWA 17038 Autonomous Measurement Center	0 / 0	0 / 0	0 / 0	498 / 19645	0 / 0
	CMM Holders	0 / 0	0 / 0	0 / 0	0 / 0	215 / 8462
	Collaboration on computations in GT Power	176 / 6907	0 / 0	0 / 0	0 / 0	0 / 0
	Collaboration on computations in GT Power	1937 / 76384	1891 / 74580	80 / 3131	0 / 0	0 / 0

²⁸ If the client is from abroad, indicate in brackets the country of origin of the client.

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Comparison analysis of dust samples	0 / 0	0 / 0	0 / 0	0 / 0	244 / 9614
	Computational support for EPO/5	0 / 0	0 / 0	195 / 7667	132 / 5172	0 / 0
	Computational support for EPO/5	0 / 0	0 / 0	1073 / 42326	1392 / 54892	1435 / 56593
	Contract research for Virtual Clamping project	0 / 0	0 / 0	0 / 0	0 / 0	420 / 16569
	Cooling analysis of LED modules	0 / 0	0 / 0	0 / 0	238 / 9373	0 / 0
	Creation of material curves	0 / 0	0 / 0	0 / 0	925 / 36482	333 / 13109
	Design and testing of field sedimentation tests.	75 / 2959	75 / 2959	0 / 0	0 / 0	0 / 0
	Design, assembly and verification of a cellar dust density measuring instrument	177 / 6983	0 / 0	0 / 0	0 / 0	0 / 0
	Determination of material properties of selected parts significantly affecting heat transfer in critical areas of the vehicle.	0 / 0	0 / 0	0 / 0	0 / 0	367 / 14468
	Development and production of fitness unit	0 / 0	0 / 0	0 / 0	135 / 5294	0 / 0
	Development and production of HD module demonstrator for headlight	0 / 0	0 / 0	0 / 0	467 / 18423	0 / 0
	Development and production of HD module demonstrator for headlight.	0 / 0	0 / 0	700 / 27614	0 / 0	0 / 0
	Development of a projection lamp.	0 / 0	292 / 11497	0 / 0	0 / 0	0 / 0
	Development of measuring methodology and measuring equipment	0 / 0	0 / 0	685 / 27022	0 / 0	0 / 0
	Development of research on the topic of optimizing the handling of measurement orders with a focus on dimensional quality control of production of engine and gearbox components.	0 / 0	0 / 0	217 / 8561	0 / 0	0 / 0
	Development tests	0 / 0	0 / 0	0 / 0	0 / 0	1069 / 42158

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
	Development tests of petrol engine	1236 / 48753	1253 / 49422	210 / 8254	0 / 0	0 / 0
	Development tests of synchronization mechanisms	0 / 0	312 / 12288	0 / 0	0 / 0	0 / 0
	Development tests of the NV engine	0 / 0	0 / 0	720 / 28403	0 / 0	0 / 0
	Development tests of the standard VI. gear	0 / 0	1930 / 76103	0 / 0	0 / 0	0 / 0
	Development tests-Hysteresis differential	0 / 0	0 / 0	0 / 0	0 / 0	499 / 19675
	Differential Hysteresis Measurement	127 / 4999	0 / 0	0 / 0	0 / 0	0 / 0
	Engine development tests	0 / 0	0 / 0	3132 / 123551	2249 / 88701	0 / 0
	Engine performance verification	0 / 0	0 / 0	0 / 0	0 / 0	622 / 24525
	Entry exp. Cars with cylinder brakes	0 / 0	0 / 0	106 / 4172	0 / 0	0 / 0
	Experimental investigation of the behavior of the axle lock differential.	267 / 10529	0 / 0	0 / 0	0 / 0	0 / 0
	External modification of the radar cover	0 / 0	0 / 0	270 / 10651	0 / 0	0 / 0
	External modification of the radar cover	0 / 0	0 / 0	320 / 12624	0 / 0	0 / 0
	Gearbox development tests	465 / 18337	0 / 0	0 / 0	0 / 0	0 / 0
	Gearbox installation, differential hysteresis measurement, gearbox disassembly, inspection, data export, test report	0 / 0	0 / 0	100 / 3908	0 / 0	0 / 0
	IC. -Measurement, testing and calibration	0 / 0	0 / 0	0 / 0	0 / 0	78 / 3077
	LED cooling analysis	0 / 0	0 / 0	0 / 0	0 / 0	594 / 23409
	Measurement and evaluation of CEMA dust sample	0 / 0	0 / 0	0 / 0	0 / 0	159 / 6269
	Measurement and evaluation of CEMA19 samples	150 / 5918	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Measurement and evaluation of dust sample CEMA 21/3	0 / 0	0 / 0	0 / 0	143 / 5638	0 / 0
	Measurement and evaluation of dust samples CEMA 22/1	0 / 0	0 / 0	0 / 0	140 / 5503	0 / 0
	Measurement and evaluation of dust samples.	0 / 0	0 / 0	106 / 4150	0 / 0	0 / 0
	Measurement of ATCT cooling curves	1628 / 64199	1110 / 43772	1258 / 49608	666 / 26263	0 / 0
	Metrologist Certificates	0 / 0	0 / 0	0 / 0	119 / 4695	0 / 0
	Optimization of measurement plans, determination of temperature curves for individual products, technical and economic evaluation using MS PowerBI.	0 / 0	0 / 0	248 / 9784	0 / 0	0 / 0
	Qualification activity-material sciences.	73 / 2841	0 / 0	0 / 0	0 / 0	0 / 0
	Qualification activity-Metrology	0 / 0	23 / 900	119 / 4695	23 / 900	0 / 0
	Statistical analysis of asthma. Activities	152 / 5997	0 / 0	0 / 0	0 / 0	0 / 0
	SW development on OVL. Measure and measure. Equipment.	0 / 0	0 / 0	0 / 0	510 / 20119	0 / 0
	Test Anfahrttest gearbox MQ200	0 / 0	0 / 0	0 / 0	316 / 12438	0 / 0
	Test Anfahrttest gearbox MQ281	0 / 0	0 / 0	0 / 0	316 / 12438	0 / 0
	Test for BMG 1.0 TSI engine from MLSL	1172 / 46214	0 / 0	0 / 0	0 / 0	0 / 0
	Test samples from 3D printing	0 / 0	0 / 0	0 / 0	62 / 2446	0 / 0
	Testing of road dust-air filter interactions using electron microscope.	0 / 0	0 / 0	0 / 0	154 / 6059	0 / 0
	Theoretical elaboration of sedimentation methodology	100 / 3929	0 / 0	0 / 0	0 / 0	0 / 0
	Verification of part properties under cyclic loading	0 / 0	0 / 0	176 / 6943	0 / 0	117 / 4586
	Small contracts /Various titles	77 / 3038	90 / 3531	93 / 3653	141 / 5542	57 / 2231

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	
SKODA AUTO,A.S. subtotal		8046 / 317394	7088 / 279585	9804 / 386708	9070 / 357754	6403 / 252549
CESKE RADIOKOMUNIK	Research and development of detection of vehicles with excessive particulate emissions	0 / 0	0 / 0	0 / 0	4766 / 187998	5143 / 202851
CESKE RADIOKOMUNIK subtotal		0 / 0	0 / 0	0 / 0	4766 / 187998	5143 / 202851
SKODA X S.R.O.	Construction and operation of a fleet system operating in the form of "carsharing".	988 / 38942	1879 / 74099	2402 / 94741	2307 / 91000	395 / 15554
SKODA X S.R.O. subtotal		988 / 38942	1879 / 74099	2402 / 94741	2307 / 91000	395 / 15554
BOSCH ROBERT SPOL.S.	Analysis of data from operational measurements of vibrating equipment for determining the condition of this equipment	0 / 0	0 / 0	0 / 0	107 / 4198	0 / 0
	Contract research and development of methods for evaluating the condition of test shakers based on operational measurements.	0 / 0	0 / 0	336 / 13255	0 / 0	0 / 0
	Contract research: study of existing solutions	318 / 12545	0 / 0	0 / 0	0 / 0	0 / 0
	Creep Test for Isuzu	285 / 11243	0 / 0	0 / 0	0 / 0	0 / 0
	Experimental research of vibration state measurement methodology for maintenance optimization.	320 / 12624	0 / 0	0 / 0	0 / 0	0 / 0
	Fasteners	52 / 2052	0 / 0	0 / 0	0 / 0	0 / 0
	Modular FEM model of valves and thermal barriers for further development in RBCB	0 / 0	0 / 0	0 / 0	160 / 6296	0 / 0
	Optimization of thermal barriers for vibrating machines with a temperature chamber.	0 / 0	806 / 31795	506 / 19937	0 / 0	0 / 0
	Optimization of thermal barriers for vibration tests with a temperature chamber	397 / 15661	0 / 0	0 / 0	0 / 0	0 / 0
	Qualification activity-ISO GPS	0 / 0	0 / 0	28 / 1093	50 / 1953	42 / 1657
	Research and development of methods for evaluating the condition	0 / 0	650 / 25642	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	of test shakers based on operational measurements.					
	Research of probabilistic methods	0 / 0	0 / 0	336 / 13255	0 / 0	0 / 0
	Research on a special type of deep neural networks	0 / 0	0 / 0	0 / 0	107 / 4198	0 / 0
	Research on composite PTC polymers	0 / 0	0 / 0	0 / 0	0 / 0	350 / 13807
	Research on metal fabrication methods. Electrodes for heating elements	0 / 0	612 / 24143	421 / 16608	0 / 0	0 / 0
	Research on methods of fabrication of metal electrodes for heating elements	0 / 0	0 / 0	0 / 0	135 / 5326	0 / 0
	Research on methods of fabrication of metal electrodes for heating elements.	0 / 0	590 / 23275	0 / 0	0 / 0	0 / 0
	Research on methods of manufacturing metal electrodes for heating elements.	476 / 18778	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	21 / 809	0 / 0	0 / 0	25 / 987	17 / 653
BOSCH ROBERT SPOL.S. subtotal		1869 / 73709	2658 / 104853	1627 / 64146	582 / 22955	409 / 16117
PLANE VERTI S.R.O. Praha 2	Design of measurement concept and documents for ordering components necessary for project implementation	0 / 0	0 / 0	168 / 6628	0 / 0	0 / 0
	Experimental analysis of accuracy of BRAL machining center	0 / 0	250 / 9862	0 / 0	0 / 0	0 / 0
	Integration of additional measuring device into the machine tool	0 / 0	0 / 0	0 / 0	1991 / 78533	0 / 0
	Interaction of metrology software and machine tool	0 / 0	0 / 0	0 / 0	0 / 0	3302 / 130225
	Simulation analysis of machine dimensions to achieve defined target stiffness	0 / 0	0 / 0	0 / 0	144 / 5681	0 / 0
PLANE VERTI S.R.O. Praha 2 subtotal		0 / 0	250 / 9862	168 / 6628	2135 / 84214	3302 / 130225

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
STROJIRNA TYC S.R.O.	Assembled milling head within the project Reg. No. CZ.01.1.02/0.0/0.0/19 _ 262/0020238	0 / 0	0 / 0	0 / 0	1700 / 67062	0 / 0
	Calculation and construction design of two-axis milling drill head with mechanical spindle drive	399 / 15740	0 / 0	0 / 0	0 / 0	0 / 0
	Documentation Fork head with mechanical drive	0 / 0	2000 / 78896	0 / 0	0 / 0	0 / 0
	Documentation Fork milling head with electric spindle	0 / 0	0 / 0	1200 / 47338	0 / 0	0 / 0
	Measurement results including design modifications	0 / 0	0 / 0	500 / 19724	0 / 0	0 / 0
	Small contracts /Various titles	15 / 592	0 / 0	0 / 0	0 / 0	0 / 0
STROJIRNA TYC S.R.O. subtotal		414 / 16332	2000 / 78896	1700 / 67062	1700 / 67062	0 / 0
CARL ZEISS, SPOL.S.R.	Application support in CMM	0 / 0	0 / 0	0 / 0	0 / 0	68 / 2671
	Contract development activities/Metrology	600 / 23630	0 / 0	0 / 0	0 / 0	0 / 0
	Cooperation in research and development in metrology	900 / 35503	900 / 35503	0 / 0	0 / 0	0 / 0
	Custom measurement	135 / 5315	0 / 0	0 / 0	0 / 0	0 / 0
	ZEISS custom measurement	0 / 0	439 / 17288	405 / 15971	521 / 20513	1687 / 66526
	Small contracts /Various titles	57 / 2241	0 / 0	0 / 0	0 / 0	0 / 0
CARL ZEISS, SPOL.S.R. subtotal		1691 / 66688	1339 / 52791	405 / 15971	521 / 20513	1755 / 69196
SOMA SPOL. S R. O.	Evaluation and generalization of the results of HS storage design.	0 / 0	0 / 0	0 / 0	0 / 0	704 / 27772
	Research and development of HS printing cylinder bearing	0 / 0	0 / 0	618 / 24379	0 / 0	0 / 0
	Research and modeling of damping of HS bearing	0 / 0	0 / 0	0 / 0	2528 / 99724	0 / 0
	Research and Modeling of HS Loading Damping	0 / 0	0 / 0	770 / 30375	0 / 0	0 / 0
	Research of requirements for HS storage, presentation summarizing	0 / 0	0 / 0	396 / 15622	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	the results of the research of requirements.					
	Small contracts /Various titles	47 / 1838	0 / 0	0 / 0	0 / 0	0 / 0
SOMA SPOL. S R. O. subtotal		47 / 1838	0 / 0	1784 / 70375	2528 / 99724	704 / 27772
EATON ELEKTROTECHNIK	Advanced VT systems-Govt Program	0 / 0	0 / 0	243 / 9568	0 / 0	0 / 0
	Development of an innovative closed test rig for recirculation pump tests	0 / 0	0 / 0	0 / 0	100 / 3945	0 / 0
	Es gibt nicht, dass es nicht nicht, wenn es nicht nicht	0 / 0	0 / 0	0 / 0	0 / 0	3134 / 123599
	Measurement, Outputs and Component Evaluation	0 / 0	0 / 0	0 / 0	0 / 0	60 / 2367
	R&D measurements DAF MX-11	0 / 0	0 / 0	0 / 0	0 / 0	149 / 5840
	Research work in tribology and nanomaterial for friction reduction of mechanical components.	0 / 0	201 / 7924	0 / 0	0 / 0	0 / 0
	Simulation and consultation in the research of zero-emission powertrains for commercial vehicles.	0 / 0	199 / 7851	0 / 0	0 / 0	0 / 0
	Virtual optimization of the drive of a fully electric bus (engine and gears) using the driving record in real traffic.	211 / 8315	0 / 0	0 / 0	0 / 0	0 / 0
	Yes. Assessment of EL properties. Bus	0 / 0	0 / 0	200 / 7870	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	7 / 257	0 / 0	20 / 756
EATON ELEKTROTECHNIK subtotal		211 / 8315	400 / 15774	449 / 17694	100 / 3945	3361 / 132561
CEZ, A.S.	Assessment of the influence of water injection into the combustion chamber of the NZ boiler and injection after the boiler on the output parameters of flue gases after the LJ in the Ledvice power plant	0 / 0	82 / 3206	0 / 0	0 / 0	0 / 0
	Determination of the influence of Hg-coal/TAP	0 / 0	0 / 0	0 / 0	870 / 34314	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Evaluation of operational tests for the capture of Hg from flue gases in the Trmice heating plant	152 / 5965	0 / 0	0 / 0	0 / 0	0 / 0
	Professional activity according to the partial cooperation agreement	0 / 0	0 / 0	300 / 11835	0 / 0	0 / 0
	Professional activity according to the partial cooperation agreement	250 / 9862	250 / 9862	0 / 0	300 / 11835	400 / 15780
	Professional supervision during the production of castings. Shield Gen.	100 / 3920	0 / 0	0 / 0	0 / 0	0 / 0
	Proposal of measures to reduce the power consumption of boilers K1 and K4 in the Trmice heating plant below 50 MWt.	79 / 3093	0 / 0	0 / 0	0 / 0	0 / 0
	Qualification activity- Thermohydraulics	0 / 0	0 / 0	0 / 0	68 / 2647	0 / 0
	R&D verification of "ScatRexcit Blue Boson" technology	0 / 0	0 / 0	150 / 5918	0 / 0	0 / 0
	Research on the absorber of wet method of flue gas desulfurization from the point of view of Hg issues and the influence of Hg reemission	79 / 3085	0 / 0	0 / 0	0 / 0	0 / 0
	TP-Combustion test of coal and sludge in a fluidized boiler	0 / 0	0 / 0	0 / 0	320 / 12619	0 / 0
	TP-Concept study to increase the efficiency of biomass boiler	0 / 0	0 / 0	0 / 0	0 / 0	324 / 12782
	TP-Research on the influence of the operating parameter on the output emission of HGT	0 / 0	0 / 0	0 / 0	0 / 0	145 / 5720
	Small contracts /Various titles	4 / 158	97 / 3807	31 / 1212	51 / 1980	0 / 0
CEZ, A.S. subtotal		662 / 26082	428 / 16874	481 / 18964	1608 / 63393	869 / 34281
SKODA TRANSPORTATION	Contract research and evaluation of basic driving characteristics of MBS model of a prototype of a powerful traction rolling stock.	158 / 6196	0 / 0	0 / 0	0 / 0	0 / 0
	Contract research-investigation and calculations of dynamic properties for FCB tram.	0 / 0	308 / 12123	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Cooperation and support in the field of rolling stock	323 / 12722	323 / 12722	323 / 12722	323 / 12722	323 / 12722
	High cycle fatigue tests at negative temperatures.	0 / 0	0 / 0	309 / 12190	0 / 0	0 / 0
	Preparation of an EJ energy consumption assessment for Latvia	60 / 2367	0 / 0	0 / 0	0 / 0	0 / 0
	Simulation calculation	0 / 0	0 / 0	269 / 10600	0 / 0	0 / 0
	Simulation calculations for the 36T Mannheim tram project.	0 / 0	0 / 0	986 / 38896	0 / 0	0 / 0
	Simulation calculations of the 36T tram of the Mannheim project.	0 / 0	0 / 0	99 / 3898	0 / 0	0 / 0
	Vehicle simulation model and simulation calculations	0 / 0	127 / 4991	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	20 / 789	0 / 0	15 / 592	36 / 1421	0 / 0
SKODA TRANSPORTATION subtotal		560 / 22073	757 / 29835	2000 / 78896	359 / 14143	323 / 12722
DOOSAN BOBCAT EMEA	Analysis of hydraulic tubes 7298057 and 7299408	51 / 1997	0 / 0	0 / 0	0 / 0	0 / 0
	Analysis of Shaft axles PN 6709757	0 / 0	88 / 3472	0 / 0	0 / 0	0 / 0
	Analysis of Shaft Motor Carrier 7257470	0 / 0	0 / 0	0 / 0	0 / 0	71 / 2782
	Analysis of slewing bearings	0 / 0	0 / 0	0 / 0	129 / 5053	0 / 0
	Analysis of Sprocket Machined.	0 / 0	117 / 4611	0 / 0	0 / 0	0 / 0
	Analysis of welds of cylinders 7103256, 7179957 and 7180183	104 / 4078	0 / 0	0 / 0	0 / 0	0 / 0
	Analysis of welds on cylinders	404 / 15913	0 / 0	58 / 2280	0 / 0	0 / 0
	Analysis of welds on hydraulic cylinders	0 / 0	48 / 1861	226 / 8908	0 / 0	0 / 0
	Cardan Load Measurement for CWL95	0 / 0	0 / 0	0 / 0	0 / 0	190 / 7464
	Coating thickness measurement by optical method	0 / 0	0 / 0	0 / 0	0 / 0	99 / 3906

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Delivery and configuration of two GSV-6BT control panels for gimbal measurement	0 / 0	0 / 0	0 / 0	0 / 0	57 / 2217
	Heart rate analysis. Processing	0 / 0	81 / 3188	0 / 0	0 / 0	0 / 0
	Installation of strain gauges on excavator chassis	0 / 0	0 / 0	0 / 0	0 / 0	178 / 7002
	Macroscopic evaluation of welds.	0 / 0	0 / 0	68 / 2683	0 / 0	0 / 0
	Materials analysis (HD-PE RAW, HD-PE, ISOFORM 456T20)	61 / 2375	0 / 0	0 / 0	0 / 0	0 / 0
	Preparation of the ERGO Design document for Doosan Bobcat EMEA s.r.o. (Instructions for the creation of workplaces from the point of view of work ergonomics)	0 / 0	0 / 0	0 / 0	0 / 0	62 / 2446
	Tensile test of bolts 31C1228	0 / 0	0 / 0	65 / 2565	0 / 0	0 / 0
	Small contracts /Various titles	238 / 9377	129 / 5062	382 / 15039	192 / 7544	171 / 6713
DOOSAN BOBCAT EMEA subtotal		856 / 33738	462 / 18191	798 / 31472	320 / 12596	825 / 32528
BEZNOSKA S.R.O.	Abrasion test of SVL knee replacements, method according to ISO 14243-2, 3	0 / 0	0 / 0	0 / 0	0 / 0	835 / 32939
	Abrasion tests of knee implant inserts.	150 / 5918	0 / 0	0 / 0	0 / 0	0 / 0
	Activities concerning beta-titanium materials and their properties.	60 / 2367	0 / 0	0 / 0	0 / 0	0 / 0
	Bending fatigue test of cemented revision femoral shafts, method according to ISO 7206-4	0 / 0	0 / 0	0 / 0	0 / 0	118 / 4655
	Bending fatigue test of CMS tibial plates according to ISO 14879-1	0 / 0	0 / 0	0 / 0	189 / 7456	0 / 0
	Bending fatigue test of SVL tibial plates according to ISO 14879-1	0 / 0	0 / 0	0 / 0	189 / 7456	0 / 0
	CSC femoral shaft bending fatigue test, method according to ISO 7206-4	0 / 0	0 / 0	0 / 0	0 / 0	118 / 4655

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Fatigue bending test of uncemented revision femoral SF shafts, method according to ISO 7206-4	0 / 0	0 / 0	0 / 0	0 / 0	118 / 4655
	Fatigue test in bending of femoral necks of CSC shafts	0 / 0	0 / 0	0 / 0	0 / 0	159 / 6273
	Fatigue test in bending of femoral shafts CEP D56, method according to ISO 7206-4	0 / 0	0 / 0	0 / 0	0 / 0	118 / 4655
	Fatigue test in bending of tibial plates according to ISO 14879-1	0 / 0	0 / 0	0 / 0	477 / 18817	0 / 0
	Fatigue test of femoral shafts TRIO, method according to ISO 7206-4	0 / 0	0 / 0	0 / 0	0 / 0	118 / 4655
	Fatigue testing of femoral necks SF	0 / 0	0 / 0	0 / 0	0 / 0	310 / 12229
	SVLOCK tibial plate bending fatigue test according to ISO 14879-1	0 / 0	0 / 0	0 / 0	189 / 7456	0 / 0
	Small contracts /Various titles	85 / 3354	24 / 947	0 / 0	0 / 0	0 / 0
BEZNOSKA S.R.O. subtotal		295 / 11638	24 / 947	0 / 0	1044 / 41184	1894 / 74715
TGS NASTROJE-STROJE-	Development of new types of cutting tools at TGS	0 / 0	288 / 11361	0 / 0	0 / 0	0 / 0
	Development of new types of cutting tools at TGS, Reg. no. CZ.01. 1.02/0.0/17 _ 106/0012281	0 / 0	1835 / 72365	0 / 0	0 / 0	0 / 0
	Research activity for the project CZ.01. 1.02/0.0/17 _ 106/0012281	750 / 29586	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	21 / 829	0 / 0
TGS NASTROJE-STROJE-subtotal		750 / 29586	2123 / 83726	0 / 0	21 / 829	0 / 0
ECOONE EUROPE, S.R.O	Development of assembly technology of functional prototype of atmospheric water generator Query Water	0 / 0	0 / 0	2240 / 88363	0 / 0	0 / 0
	Development of assembly technology of functional prototype of atmospheric water generator Query Water-Stage 1-1/2021	0 / 0	0 / 0	140 / 5523	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Development of assembly technology of functional prototype of atmospheric water generator Query Water-Stage 1-2/2021	0 / 0	0 / 0	140 / 5523	0 / 0	0 / 0
ECOONE EUROPE, S.R.O subtotal		0 / 0	0 / 0	2520 / 99409	0 / 0	0 / 0
DOOSAN SKODA POWER S	Activity within the Trend FlexBlade project.	0 / 0	0 / 0	600 / 23669	0 / 0	0 / 0
	Activity within the Trend FlexBlade project.	0 / 0	0 / 0	0 / 0	600 / 23669	700 / 27594
	Comprehensive research measurement of steam humidity on 660 MW Ledvice turbine and data analysis	0 / 0	0 / 0	0 / 0	92 / 3612	0 / 0
	Preliminary study of the potential of Carnot batteries in connection with current DSPW technologies	0 / 0	0 / 0	0 / 0	244 / 9617	0 / 0
	Proposal of a procedure and subsequent cooperation for the commissioning and use of Eurodyssey	0 / 0	0 / 0	0 / 0	96 / 3769	0 / 0
	Thermo-mechanical fatigue analysis using viscoplastic approximation of the locality of the closing blade of the 1st stage VT steam turbine rotor	0 / 0	0 / 0	0 / 0	0 / 0	102 / 4024
	Small contracts /Various titles	49 / 1929	0 / 0	0 / 0	0 / 0	30 / 1184
DOOSAN SKODA POWER S subtotal		49 / 1929	0 / 0	600 / 23669	1031 / 40664	832 / 32801
GE AVIATION CZECH S.	Computational work in the field of FEM	0 / 0	0 / 0	0 / 0	400 / 15780	0 / 0
	Contract research in the field of cryogenic cooling of oil cooler operation	0 / 0	0 / 0	960 / 37870	0 / 0	0 / 0
	G377514800 Balling device-KRK	260 / 10257	0 / 0	0 / 0	0 / 0	0 / 0
	Residual stress test according to M601-P31-15	300 / 11835	0 / 0	0 / 0	0 / 0	0 / 0
	Residual stress test.	0 / 0	0 / 0	200 / 7890	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
	Surface roughness check of radial compressor wheels according to plan M601-1023. 21.	0 / 0	0 / 0	65 / 2557	0 / 0	0 / 0
	Small contracts /Various titles	26 / 1026	84 / 3294	0 / 0	39 / 1539	0 / 0
GE AVIATION CZECH S. subtotal		586 / 23117	84 / 3294	1225 / 48316	439 / 17318	0 / 0
SOPO S.R.O.	Development of ergonomic design of production workplaces with the aim of reducing the physical load of operators and increasing labor productivity.	0 / 0	450 / 17752	0 / 0	0 / 0	0 / 0
	Development of production automation using robotic systems	453 / 17870	0 / 0	0 / 0	0 / 0	0 / 0
	Development of production technologies and project management	0 / 0	0 / 0	80 / 3156	0 / 0	0 / 0
	Development of production technologies and project management.	0 / 0	0 / 0	240 / 9468	0 / 0	0 / 0
	Development of production technologies and project management-realized period 09/21	0 / 0	0 / 0	80 / 3156	0 / 0	0 / 0
	Development of production technologies and project management-realized period 11, 12/21	0 / 0	0 / 0	80 / 3156	0 / 0	0 / 0
	Development of production technologies in SOPO s.r.o.	154 / 6046	337 / 13287	0 / 0	0 / 0	0 / 0
	One Piece Flow	0 / 0	341 / 13423	0 / 0	0 / 0	0 / 0
SOPO S.R.O. subtotal		607 / 23916	1128 / 44461	480 / 18935	0 / 0	0 / 0
INSTITUT FÜR GEBIRGS	Technical design of the sCO ₂ turbine and compressor for Energy storage in salt caverns with supercritical CO ₂ -ESsCO ₂ -.	0 / 0	471 / 18541	0 / 0	0 / 0	0 / 0
	Technical design of the sCO ₂ turbine and compressor.	219 / 8625	0 / 0	633 / 24961	603 / 23762	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
	Thermodynamic calculations for a feasibility study on energy storage in salt caverns with sCO ₂	0 / 0	0 / 0	0 / 0	171 / 6726	0 / 0
INSTITUT FÜR GEBIRGS subtotal		219 / 8625	471 / 18541	633 / 24961	773 / 30487	0 / 0
ORLEN UNIPETROL RPA	Assessment of the residual life of the stirrer pin of the R-201 reactor.	0 / 0	0 / 0	183 / 7215	0 / 0	0 / 0
	Assessment of the service life of the stirring device of the R-201 reactors, respectively. R-251	0 / 0	0 / 0	0 / 0	90 / 3551	0 / 0
	Assessment of the service life of the stirring device of the R-201 reactors, respectively. R-251 with pin-groove mounting and after structural modification with clamping joint mounting.	0 / 0	0 / 0	91 / 3590	0 / 0	0 / 0
	Crack propagation and life of the stirrer pin of the R-201 reactor	0 / 0	479 / 18896	0 / 0	0 / 0	0 / 0
	Design of modification of the construction of special vibrating screens on the CHEZACARB unit	188 / 7417	0 / 0	0 / 0	0 / 0	0 / 0
	Experimental analysis of stress and assessment of causes of shaft pin fractures of mixers R-201 and R-251.	0 / 0	0 / 0	172 / 6782	0 / 0	0 / 0
	Kinematics of vibratory screening line CHEZACARB	57 / 2249	0 / 0	0 / 0	0 / 0	0 / 0
	Perform a basic technical overhaul of the EA-203A and assess the possible cause of its crash	0 / 0	53 / 2072	0 / 0	0 / 0	0 / 0
	Strength analysis of pressure vessel	0 / 0	0 / 0	0 / 0	0 / 0	85 / 3354
	Strength check of the stirrer pin of the R-201 reactor	70 / 2762	0 / 0	0 / 0	0 / 0	0 / 0
	Technical analysis of the R-302 reactor	0 / 0	115 / 4537	40 / 1578	0 / 0	0 / 0
	Technical analysis of the R-304 reactor accident	0 / 0	0 / 0	165 / 6509	0 / 0	0 / 0
	Tendering activities for R-30X reactors	0 / 0	0 / 0	130 / 5129	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Vibration problems of pumps 1310-P02	0 / 0	0 / 0	0 / 0	122 / 4784	0 / 0
	Small contracts /Various titles	0 / 0	35 / 1381	0 / 0	0 / 0	0 / 0
ORLEN UNIPETROL RPA subtotal		315 / 12427	682 / 26884	781 / 30801	212 / 8334	85 / 3354
SLOVACKE STROJIRNY,	Consultation and participation in the development within the project CZ.01. 1.02/0.0/0.0/15 _ 019/0000812	163 / 6430	0 / 0	0 / 0	0 / 0	0 / 0
	Control model of thermo-mechanical behavior of the machine	880 / 34691	0 / 0	0 / 0	0 / 0	0 / 0
	Experimental research and measurement	980 / 38636	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	8 / 296	0 / 0	0 / 0	0 / 0
SLOVACKE STROJIRNY, subtotal		2022 / 79756	8 / 296	0 / 0	0 / 0	0 / 0
GARRETT MOTION CZECH	Calibration of engine models, data analysis	0 / 0	0 / 0	0 / 0	740 / 29160	0 / 0
	Emmission dyno rental	0 / 0	0 / 0	0 / 0	0 / 0	65 / 2539
	Measurement of CTU-Passat NOx	0 / 0	0 / 0	52 / 2030	0 / 0	0 / 0
	Modeling Hybrid powertrains.	0 / 0	79 / 3111	0 / 0	0 / 0	0 / 0
	NPO 801153 LVG H3 Engine Measuring	111 / 4371	0 / 0	0 / 0	0 / 0	0 / 0
	Presentation describing the calibration process and quality	0 / 0	0 / 0	0 / 0	0 / 0	81 / 3182
	Vehicle Testing-Emission Measurement	0 / 0	0 / 0	0 / 0	0 / 0	107 / 4217
	WP 5 # FRM Model Calibration	0 / 0	0 / 0	576 / 22722	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	33 / 1279	0 / 0	42 / 1649	47 / 1825
GARRETT MOTION CZECH subtotal		111 / 4371	112 / 4389	628 / 24752	781 / 30809	299 / 11761
FYZIKALNI USTAV AV C	Cooling nozzle processing	0 / 0	93 / 3649	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Debugged control programs for workpiece processing robots	0 / 0	0 / 0	54 / 2131	0 / 0	0 / 0
	Development and production of laser heads	0 / 0	0 / 0	0 / 0	0 / 0	57 / 2249
	Characteristics of typical hospital waste and comparison with other wastes	0 / 0	0 / 0	0 / 0	0 / 0	168 / 6628
	Insulation socket, Insulation molex, Insulation MDP	0 / 0	0 / 0	69 / 2685	0 / 0	0 / 0
	Modification of the selected concept and sensitivity analysis	0 / 0	0 / 0	0 / 0	159 / 6249	0 / 0
	Performing a series of experimental measurements	0 / 0	320 / 12624	0 / 0	0 / 0	0 / 0
	Test components for ATLAS ITK within CERN-MOU-2019-018, WBS 2.2. 3.5. 2 and 2.2. 3.6	0 / 0	0 / 0	566 / 22326	0 / 0	0 / 0
	Test components for bonding R0-R5 incl. eloxu	0 / 0	0 / 0	144 / 5654	0 / 0	0 / 0
	TK Current Measurement Jigs for Atlas ITK Strip Project	0 / 0	58 / 2288	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	120 / 4716	30 / 1184	75 / 2956	0 / 0	10 / 358
FYZIKALNI USTAV AV C subtotal		120 / 4716	501 / 19744	907 / 35750	159 / 6249	235 / 9233
SA LHOIST RECHERCHE	Experimental research of mercury adsorption from flue gas	625 / 24655	185 / 7289	0 / 0	0 / 0	0 / 0
	Experimental research of mercury adsorption from flue gas-Technical report	0 / 0	0 / 0	1104 / 43543	0 / 0	0 / 0
SA LHOIST RECHERCHE subtotal		625 / 24655	185 / 7289	1104 / 43543	0 / 0	0 / 0
SMART CITY LAB S.R.O	Construction and operation of a fleet system operating in the form of "carsharing".	1867 / 73628	0 / 0	0 / 0	0 / 0	0 / 0
SMART CITY LAB S.R.O subtotal		1867 / 73628	0 / 0	0 / 0	0 / 0	0 / 0
WIKOV MGI A.S.	Alstom Production Analysis	0 / 0	95 / 3739	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Analytical, optimization and development activities in WIKOV MGI a.s.	244 / 9594	321 / 12646	0 / 0	0 / 0	0 / 0
	Assembly analysis of Kocks-Center 300 gearboxes	200 / 7888	0 / 0	0 / 0	0 / 0	0 / 0
	Cooling nozzle processing	0 / 0	192 / 7555	0 / 0	167 / 6580	112 / 4387
	Efficiency measurement and preparation of measurement report for "EMU-Latvia" gearbox	0 / 0	0 / 0	105 / 4123	0 / 0	0 / 0
	Optimization of the Alstom product assembly process	0 / 0	0 / 0	250 / 9845	0 / 0	0 / 0
	Small contracts /Various titles	50 / 1973	62 / 2438	42 / 1657	0 / 0	0 / 0
WIKOV MGI A.S. subtotal		494 / 19454	669 / 26377	397 / 15624	167 / 6580	112 / 4387
ATTL A SPOL. S.R.O.	Application of proposed solutions to project No.: CZ.01. 1.02/0.0/0.0/18 _ 215/0018014	0 / 0	399 / 15740	0 / 0	0 / 0	0 / 0
	Laser welding innovation services	400 / 15760	0 / 0	0 / 0	0 / 0	0 / 0
	Production of prototypes and validation for the project No.: CZ.01. 1.02/0.0/0.0/18 _ 215/0018014	0 / 0	798 / 31480	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	2 / 60	4 / 143	35 / 1361	23 / 888	24 / 947
ATTL A SPOL. S.R.O. subtotal		401 / 15819	1201 / 47361	35 / 1361	23 / 888	24 / 947
MEOPTA - OPTIKA, S.R	Data evaluation, processing and analysis of measurement results of optomechanical assemblies dynamics.	0 / 0	0 / 0	177 / 6983	0 / 0	0 / 0
	Measurement of dynamic effects on sports/military optomechanical assemblies.	0 / 0	71 / 2801	0 / 0	0 / 0	0 / 0
	Non-contact Surface Tension Detection of Hybrid Optomechanical Assembly	155 / 6091	0 / 0	0 / 0	0 / 0	0 / 0
	Visualization of workplace design and time study of assembly of both assemblies	0 / 0	0 / 0	0 / 0	700 / 27614	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
	Workplace design from the point of view of work ergonomics.	0 / 0	0 / 0	0 / 0	153 / 6008	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	6 / 209	0 / 0
MEOPTA - OPTIKA, S.R subtotal		155 / 6091	71 / 2801	177 / 6983	858 / 33829	0 / 0
PRIMOCO UAV SE	Design calculations and development tests for unmanned aerial vehicle certification	0 / 0	0 / 0	0 / 0	116 / 4557	636 / 25089
	Design calculations and development tests for unmanned aircraft certification	0 / 0	0 / 0	0 / 0	0 / 0	56 / 2210
	Development of the program and methodologies of type tests of unmanned aircraft	0 / 0	0 / 0	150 / 5918	0 / 0	0 / 0
	Perform design calculations and development tests for the certification of unmanned aircraft	0 / 0	0 / 0	0 / 0	0 / 0	126 / 4951
	Preparation of documentation for certification of unmanned aircraft	0 / 0	0 / 0	0 / 0	158 / 6233	0 / 0
PRIMOCO UAV SE subtotal		0 / 0	0 / 0	150 / 5918	274 / 10789	818 / 32249
AERO VODOCHODY	Modifications of chemical processing technologies based on REACH regulation	0 / 0	0 / 0	0 / 0	362 / 14281	408 / 16081
	We invoice you for an expert analysis of the state of the surface treatment processes	0 / 0	0 / 0	0 / 0	0 / 0	380 / 14991
	Small contracts /Various titles	0 / 0	51 / 2012	0 / 0	0 / 0	0 / 0
AERO VODOCHODY subtotal		0 / 0	51 / 2012	0 / 0	362 / 14281	788 / 31072
REDITELSTVI SILNIC	Assessment of fault condition of building D47091/1 SO 233.	118 / 4640	0 / 0	0 / 0	0 / 0	0 / 0
	Determination of corrosive aggressiveness of the environment (design, production and installation of 2 devices including software for data collection and evaluation).	0 / 0	200 / 7890	0 / 0	0 / 0	0 / 0
	Technical activity in the field of steel corrosion	0 / 0	0 / 0	286 / 11283	240 / 9468	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Technical support in the field of steel corrosion.	147 / 5799	123 / 4833	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	24 / 947	0 / 0	0 / 0	0 / 0	0 / 0
REDITELSTVI SILNIC subtotal		289 / 11385	323 / 12722	286 / 11283	240 / 9468	0 / 0
UNIVERZITA J.E. PURK	Scientific and technical activities related to the development, implementation and production of composites containing high-strength fibres	0 / 0	0 / 0	0 / 0	550 / 21697	450 / 17752
	Small contracts /Various titles	25 / 979	0 / 0	31 / 1198	24 / 947	45 / 1744
UNIVERZITA J.E. PURK subtotal		25 / 979	0 / 0	31 / 1198	574 / 22643	495 / 19496
AIRS, S.R.O.	Development of software for tracking thumb position.	200 / 7890	0 / 0	0 / 0	0 / 0	0 / 0
	Testing of the proposed HW and SW solution.	0 / 0	0 / 0	0 / 0	370 / 14596	0 / 0
	Testing of the proposed SW solution and support of commissioning.	200 / 7890	0 / 0	0 / 0	0 / 0	0 / 0
	Verification and debugging of the created model on process data.	0 / 0	350 / 13807	0 / 0	0 / 0	0 / 0
AIRS, S.R.O. subtotal		400 / 15780	350 / 13807	0 / 0	370 / 14596	0 / 0
COMPOTECH PLUS S.R.O	Automation in the field of forming press machines	0 / 0	0 / 0	0 / 0	70 / 2762	0 / 0
	Design and computational control "Omega housing"	0 / 0	0 / 0	0 / 0	0 / 0	355 / 14004
	Experimental modal analysis of composite beam prototypes	0 / 0	0 / 0	0 / 0	197 / 7760	0 / 0
	Simulation model, achieved results and their process interpretation.	0 / 0	0 / 0	118 / 4655	0 / 0	0 / 0
	Testing of samples ID 48	253 / 9949	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	15 / 592	13 / 490	28 / 1105	0 / 0	57 / 2214
COMPOTECH PLUS S.R.O subtotal		268 / 10541	13 / 490	146 / 5760	267 / 10521	412 / 16217

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
DORMER PRAMET S.R.O.	Complex tests of turning insert shapers CNMG 120408E during longitudinal turning of steel CSN 12 050.9.	0 / 0	0 / 0	0 / 0	0 / 0	162 / 6391
	Comprehensive tests of turning insert formers CNMG 120404E	0 / 0	0 / 0	0 / 0	0 / 0	74 / 2912
	Edge durability tests of turning inserts.	0 / 0	147 / 5799	0 / 0	0 / 0	0 / 0
	Measurement of force load of tools during milling of material CSN 12050.9	0 / 0	0 / 0	59 / 2320	0 / 0	54 / 2131
	Measurement of the durability of the cutting edge of turning inserts depending on the type of cooling during machining of stainless steel	0 / 0	0 / 0	159 / 6273	0 / 0	0 / 0
	Qualification activity-milling cutter tooth pitch	0 / 0	0 / 0	0 / 0	74 / 2920	0 / 0
	Testing/debugging cutting conditions for CCMT geometries	0 / 0	0 / 0	0 / 0	133 / 5227	0 / 0
	Tests of the magnitude of the force load during drilling with different types of drills during drilling of steel CSN 12 050.9 and measurement of the dynamic compliance of tools and the acoustic pressure emitted during drilling.	0 / 0	0 / 0	0 / 0	0 / 0	94 / 3693
	Small contracts /Various titles	38 / 1500	0 / 0	14 / 517	50 / 1973	39 / 1515
DORMER PRAMET S.R.O. subtotal		38 / 1500	147 / 5799	231 / 9109	257 / 10119	422 / 16640
INDORAMA VENTURES MO	Contract research focused on measuring the temperature dependence of viscose flow properties	0 / 0	100 / 3945	0 / 0	0 / 0	0 / 0
	Contract research focused on the study of mixing and design of semi-operational stirred reactor	0 / 0	0 / 0	0 / 0	360 / 14202	200 / 7890
	Testing FMV-Composites	0 / 0	0 / 0	0 / 0	0 / 0	98 / 3866

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Testing of biocomposites- Determination of mechanical properties of samples	0 / 0	0 / 0	0 / 0	0 / 0	238 / 9389
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	25 / 987
INDORAMA VENTURES MO subtotal		0 / 0	100 / 3945	0 / 0	360 / 14202	561 / 22131
SLEVARNA CHOMUTOV, A	Achieving a higher quality level of castings made of carbon, low-alloy steels and special chromium castings	0 / 0	150 / 5918	236 / 9310	0 / 0	0 / 0
	Development and verification of molding compounds	170 / 6707	0 / 0	0 / 0	75 / 2959	0 / 0
	Ecology and economics of inlet systems for large steel castings	0 / 0	0 / 0	0 / 0	135 / 5326	250 / 9862
SLEVARNA CHOMUTOV, A subtotal		170 / 6707	150 / 5918	236 / 9310	210 / 8285	250 / 9862
VSEOBECNA FAKULTNI	Design and optimization of a CO2 bubble generation and monitoring system	0 / 0	0 / 0	249 / 9823	0 / 0	0 / 0
	Design of systems or procedures for the formation of gas microbubbles, construction of a simulated hydraulic circuit for injection and monitoring of gas bubbles.	0 / 0	248 / 9784	0 / 0	0 / 0	0 / 0
	Development of measuring device for bronchoscope	0 / 0	0 / 0	0 / 0	0 / 0	110 / 4340
	Mechanical tests of biological tissues (blood vessels)	0 / 0	29 / 1144	29 / 1144	29 / 1144	0 / 0
	Mechanical tests of hemostatic collagen foams	273 / 10759	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	34 / 1305	0 / 0	0 / 0
VSEOBECNA FAKULTNI subtotal		273 / 10759	277 / 10928	312 / 12271	29 / 1144	110 / 4340
PBS TURBO, S.R.O.	Measurement of angularly indexed pressure profiles at the turbine inlet on a TCR14 turbocharger	0 / 0	0 / 0	95 / 3748	0 / 0	0 / 0
	Prototype of compressor rotor 11.521228055 (tuning of wheel blades, machining of wheel blades)	0 / 0	0 / 0	0 / 0	0 / 0	143 / 5634

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Qualification activity-ISO GPS	0 / 0	0 / 0	132 / 5182	0 / 0	0 / 0
	Qualification activity-Machining 11.52022-4464	0 / 0	613 / 24174	0 / 0	0 / 0	0 / 0
PBS TURBO, S.R.O. subtotal		0 / 0	613 / 24174	227 / 8929	0 / 0	143 / 5634
JIHOSTROJ A.S.	Experimental simulation study of the potential of the RGZ heat engine in systems for the utilization of renewable heat sources.	0 / 0	0 / 0	356 / 14044	0 / 0	0 / 0
	Feasibility study of robotization of small series assembly of tooth pumps	0 / 0	0 / 0	0 / 0	150 / 5915	0 / 0
	Project RAMO-Consultancy and advisory activities	0 / 0	0 / 0	0 / 0	0 / 0	83 / 3272
	Project RAMO-Consultancy and advisory activities.	0 / 0	0 / 0	0 / 0	94 / 3700	0 / 0
	Simulation in the GT-Power program.	0 / 0	207 / 8143	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	4 / 139	5 / 198	5 / 198	3 / 107	74 / 2902
JIHOSTROJ A.S. subtotal		4 / 139	212 / 8340	361 / 14241	247 / 9720	157 / 6174
VYZK. US. ZELEZNICNI	Design and implementation of digital twin of dynamic test bench	0 / 0	0 / 0	0 / 0	398 / 15671	500 / 19695
	Preparation of strength assessment for the E6MST locomotive project	0 / 0	0 / 0	80 / 3156	0 / 0	0 / 0
VYZK. US. ZELEZNICNI subtotal		0 / 0	0 / 0	80 / 3156	398 / 15671	500 / 19695
DOOSAN MACHINE TOOLE Advanced Technology Team	Résumé: Dans ce contexte, nous avons développé une méthode d'échelle d'une méthode d'échelle.	970 / 38248	0 / 0	0 / 0	0 / 0	0 / 0
DOOSAN MACHINE TOOLE Advanced Technology Team subtotal		970 / 38248	0 / 0	0 / 0	0 / 0	0 / 0
HAVEL & PARTNERS S.R	Packing of expert opinion from the area of "Transport".	0 / 0	0 / 0	954 / 37634	0 / 0	0 / 0
HAVEL & PARTNERS S.R subtotal		0 / 0	0 / 0	954 / 37634	0 / 0	0 / 0
KPMG CESKA REPUBLIKA	Expert assessment of selected research and development projects	0 / 0	0 / 0	0 / 0	348 / 13728	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	implemented by companies in the automotive industry					
	Expert assessment of selected research and development projects in the automotive industry	0 / 0	0 / 0	0 / 0	0 / 0	360 / 14202
	Provision of professional services	60 / 2367	0 / 0	0 / 0	0 / 0	0 / 0
	Qualification activity-review	0 / 0	30 / 1184	120 / 4734	0 / 0	0 / 0
KPMG CIESKA REPUBLIKA subtotal		60 / 2367	30 / 1184	120 / 4734	348 / 13728	360 / 14202
HYDRONAUT LAB S.R.O.	Design and implementation of a technological solution aimed at reducing the humidity inside the underwater research laboratory H03 Deeplab.	0 / 0	0 / 0	428 / 16860	0 / 0	0 / 0
	Verification of water vapor condensation in the underwater laboratory H03 Deeplab.	0 / 0	480 / 18916	0 / 0	0 / 0	0 / 0
HYDRONAUT LAB S.R.O. subtotal		0 / 0	480 / 18916	428 / 16860	0 / 0	0 / 0
ING. MARTIN KAVAN	Development of an innovative laser cutting machine control system for communication with new hardware components	0 / 0	0 / 0	0 / 0	0 / 0	850 / 33531
ING. MARTIN KAVAN subtotal		0 / 0	0 / 0	0 / 0	0 / 0	850 / 33531
CESKA EXPORTNI BANKA	Expert activities in Aero V.	350 / 13807	280 / 11046	210 / 8285	0 / 0	0 / 0
CESKA EXPORTNI BANKA subtotal		350 / 13807	280 / 11046	210 / 8285	0 / 0	0 / 0
VSB - TECHNICKA UNI	Continuous measurement of Hg emissions	0 / 0	0 / 0	0 / 0	250 / 9862	0 / 0
	Continuous measurement of Hg emissions in Chvaletice power plant during sorbent testing	0 / 0	0 / 0	0 / 0	0 / 0	80 / 3156
	Measurement of Hg emissions	0 / 0	165 / 6509	0 / 0	0 / 0	0 / 0
	Research measurement of total HGT behind CEZ, a.s.	0 / 0	0 / 0	65 / 2565	0 / 0	0 / 0
	Small contracts /Various titles	68 / 2667	66 / 2588	73 / 2848	30 / 1181	40 / 1551

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
VSB - TECHNICKA UNI subtotal		68 / 2667	231 / 9097	138 / 5412	280 / 11043	120 / 4706
TATRA TRUCKS A.S.	Tatra Hydrogen Engine Study	0 / 0	0 / 0	0 / 0	0 / 0	800 / 31559
TATRA TRUCKS A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	800 / 31559
STRATOSYST S.R.O.	Design calculations and development tests for unmanned aerial vehicle certification	0 / 0	0 / 0	0 / 0	0 / 0	598 / 23590
	Implementation of system design of kinetic energy absorbers	0 / 0	0 / 0	0 / 0	0 / 0	89 / 3488
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	93 / 3669
STRATOSYST S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	780 / 30746
EATON INDUSTRIES B.V	FEM modeling/Design phase	0 / 0	0 / 0	250 / 9862	500 / 19724	0 / 0
EATON INDUSTRIES B.V subtotal		0 / 0	0 / 0	250 / 9862	500 / 19724	0 / 0
BRM AERO, S.R.O.	Flutter Analysis of B23 Aircraft	270 / 10651	0 / 0	0 / 0	0 / 0	0 / 0
	Flutter Analysis of Bristell Aircraft	245 / 9665	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	30 / 1184	121 / 4745	40 / 1574	34 / 1326	0 / 0
BRM AERO, S.R.O. subtotal		545 / 21500	121 / 4745	40 / 1574	34 / 1326	0 / 0
MEDIN A.S.	Experimental evaluation of mechanical properties of splints and nails.	195 / 7693	0 / 0	0 / 0	0 / 0	0 / 0
	Fatigue test to verify tibial nail service life	0 / 0	0 / 0	60 / 2367	0 / 0	0 / 0
	Static and fatigue tests of splints according to ASTM F382.	0 / 0	160 / 6312	135 / 5326	95 / 3748	0 / 0
	Small contracts /Various titles	0 / 0	40 / 1578	45 / 1776	0 / 0	0 / 0
MEDIN A.S. subtotal		195 / 7693	200 / 7890	240 / 9468	95 / 3748	0 / 0
DIAMO, STATNI PODNIK	Feasibility study of the preparation and implementation of the construction of pumped hydro power plants	698 / 27515	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
DIAMO, STATNI PODNIK subtotal		698 / 27515	0 / 0	0 / 0	0 / 0	0 / 0
SPOLANA S.R.O.	Contract research focused on design and analysis of mixed PVC polymerization reactors	0 / 0	0 / 0	0 / 0	438 / 17279	0 / 0
	Technical support for the implementation of the R-302 reactor	0 / 0	0 / 0	0 / 0	110 / 4340	0 / 0
	Thermal calculation of boiler KS2020	0 / 0	0 / 0	86 / 3393	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	40 / 1578
SPOLANA S.R.O. subtotal		0 / 0	0 / 0	86 / 3393	548 / 21618	40 / 1578
LA COMPOSITE S.R.O.	Realization of research on mechanical properties of composite materials	0 / 0	0 / 0	129 / 5081	114 / 4486	0 / 0
	Realization of research on mechanical properties of composite materials.	170 / 6703	113 / 4450	0 / 0	0 / 0	0 / 0
	Research on mechanical properties of composite materials.	0 / 0	0 / 0	0 / 0	0 / 0	110 / 4328
	Small contracts /Various titles	0 / 0	0 / 0	38 / 1468	0 / 0	0 / 0
LA COMPOSITE S.R.O. subtotal		170 / 6703	113 / 4450	166 / 6549	114 / 4486	110 / 4328
SEVEN ENGINEERING S	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	75 / 2959	0 / 0
	Technical assistance for the dosing of sodium sulfide in the Chvaletice power plant	0 / 0	0 / 0	0 / 0	0 / 0	100 / 3945
	Technical assistance for the testing of sorbents at the Pocerady power plant	0 / 0	0 / 0	0 / 0	170 / 6707	0 / 0
	Technical assistance in the testing of sorbents at the Chvaletice power plant	0 / 0	0 / 0	0 / 0	0 / 0	265 / 10454
	Test of sorbent performance at temperatures above 300 °C on samples CSC PH600BR and Albemarle B-PAC +	0 / 0	0 / 0	0 / 0	0 / 0	55 / 2170

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
SEV.EN ENGINEERING S subtotal		0 / 0	0 / 0	0 / 0	245 / 9665	420 / 16569
DIRECT FLY S.R.O.	Static and dynamic tests of the ALTO 600kg aircraft	0 / 0	0 / 0	665 / 26217	0 / 0	0 / 0
DIRECT FLY S.R.O. subtotal		0 / 0	0 / 0	665 / 26217	0 / 0	0 / 0
ATEKO A.S.	Debugging of NC programs/machining of switchgear body	0 / 0	0 / 0	138 / 5436	0 / 0	0 / 0
	Modification of NC programs, production of own final compressor wheel	51 / 1997	0 / 0	0 / 0	0 / 0	0 / 0
	Qualification activity-TEG switchgear	0 / 0	193 / 7606	73 / 2872	0 / 0	0 / 0
	Qualification activity-tuning of drives	170 / 6699	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	26 / 1026	0 / 0
ATEKO A.S. subtotal		221 / 8695	193 / 7606	211 / 8308	26 / 1026	0 / 0
MIWA TECHNOLOGIES, A	Design concept and basic-design of pumps	0 / 0	0 / 0	95 / 3748	0 / 0	0 / 0
	Technical solution proposal for bulk food filling line.	0 / 0	0 / 0	180 / 7101	0 / 0	348 / 13728
MIWA TECHNOLOGIES, A subtotal		0 / 0	0 / 0	275 / 10849	0 / 0	348 / 13728
UJV REZ, A. S.	Realization of vibration measurement on the cooling pipe of the LVR-15 reactor	0 / 0	0 / 0	0 / 0	0 / 0	447 / 17614
	Small contracts /Various titles	0 / 0	34 / 1326	25 / 973	5 / 198	104 / 4083
UJV REZ, A. S. subtotal		0 / 0	34 / 1326	25 / 973	5 / 198	550 / 21697
SUJB_	Expert support in the control and verification of fraudulent, counterfeit and suspicious items (nuclear)	0 / 0	0 / 0	0 / 0	300 / 11835	300 / 11835
SUJB_ subtotal		0 / 0	0 / 0	0 / 0	300 / 11835	300 / 11835
COCKERILL MAINTENANC	Simulation calculations of diesel-electric locomotive CMI	0 / 0	0 / 0	0 / 0	0 / 0	593 / 23392

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
COCKERILL MAINTENANC subtotal		0 / 0	0 / 0	0 / 0	0 / 0	593 / 23392
TOS VARNSDORF A.S.	3D models and 2D drawings of sent components and assemblies AVO125	0 / 0	0 / 0	183 / 7219	0 / 0	0 / 0
	3D models and 2D drawings of sent components and assemblies AVO160	0 / 0	0 / 0	183 / 7219	0 / 0	0 / 0
	Qualification activity-tuning of drives	60 / 2367	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	86 / 3364	34 / 1335	47 / 1847
TOS VARNSDORF A.S. subtotal		60 / 2367	0 / 0	452 / 17802	34 / 1335	47 / 1847
HJ AUTOMATIZACE S.R. Praha 5	Development of automated assembly workplace	0 / 0	242 / 9532	222 / 8728	0 / 0	0 / 0
	Production of prototypes for automated assembly workplaces	0 / 0	0 / 0	107 / 4212	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	14 / 522	0 / 0	0 / 0	0 / 0
HJ AUTOMATIZACE S.R. Praha 5 subtotal		0 / 0	255 / 10053	328 / 12939	0 / 0	0 / 0
KOREA INSTITUTE OF M	Research services under the Services Agreement.	0 / 0	0 / 0	576 / 22687	0 / 0	0 / 0
KOREA INSTITUTE OF M subtotal		0 / 0	0 / 0	576 / 22687	0 / 0	0 / 0
HOWDEN CKD COMPRESSO	Algorithm usable in prototype SW (Python) and design of software modification.	85 / 3354	0 / 0	0 / 0	0 / 0	0 / 0
	Measurement and analysis of Rheden impellers.	0 / 0	0 / 0	164 / 6470	0 / 0	0 / 0
	Research report-SW modules (Python).	185 / 7298	0 / 0	0 / 0	0 / 0	0 / 0
	Research-Experimental modal analysis of impellers.	0 / 0	0 / 0	0 / 0	129 / 5073	0 / 0
	Small contracts /Various titles	4 / 158	0 / 0	0 / 0	0 / 0	0 / 0
HOWDEN CKD COMPRESSO subtotal		274 / 10809	0 / 0	164 / 6470	129 / 5073	0 / 0
ENERGOCENTRUM PLUS ,	Design and pilot implementation of a general control system for air conditioning units.	0 / 0	496 / 19552	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Small contracts /Various titles	43 / 1697	0 / 0	4 / 138	0 / 0	11 / 411
ENERGOCENTRUM PLUS , subtotal		43 / 1697	496 / 19552	4 / 138	0 / 0	11 / 411
BRANO A.S.	Noise analysis of the lock system.	0 / 0	100 / 3945	0 / 0	100 / 3945	0 / 0
	Performance of simulation research characteristics of shock absorbers and the influence of parameters on comfort.	100 / 3945	0 / 0	0 / 0	0 / 0	0 / 0
	Research of a shock absorber with non-traditional characteristics	0 / 0	0 / 0	0 / 0	0 / 0	100 / 3945
	Support for static kinematic solution of mechanisms	0 / 0	0 / 0	0 / 0	0 / 0	65 / 2565
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	46 / 1815	35 / 1381
BRANO A.S. subtotal		100 / 3945	100 / 3945	0 / 0	146 / 5760	200 / 7890
RUSINAK MIROSLAV	Adjustment of three tool clamps and one workpiece clamp version	0 / 0	0 / 0	0 / 0	95 / 3748	0 / 0
	Post Processor Activities	0 / 0	0 / 0	230 / 9073	0 / 0	0 / 0
	Working on postprocessors	0 / 0	160 / 6312	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	26 / 1006	0 / 0	0 / 0	35 / 1381
RUSINAK MIROSLAV subtotal		0 / 0	186 / 7318	230 / 9073	95 / 3748	35 / 1381
HIWIN S.R.O.	Analysis of structural properties	125 / 4924	0 / 0	0 / 0	0 / 0	0 / 0
	SW control project Beckhoff-AZD manipulator	205 / 8072	195 / 7669	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	16 / 632	0 / 0	0 / 0	0 / 0	0 / 0
HIWIN S.R.O. subtotal		346 / 13626	195 / 7669	0 / 0	0 / 0	0 / 0
HPH, SPOL. S R.O.	Engine measurement TJ-42	0 / 0	0 / 0	0 / 0	0 / 0	192 / 7574
	Flutter analysis of tail surfaces of sailboats EB29DR and EB29R	0 / 0	0 / 0	220 / 8677	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Revision of Flutter Resistance Technical Reports for Shark and Twin Shark	66 / 2604	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	40 / 1563	10 / 395	0 / 0
HPH, SPOL. S.R.O. subtotal		66 / 2604	0 / 0	260 / 10240	10 / 395	192 / 7574
BUZULUK A.S.	Technological-metallurgical research and development	170 / 6707	170 / 6707	30 / 1184	90 / 3551	60 / 2367
BUZULUK A.S. subtotal		170 / 6707	170 / 6707	30 / 1184	90 / 3551	60 / 2367
SIEMENS S.R.O.	Control of spindle drive control, vibration diagnostics of spindle drive	0 / 0	0 / 0	0 / 0	70 / 2762	0 / 0
	Qualification activity-ISO GPS	14 / 537	0 / 0	0 / 0	46 / 1799	0 / 0
	Small contracts /Various titles	109 / 4285	61 / 2396	39 / 1529	50 / 1956	126 / 4943
SIEMENS S.R.O. subtotal		123 / 4821	61 / 2396	39 / 1529	166 / 6516	126 / 4943
PERSIMMON TECHNOLOGI	Labour used for the construction and manufacture	0 / 0	113 / 4445	0 / 0	0 / 0	0 / 0
	Labour used for the consultancy, programming, assembly and commissioning for linear drive	0 / 0	0 / 0	118 / 4647	0 / 0	0 / 0
	Labour used for the consultancy, programming, experimenting, machining	0 / 0	0 / 0	0 / 0	0 / 0	79 / 3113
	Research optical data link	0 / 0	0 / 0	0 / 0	51 / 1999	0 / 0
	Software simulations (Zemax OpticStudio)-optical simulations of researched approach.	0 / 0	0 / 0	0 / 0	150 / 5885	0 / 0
PERSIMMON TECHNOLOGI subtotal		0 / 0	113 / 4445	118 / 4647	200 / 7884	79 / 3113
INOMECH S.R.O.	Development of a universal control unit and advanced calibration methods to repurpose obsolete robots	0 / 0	0 / 0	0 / 0	0 / 0	100 / 3945
	Development of robot motion planning and calibration of robots for machining.	0 / 0	200 / 7890	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Small contracts /Various titles	150 / 5918	50 / 1973	0 / 0	0 / 0	0 / 0
INOMECH S.R.O. subtotal		150 / 5918	250 / 9862	0 / 0	0 / 0	100 / 3945
LYNAX S.R.O.	Development tests-ignition chamber	0 / 0	0 / 0	0 / 0	500 / 19724	0 / 0
LYNAX S.R.O. subtotal		0 / 0	0 / 0	0 / 0	500 / 19724	0 / 0
WAKEMASTER, S.R.O.	Creating the user environment of the basic CAM application including the postprocessor	0 / 0	0 / 0	0 / 0	250 / 9862	0 / 0
	Creation of the computing core of the basic CAM application including the postprocessor	0 / 0	0 / 0	0 / 0	0 / 0	250 / 9862
WAKEMASTER, S.R.O. subtotal		0 / 0	0 / 0	0 / 0	250 / 9862	250 / 9862
MYSCADA TECHNOLOGIES	Design of a concept and development of a prototype of a self-learning system based on the developed Computational Intelligence package	0 / 0	200 / 7890	0 / 0	0 / 0	0 / 0
	Design of suitable methods of computational intelligence, data processing and adaptive control, programming package of these functions in open-source	0 / 0	200 / 7890	0 / 0	0 / 0	0 / 0
	Feasibility study of analytical data module with transfer of expert and process knowledge	0 / 0	100 / 3945	0 / 0	0 / 0	0 / 0
MYSCADA TECHNOLOGIES subtotal		0 / 0	500 / 19724	0 / 0	0 / 0	0 / 0
1ST CLOUD REPUBLIC A	Software development and delivery	499 / 19678	0 / 0	0 / 0	0 / 0	0 / 0
1ST CLOUD REPUBLIC A subtotal		499 / 19678	0 / 0	0 / 0	0 / 0	0 / 0
TUV SUD CZECH S.R.O.	Assessment of the impact of fuel change on the technology and operation of the power plant.	130 / 5113	0 / 0	0 / 0	0 / 0	0 / 0
	Experimental description of the properties of the internal combustion engine.	0 / 0	0 / 0	86 / 3379	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Preparation of brake station test cycle simulation	0 / 0	0 / 0	0 / 0	95 / 3734	0 / 0
	Small contracts /Various titles	40 / 1578	98 / 3829	2 / 43	50 / 1957	0 / 0
TUV SUD CZECH S.R.O. subtotal		170 / 6691	98 / 3829	87 / 3421	145 / 5691	0 / 0
ABOUT CZ, S.R.O.	Software development and delivery	494 / 19479	0 / 0	0 / 0	0 / 0	0 / 0
ABOUT CZ, S.R.O. subtotal		494 / 19479	0 / 0	0 / 0	0 / 0	0 / 0
NOE'S, S.R.O.	Development and delivery of SW BOSS 4.0	494 / 19479	0 / 0	0 / 0	0 / 0	0 / 0
NOE'S, S.R.O. subtotal		494 / 19479	0 / 0	0 / 0	0 / 0	0 / 0
POSTER MEDIA NETWORK	Development and delivery of SW BOSS 4.0	494 / 19479	0 / 0	0 / 0	0 / 0	0 / 0
POSTER MEDIA NETWORK subtotal		494 / 19479	0 / 0	0 / 0	0 / 0	0 / 0
ERWIN JUNKER GRINDIN	Analysis and interpretation of measurement results	108 / 4261	0 / 0	0 / 0	0 / 0	24 / 947
	Analysis and interpretation of measurement results, SW processing	0 / 0	0 / 0	72 / 2841	0 / 0	0 / 0
	Analysis and interpretation of measurement results.	0 / 0	0 / 0	0 / 0	120 / 4734	0 / 0
	Design, calculation of the capillary regulator of the "Z" axis of the PF8 machine	0 / 0	59 / 2320	0 / 0	0 / 0	0 / 0
	Experimental analysis of static stiffness of grinding wheel replacement arm PF3 7294625.	0 / 0	0 / 0	0 / 0	0 / 0	84 / 3314
	Small contracts /Various titles	24 / 947	0 / 0	0 / 0	0 / 0	0 / 0
ERWIN JUNKER GRINDIN subtotal		132 / 5208	59 / 2320	72 / 2841	120 / 4734	108 / 4261
NANOTECH-EUROPE S.R.	Experimental research for knowledge creation of effects of nanoadditives Nanotech	0 / 0	0 / 0	0 / 0	0 / 0	470 / 18541
NANOTECH-EUROPE S.R. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	470 / 18541
JAWA MOTO SPOL. S R.	Creation of a mathematical model of the Jawa 1000 internal combustion	0 / 0	129 / 5070	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	engine and execution of a basic optimization study.					
	Experimental description of internal combustion engine behavior	0 / 0	0 / 0	121 / 4737	0 / 0	0 / 0
	Experimental description of the Jawa 1000 petrol engine	0 / 0	55 / 2152	0 / 0	0 / 0	0 / 0
	Mathematical description of internal combustion engine behavior	0 / 0	0 / 0	63 / 2486	0 / 0	0 / 0
	Qualification activity-International welding technologist	0 / 0	61 / 2407	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	6 / 217	0 / 0	0 / 0	0 / 0	35 / 1374
JAWA MOTO SPOL. S R. subtotal		6 / 217	245 / 9628	184 / 7222	0 / 0	35 / 1374
PRAZSKA VODOHOSPODAR	Expert assessment of flood pumps	0 / 0	460 / 18146	0 / 0	0 / 0	0 / 0
PRAZSKA VODOHOSPODAR subtotal		0 / 0	460 / 18146	0 / 0	0 / 0	0 / 0
CESKY METROLOGICKY	Development of production technology and production of the artifact "Blade" according to the supplied CAD model and drawing documentation	0 / 0	0 / 0	74 / 2900	0 / 0	0 / 0
	Machining of quartz tubes	0 / 0	0 / 0	0 / 0	0 / 0	175 / 6904
	Qualification Activity-Artifact	0 / 0	112 / 4419	0 / 0	0 / 0	0 / 0
	Qualification activity-part	0 / 0	0 / 0	96 / 3787	0 / 0	0 / 0
CESKY METROLOGICKY subtotal		0 / 0	112 / 4419	170 / 6687	0 / 0	175 / 6904
MOMENTIVE SPECIALTY	Study of heat supply from synthomer a.s. To CZT Sokolov	0 / 0	131 / 5144	0 / 0	0 / 0	0 / 0
	Study of the transition of PE to natural gas.	325 / 12805	0 / 0	0 / 0	0 / 0	0 / 0
MOMENTIVE SPECIALTY subtotal		325 / 12805	131 / 5144	0 / 0	0 / 0	0 / 0
CENTRUM VYZKUMU REZ	Compander rotor design	0 / 0	0 / 0	0 / 0	0 / 0	109 / 4300

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Design and production of mandrels, self-balancing of the rotor, centrifugation, accompanying documentation	0 / 0	0 / 0	278 / 10943	0 / 0	0 / 0
	Qualification activity-OSH in welding, international tests according to CSN 05 070 5	60 / 2336	0 / 0	0 / 0	0 / 0	0 / 0
CENTRUM VYZKUMU REZ subtotal		60 / 2336	0 / 0	278 / 10943	0 / 0	109 / 4300
HOFMEISTER S.R.O.	Experimental verification of hybrid cutting tools. Project registration number: CZ.01. 1.02/0.0/0.0/20 _ 358/0028177	0 / 0	0 / 0	0 / 0	0 / 0	399 / 15740
	Small contracts /Various titles	42 / 1657	0 / 0	0 / 0	0 / 0	0 / 0
HOFMEISTER S.R.O. subtotal		42 / 1657	0 / 0	0 / 0	0 / 0	399 / 15740
GKR STEEL S.R.O.	Development of coupling devices for pick-up vehicles, turntables and kingpin-preparation of documentation.	0 / 0	0 / 0	437 / 17239	0 / 0	0 / 0
GKR STEEL S.R.O. subtotal		0 / 0	0 / 0	437 / 17239	0 / 0	0 / 0
SKO-ENERGO, S.R.O.	Assessment of the reduction of biomass impacts	0 / 0	0 / 0	141 / 5557	0 / 0	0 / 0
	Study on integration of CCS technology for S&E	240 / 9435	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	51 / 1985	0 / 0	0 / 0	0 / 0
SKO-ENERGO, S.R.O. subtotal		240 / 9435	51 / 1985	141 / 5557	0 / 0	0 / 0
INTECHA, SPOL. S R.O	Analysis of flow and sedimentation in strainer	0 / 0	0 / 0	0 / 0	0 / 0	430 / 16963
INTECHA, SPOL. S R.O subtotal		0 / 0	0 / 0	0 / 0	0 / 0	430 / 16963
CESKY PLYNARENSKY A	Revision of technical rules TPG G 935 01 Route closures of gas pipelines from steel tubes.	0 / 0	0 / 0	426 / 16805	0 / 0	0 / 0
CESKY PLYNARENSKY A subtotal		0 / 0	0 / 0	426 / 16805	0 / 0	0 / 0
AEROPILOT S.R.O.	Flutter analysis of Legend aircraft	0 / 0	417 / 16414	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Small contracts /Various titles	4 / 158	2 / 79	0 / 0	0 / 0	0 / 0
AEROPILOT S.R.O. subtotal		4 / 158	419 / 16493	0 / 0	0 / 0	0 / 0
PBS ENERGO, A.S.	Qualification activity-Disc switchboard	0 / 0	87 / 3425	0 / 0	0 / 0	0 / 0
	Qualification activity-Impeller milling	0 / 0	329 / 12971	0 / 0	0 / 0	0 / 0
PBS ENERGO, A.S. subtotal		0 / 0	416 / 16395	0 / 0	0 / 0	0 / 0
REON, S.R.O.	Optimization of equipment for the production of edible cups	0 / 0	0 / 0	412 / 16223	0 / 0	0 / 0
REON, S.R.O. subtotal		0 / 0	0 / 0	412 / 16223	0 / 0	0 / 0
COMTES FHT A.S.	Compilation of the FEM model of the buggy truck based on the supplied CAD geometry.	90 / 3551	25 / 987	0 / 0	0 / 0	0 / 0
	Qualification activity-creation of material models	99 / 3890	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	96 / 3760	50 / 1965	45 / 1776	0 / 0	0 / 0
COMTES FHT A.S. subtotal		284 / 11200	75 / 2951	45 / 1776	0 / 0	0 / 0
VEOLIA ENERGIE KOLIN	Conversion of K8 boiler for biomass combustion	227 / 8920	0 / 0	0 / 0	0 / 0	0 / 0
	Possibility analysis-reconstruction of K8 boiler for TAP combustion	175 / 6874	0 / 0	0 / 0	0 / 0	0 / 0
VEOLIA ENERGIE KOLIN subtotal		401 / 15793	0 / 0	0 / 0	0 / 0	0 / 0
ROTANA A.S.	Evaluation and analysis of experimental data, design of suitable working conditions.	0 / 0	0 / 0	400 / 15780	0 / 0	0 / 0
ROTANA A.S. subtotal		0 / 0	0 / 0	400 / 15780	0 / 0	0 / 0
PRODAKO PRODUCTION S	Basic creation of a postprocessor for testing basic movements	0 / 0	0 / 0	205 / 8072	0 / 0	0 / 0
	Modification of tool path settings on workpiece in Siemens NX CAM version NX12	0 / 0	0 / 0	66 / 2604	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	65 / 2557	64 / 2509	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
PRODAKO PRODUCTION S subtotal		0 / 0	0 / 0	336 / 13231	64 / 2509	0 / 0
CV MACHINING S.R.O.	In-process monitoring of tool wear during drilling and tapping	0 / 0	0 / 0	390 / 15385	0 / 0	0 / 0
CV MACHINING S.R.O. subtotal		0 / 0	0 / 0	390 / 15385	0 / 0	0 / 0
VARIOTEC S.R.O.	Performance of calculation, research and development work of a prototype of a two-stroke internal combustion engine	390 / 15366	0 / 0	0 / 0	0 / 0	0 / 0
VARIOTEC S.R.O. subtotal		390 / 15366	0 / 0	0 / 0	0 / 0	0 / 0
KERVAL A.S.	Design of an innovative method of production of profiles for steel door frames.	388 / 15306	0 / 0	0 / 0	0 / 0	0 / 0
KERVAL A.S. subtotal		388 / 15306	0 / 0	0 / 0	0 / 0	0 / 0
KVK TECHNOLOGY S.R.O	Design and construction of tools for forming stainless steel parts	0 / 0	385 / 15188	0 / 0	0 / 0	0 / 0
KVK TECHNOLOGY S.R.O subtotal		0 / 0	385 / 15188	0 / 0	0 / 0	0 / 0
USTAV FYZIKY PLAZMAT	Cooperation in the preparation of a publication on refinement of the grinding process of optical elements	0 / 0	0 / 0	0 / 0	0 / 0	118 / 4655
	Project CZ.02. 1.01/0.0/0.0/16 _ 026/0008390	0 / 0	0 / 0	0 / 0	142 / 5602	0 / 0
	Small contracts /Various titles	27 / 1039	50 / 1973	49 / 1914	0 / 0	0 / 0
USTAV FYZIKY PLAZMAT subtotal		27 / 1039	50 / 1973	49 / 1914	142 / 5602	118 / 4655
USTAV JADERNE FY FS	Acquisition and testing of final prototypes of ion beam tube elements.	0 / 0	0 / 0	174 / 6841	0 / 0	0 / 0
	Development and production of ion beam guide tube sample	77 / 3038	0 / 0	0 / 0	0 / 0	0 / 0
	Tests of ion beam guide tube elements	0 / 0	128 / 5044	0 / 0	0 / 0	0 / 0
USTAV JADERNE FY FS subtotal		77 / 3038	128 / 5044	174 / 6841	0 / 0	0 / 0
SIEMENS MOBILITY, S.	Expert analysis of possibilities to increase active and passive safety of	0 / 0	0 / 0	0 / 0	102 / 3997	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
	operation of railway vehicles of regional transport in the Czech Republic					
	Strength test of wheel holder	0 / 0	0 / 0	0 / 0	0 / 0	72 / 2809
	Technical Assessment	0 / 0	122 / 4778	0 / 0	0 / 0	0 / 0
	Technical Assessment	83 / 3260	0 / 0	0 / 0	0 / 0	0 / 0
SIEMENS MOBILITY, S. subtotal		83 / 3260	122 / 4778	0 / 0	102 / 3997	72 / 2809
HONEYWELL INTER	Design modifications of CTU flight simulator for testing new avionics concepts	0 / 0	0 / 0	318 / 12534	0 / 0	0 / 0
	Modification and adjustments of the setup for testing of new avionics concepts	0 / 0	0 / 0	0 / 0	54 / 2120	0 / 0
HONEYWELL INTER subtotal		0 / 0	0 / 0	318 / 12534	54 / 2120	0 / 0
ORLEN UNICRE A.S.	Mobile hydrogen filling station	0 / 0	0 / 0	0 / 0	368 / 14517	0 / 0
ORLEN UNICRE A.S. subtotal		0 / 0	0 / 0	0 / 0	368 / 14517	0 / 0
METAL 3D, S.R.O.	Analysis of properties of 3D printed, lightweight and hollow structures.	0 / 0	0 / 0	363 / 14320	0 / 0	0 / 0
METAL 3D, S.R.O. subtotal		0 / 0	0 / 0	363 / 14320	0 / 0	0 / 0
KOOPERATIVA, VYROBNE	Analysis of problems in forming the ends of the tubes of public lighting poles	0 / 0	0 / 0	0 / 0	0 / 0	360 / 14202
KOOPERATIVA, VYROBNE subtotal		0 / 0	0 / 0	0 / 0	0 / 0	360 / 14202
PLZENSKY PRAZDROJ, A	Dissipation of the thermal load of the building of the central bottling plant of the Pilsen brewery for adjusting the thermal state of the environment	0 / 0	360 / 14202	0 / 0	0 / 0	0 / 0
PLZENSKY PRAZDROJ, A subtotal		0 / 0	360 / 14202	0 / 0	0 / 0	0 / 0
UNITED ENERGY, A.S.	CO2 capture studies	0 / 0	61 / 2407	0 / 0	0 / 0	0 / 0
	Tools for the production of top plate fluid nozzles.	0 / 0	250 / 9847	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Small contracts /Various titles	0 / 0	0 / 0	16 / 606	26 / 1021	8 / 296
UNITED ENERGY, A.S. subtotal		0 / 0	311 / 12253	16 / 606	26 / 1021	8 / 296
METROPROJEKT PRAHA	Environmental parameters in the Prague metro area	0 / 0	0 / 0	0 / 0	85 / 3328	0 / 0
	Measurement of temperature, relative humidity, air velocity, etc. According to the specification in the submitted offer in 5 metro stations.	0 / 0	85 / 3328	0 / 0	0 / 0	0 / 0
	Processing of computer simulation of the internal environment of the metro station Nemocnice Krc.	0 / 0	0 / 0	190 / 7496	0 / 0	0 / 0
METROPROJEKT PRAHA subtotal		0 / 0	85 / 3328	190 / 7496	85 / 3328	0 / 0
A2 CZ CONCEPTS S.R.O	Flutter analysis of Ellipse Spirit aircraft according to UL 2/2019.	0 / 0	357 / 14083	0 / 0	0 / 0	0 / 0
A2 CZ CONCEPTS S.R.O subtotal		0 / 0	357 / 14083	0 / 0	0 / 0	0 / 0
ZALL JIHLAVAN AIRPLA	Preparation of documents for obtaining type certificate P of the Amateur Aviation Association of the Czech Republic for all-metal low-wing aircraft Skyleader 400	350 / 13807	0 / 0	0 / 0	0 / 0	0 / 0
ZALL JIHLAVAN AIRPLA subtotal		350 / 13807	0 / 0	0 / 0	0 / 0	0 / 0
HECKL S.R.O.	Development of a handwheel made of polymer materials	0 / 0	350 / 13784	0 / 0	0 / 0	0 / 0
HECKL S.R.O. subtotal		0 / 0	350 / 13784	0 / 0	0 / 0	0 / 0
TEPLARNA LOUCOVICE,	Technical due diligence of biomass cogeneration plant on wood chips	0 / 0	0 / 0	0 / 0	348 / 13697	0 / 0
TEPLARNA LOUCOVICE, subtotal		0 / 0	0 / 0	0 / 0	348 / 13697	0 / 0
HLAVNI MESTO PRAH	Design of technical solution of modification of HVAC collector Modrany.	0 / 0	183 / 7219	0 / 0	0 / 0	0 / 0
	Measurement of air flow in collector Modrany	153 / 6036	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	4 / 158	0 / 0	0 / 0	5 / 198	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
HLAVNI MESTO PRAH subtotal		157 / 6194	183 / 7219	0 / 0	5 / 198	0 / 0
L.K. ENGINEERING, S.	Upon successful completion of WP 104 and successful MDR and acceptance by the Agency of all related deliverable items	0 / 0	0 / 0	0 / 0	130 / 5118	214 / 8416
L.K. ENGINEERING, S. subtotal		0 / 0	0 / 0	0 / 0	130 / 5118	214 / 8416
OK-BE S.R.O.	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	0 / 0	162 / 6374
	Supervision of repairs of PKO-Harachov viaduct.	0 / 0	60 / 2367	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	20 / 789	93 / 3669	0 / 0	0 / 0
OK-BE S.R.O. subtotal		0 / 0	80 / 3156	93 / 3669	0 / 0	162 / 6374
STARMANS ELECTRONI_1	Development and delivery of 4Q inverter controller software for hybrid locomotive	0 / 0	0 / 0	0 / 0	0 / 0	331 / 13041
	Small contracts /Various titles	0 / 0	4 / 146	0 / 0	0 / 0	0 / 0
STARMANS ELECTRONI_1 subtotal		0 / 0	4 / 146	0 / 0	0 / 0	331 / 13041
PRUSA RESEARCH S.R.O	Analysis of particle distribution from samples	235 / 9255	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	98 / 3842	0 / 0	0 / 0	0 / 0	0 / 0
PRUSA RESEARCH S.R.O subtotal		332 / 13096	0 / 0	0 / 0	0 / 0	0 / 0
VODNI ENERGIE S.R.O.	Experimental evaluation of pressure loss of aeration membrane and aeration elements	0 / 0	0 / 0	0 / 0	99 / 3898	0 / 0
	Performance of scientific research work related to the design of the geometry of a new hydropneumatic aerator.	0 / 0	0 / 0	0 / 0	0 / 0	233 / 9176
VODNI ENERGIE S.R.O. subtotal		0 / 0	0 / 0	0 / 0	99 / 3898	233 / 9176
PT SOLUTIONS WORLDWI	Application of Machine Vision for Automatic Measurement in Cutting Cylindrical Sheets	325 / 12821	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
PT SOLUTIONS WORLDWI subtotal		325 / 12821	0 / 0	0 / 0	0 / 0	0 / 0
VENTOS ENERGY SOLUTI	Energy balance of air drying	0 / 0	55 / 2146	0 / 0	0 / 0	0 / 0
	Technical analysis of the existing design of the heat exchanger	0 / 0	0 / 0	0 / 0	180 / 7101	0 / 0
	Small contracts /Various titles	0 / 0	48 / 1878	0 / 0	0 / 0	40 / 1578
VENTOS ENERGY SOLUTI subtotal		0 / 0	102 / 4024	0 / 0	180 / 7101	40 / 1578
SMOLO A.S.	Basic design of the selected variant crystallization evaporators.	320 / 12624	0 / 0	0 / 0	0 / 0	0 / 0
SMOLO A.S. subtotal		320 / 12624	0 / 0	0 / 0	0 / 0	0 / 0
BAEST MACHINES & STR	Analysis of suitable methods of mechanization and robotization of welding processes, determination and selection of suitable technological procedures and use of existing technological equipment.	0 / 0	295 / 11638	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	16 / 632	0 / 0
BAEST MACHINES & STR subtotal		0 / 0	295 / 11638	0 / 0	16 / 632	0 / 0
STROS-SEDLČANSKE STR	Design analysis and experimental measurements for determining dynamic coefficients	0 / 0	0 / 0	0 / 0	309 / 12180	0 / 0
STROS-SEDLČANSKE STR subtotal		0 / 0	0 / 0	0 / 0	309 / 12180	0 / 0
EVEKTOR, SPOL. S R.O	Flutter Analysis of Harmony Aircraft	0 / 0	0 / 0	0 / 0	253 / 9981	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	50 / 1973
EVEKTOR, SPOL. S R.O subtotal		0 / 0	0 / 0	0 / 0	253 / 9981	50 / 1973
TECHNICKÉ SLUŽBY 002	Hg measurement in SAKO Brno-Hg analyzer rental	0 / 0	0 / 0	0 / 0	0 / 0	76 / 2999
	Hg measurement in Termizo Liberec- Hg analyzer rental	0 / 0	0 / 0	0 / 0	0 / 0	152 / 5997
	Technical cooperation on mercury measurement and balance in ZERO Chotkov	0 / 0	0 / 0	75 / 2959	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	
TECHNICKÉ SLUŽBY 002 subtotal		0 / 0	0 / 0	75 / 2959	0 / 0	228 / 8995
VOPSS REPEC S.R.O.	Postprocessor and simulation model for SP430L2 and CAM system Siemens NX. Project registration number: CZ.01. 1.02/0.0/0.0/20 _ 358/0028196.	0 / 0	0 / 0	0 / 0	0 / 0	302 / 11914
VOPSS REPEC S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	302 / 11914
MGM COMPRO S.R.O.	Design of tilt rotor propulsion system for UAV.	300 / 11835	0 / 0	0 / 0	0 / 0	0 / 0
MGM COMPRO S.R.O. subtotal		300 / 11835	0 / 0	0 / 0	0 / 0	0 / 0
STROJIRNA LITVINOV S	Measurement of vertical wind tunnel parameters	88 / 3464	0 / 0	0 / 0	0 / 0	0 / 0
	Qualification activity-Employee training	0 / 0	0 / 0	0 / 0	208 / 8183	0 / 0
STROJIRNA LITVINOV S subtotal		88 / 3464	0 / 0	0 / 0	208 / 8183	0 / 0
VZDUCHOTECHNIK, S.R.	Conceptual design of the cover of the existing dryer for a new nebulisation head within the project CZ.01. 1.02/0.0/0.0/17 _ 176/0015563	0 / 0	60 / 2367	0 / 0	0 / 0	0 / 0
	Design of the nebulizer head, dryer and drying line	0 / 0	0 / 0	108 / 4261	0 / 0	0 / 0
	Methodology for testing and optimizing the operation of a complete demonstrator system.	0 / 0	0 / 0	122 / 4793	0 / 0	0 / 0
VZDUCHOTECHNIK, S.R. subtotal		0 / 0	60 / 2367	230 / 9054	0 / 0	0 / 0
LEHMAN RENE	Fasteners	154 / 6040	124 / 4892	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	11 / 434	0 / 0	0 / 0	0 / 0	0 / 0
LEHMAN RENE subtotal		165 / 6474	124 / 4892	0 / 0	0 / 0	0 / 0
PRUSA MANUFACTURING	Analysis of particle distribution from samples	0 / 0	161 / 6344	53 / 2083	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	29 / 1135	24 / 943	0 / 0	20 / 789
PRUSA MANUFACTURING subtotal		0 / 0	190 / 7478	77 / 3026	0 / 0	20 / 789

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
VM ENGINEERING S.R.O	Study and design of a prototype for fusion of sensors in the spectrum of visible radiation, thermal radiation and depth sensor for online industrial detection.	0 / 0	0 / 0	285 / 11243	0 / 0	0 / 0
VM ENGINEERING S.R.O subtotal		0 / 0	0 / 0	285 / 11243	0 / 0	0 / 0
PULS INVESTICNI S.R.	Intel's proposal. A gripper for a robot containing a laser marking machine.	284 / 11204	0 / 0	0 / 0	0 / 0	0 / 0
PULS INVESTICNI S.R. subtotal		284 / 11204	0 / 0	0 / 0	0 / 0	0 / 0
CONTINENTAL AUTOMOTI	Performance of working test in autoclave	0 / 0	0 / 0	0 / 0	10 / 395	176 / 6943
	Qualification activity-ISO GPS	0 / 0	38 / 1480	30 / 1160	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	29 / 1144
CONTINENTAL AUTOMOTI subtotal		0 / 0	38 / 1480	30 / 1160	10 / 395	205 / 8087
DOPRAVNI PODNIK HL.	Analysis of electrical properties and verification of conductivity of rubber damping inserts for 15t tram wheels	0 / 0	101 / 3985	0 / 0	0 / 0	0 / 0
	Analysis of electrical properties and verification of conductivity of rubber wheel liners of 15T tram	95 / 3748	0 / 0	0 / 0	0 / 0	0 / 0
	Review on air conditioning for trams Skoda 15 T for City	60 / 2367	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	20 / 789	0 / 0	0 / 0
DOPRAVNI PODNIK HL. subtotal		155 / 6115	101 / 3985	20 / 789	0 / 0	0 / 0
ENERGOTRANS, A.S.	Demonstration of guaranteed parameters of desulfurization lines.	0 / 0	76 / 2999	0 / 0	0 / 0	0 / 0
	Opinion on determining the efficiency of the new fluid boiler	135 / 5326	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	13 / 505	43 / 1697	0 / 0
ENERGOTRANS, A.S. subtotal		135 / 5326	76 / 2999	13 / 505	43 / 1697	0 / 0
TEPLARNA CESKE BUDEJ	Assessment of the study of future heat supply in Ceske Budejovice.	0 / 0	152 / 5997	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Performing a one-time measurement on the K11 boiler in order to evaluate the real operation of DeNOxSNCR.	0 / 0	60 / 2367	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	10 / 375	45 / 1776	0 / 0	0 / 0	0 / 0
TEPLARNA CESKE BUDEJ subtotal		10 / 375	257 / 10139	0 / 0	0 / 0	0 / 0
PRVNI BRNENSKA STRO	Qualification activity-Disc of distributor blades	0 / 0	0 / 0	264 / 10406	0 / 0	0 / 0
PRVNI BRNENSKA STRO subtotal		0 / 0	0 / 0	264 / 10406	0 / 0	0 / 0
LUCEBNI ZAVODY DRASL	Calculation of modification of the exchanger La Mont	0 / 0	69 / 2695	0 / 0	0 / 0	0 / 0
	Measurement of flow properties of DPG	0 / 0	0 / 0	0 / 0	0 / 0	76 / 2999
	Small contracts /Various titles	47 / 1849	67 / 2610	0 / 0	0 / 0	7 / 253
LUCEBNI ZAVODY DRASL subtotal		47 / 1849	135 / 5304	0 / 0	0 / 0	83 / 3251
PARTNER / ZAKAZNIK	Qualification activity-International welding technologist	73 / 2869	35 / 1370	0 / 0	62 / 2446	0 / 0
	Qualification activity-OSH in welding, international tests according to CSN 05 070 5	40 / 1562	11 / 431	21 / 825	0 / 0	0 / 0
	Small contracts /Various titles	8 / 284	0 / 0	13 / 513	0 / 0	0 / 0
PARTNER / ZAKAZNIK subtotal		120 / 4714	46 / 1800	34 / 1338	62 / 2446	0 / 0
BOTANICKA ZAHRADA HL	Software development and its implementation for devices providing audio information for the blind	0 / 0	130 / 5129	130 / 5129	0 / 0	0 / 0
BOTANICKA ZAHRADA HL subtotal		0 / 0	130 / 5129	130 / 5129	0 / 0	0 / 0
MOSA SOLUTION S.R.O.	Research and Development No. V-M-11 in the framework of "Experimental development of equipment for the elimination of dust impurities on impellers"	150 / 5918	0 / 0	0 / 0	0 / 0	0 / 0
	Research report within the project "Experimental device for cleaning electrodes of electrodepressor and increasing efficiency".	110 / 4340	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
MOSA SOLUTION S.R.O. subtotal		260 / 10257	0 / 0	0 / 0	0 / 0	0 / 0
WACKER NEUSON LINZ G	Research on the carrying capacity of the D24 dump truck operator's cab	0 / 0	215 / 8466	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	40 / 1549	0 / 0	0 / 0	0 / 0
WACKER NEUSON LINZ G subtotal		0 / 0	254 / 10014	0 / 0	0 / 0	0 / 0
H55 S.A.	Flutter analysis of the airplane H55 according to CS 23.2245 AMDT5 using CS.VLA.629 as AMC.	250 / 9847	0 / 0	0 / 0	0 / 0	0 / 0
H55 S.A. subtotal		250 / 9847	0 / 0	0 / 0	0 / 0	0 / 0
STATNI USTAV RADIACN	Qualification activity-Employee training	0 / 0	0 / 0	0 / 0	83 / 3261	166 / 6521
STATNI USTAV RADIACN subtotal		0 / 0	0 / 0	0 / 0	83 / 3261	166 / 6521
USTAV MATERIALOV A M	Fatigue tests of dental implants MV4, 5-10 (TiGr4) according to EN ISO 14801	0 / 0	120 / 4703	0 / 0	0 / 0	0 / 0
	Fatigue tests of dental implants MV4, 5-10 Biacom according to EN ISO 14801	0 / 0	129 / 5073	0 / 0	0 / 0	0 / 0
USTAV MATERIALOV A M subtotal		0 / 0	248 / 9776	0 / 0	0 / 0	0 / 0
CESKA AGENTURA PRO S	Preparation of draft Czech technical standard	206 / 8103	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	42 / 1631	0 / 0	0 / 0	0 / 0	0 / 0
CESKA AGENTURA PRO S subtotal		247 / 9733	0 / 0	0 / 0	0 / 0	0 / 0
GLEBUS ALLOYS EUROPE	Preparation, execution and evaluation of experimental measurement of tribological properties	0 / 0	0 / 0	0 / 0	246 / 9705	0 / 0
GLEBUS ALLOYS EUROPE subtotal		0 / 0	0 / 0	0 / 0	246 / 9705	0 / 0
KOLEKTORY PRAHA A.S.	Activities and measurements-air flow in the Dáblíce collector	0 / 0	0 / 0	0 / 0	166 / 6549	0 / 0
	Measurement of air flow in collector Modrany	0 / 0	0 / 0	0 / 0	0 / 0	77 / 3038

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	
KOLEKTORY PRAHA A.S. subtotal		0 / 0	0 / 0	0 / 0	166 / 6549	77 / 3038
MINISTERSTVO OBRANY	Preparation of expert opinion MO	211 / 8304	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	32 / 1239
MINISTERSTVO OBRANY subtotal		211 / 8304	0 / 0	0 / 0	0 / 0	32 / 1239
FANI TRADE S.R.O.	Research work on a Stirling engine model according to patent CZ308724	0 / 0	0 / 0	241 / 9473	0 / 0	0 / 0
FANI TRADE S.R.O. subtotal		0 / 0	0 / 0	241 / 9473	0 / 0	0 / 0
GULIWER ELECTRONICS,	Development and testing of AdBlue dosing system components.	234 / 9229	0 / 0	0 / 0	0 / 0	0 / 0
GULIWER ELECTRONICS, subtotal		234 / 9229	0 / 0	0 / 0	0 / 0	0 / 0
SEKO AEROSPACE, A.S.	Analysis of blade set according to PS-0551	0 / 0	0 / 0	0 / 0	0 / 0	80 / 3156
	Preparation of sample analysis	0 / 0	0 / 0	0 / 0	75 / 2959	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	75 / 2959	0 / 0	0 / 0
SEKO AEROSPACE, A.S. subtotal		0 / 0	0 / 0	75 / 2959	75 / 2959	80 / 3156
BTL HEALTHCARE TECHN	Measurement of diffusivity of barium sulfate surface samples	0 / 0	0 / 0	0 / 0	104 / 4083	0 / 0
	Study of energy transfer characteristics of pulsed discharge lamp radiation to laser crystal	0 / 0	0 / 0	90 / 3551	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	34 / 1314	0 / 0	0 / 0
BTL HEALTHCARE TECHN subtotal		0 / 0	0 / 0	124 / 4864	104 / 4083	0 / 0
VEOLIA ENERGIE CR	Qualification activity-review	0 / 0	0 / 0	116 / 4545	36 / 1421	46 / 1799
	Small contracts /Various titles	0 / 0	30 / 1172	0 / 0	0 / 0	0 / 0
VEOLIA ENERGIE CR subtotal		0 / 0	30 / 1172	116 / 4545	36 / 1421	46 / 1799
SECHERON HASLER CZ	Qualification activity-ISO GPS	13 / 513	68 / 2667	0 / 0	40 / 1578	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Qualification activity-technology, surface treatment	56 / 2210	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	7 / 253	40 / 1578	0 / 0
SECHERON HASLER CZ subtotal		69 / 2722	68 / 2667	7 / 253	80 / 3156	0 / 0
SPACEK S.R.O.	Flutter analysis of SD-2 aircraft	0 / 0	0 / 0	221 / 8718	0 / 0	0 / 0
SPACEK S.R.O. subtotal		0 / 0	0 / 0	221 / 8718	0 / 0	0 / 0
HLVC A SPOL. S.R.O. Praha 6	Expert opinion in the matter of damage event damage to trucks	0 / 0	0 / 0	31 / 1223	33 / 1283	0 / 0
	Expert Opinion on Locomotive Damage Event	0 / 0	0 / 0	27 / 1066	30 / 1184	0 / 0
	Qualification activity-review	0 / 0	0 / 0	62 / 2436	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	33 / 1302	0 / 0
HLVC A SPOL. S.R.O. Praha 6 subtotal		0 / 0	0 / 0	120 / 4724	96 / 3768	0 / 0
JIRI HRUBY 001	Postprocessor source code with machine model and kinematics of the OS	0 / 0	0 / 0	215 / 8482	0 / 0	0 / 0
JIRI HRUBY 001 subtotal		0 / 0	0 / 0	215 / 8482	0 / 0	0 / 0
TOSHULIN	Calculation of the hydrostatic bearing of the Y axis for the machine V.N. 1900	0 / 0	204 / 8048	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	10 / 391	0 / 0
TOSHULIN subtotal		0 / 0	204 / 8048	0 / 0	10 / 391	0 / 0
F.X.MEILLER SLANY S.	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	75 / 2959	0 / 0
	Version IA according to EN ISO 3834-2.	0 / 0	30 / 1184	30 / 1184	0 / 0	0 / 0
	Small contracts /Various titles	39 / 1539	3 / 109	0 / 0	33 / 1302	0 / 0
F.X.MEILLER SLANY S. subtotal		39 / 1539	33 / 1292	30 / 1184	108 / 4261	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
GREIF-AKUSTIKA,S.R.O	Measurement of acoustic parameters of crosstalk dampers	136 / 5365	0 / 0	0 / 0	0 / 0	0 / 0
	Research and development of new soundproof and fire doors	0 / 0	70 / 2762	0 / 0	0 / 0	0 / 0
GREIF-AKUSTIKA,S.R.O subtotal		136 / 5365	70 / 2762	0 / 0	0 / 0	0 / 0
SVV PRAHA, S.R.O.	Qualification activity-International welding technologist	21 / 790	14 / 521	17 / 656	113 / 4422	20 / 766
	Small contracts /Various titles	11 / 427	7 / 277	6 / 221	0 / 0	0 / 0
SVV PRAHA, S.R.O. subtotal		31 / 1216	21 / 797	23 / 876	113 / 4422	20 / 766
CESKA ZEMEDELSKA UNI	Analysis of velocity field of air flow inside experimental dryer.	100 / 3945	0 / 0	0 / 0	0 / 0	0 / 0
	Measurement of emissions of a motorcycle category L3 in a cylinder test room	0 / 0	0 / 0	0 / 0	0 / 0	54 / 2092
	Small contracts /Various titles	0 / 0	30 / 1184	20 / 789	1 / 30	0 / 0
CESKA ZEMEDELSKA UNI subtotal		100 / 3945	30 / 1184	20 / 789	1 / 30	54 / 2092
TECRON S.R.O. Praha 8	Verification of the properties of parts manufactured by additive technology.	0 / 0	202 / 7969	0 / 0	0 / 0	0 / 0
TECRON S.R.O. Praha 8 subtotal		0 / 0	202 / 7969	0 / 0	0 / 0	0 / 0
ERNST LEOPOLD S.R.O.	Technological and metallurgical research and development	40 / 1578	160 / 6312	0 / 0	0 / 0	0 / 0
ERNST LEOPOLD S.R.O. subtotal		40 / 1578	160 / 6312	0 / 0	0 / 0	0 / 0
JIHOESKY, A.S. VEDE	Design of single-purpose machines	200 / 7858	0 / 0	0 / 0	0 / 0	0 / 0
JIHOESKY, A.S. VEDE subtotal		200 / 7858	0 / 0	0 / 0	0 / 0	0 / 0
PLASTOIL EUROPE, A.S	Design and parameters of equipment for mechanical disintegration of waste textiles	0 / 0	0 / 0	0 / 0	194 / 7653	0 / 0
PLASTOIL EUROPE, A.S subtotal		0 / 0	0 / 0	0 / 0	194 / 7653	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	
TEPLARNA OTROKOVICE	Measurement of the total concentration of Hg in flue gases from boilers K3 and K4.	180 / 7101	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	12 / 474	0 / 0	0 / 0	0 / 0
TEPLARNA OTROKOVICE subtotal		180 / 7101	12 / 474	0 / 0	0 / 0	0 / 0
VLADYKA ROBERT, MGR. Praha 1	Qualification activity-review	0 / 0	0 / 0	192 / 7574	0 / 0	0 / 0
VLADYKA ROBERT, MGR. Praha 1 subtotal		0 / 0	0 / 0	192 / 7574	0 / 0	0 / 0
MINISTERSTVO FINANCI	Expert recommendations for the developed project from companies JIKA-CZ s.r.o.	0 / 0	0 / 0	0 / 0	185 / 7279	0 / 0
MINISTERSTVO FINANCI subtotal		0 / 0	0 / 0	0 / 0	185 / 7279	0 / 0
PIVOVARY STAROPRAME	Qualification activity-milling cutter tooth pitch	0 / 0	0 / 0	79 / 3093	0 / 0	0 / 0
	Qualification activity-OSH in welding, international tests according to CSN 05 070 5	101 / 3977	0 / 0	0 / 0	0 / 0	5 / 178
PIVOVARY STAROPRAME subtotal		101 / 3977	0 / 0	79 / 3093	0 / 0	5 / 178
JETTI, A.S.	Calculations of heat transfer through insulation panels	0 / 0	183 / 7212	0 / 0	0 / 0	0 / 0
JETTI, A.S. subtotal		0 / 0	183 / 7212	0 / 0	0 / 0	0 / 0
BRESSON POWER A.S.	Development of expert analyses for determination of material characteristics of Allobor 5 alloy	0 / 0	0 / 0	0 / 0	80 / 3156	0 / 0
	Research work on the development of a new Al-B-based alloy	0 / 0	0 / 0	0 / 0	54 / 2101	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	48 / 1880	0 / 0
BRESSON POWER A.S. subtotal		0 / 0	0 / 0	0 / 0	181 / 7137	0 / 0
ISOLA POWERTEKK S.R.	Preparation, execution and evaluation of experimental measurement of tribological properties	0 / 0	0 / 0	0 / 0	0 / 0	179 / 7050
ISOLA POWERTEKK S.R. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	179 / 7050

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
USTAV EXPERIMENTALNI	Carrying out measurements in an engine test room for the purpose of exposure of cell cultures.	0 / 0	0 / 0	179 / 7048	0 / 0	0 / 0
USTAV EXPERIMENTALNI subtotal		0 / 0	0 / 0	179 / 7048	0 / 0	0 / 0
FESTO S.R.O.	Qualification activity-Servo drives	44 / 1710	0 / 0	30 / 1184	30 / 1184	71 / 2782
FESTO S.R.O. subtotal		44 / 1710	0 / 0	30 / 1184	30 / 1184	71 / 2782
UAB PRODENTA	Fatigue test for endosseous dental implants according to EN ISO 14801	0 / 0	0 / 0	0 / 0	0 / 0	137 / 5389
	Small contracts /Various titles	0 / 0	0 / 0	17 / 634	0 / 0	20 / 763
UAB PRODENTA subtotal		0 / 0	0 / 0	17 / 634	0 / 0	156 / 6152
CZ A.S.	Measurement of blade surface errors and wear of used tools	0 / 0	0 / 0	0 / 0	0 / 0	54 / 2131
	Small contracts /Various titles	50 / 1941	0 / 0	24 / 947	44 / 1705	0 / 0
CZ A.S. subtotal		50 / 1941	0 / 0	24 / 947	44 / 1705	54 / 2131
TOOL AXIS S.R.O.	Determination of suitable laser cutting parameters for structural and stainless steel	122 / 4805	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	46 / 1815	0 / 0	0 / 0	0 / 0	0 / 0
TOOL AXIS S.R.O. subtotal		168 / 6620	0 / 0	0 / 0	0 / 0	0 / 0
CESKA ZBROJOVKA A.S.	Small contracts /Various titles	0 / 0	20 / 789	0 / 0	0 / 0	147 / 5799
CESKA ZBROJOVKA A.S. subtotal		0 / 0	20 / 789	0 / 0	0 / 0	147 / 5799
MARTIN VACULIK	Measurement of the complete characteristics of the VW 1.4 TSI engine	0 / 0	0 / 0	0 / 0	0 / 0	166 / 6533
MARTIN VACULIK subtotal		0 / 0	0 / 0	0 / 0	0 / 0	166 / 6533
LASAK S.R.O.	Fatigue test of dental implant according to EN ISO 14801-Bioniq implant	0 / 0	0 / 0	0 / 0	161 / 6352	0 / 0
	Small contracts /Various titles	1 / 32	4 / 127	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
LASAK S.R.O. subtotal		1 / 32	4 / 127	0 / 0	161 / 6352	0 / 0
TECHSOFT ENGINEERING	Design of uniform ammonia distribution in a modified distributor.	0 / 0	62 / 2446	0 / 0	0 / 0	0 / 0
	Design of uniform ammonia flow distribution in a modified distributor.	102 / 4024	0 / 0	0 / 0	0 / 0	0 / 0
TECHSOFT ENGINEERING subtotal		102 / 4024	62 / 2446	0 / 0	0 / 0	0 / 0
UJP PRAHA A.S.	Performing EBSD analyses on bodies after creep tests	0 / 0	0 / 0	0 / 0	105 / 4143	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	12 / 474	0 / 0	47 / 1831
UJP PRAHA A.S. subtotal		0 / 0	0 / 0	12 / 474	105 / 4143	47 / 1831
TEMPERATOR S.R.O.	Testing of fuel properties on a diesel engine.	162 / 6385	0 / 0	0 / 0	0 / 0	0 / 0
TEMPERATOR S.R.O. subtotal		162 / 6385	0 / 0	0 / 0	0 / 0	0 / 0
STV GROUP A.S.	Development of discounted repair technology for belt joints	0 / 0	0 / 0	0 / 0	0 / 0	160 / 6312
STV GROUP A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	160 / 6312
BORSODCHEM MCHZ, S.R.	Analysis of the current state and design of the filtration process of the crude reaction mixture of substance E including basic-design processing of the filter arrangement including peripherals	144 / 5681	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	15 / 592	0 / 0	0 / 0	0 / 0	0 / 0
BORSODCHEM MCHZ, S.R. subtotal		159 / 6273	0 / 0	0 / 0	0 / 0	0 / 0
MAVEL, A.S.	Analysis of shaft fracture, assessment of chemical composition of water turbine blades.	0 / 0	121 / 4744	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	23 / 892	0 / 0	0 / 0	9 / 336
MAVEL, A.S. subtotal		0 / 0	143 / 5636	0 / 0	0 / 0	9 / 336
QUINN HOTELS PRAHA,	Preparation, execution and evaluation of experimental	0 / 0	0 / 0	0 / 0	150 / 5918	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	measurement of tribological properties					
QUINN HOTELS PRAHA, subtotal		0 / 0	0 / 0	0 / 0	150 / 5918	0 / 0
VVV MOST SPOL. S R.O	Design of a technical solution for hydraulic separation of slag from process water	148 / 5839	0 / 0	0 / 0	0 / 0	0 / 0
VVV MOST SPOL. S R.O subtotal		148 / 5839	0 / 0	0 / 0	0 / 0	0 / 0
TEDOM A.S.	Model description of dynamic properties of the mechanism	0 / 0	0 / 0	0 / 0	84 / 3283	0 / 0
	Small contracts /Various titles	64 / 2509	0 / 0	0 / 0	0 / 0	0 / 0
TEDOM A.S. subtotal		64 / 2509	0 / 0	0 / 0	84 / 3283	0 / 0
AIRCRAFT INDUSTRIES,	Experimental fatigue tests of welded joints	0 / 0	0 / 0	0 / 0	0 / 0	76 / 2964
	Metallographic analysis of hinges	0 / 0	70 / 2745	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	2 / 79	0 / 0	0 / 0
AIRCRAFT INDUSTRIES, subtotal		0 / 0	70 / 2745	2 / 79	0 / 0	76 / 2964
TSS, SPOL. S R.O.	Qualification activity-smelter, moulding, mill	0 / 0	83 / 3260	0 / 0	55 / 2145	0 / 0
	Small contracts /Various titles	0 / 0	3 / 119	0 / 0	2 / 79	4 / 158
TSS, SPOL. S R.O. subtotal		0 / 0	86 / 3378	0 / 0	57 / 2224	4 / 158
MYPLAST S.R.O.	Refrigerant fill measurement	0 / 0	0 / 0	0 / 0	110 / 4327	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	36 / 1421	0 / 0	0 / 0
MYPLAST S.R.O. subtotal		0 / 0	0 / 0	36 / 1421	110 / 4327	0 / 0
CEZ ENERGETICKE PROD	Study of CO2 capture from EPOC flue gases	145 / 5720	0 / 0	0 / 0	0 / 0	0 / 0
CEZ ENERGETICKE PROD subtotal		145 / 5720	0 / 0	0 / 0	0 / 0	0 / 0
UNIVERZITA KARLOVA	Qualification activity-Vacuum connectors	0 / 0	70 / 2738	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	Small contracts /Various titles	30 / 1178	17 / 668	0 / 0	0 / 0	29 / 1121
UNIVERZITA KARLOVA subtotal		30 / 1178	87 / 3406	0 / 0	0 / 0	29 / 1121
PONTEX, SPOL. S.R.O.	Inspection of welds at gas crossings "K" Týn nad Vltavou and "W"	0 / 0	0 / 0	0 / 0	70 / 2762	0 / 0
	Small contracts /Various titles	0 / 0	40 / 1578	0 / 0	0 / 0	31 / 1196
PONTEX, SPOL. S.R.O. subtotal		0 / 0	40 / 1578	0 / 0	70 / 2762	31 / 1196
CERTIFIKACNI SDRUZEN	Qualification activity-technology, surface treatment	0 / 0	0 / 0	0 / 0	140 / 5523	0 / 0
CERTIFIKACNI SDRUZEN subtotal		0 / 0	0 / 0	0 / 0	140 / 5523	0 / 0
LH TECHNIK S.R.O.	Qualification activity-International welding technologist	0 / 0	0 / 0	61 / 2407	75 / 2959	0 / 0
LH TECHNIK S.R.O. subtotal		0 / 0	0 / 0	61 / 2407	75 / 2959	0 / 0
SHM, S.R.O.	Cutting edge durability tests for VBD face milling	0 / 0	100 / 3945	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	36 / 1401	0 / 0	0 / 0	0 / 0	0 / 0
SHM, S.R.O. subtotal		36 / 1401	100 / 3945	0 / 0	0 / 0	0 / 0
TIRE MACHINERY AND E	Preparation, execution and evaluation of experimental measurement of tribological properties	0 / 0	0 / 0	0 / 0	136 / 5328	0 / 0
TIRE MACHINERY AND E subtotal		0 / 0	0 / 0	0 / 0	136 / 5328	0 / 0
KOCIANOVA MILADA	Brake caliper "C"	0 / 0	65 / 2557	0 / 0	0 / 0	0 / 0
	Brake caliper "C" with RM adjustment	0 / 0	0 / 0	0 / 0	70 / 2730	0 / 0
KOCIANOVA MILADA subtotal		0 / 0	65 / 2557	0 / 0	70 / 2730	0 / 0
DFH HAUS CZ S.R.O.	Recovery of waste heat from compressors	0 / 0	0 / 0	0 / 0	0 / 0	131 / 5168
DFH HAUS CZ S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	131 / 5168
STP Z.S.	Promotional activities	0 / 0	0 / 0	130 / 5129	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
STP Z.S. subtotal		0 / 0	0 / 0	130 / 5129	0 / 0	0 / 0
EPPLIX S.R.O.	Optimization of mixing and configuration of autoclave for expanded polypropylene production	0 / 0	0 / 0	0 / 0	0 / 0	128 / 5050
EPPLIX S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	128 / 5050
MFS DIGITAL CZ, S.R. Praha 1	Simulation of thermal behaviour of the interspace of a double facade.	0 / 0	128 / 5050	0 / 0	0 / 0	0 / 0
MFS DIGITAL CZ, S.R. Praha 1 subtotal		0 / 0	128 / 5050	0 / 0	0 / 0	0 / 0
SURFACETREAT A.S.	Plasma surfaces, vacuum devices and design calculations in CAD system	127 / 5002	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
SURFACETREAT A.S. subtotal		127 / 5002	0 / 0	1 / 20	0 / 0	0 / 0
VODA ZELIVKA, A.S.	Basic-Design Model flocculation tanks for drinking water treatment	0 / 0	0 / 0	0 / 0	0 / 0	126 / 4971
VODA ZELIVKA, A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	126 / 4971
TOS KURIM - OS,A.S.	Examination of excessive vibration of a gantry machining center.	0 / 0	55 / 2154	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	28 / 1073	0 / 0	0 / 0	44 / 1726
TOS KURIM - OS,A.S. subtotal		0 / 0	82 / 3227	0 / 0	0 / 0	44 / 1726
ASOCIACE SAMOSTATNYC Praha 2	Preparation of a professional study on the topic "Possible changes in the workforce in the era of digitalization and robotization".	0 / 0	124 / 4891	0 / 0	0 / 0	0 / 0
ASOCIACE SAMOSTATNYC Praha 2 subtotal		0 / 0	124 / 4891	0 / 0	0 / 0	0 / 0
JANUSZ EJMA	En effet, nous avons développé une méthode d'électronique d'électronique et d'électronique d'électronique.	0 / 0	0 / 0	124 / 4880	0 / 0	0 / 0
JANUSZ EJMA subtotal		0 / 0	0 / 0	124 / 4880	0 / 0	0 / 0
EAGLE SPOLKA Z OGRAN	En effet, nous avons développé une méthode d'électronique d'	0 / 0	0 / 0	0 / 0	121 / 4748	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
	électronique et d 'électronique d' électronique.					
EAGLE SPOLKA Z OGRAN subtotal		0 / 0	0 / 0	0 / 0	121 / 4748	0 / 0
GLASSFIT CZECH S.R.O	Study of mixing and heat transfer in a stirred enamel reactor	0 / 0	0 / 0	0 / 0	0 / 0	120 / 4734
GLASSFIT CZECH S.R.O subtotal		0 / 0	0 / 0	0 / 0	0 / 0	120 / 4734
WATECH A.S.	Evaluation of surface treatment properties of samples supplied by WATECH	0 / 0	0 / 0	119 / 4665	0 / 0	0 / 0
WATECH A.S. subtotal		0 / 0	0 / 0	119 / 4665	0 / 0	0 / 0
ZF ENGINEERING PLZEN	Qualification activity-ISO GPS	0 / 0	79 / 3093	16 / 608	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	24 / 947	0 / 0	0 / 0	0 / 0
ZF ENGINEERING PLZEN subtotal		0 / 0	103 / 4040	16 / 608	0 / 0	0 / 0
CAD -PRO SPOL.S R.O.	Qualification activity-pumping technology	0 / 0	0 / 0	27 / 1042	31 / 1223	0 / 0
	Small contracts /Various titles	0 / 0	27 / 1042	0 / 0	0 / 0	34 / 1321
CAD -PRO SPOL.S R.O. subtotal		0 / 0	27 / 1042	27 / 1042	31 / 1223	34 / 1321
PRUSA DEVELOPMENT A. Praha 7	Simulation with crown wheel displacement	0 / 0	0 / 0	76 / 2983	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	29 / 1137	12 / 474	0 / 0
PRUSA DEVELOPMENT A. Praha 7 subtotal		0 / 0	0 / 0	105 / 4119	12 / 474	0 / 0
DBH TECHNOLOGIES S.R	Small contracts /Various titles	0 / 0	104 / 4097	10 / 395	0 / 0	0 / 0
DBH TECHNOLOGIES S.R subtotal		0 / 0	104 / 4097	10 / 395	0 / 0	0 / 0
HAWLE ARMATURY, SPOL	Measurement of contact pressures using correction calipers	0 / 0	0 / 0	0 / 0	0 / 0	99 / 3874
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	15 / 592
HAWLE ARMATURY, SPOL subtotal		0 / 0	0 / 0	0 / 0	0 / 0	114 / 4465

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
UNO PRAHA S.R.O.	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	61 / 2407	0 / 0
	Welding of studs and quality testing of welded joints	0 / 0	0 / 0	0 / 0	0 / 0	51 / 1993
UNO PRAHA S.R.O. subtotal		0 / 0	0 / 0	0 / 0	61 / 2407	51 / 1993
STROJIRNA TEDESCO, A	Qualification activity-International welding technologist	0 / 0	0 / 0	75 / 2959	0 / 0	0 / 0
	Small contracts /Various titles	35 / 1381	0 / 0	0 / 0	0 / 0	0 / 0
STROJIRNA TEDESCO, A subtotal		35 / 1381	0 / 0	75 / 2959	0 / 0	0 / 0
DAC MOTORS A.S.	Refrigerant fill measurement type CN-D-10PP	0 / 0	0 / 0	0 / 0	0 / 0	109 / 4299
DAC MOTORS A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	109 / 4299
MANEKO, SPOL. S R.O.	Alternative fuel engine testing	108 / 4255	0 / 0	0 / 0	0 / 0	0 / 0
MANEKO, SPOL. S R.O. subtotal		108 / 4255	0 / 0	0 / 0	0 / 0	0 / 0
FAKULTNI NEMOCNICE V	Mechanical uniaxial tensile tests of human pericardial tissue	0 / 0	0 / 0	0 / 0	25 / 979	42 / 1631
	Small contracts /Various titles	0 / 0	0 / 0	42 / 1631	0 / 0	0 / 0
FAKULTNI NEMOCNICE V subtotal		0 / 0	0 / 0	42 / 1631	25 / 979	42 / 1631
PETLACH TZB S.R.O.	Assessment of air mixing for the purpose of assessing the concentration of extinguishing agent.	0 / 0	53 / 2091	0 / 0	0 / 0	0 / 0
	Study of the effect of replacement of lighting fixtures on thermal well-being in the workplace.	54 / 2127	0 / 0	0 / 0	0 / 0	0 / 0
PETLACH TZB S.R.O. subtotal		54 / 2127	53 / 2091	0 / 0	0 / 0	0 / 0
DAKO-CZ, A.S.	Structural analysis and metrology of selected parts of tram brake accumulator	0 / 0	0 / 0	0 / 0	69 / 2715	0 / 0
	Small contracts /Various titles	0 / 0	37 / 1452	0 / 0	0 / 0	0 / 0
DAKO-CZ, A.S. subtotal		0 / 0	37 / 1452	0 / 0	69 / 2715	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	
CARBON DESIGN S.R.O.	FM250 Vampire wing carrying capacity research	105 / 4143	0 / 0	0 / 0	0 / 0	0 / 0
CARBON DESIGN S.R.O. subtotal		105 / 4143	0 / 0	0 / 0	0 / 0	0 / 0
ATG S.R.O.	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	0 / 0	104 / 4076
ATG S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	104 / 4076
KOMS PRAHA, S.R.O.	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	0 / 0	104 / 4076
KOMS PRAHA, S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	104 / 4076
NYMWAG CS A.S.	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	0 / 0	104 / 4076
NYMWAG CS A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	104 / 4076
RHI MAGNESITA CZECH	Study of KKV products	0 / 0	80 / 3156	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	21 / 829	0 / 0	0 / 0	0 / 0	0 / 0
RHI MAGNESITA CZECH subtotal		21 / 829	80 / 3156	0 / 0	0 / 0	0 / 0
HENNLICH S.R.O.	Qualification activity-thermodynamics, aerodynamics, hydraulics	84 / 3314	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	16 / 632	0 / 0	0 / 0	0 / 0	0 / 0
HENNLICH S.R.O. subtotal		100 / 3945	0 / 0	0 / 0	0 / 0	0 / 0
MINISTERSTVO DOPR	Analysis of variants of urban transport development with regard to economy and environment	100 / 3945	0 / 0	0 / 0	0 / 0	0 / 0
MINISTERSTVO DOPR subtotal		100 / 3945	0 / 0	0 / 0	0 / 0	0 / 0
SIPRAL A.S.	Simulation study of flow and heat transfer in a double facade cavity	100 / 3945	0 / 0	0 / 0	0 / 0	0 / 0
SIPRAL A.S. subtotal		100 / 3945	0 / 0	0 / 0	0 / 0	0 / 0
TEPLARNA Kladno S.R.	Combustion test of brown coal + TAP	0 / 0	0 / 0	0 / 0	0 / 0	100 / 3945
TEPLARNA Kladno S.R. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	100 / 3945

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
B. BRAUN MEDICAL S.R	Preparation of expert opinion Braun Medical	100 / 3929	0 / 0	0 / 0	0 / 0	0 / 0
B. BRAUN MEDICAL S.R subtotal		100 / 3929	0 / 0	0 / 0	0 / 0	0 / 0
TECHNOLOGICKA PLATF	Small contracts /Various titles	100 / 3913	0 / 0	0 / 0	0 / 0	0 / 0
TECHNOLOGICKA PLATF subtotal		100 / 3913	0 / 0	0 / 0	0 / 0	0 / 0
PARS NOVA A.S.	Qualification activity-Employee training	0 / 0	0 / 0	50 / 1953	50 / 1953	0 / 0
PARS NOVA A.S. subtotal		0 / 0	0 / 0	50 / 1953	50 / 1953	0 / 0
TCTM OIL, S.R.O.	Processing of the assessment of the introductory information to the automated system of pumping chemical solutions into wells.	98 / 3866	0 / 0	0 / 0	0 / 0	0 / 0
TCTM OIL, S.R.O. subtotal		98 / 3866	0 / 0	0 / 0	0 / 0	0 / 0
VUT BRNO	Qualification activity-International welding technologist	14 / 521	20 / 778	0 / 0	23 / 887	0 / 0
	Small contracts /Various titles	3 / 119	0 / 0	0 / 0	0 / 0	40 / 1563
VUT BRNO subtotal		17 / 639	20 / 778	0 / 0	23 / 887	40 / 1563
SPOLECNOST PRO VYZ	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	98 / 3847
SPOLECNOST PRO VYZ subtotal		0 / 0	0 / 0	0 / 0	0 / 0	98 / 3847
JHV - DEVELOPMENT S.	Qualification activity-International welding technologist	0 / 0	0 / 0	75 / 2959	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	22 / 857	0 / 0	0 / 0	0 / 0
JHV - DEVELOPMENT S. subtotal		0 / 0	22 / 857	75 / 2959	0 / 0	0 / 0
EXPLOSIA A.S.	Contract research focused on analysis of the current state of explosive extrusion, design of experiments and basic-design of extrusion head for multicomponent extrusion of razor products	96 / 3787	0 / 0	0 / 0	0 / 0	0 / 0
EXPLOSIA A.S. subtotal		96 / 3787	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
MILLENIUM TECHNOLOGI Praha 1	Design of a method for cooling the obtained process gas before cleaning and gas treatment after cleaning	0 / 0	96 / 3786	0 / 0	0 / 0	0 / 0
MILLENIUM TECHNOLOGI Praha 1 subtotal		0 / 0	96 / 3786	0 / 0	0 / 0	0 / 0
BLANIK AIRCRAFT CZ S	Development and supply of sensors and imaging and recording equipment for the existing machine.	95 / 3748	0 / 0	0 / 0	0 / 0	0 / 0
BLANIK AIRCRAFT CZ S subtotal		95 / 3748	0 / 0	0 / 0	0 / 0	0 / 0
ELPRAMO S.R.O.	Simulation analysis of photovoltaic system for residential building	0 / 0	0 / 0	0 / 0	0 / 0	95 / 3748
ELPRAMO S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	95 / 3748
CEGELEC A.S.	Small contracts /Various titles	33 / 1302	10 / 393	10 / 391	20 / 789	20 / 789
CEGELEC A.S. subtotal		33 / 1302	10 / 393	10 / 391	20 / 789	20 / 789
ALMET A.S.	Small contracts /Various titles	19 / 726	49 / 1926	14 / 537	5 / 194	6 / 237
ALMET A.S. subtotal		19 / 726	49 / 1926	14 / 537	5 / 194	6 / 237
BTL MEDICAL TECHNOLO	Small contracts /Various titles	8 / 285	50 / 1973	35 / 1350	0 / 0	0 / 0
BTL MEDICAL TECHNOLO subtotal		8 / 285	50 / 1973	35 / 1350	0 / 0	0 / 0
VSCHT	Small contracts /Various titles	31 / 1195	27 / 1058	24 / 926	0 / 0	10 / 395
VSCHT subtotal		31 / 1195	27 / 1058	24 / 926	0 / 0	10 / 395
SKODA ELECTRIC A.S.	Small contracts /Various titles	55 / 2170	35 / 1381	0 / 0	0 / 0	0 / 0
SKODA ELECTRIC A.S. subtotal		55 / 2170	35 / 1381	0 / 0	0 / 0	0 / 0
VUTS, A.S.	Mapping potential users of automation products for the OP project	0 / 0	90 / 3551	0 / 0	0 / 0	0 / 0
VUTS, A.S. subtotal		0 / 0	90 / 3551	0 / 0	0 / 0	0 / 0
MASCHINEN-VERTRIEBS-	Machinery design proposal-Watterjet-Ecowasp	90 / 3542	0 / 0	0 / 0	0 / 0	0 / 0
MASCHINEN-VERTRIEBS-subtotal		90 / 3542	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
DOWTY PROPELLERS	Ice Adhesion Measurements of IP1, IP2 and IP3-"Investigation"	0 / 0	0 / 0	0 / 0	0 / 0	90 / 3541
DOWTY PROPELLERS subtotal		0 / 0	0 / 0	0 / 0	0 / 0	90 / 3541
NIMBLE ENERGY S.R.O. Praha 1	Design of the structural solution of the trailer system and frame for the transport of battery boxes.	0 / 0	90 / 3521	0 / 0	0 / 0	0 / 0
NIMBLE ENERGY S.R.O. Praha 1 subtotal		0 / 0	90 / 3521	0 / 0	0 / 0	0 / 0
USTAV FYZIKY ATMOSFE	Implementation of thermal-vacuum cycling and subsequent research of material characteristics	0 / 0	0 / 0	0 / 0	90 / 3519	0 / 0
USTAV FYZIKY ATMOSFE subtotal		0 / 0	0 / 0	0 / 0	90 / 3519	0 / 0
MICHAL LANK	Development tests of petrol engine	0 / 0	0 / 0	0 / 0	0 / 0	87 / 3425
MICHAL LANK subtotal		0 / 0	0 / 0	0 / 0	0 / 0	87 / 3425
AREA FOUR INDUSTRIES	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	0 / 0	87 / 3424
AREA FOUR INDUSTRIES subtotal		0 / 0	0 / 0	0 / 0	0 / 0	87 / 3424
AZ WELD STUHL S.R.O	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	0 / 0	87 / 3424
AZ WELD STUHL S.R.O subtotal		0 / 0	0 / 0	0 / 0	0 / 0	87 / 3424
JIHOTEC SPOL. S R.O	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	0 / 0	87 / 3424
JIHOTEC SPOL. S R.O subtotal		0 / 0	0 / 0	0 / 0	0 / 0	87 / 3424
PURE FLIGHT S.R.O.	Flutter Analysis of Phoenix Aircraft	0 / 0	0 / 0	0 / 0	0 / 0	87 / 3397
PURE FLIGHT S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	87 / 3397
ADITERA S. R. O.	Fasteners	0 / 0	0 / 0	0 / 0	75 / 2959	10 / 395
ADITERA S. R. O. subtotal		0 / 0	0 / 0	0 / 0	75 / 2959	10 / 395
PULSKLIMA, SPOL. S R	Verification of noise parameters for SUP and ETA endpieces and Duovent Compact casing	0 / 0	0 / 0	85 / 3354	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
PULSKLIMA, SPOL. S R subtotal		0 / 0	0 / 0	85 / 3354	0 / 0	0 / 0
SEA KOLIN S.R.O.	Small contracts /Various titles	85 / 3354	0 / 0	0 / 0	0 / 0	0 / 0
SEA KOLIN S.R.O. subtotal		85 / 3354	0 / 0	0 / 0	0 / 0	0 / 0
SIGMA GROUP A.S.	Measurement of force effects from the fluid on the pump rotor	0 / 0	0 / 0	85 / 3354	0 / 0	0 / 0
SIGMA GROUP A.S. subtotal		0 / 0	0 / 0	85 / 3354	0 / 0	0 / 0
VUAB PHARMA	Development of nozzles with adapters for connecting hoses	0 / 0	0 / 0	0 / 0	0 / 0	85 / 3354
VUAB PHARMA subtotal		0 / 0	0 / 0	0 / 0	0 / 0	85 / 3354
NUM SOLUTION S.R.O.	Adjustment of thread tolerances	0 / 0	85 / 3330	0 / 0	0 / 0	0 / 0
NUM SOLUTION S.R.O. subtotal		0 / 0	85 / 3330	0 / 0	0 / 0	0 / 0
WOOD & PARKET SYSTEM	Calculation of tests and correction of articles	0 / 0	0 / 0	0 / 0	84 / 3298	0 / 0
WOOD & PARKET SYSTEM subtotal		0 / 0	0 / 0	0 / 0	84 / 3298	0 / 0
KWD BOHEMIA, S.R.O.	Optical measurement of Zn coating thickness on galvanized nuts	0 / 0	0 / 0	58 / 2288	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	25 / 987	0 / 0	0 / 0
KWD BOHEMIA, S.R.O. subtotal		0 / 0	0 / 0	83 / 3275	0 / 0	0 / 0
MEDOKOMERC S.R.O.	Simulation of flow and circulation with the existing stirrer and modification of the geometry of the stirrer and simulation verification of circulation in the whole batch.	73 / 2880	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	10 / 395
MEDOKOMERC S.R.O. subtotal		73 / 2880	0 / 0	0 / 0	0 / 0	10 / 395
STREDNI PRUMYSLOVA	Qualification activity-International welding technologist	0 / 0	0 / 0	61 / 2407	0 / 0	0 / 0
	Small contracts /Various titles	20 / 789	0 / 0	0 / 0	0 / 0	0 / 0
STREDNI PRUMYSLOVA subtotal		20 / 789	0 / 0	61 / 2407	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
AKKODIS CZ S.R.O.	Small contracts /Various titles	46 / 1795	31 / 1223	5 / 168	0 / 0	0 / 0
AKKODIS CZ S.R.O. subtotal		46 / 1795	31 / 1223	5 / 168	0 / 0	0 / 0
AULIK FISER ARCHITEK	Simulation studies for roztyly plaza	0 / 0	0 / 0	0 / 0	80 / 3156	0 / 0
AULIK FISER ARCHITEK subtotal		0 / 0	0 / 0	0 / 0	80 / 3156	0 / 0
LL-C (CERTIFICATION)	Mechanical testing	80 / 3156	0 / 0	0 / 0	0 / 0	0 / 0
LL-C (CERTIFICATION) subtotal		80 / 3156	0 / 0	0 / 0	0 / 0	0 / 0
CRYTUR, SPOL. S R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	45 / 1768	34 / 1334
CRYTUR, SPOL. S R.O. subtotal		0 / 0	0 / 0	0 / 0	45 / 1768	34 / 1334
BOHEMIACHLAD PRAHA S	Determination of the required cooling capacity for cooling existing CK tanks in the brewery	0 / 0	0 / 0	0 / 0	78 / 3077	0 / 0
BOHEMIACHLAD PRAHA S subtotal		0 / 0	0 / 0	0 / 0	78 / 3077	0 / 0
LOM PRAHA S.P.	Strength verification of composite bracket assembly	0 / 0	0 / 0	0 / 0	0 / 0	78 / 3077
LOM PRAHA S.P. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	78 / 3077
MESTO VARNSDORF	Assessment of alternatives to the current method of supplying the city of Varnsdorf with thermal energy	0 / 0	0 / 0	0 / 0	78 / 3077	0 / 0
MESTO VARNSDORF subtotal		0 / 0	0 / 0	0 / 0	78 / 3077	0 / 0
CZECH AVIATION TRAIN	Qualification activity-lecturing services	0 / 0	77 / 3018	0 / 0	0 / 0	0 / 0
CZECH AVIATION TRAIN subtotal		0 / 0	77 / 3018	0 / 0	0 / 0	0 / 0
ALUMETALL CZ S.R.O.	Bursting tests and tests of selected materials	16 / 614	9 / 322	15 / 555	11 / 409	19 / 725
	Small contracts /Various titles	10 / 395	0 / 0	0 / 0	0 / 0	0 / 0
ALUMETALL CZ S.R.O. subtotal		26 / 1008	9 / 322	15 / 555	11 / 409	19 / 725
HEIDELBERG MATERIALS	Study of heat utilization in the technological process of cooling cement mixture.	77 / 3006	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
HEIDELBERG MATERIALS subtotal		77 / 3006	0 / 0	0 / 0	0 / 0	0 / 0
CESKOSLOVENSKY LLOYD	Qualification activity-International welding technologist	0 / 0	75 / 2959	0 / 0	0 / 0	0 / 0
CESKOSLOVENSKY LLOYD subtotal		0 / 0	75 / 2959	0 / 0	0 / 0	0 / 0
CZECH AIRLINES TECHN	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	75 / 2959	0 / 0
CZECH AIRLINES TECHN subtotal		0 / 0	0 / 0	0 / 0	75 / 2959	0 / 0
DNV CZECH REPUBLIC S	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	75 / 2959	0 / 0
DNV CZECH REPUBLIC S subtotal		0 / 0	0 / 0	0 / 0	75 / 2959	0 / 0
FORTEX - AGS, A.S.	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	75 / 2959	0 / 0
FORTEX - AGS, A.S. subtotal		0 / 0	0 / 0	0 / 0	75 / 2959	0 / 0
FOXCONN CZ S.R.O.	Qualification activity-International welding technologist	0 / 0	0 / 0	75 / 2959	0 / 0	0 / 0
FOXCONN CZ S.R.O. subtotal		0 / 0	0 / 0	75 / 2959	0 / 0	0 / 0
METSO CZECH REPUBLIC	Qualification activity-International welding technologist	75 / 2959	0 / 0	0 / 0	0 / 0	0 / 0
METSO CZECH REPUBLIC subtotal		75 / 2959	0 / 0	0 / 0	0 / 0	0 / 0
N+N - KONSTRUKCE A D	Qualification activity-International welding technologist	0 / 0	0 / 0	75 / 2959	0 / 0	0 / 0
N+N - KONSTRUKCE A D subtotal		0 / 0	0 / 0	75 / 2959	0 / 0	0 / 0
NEMOCNICE STRAKONICE	Reduction of energy intensity and modernization of the laundry of Strakonice Hospital, a.s	0 / 0	0 / 0	0 / 0	0 / 0	75 / 2959
NEMOCNICE STRAKONICE subtotal		0 / 0	0 / 0	0 / 0	0 / 0	75 / 2959
PBS INDUSTRY, A.S.	Qualification activity-International welding technologist	0 / 0	0 / 0	75 / 2959	0 / 0	0 / 0
PBS INDUSTRY, A.S. subtotal		0 / 0	0 / 0	75 / 2959	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
REVOK S.R.O. - REALI	Qualification activity-International welding technologist	0 / 0	75 / 2959	0 / 0	0 / 0	0 / 0
REVOK S.R.O. - REALI subtotal		0 / 0	75 / 2959	0 / 0	0 / 0	0 / 0
UNITED REGISTRAR OF	Qualification activity-International welding technologist	0 / 0	0 / 0	75 / 2959	0 / 0	0 / 0
UNITED REGISTRAR OF subtotal		0 / 0	0 / 0	75 / 2959	0 / 0	0 / 0
ZAPADOČESKA UNIVER. Fakulta strojní	Qualification activity-International welding technologist	0 / 0	75 / 2959	0 / 0	0 / 0	0 / 0
ZAPADOČESKA UNIVER. Fakulta strojní subtotal		0 / 0	75 / 2959	0 / 0	0 / 0	0 / 0
AXA CNC STROJE, S.R.	Small contracts /Various titles	75 / 2950	0 / 0	0 / 0	0 / 0	0 / 0
AXA CNC STROJE, S.R. subtotal		75 / 2950	0 / 0	0 / 0	0 / 0	0 / 0
KRAMER-WERKE GMBH	Small contracts /Various titles	0 / 0	42 / 1643	33 / 1288	0 / 0	0 / 0
KRAMER-WERKE GMBH subtotal		0 / 0	42 / 1643	33 / 1288	0 / 0	0 / 0
TAJMAC-ZPS, A.S.	TMZ642CNC Linear Axis Positioning Accuracy Measurement	57 / 2230	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	18 / 691	0 / 0	0 / 0	0 / 0	0 / 0
TAJMAC-ZPS, A.S. subtotal		75 / 2920	0 / 0	0 / 0	0 / 0	0 / 0
LASERNEEDLE CZ S.R.O	Small contracts /Various titles	0 / 0	0 / 0	74 / 2920	0 / 0	0 / 0
LASERNEEDLE CZ S.R.O subtotal		0 / 0	0 / 0	74 / 2920	0 / 0	0 / 0
CESKY SVARECKÝ USTA	Qualification activity-International welding technologist	13 / 474	30 / 1182	0 / 0	13 / 484	8 / 302
	Small contracts /Various titles	11 / 402	0 / 0	0 / 0	0 / 0	0 / 0
CESKY SVARECKÝ USTA subtotal		23 / 875	30 / 1182	0 / 0	13 / 484	8 / 302
HOUFEK A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	71 / 2798
HOUFEK A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	71 / 2798
DATATHERM, SPOL. S R	Qualification activity-Ash fuel samples for Wotan Forest Saltnice project	71 / 2772	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
DATATHERM, SPOL. S R subtotal		71 / 2772	0 / 0	0 / 0	0 / 0	0 / 0
AAS AUTOMOTIVE S.R.O	Qualification activity-review	0 / 0	70 / 2762	0 / 0	0 / 0	0 / 0
AAS AUTOMOTIVE S.R.O subtotal		0 / 0	70 / 2762	0 / 0	0 / 0	0 / 0
PETRUSKA, A.S. Brno-Tuřany	Analysis of the current condition of the drying line.	0 / 0	70 / 2762	0 / 0	0 / 0	0 / 0
PETRUSKA, A.S. Brno-Tuřany subtotal		0 / 0	70 / 2762	0 / 0	0 / 0	0 / 0
STAVBY MOSTU A.S.	Research work for verification of weldability of FESMA materials by different welding methods	0 / 0	0 / 0	70 / 2762	0 / 0	0 / 0
STAVBY MOSTU A.S. subtotal		0 / 0	0 / 0	70 / 2762	0 / 0	0 / 0
ZUCCA A.S.	Qualification activity-review	0 / 0	0 / 0	70 / 2762	0 / 0	0 / 0
ZUCCA A.S. subtotal		0 / 0	0 / 0	70 / 2762	0 / 0	0 / 0
PIERBURG S.R.O.	Assessment of the weld joint of the shaft and the damper.	0 / 0	0 / 0	52 / 2052	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	18 / 679	0 / 0	0 / 0
PIERBURG S.R.O. subtotal		0 / 0	0 / 0	70 / 2730	0 / 0	0 / 0
ECKERT & ZIEGLER CES	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	70 / 2728	0 / 0
ECKERT & ZIEGLER CES subtotal		0 / 0	0 / 0	0 / 0	70 / 2728	0 / 0
TEDIKO, S.R.O.	Plating of colloidal impressions	0 / 0	0 / 0	0 / 0	0 / 0	70 / 2728
TEDIKO, S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	70 / 2728
VIBRACOUSTIC CZ, S.R	Small contracts /Various titles	0 / 0	5 / 178	63 / 2454	3 / 83	0 / 0
VIBRACOUSTIC CZ, S.R subtotal		0 / 0	5 / 178	63 / 2454	3 / 83	0 / 0
MOTORDESIGN S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	32 / 1239	38 / 1468
MOTORDESIGN S.R.O. subtotal		0 / 0	0 / 0	0 / 0	32 / 1239	38 / 1468
REGULTECH SERVIS, S.	Checking the design of the heat pump cooling circuit	0 / 0	0 / 0	0 / 0	68 / 2651	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
REGULTECH SERVIS, S. subtotal		0 / 0	0 / 0	0 / 0	68 / 2651	0 / 0
ABB S.R.O.	Small contracts /Various titles	24 / 924	0 / 0	0 / 0	43 / 1697	0 / 0
ABB S.R.O. subtotal		24 / 924	0 / 0	0 / 0	43 / 1697	0 / 0
EXPERBUY DEUTSCHLAND	Small contracts /Various titles	27 / 1034	40 / 1578	0 / 0	0 / 0	0 / 0
EXPERBUY DEUTSCHLAND subtotal		27 / 1034	40 / 1578	0 / 0	0 / 0	0 / 0
DEKONTA, A.S.	Small contracts /Various titles	65 / 2565	0 / 0	0 / 0	0 / 0	0 / 0
DEKONTA, A.S. subtotal		65 / 2565	0 / 0	0 / 0	0 / 0	0 / 0
VEZENSKA SLUZBA CESK	Evaluation of the efficiency and reliability of Ekomat 1500 and 950 boilers	0 / 0	0 / 0	65 / 2565	0 / 0	0 / 0
VEZENSKA SLUZBA CESK subtotal		0 / 0	0 / 0	65 / 2565	0 / 0	0 / 0
MARTIA A.S.	Analytical calculation of condensate formation from individual evaporators or air conditioning units	0 / 0	0 / 0	0 / 0	65 / 2547	0 / 0
MARTIA A.S. subtotal		0 / 0	0 / 0	0 / 0	65 / 2547	0 / 0
CENTRUM ANDRAGOGIKY,	Qualification activity-Technology	0 / 0	0 / 0	65 / 2541	0 / 0	0 / 0
CENTRUM ANDRAGOGIKY, subtotal		0 / 0	0 / 0	65 / 2541	0 / 0	0 / 0
PRUSA RESEARCH A.S.	Analysis of the current state of assembly workplaces	0 / 0	0 / 0	0 / 0	0 / 0	64 / 2507
PRUSA RESEARCH A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	64 / 2507
UNIVERZITA PARDUBICE	Small contracts /Various titles	33 / 1302	30 / 1184	1 / 20	0 / 0	0 / 0
UNIVERZITA PARDUBICE subtotal		33 / 1302	30 / 1184	1 / 20	0 / 0	0 / 0
LAGUS S.R.O.	Small contracts /Various titles	24 / 947	39 / 1515	0 / 0	0 / 0	0 / 0
LAGUS S.R.O. subtotal		24 / 947	39 / 1515	0 / 0	0 / 0	0 / 0
TOMAS BRITNIK	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	62 / 2446	0 / 0
TOMAS BRITNIK subtotal		0 / 0	0 / 0	0 / 0	62 / 2446	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
SPRAVA ZELEZNIC, STA	Qualification activity-OSH in welding, international tests according to CSN 05 070 5	0 / 0	62 / 2442	0 / 0	0 / 0	0 / 0
SPRAVA ZELEZNIC, STA subtotal		0 / 0	62 / 2442	0 / 0	0 / 0	0 / 0
MAHR, SPOL. S R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	62 / 2425
MAHR, SPOL. S R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	62 / 2425
ALL ACADEMY S.R.O.	Qualification activity-International welding technologist	61 / 2407	0 / 0	0 / 0	0 / 0	0 / 0
ALL ACADEMY S.R.O. subtotal		61 / 2407	0 / 0	0 / 0	0 / 0	0 / 0
CSGM A.S.	Qualification activity-International welding technologist	0 / 0	0 / 0	61 / 2407	0 / 0	0 / 0
CSGM A.S. subtotal		0 / 0	0 / 0	61 / 2407	0 / 0	0 / 0
ELDIS PARDUBICE, S.R	Qualification activity-International welding technologist	0 / 0	0 / 0	61 / 2407	0 / 0	0 / 0
ELDIS PARDUBICE, S.R subtotal		0 / 0	0 / 0	61 / 2407	0 / 0	0 / 0
ENERGO CHOCEN, S.R.O	Qualification activity-International welding technologist	61 / 2407	0 / 0	0 / 0	0 / 0	0 / 0
ENERGO CHOCEN, S.R.O subtotal		61 / 2407	0 / 0	0 / 0	0 / 0	0 / 0
GERBET TRAINING CENT	Qualification activity-International welding technologist	61 / 2407	0 / 0	0 / 0	0 / 0	0 / 0
GERBET TRAINING CENT subtotal		61 / 2407	0 / 0	0 / 0	0 / 0	0 / 0
PERSA, A. S. Praha 10	Qualification activity-International welding technologist	0 / 0	61 / 2407	0 / 0	0 / 0	0 / 0
PERSA, A. S. Praha 10 subtotal		0 / 0	61 / 2407	0 / 0	0 / 0	0 / 0
REGIOJET, A.S.	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	61 / 2407	0 / 0
REGIOJET, A.S. subtotal		0 / 0	0 / 0	0 / 0	61 / 2407	0 / 0
RETEZY VAMBERK SPOL.	Qualification activity-International welding technologist	0 / 0	61 / 2407	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
RETEZY VAMBERK SPOL. subtotal		0 / 0	61 / 2407	0 / 0	0 / 0	0 / 0
STREDNI ODBORNE_____	Qualification activity-International welding technologist	0 / 0	0 / 0	0 / 0	61 / 2407	0 / 0
STREDNI ODBORNE_____ subtotal		0 / 0	0 / 0	0 / 0	61 / 2407	0 / 0
EPG CENTRAL MOST S.R Praha 1	Measurement and evaluation of ventilation operation OC Central Most.	61 / 2399	0 / 0	0 / 0	0 / 0	0 / 0
EPG CENTRAL MOST S.R Praha 1 subtotal		61 / 2399	0 / 0	0 / 0	0 / 0	0 / 0
AIR PRODUCTS SPOL.S	Research and development in modern additive technologies using electric arc-MIG/MAG methods	60 / 2367	0 / 0	0 / 0	0 / 0	0 / 0
AIR PRODUCTS SPOL.S subtotal		60 / 2367	0 / 0	0 / 0	0 / 0	0 / 0
I&AAT SPOL. S R.O.	Construction of a device for drying chips	0 / 0	0 / 0	0 / 0	60 / 2367	0 / 0
I&AAT SPOL. S R.O. subtotal		0 / 0	0 / 0	0 / 0	60 / 2367	0 / 0
JINOVA S.R.O.	Measurement of performance and temperature parameters of flue gas-air exchanger MTP-150 and subsequent modification proposals to increase efficiency according to "Ecodesign" 2016/2281	0 / 0	60 / 2367	0 / 0	0 / 0	0 / 0
JINOVA S.R.O. subtotal		0 / 0	60 / 2367	0 / 0	0 / 0	0 / 0
KUFI INT, S.R.O.	Training in refrigeration technology.	0 / 0	0 / 0	0 / 0	0 / 0	60 / 2367
KUFI INT, S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	60 / 2367
MEGA A.S.	Evaluation of the state of anti-corrosion protection of the Iveco bus chassis.	59 / 2311	0 / 0	0 / 0	0 / 0	0 / 0
	Small contracts /Various titles	0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
MEGA A.S. subtotal		59 / 2311	0 / 0	1 / 20	0 / 0	0 / 0
ALFIMEX S.R.O.	Vibration characteristics of compressors	59 / 2326	0 / 0	0 / 0	0 / 0	0 / 0
ALFIMEX S.R.O. subtotal		59 / 2326	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
KOPOS KOLIN A.S.	Design, creation of computational models and performance of computational analyses	0 / 0	0 / 0	0 / 0	58 / 2273	0 / 0
KOPOS KOLIN A.S. subtotal		0 / 0	0 / 0	0 / 0	58 / 2273	0 / 0
INOS-SERVIS S.R.O.	Design of bioreactor mixing system	0 / 0	0 / 0	0 / 0	56 / 2210	0 / 0
INOS-SERVIS S.R.O. subtotal		0 / 0	0 / 0	0 / 0	56 / 2210	0 / 0
ZKW SLOVAKIA S.R.O.	Analysis of internal reflector surfaces	0 / 0	0 / 0	0 / 0	56 / 2200	0 / 0
ZKW SLOVAKIA S.R.O. subtotal		0 / 0	0 / 0	0 / 0	56 / 2200	0 / 0
5M S.R.O.	Filling machine control system upgrade	0 / 0	0 / 0	0 / 0	0 / 0	56 / 2178
5M S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	56 / 2178
LASERTHERM SPOL. S R	Small contracts /Various titles	0 / 0	0 / 0	30 / 1184	26 / 995	0 / 0
LASERTHERM SPOL. S R subtotal		0 / 0	0 / 0	30 / 1184	26 / 995	0 / 0
DAKARI CZECH S.R.O.	Technical assessment of the implementation of pyrolysis of mixed municipal waste on an industrial scale	0 / 0	0 / 0	0 / 0	55 / 2170	0 / 0
DAKARI CZECH S.R.O. subtotal		0 / 0	0 / 0	0 / 0	55 / 2170	0 / 0
JAWA FACTORY S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	55 / 2170	0 / 0	0 / 0
JAWA FACTORY S.R.O. subtotal		0 / 0	0 / 0	55 / 2170	0 / 0	0 / 0
ECOM SPOL. S R.O.	Qualification activity-Employee training	0 / 0	0 / 0	0 / 0	27 / 1047	27 / 1047
ECOM SPOL. S R.O. subtotal		0 / 0	0 / 0	0 / 0	27 / 1047	27 / 1047
DEVRO S.R.O.	Measurement of rheological properties of collagen samples 400NJ1012	0 / 0	0 / 0	53 / 2083	0 / 0	0 / 0
DEVRO S.R.O. subtotal		0 / 0	0 / 0	53 / 2083	0 / 0	0 / 0
KROFIAN CZ SPOL. S R	Small contracts /Various titles	0 / 0	0 / 0	51 / 1989	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
KROFIAN CZ SPOL. S R subtotal		0 / 0	0 / 0	51 / 1989	0 / 0	0 / 0
A G R O M E T A L L	Small contracts /Various titles	0 / 0	0 / 0	51 / 1980	0 / 0	0 / 0
A G R O M E T A L L subtotal		0 / 0	0 / 0	51 / 1980	0 / 0	0 / 0
JAKUB DOLEJS	Small contracts /Various titles	0 / 0	0 / 0	50 / 1973	0 / 0	0 / 0
JAKUB DOLEJS subtotal		0 / 0	0 / 0	50 / 1973	0 / 0	0 / 0
DOM-ZO 13,S.R.O.	Small contracts /Various titles	11 / 419	13 / 476	14 / 552	0 / 0	13 / 510
DOM-ZO 13,S.R.O. subtotal		11 / 419	13 / 476	14 / 552	0 / 0	13 / 510
METROSTAV A.S	Small contracts /Various titles	1 / 40	49 / 1906	0 / 0	0 / 0	0 / 0
METROSTAV A.S subtotal		1 / 40	49 / 1906	0 / 0	0 / 0	0 / 0
LOM PRAHA TRADE A.S. Praha 10	Small contracts /Various titles	49 / 1931	0 / 0	0 / 0	0 / 0	0 / 0
LOM PRAHA TRADE A.S. Praha 10 subtotal		49 / 1931	0 / 0	0 / 0	0 / 0	0 / 0
ACO INDUSTRIES	Small contracts /Various titles	18 / 711	0 / 0	0 / 0	30 / 1184	0 / 0
ACO INDUSTRIES subtotal		18 / 711	0 / 0	0 / 0	30 / 1184	0 / 0
VANAD 2000 A.S.	Small contracts /Various titles	48 / 1877	0 / 0	0 / 0	0 / 0	0 / 0
VANAD 2000 A.S. subtotal		48 / 1877	0 / 0	0 / 0	0 / 0	0 / 0
AMPENG S.R.O. Praha 15	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	47 / 1847
AMPENG S.R.O. Praha 15 subtotal		0 / 0	0 / 0	0 / 0	0 / 0	47 / 1847
SPOLECENSTVI VLA 004 Praha 11	Small contracts /Various titles	0 / 0	8 / 310	0 / 0	0 / 0	39 / 1513
SPOLECENSTVI VLA 004 Praha 11 subtotal		0 / 0	8 / 310	0 / 0	0 / 0	39 / 1513
HZP A.S.	Small contracts /Various titles	0 / 0	0 / 0	30 / 1164	16 / 632	0 / 0
HZP A.S. subtotal		0 / 0	0 / 0	30 / 1164	16 / 632	0 / 0
STATNI USTAV JADERNE	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	45 / 1776	0 / 0
STATNI USTAV JADERNE subtotal		0 / 0	0 / 0	0 / 0	45 / 1776	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
STROJMETAL ALUMINIUM	Small contracts /Various titles	0 / 0	45 / 1776	0 / 0	0 / 0	0 / 0
STROJMETAL ALUMINIUM subtotal		0 / 0	45 / 1776	0 / 0	0 / 0	0 / 0
SCHAFER - MENK S.R.O	Small contracts /Various titles	45 / 1774	0 / 0	0 / 0	0 / 0	0 / 0
SCHAFER - MENK S.R.O subtotal		45 / 1774	0 / 0	0 / 0	0 / 0	0 / 0
LAVARIS S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	44 / 1713
LAVARIS S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	44 / 1713
TECHNICKA UNIVERZIT	Small contracts /Various titles	15 / 554	0 / 0	1 / 20	4 / 158	25 / 967
TECHNICKA UNIVERZIT subtotal		15 / 554	0 / 0	1 / 20	4 / 158	25 / 967
MECHATEC S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	43 / 1684	0 / 0	0 / 0
MECHATEC S.R.O. subtotal		0 / 0	0 / 0	43 / 1684	0 / 0	0 / 0
FYZIOLOGICKY USTAV A	Small contracts /Various titles	0 / 0	43 / 1677	0 / 0	0 / 0	0 / 0
FYZIOLOGICKY USTAV A subtotal		0 / 0	43 / 1677	0 / 0	0 / 0	0 / 0
VUKV A.S.	Small contracts /Various titles	0 / 0	43 / 1677	0 / 0	0 / 0	0 / 0
VUKV A.S. subtotal		0 / 0	43 / 1677	0 / 0	0 / 0	0 / 0
TOMAS JANDA 001 Praha-Běchovice	Small contracts /Various titles	0 / 0	0 / 0	43 / 1671	0 / 0	0 / 0
TOMAS JANDA 001 Praha-Běchovice subtotal		0 / 0	0 / 0	43 / 1671	0 / 0	0 / 0
MB PHARMA S.R.O.	Small contracts /Various titles	0 / 0	42 / 1657	0 / 0	0 / 0	0 / 0
MB PHARMA S.R.O. subtotal		0 / 0	42 / 1657	0 / 0	0 / 0	0 / 0
BMD A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	41 / 1618
BMD A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	41 / 1618
PARKER-HANNIFIN S.R.	Small contracts /Various titles	41 / 1618	0 / 0	0 / 0	0 / 0	0 / 0
PARKER-HANNIFIN S.R. subtotal		41 / 1618	0 / 0	0 / 0	0 / 0	0 / 0
AGC FLAT GLASS CZECH	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	41 / 1616	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
AGC FLAT GLASS CZECH subtotal		0 / 0	0 / 0	0 / 0	41 / 1616	0 / 0
STRIX CHOMUTOV, A.S.	Small contracts /Various titles	0 / 0	0 / 0	41 / 1598	0 / 0	0 / 0
STRIX CHOMUTOV, A.S. subtotal		0 / 0	0 / 0	41 / 1598	0 / 0	0 / 0
VUHZ A.S.	Small contracts /Various titles	0 / 0	18 / 711	23 / 888	0 / 0	0 / 0
VUHZ A.S. subtotal		0 / 0	18 / 711	23 / 888	0 / 0	0 / 0
EDIKT A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	40 / 1578
EDIKT A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	40 / 1578
GUARANT INTERNATI FS	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	40 / 1578	0 / 0
GUARANT INTERNATI FS subtotal		0 / 0	0 / 0	0 / 0	40 / 1578	0 / 0
TOS - MET SLEVARNA A	Small contracts /Various titles	0 / 0	0 / 0	40 / 1578	0 / 0	0 / 0
TOS - MET SLEVARNA A subtotal		0 / 0	0 / 0	40 / 1578	0 / 0	0 / 0
USTAV CHEMICKYCH PRO	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	40 / 1578	0 / 0
USTAV CHEMICKYCH PRO subtotal		0 / 0	0 / 0	0 / 0	40 / 1578	0 / 0
TARGET TECHNOLOGIE S	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	40 / 1567	0 / 0
TARGET TECHNOLOGIE S subtotal		0 / 0	0 / 0	0 / 0	40 / 1567	0 / 0
KONCERN DESIGN STUDI	Small contracts /Various titles	16 / 616	0 / 0	24 / 947	0 / 0	0 / 0
KONCERN DESIGN STUDI subtotal		16 / 616	0 / 0	24 / 947	0 / 0	0 / 0
MEVA A.S.	Small contracts /Various titles	0 / 0	0 / 0	40 / 1563	0 / 0	0 / 0
MEVA A.S. subtotal		0 / 0	0 / 0	40 / 1563	0 / 0	0 / 0
MOTOR JIKOV FOSTRON	Small contracts /Various titles	40 / 1563	0 / 0	0 / 0	0 / 0	0 / 0
MOTOR JIKOV FOSTRON subtotal		40 / 1563	0 / 0	0 / 0	0 / 0	0 / 0
BALL AEROSOL PACKAGI	Small contracts /Various titles	39 / 1512	0 / 0	0 / 0	0 / 0	0 / 0
BALL AEROSOL PACKAGI subtotal		39 / 1512	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
ABNER A.S.	Small contracts /Various titles	0 / 0	38 / 1500	0 / 0	0 / 0	0 / 0
ABNER A.S. subtotal		0 / 0	38 / 1500	0 / 0	0 / 0	0 / 0
ATEC V.O.S.	Small contracts /Various titles	0 / 0	38 / 1500	0 / 0	0 / 0	0 / 0
ATEC V.O.S. subtotal		0 / 0	38 / 1500	0 / 0	0 / 0	0 / 0
PRUSA POLYMERS A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	38 / 1500
PRUSA POLYMERS A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	38 / 1500
CESKA NARODNI BANKA	Small contracts /Various titles	0 / 0	24 / 947	0 / 0	13 / 513	0 / 0
CESKA NARODNI BANKA subtotal		0 / 0	24 / 947	0 / 0	13 / 513	0 / 0
DPOV, A.S.	Small contracts /Various titles	0 / 0	0 / 0	37 / 1460	0 / 0	0 / 0
DPOV, A.S. subtotal		0 / 0	0 / 0	37 / 1460	0 / 0	0 / 0
SKD TRADE, A.S.	Small contracts /Various titles	0 / 0	0 / 0	37 / 1450	0 / 0	0 / 0
SKD TRADE, A.S. subtotal		0 / 0	0 / 0	37 / 1450	0 / 0	0 / 0
SVUM A.S.	Small contracts /Various titles	36 / 1421	0 / 0	0 / 0	0 / 0	0 / 0
SVUM A.S. subtotal		36 / 1421	0 / 0	0 / 0	0 / 0	0 / 0
VIKING CNC PRAGUE A.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	36 / 1421	0 / 0
VIKING CNC PRAGUE A. subtotal		0 / 0	0 / 0	0 / 0	36 / 1421	0 / 0
VOJENSKY TECHNICKY U	Small contracts /Various titles	0 / 0	0 / 0	36 / 1421	0 / 0	0 / 0
VOJENSKY TECHNICKY U subtotal		0 / 0	0 / 0	36 / 1421	0 / 0	0 / 0
ADEON CZ S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	36 / 1415
ADEON CZ S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	36 / 1415
VZLU AEROSPACE, A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	20 / 774	17 / 640
VZLU AEROSPACE, A.S. subtotal		0 / 0	0 / 0	0 / 0	20 / 774	17 / 640
LINDAB SALES CZ S.R.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	35 / 1381

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
LINDAB SALES CZ S.R. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	35 / 1381
MONDI STETI A.S.	Small contracts /Various titles	0 / 0	35 / 1381	0 / 0	0 / 0	0 / 0
MONDI STETI A.S. subtotal		0 / 0	35 / 1381	0 / 0	0 / 0	0 / 0
PRAGOMETAL,SPOL. S R	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	35 / 1381
PRAGOMETAL,SPOL. S R subtotal		0 / 0	0 / 0	0 / 0	0 / 0	35 / 1381
TOMTON S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	35 / 1381	0 / 0
TOMTON S.R.O. subtotal		0 / 0	0 / 0	0 / 0	35 / 1381	0 / 0
APT, SPOL. S R.O.	Small contracts /Various titles	25 / 969	0 / 0	0 / 0	0 / 0	10 / 395
APT, SPOL. S R.O. subtotal		25 / 969	0 / 0	0 / 0	0 / 0	10 / 395
MUBEA, SPOL. S R.O.	Small contracts /Various titles	35 / 1350	0 / 0	0 / 0	0 / 0	0 / 0
MUBEA, SPOL. S R.O. subtotal		35 / 1350	0 / 0	0 / 0	0 / 0	0 / 0
CASTOLIN S.R.O.	Small contracts /Various titles	0 / 0	14 / 521	21 / 825	0 / 0	0 / 0
CASTOLIN S.R.O. subtotal		0 / 0	14 / 521	21 / 825	0 / 0	0 / 0
LHM MTOOLS S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	34 / 1342
LHM MTOOLS S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	34 / 1342
TYCO ELECTRONICS CZE	Small contracts /Various titles	0 / 0	0 / 0	34 / 1342	0 / 0	0 / 0
TYCO ELECTRONICS CZE subtotal		0 / 0	0 / 0	34 / 1342	0 / 0	0 / 0
LEMATEC S.R.O.	Small contracts /Various titles	0 / 0	34 / 1322	0 / 0	0 / 0	0 / 0
LEMATEC S.R.O. subtotal		0 / 0	34 / 1322	0 / 0	0 / 0	0 / 0
ROST GROUP S.R.O. Praha 3	Small contracts /Various titles	0 / 0	34 / 1303	0 / 0	0 / 0	0 / 0
ROST GROUP S.R.O. Praha 3 subtotal		0 / 0	34 / 1303	0 / 0	0 / 0	0 / 0
KOTIS S.R.O.	Small contracts /Various titles	33 / 1286	0 / 0	0 / 0	0 / 0	0 / 0
KOTIS S.R.O. subtotal		33 / 1286	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
ALTEC SPOL. S R.O.	Small contracts /Various titles	0 / 0	0 / 0	32 / 1263	0 / 0	0 / 0
ALTEC SPOL. S R.O. subtotal		0 / 0	0 / 0	32 / 1263	0 / 0	0 / 0
SLEVARNA HEUNISCH, S	Small contracts /Various titles	32 / 1263	0 / 0	0 / 0	0 / 0	0 / 0
SLEVARNA HEUNISCH, S subtotal		32 / 1263	0 / 0	0 / 0	0 / 0	0 / 0
ING. ROBERT FLEISCHM	Small contracts /Various titles	0 / 0	0 / 0	32 / 1247	0 / 0	0 / 0
ING. ROBERT FLEISCHM subtotal		0 / 0	0 / 0	32 / 1247	0 / 0	0 / 0
GROZ-BECKERT CZECH S	Small contracts /Various titles	0 / 0	32 / 1239	0 / 0	0 / 0	0 / 0
GROZ-BECKERT CZECH S subtotal		0 / 0	32 / 1239	0 / 0	0 / 0	0 / 0
ARMOTECH S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	32 / 1233
ARMOTECH S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	32 / 1233
VANESSA DESIGN S.R.O	Small contracts /Various titles	20 / 758	0 / 0	0 / 0	0 / 0	12 / 450
VANESSA DESIGN S.R.O subtotal		20 / 758	0 / 0	0 / 0	0 / 0	12 / 450
ACO INDUSTRIES TABOR	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	30 / 1184
ACO INDUSTRIES TABOR subtotal		0 / 0	0 / 0	0 / 0	0 / 0	30 / 1184
ADAMEC CRANE SYSTEMS	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	30 / 1184
ADAMEC CRANE SYSTEMS subtotal		0 / 0	0 / 0	0 / 0	0 / 0	30 / 1184
HAPPY GARAGE S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	30 / 1184	0 / 0	0 / 0
HAPPY GARAGE S.R.O. subtotal		0 / 0	0 / 0	30 / 1184	0 / 0	0 / 0
KOVOFINIS S.R.O.	Small contracts /Various titles	0 / 0	30 / 1184	0 / 0	0 / 0	0 / 0
KOVOFINIS S.R.O. subtotal		0 / 0	30 / 1184	0 / 0	0 / 0	0 / 0
TESTO S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	30 / 1184
TESTO S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	30 / 1184
VYZKUMNY USTAV BEZPE	Small contracts /Various titles	0 / 0	0 / 0	8 / 296	15 / 592	8 / 296

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
VYZKUMNY USTAV BEZPE subtotal		0 / 0	0 / 0	8 / 296	15 / 592	8 / 296
ZENTIVA, K.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	30 / 1184
ZENTIVA, K.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	30 / 1184
ZVVZ MACHINERY, A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	30 / 1184	0 / 0
ZVVZ MACHINERY, A.S. subtotal		0 / 0	0 / 0	0 / 0	30 / 1184	0 / 0
PRVNI BRNENSKA STROJ	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	30 / 1164	0 / 0
PRVNI BRNENSKA STROJ subtotal		0 / 0	0 / 0	0 / 0	30 / 1164	0 / 0
SAINT-GOBAIN CONSTRU Divize Isover	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	30 / 1164
SAINT-GOBAIN CONSTRU Divize Isover subtotal		0 / 0	0 / 0	0 / 0	0 / 0	30 / 1164
PRECIOSA, A.S.	Small contracts /Various titles	25 / 979	0 / 0	5 / 182	0 / 0	0 / 0
PRECIOSA, A.S. subtotal		25 / 979	0 / 0	5 / 182	0 / 0	0 / 0
SWISS - FORM A. S.	Small contracts /Various titles	14 / 553	15 / 592	0 / 0	0 / 0	0 / 0
SWISS - FORM A. S. subtotal		14 / 553	15 / 592	0 / 0	0 / 0	0 / 0
METALURGIE RUMBURK S	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	29 / 1125
METALURGIE RUMBURK S subtotal		0 / 0	0 / 0	0 / 0	0 / 0	29 / 1125
SAFIBRA S.R.O. .	Small contracts /Various titles	0 / 0	28 / 1085	0 / 0	0 / 0	0 / 0
SAFIBRA S.R.O. . subtotal		0 / 0	28 / 1085	0 / 0	0 / 0	0 / 0
JHV - ENGINEERING S.	Small contracts /Various titles	28 / 1081	0 / 0	0 / 0	0 / 0	0 / 0
JHV - ENGINEERING S. subtotal		28 / 1081	0 / 0	0 / 0	0 / 0	0 / 0
MELEGHY AUTOMOTIVE C	Small contracts /Various titles	0 / 0	0 / 0	28 / 1073	0 / 0	0 / 0
MELEGHY AUTOMOTIVE C subtotal		0 / 0	0 / 0	28 / 1073	0 / 0	0 / 0
LEEL COILS EUROPE S.	Small contracts /Various titles	13 / 478	15 / 592	0 / 0	0 / 0	0 / 0
LEEL COILS EUROPE S. subtotal		13 / 478	15 / 592	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
RIETER CZ S.R.O.	Small contracts /Various titles	27 / 1066	0 / 0	0 / 0	0 / 0	0 / 0
RIETER CZ S.R.O. subtotal		27 / 1066	0 / 0	0 / 0	0 / 0	0 / 0
VAKUUM PRAHA S.R.O.	Small contracts /Various titles	20 / 789	0 / 0	7 / 257	0 / 0	0 / 0
VAKUUM PRAHA S.R.O. subtotal		20 / 789	0 / 0	7 / 257	0 / 0	0 / 0
T.RAD CZECH S.R.O.	Small contracts /Various titles	0 / 0	26 / 1026	0 / 0	0 / 0	0 / 0
T.RAD CZECH S.R.O. subtotal		0 / 0	26 / 1026	0 / 0	0 / 0	0 / 0
TOPMES S.R.O.	Small contracts /Various titles	0 / 0	26 / 1026	0 / 0	0 / 0	0 / 0
TOPMES S.R.O. subtotal		0 / 0	26 / 1026	0 / 0	0 / 0	0 / 0
VITKOVICE STEEL, A.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	26 / 1026	0 / 0
VITKOVICE STEEL, A. subtotal		0 / 0	0 / 0	0 / 0	26 / 1026	0 / 0
ZABABA S.R.O.	Small contracts /Various titles	26 / 1010	0 / 0	0 / 0	0 / 0	0 / 0
ZABABA S.R.O. subtotal		26 / 1010	0 / 0	0 / 0	0 / 0	0 / 0
2 JCP A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	26 / 999
2 JCP A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	26 / 999
AHREND A.S.	Small contracts /Various titles	0 / 0	25 / 987	0 / 0	0 / 0	0 / 0
AHREND A.S. subtotal		0 / 0	25 / 987	0 / 0	0 / 0	0 / 0
ERNST & YOUNG TAX &	Small contracts /Various titles	0 / 0	0 / 0	25 / 987	0 / 0	0 / 0
ERNST & YOUNG TAX & subtotal		0 / 0	0 / 0	25 / 987	0 / 0	0 / 0
INFRAM A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	25 / 987	0 / 0
INFRAM A.S. subtotal		0 / 0	0 / 0	0 / 0	25 / 987	0 / 0
MODULARTEST S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	25 / 987
MODULARTEST S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	25 / 987
CUKROVAR VRBATKY A.S	Small contracts /Various titles	25 / 979	0 / 0	0 / 0	0 / 0	0 / 0
CUKROVAR VRBATKY A.S subtotal		25 / 979	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
PROWELD STUD WELDING Slezská Ostrava	Small contracts /Various titles	0 / 0	0 / 0	11 / 423	0 / 0	14 / 531
PROWELD STUD WELDING Slezská Ostrava subtotal		0 / 0	0 / 0	11 / 423	0 / 0	14 / 531
KDYNIIUM A. S.	Small contracts /Various titles	8 / 296	0 / 0	17 / 655	0 / 0	0 / 0
KDYNIIUM A. S. subtotal		8 / 296	0 / 0	17 / 655	0 / 0	0 / 0
ASTOS MACHINERY A.S.	Small contracts /Various titles	0 / 0	7 / 277	0 / 0	0 / 0	17 / 671
ASTOS MACHINERY A.S. subtotal		0 / 0	7 / 277	0 / 0	0 / 0	17 / 671
EKOWATT CZ S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	24 / 947
EKOWATT CZ S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	24 / 947
SWICHARD S.R.O.	Small contracts /Various titles	24 / 939	0 / 0	0 / 0	0 / 0	0 / 0
SWICHARD S.R.O. subtotal		24 / 939	0 / 0	0 / 0	0 / 0	0 / 0
WITTE NEJDEK, SPOL.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	24 / 928
WITTE NEJDEK, SPOL. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	24 / 928
INTERPLEX PRECISION	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	24 / 924	0 / 0
INTERPLEX PRECISION subtotal		0 / 0	0 / 0	0 / 0	24 / 924	0 / 0
NOVARES CZ ZEBRAK S.	Small contracts /Various titles	24 / 918	0 / 0	0 / 0	0 / 0	0 / 0
NOVARES CZ ZEBRAK S. subtotal		24 / 918	0 / 0	0 / 0	0 / 0	0 / 0
KOSTAL KONTAKT SYSTE	Small contracts /Various titles	0 / 0	0 / 0	23 / 876	0 / 0	0 / 0
KOSTAL KONTAKT SYSTE subtotal		0 / 0	0 / 0	23 / 876	0 / 0	0 / 0
DENSO CZECH S.R.O.	Small contracts /Various titles	0 / 0	22 / 868	0 / 0	0 / 0	0 / 0
DENSO CZECH S.R.O. subtotal		0 / 0	22 / 868	0 / 0	0 / 0	0 / 0
TECHCONTROL, SPOL. S	Small contracts /Various titles	22 / 868	0 / 0	0 / 0	0 / 0	0 / 0
TECHCONTROL, SPOL. S subtotal		22 / 868	0 / 0	0 / 0	0 / 0	0 / 0
MONTS S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	22 / 858	0 / 0	0 / 0
MONTS S.R.O. subtotal		0 / 0	0 / 0	22 / 858	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
POLICIE ČR PHA	Small contracts /Various titles	0 / 0	0 / 0	22 / 846	0 / 0	0 / 0
POLICIE ČR PHA subtotal		0 / 0	0 / 0	22 / 846	0 / 0	0 / 0
PROSPON, SPOL. S R.O	Small contracts /Various titles	0 / 0	22 / 838	0 / 0	0 / 0	0 / 0
PROSPON, SPOL. S R.O subtotal		0 / 0	22 / 838	0 / 0	0 / 0	0 / 0
BLUE POWER - ENERGET	Small contracts /Various titles	0 / 0	21 / 829	0 / 0	0 / 0	0 / 0
BLUE POWER - ENERGET subtotal		0 / 0	21 / 829	0 / 0	0 / 0	0 / 0
JAKUB SCERBA S.R.O.	Small contracts /Various titles	21 / 821	0 / 0	0 / 0	0 / 0	0 / 0
JAKUB SCERBA S.R.O. subtotal		21 / 821	0 / 0	0 / 0	0 / 0	0 / 0
MEGATECH INDUSTRIES Plzeň 3	Small contracts /Various titles	0 / 0	0 / 0	21 / 813	0 / 0	0 / 0
MEGATECH INDUSTRIES Plzeň 3 subtotal		0 / 0	0 / 0	21 / 813	0 / 0	0 / 0
ZACHVEJA & PARTNERI, Moravská Ostrava a Přívoz	Small contracts /Various titles	21 / 808	0 / 0	0 / 0	0 / 0	0 / 0
ZACHVEJA & PARTNERI, Moravská Ostrava a Přívoz subtotal		21 / 808	0 / 0	0 / 0	0 / 0	0 / 0
VEOLIA ENERGIE MARIA	Small contracts /Various titles	21 / 805	0 / 0	0 / 0	0 / 0	0 / 0
VEOLIA ENERGIE MARIA subtotal		21 / 805	0 / 0	0 / 0	0 / 0	0 / 0
ETHANOL ENERGY A.S.	Small contracts /Various titles	0 / 0	20 / 789	0 / 0	0 / 0	0 / 0
ETHANOL ENERGY A.S. subtotal		0 / 0	20 / 789	0 / 0	0 / 0	0 / 0
MGM, SPOL. S R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	20 / 789
MGM, SPOL. S R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	20 / 789
PLZENSKÉ MESTSKÉ DOP	Small contracts /Various titles	20 / 789	0 / 0	0 / 0	0 / 0	0 / 0
PLZENSKÉ MESTSKÉ DOP subtotal		20 / 789	0 / 0	0 / 0	0 / 0	0 / 0
SCHINDLER CZ,A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	20 / 789
SCHINDLER CZ,A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	20 / 789
SUDOP BRNO, SPOL. S	Small contracts /Various titles	20 / 789	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
SUDOP BRNO, SPOL. S subtotal		20 / 789	0 / 0	0 / 0	0 / 0	0 / 0
HZ REAL S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	20 / 782	0 / 0	0 / 0
HZ REAL S.R.O. subtotal		0 / 0	0 / 0	20 / 782	0 / 0	0 / 0
OSKON S.R.O.	Small contracts /Various titles	3 / 119	7 / 277	10 / 387	0 / 0	0 / 0
OSKON S.R.O. subtotal		3 / 119	7 / 277	10 / 387	0 / 0	0 / 0
TECHTEST, S.R.O.	Small contracts /Various titles	20 / 782	0 / 0	0 / 0	0 / 0	0 / 0
TECHTEST, S.R.O. subtotal		20 / 782	0 / 0	0 / 0	0 / 0	0 / 0
ADVANTAGE CARS S.R.O	Small contracts /Various titles	20 / 774	0 / 0	0 / 0	0 / 0	0 / 0
ADVANTAGE CARS S.R.O subtotal		20 / 774	0 / 0	0 / 0	0 / 0	0 / 0
SKOLA WELDING S.R.O.	Small contracts /Various titles	7 / 272	4 / 135	2 / 58	3 / 97	5 / 187
SKOLA WELDING S.R.O. subtotal		7 / 272	4 / 135	2 / 58	3 / 97	5 / 187
C-ENERGY PLANA S.R.O	Small contracts /Various titles	0 / 0	0 / 0	19 / 738	0 / 0	0 / 0
C-ENERGY PLANA S.R.O subtotal		0 / 0	0 / 0	19 / 738	0 / 0	0 / 0
SSAB SWEDISH STEEL S	Small contracts /Various titles	19 / 738	0 / 0	0 / 0	0 / 0	0 / 0
SSAB SWEDISH STEEL S subtotal		19 / 738	0 / 0	0 / 0	0 / 0	0 / 0
VAN LEEUWEN PRODUCTI	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	19 / 722	0 / 0
VAN LEEUWEN PRODUCTI subtotal		0 / 0	0 / 0	0 / 0	19 / 722	0 / 0
JANOVEC JIRI DOC.ING	Small contracts /Various titles	0 / 0	8 / 294	0 / 0	0 / 0	11 / 427
JANOVEC JIRI DOC.ING subtotal		0 / 0	8 / 294	0 / 0	0 / 0	11 / 427
CESKA SLEVARENSKA SP	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	7 / 277	11 / 434
CESKA SLEVARENSKA SP subtotal		0 / 0	0 / 0	0 / 0	7 / 277	11 / 434
INVELT SERVIS, S.R.O	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	18 / 711
INVELT SERVIS, S.R.O subtotal		0 / 0	0 / 0	0 / 0	0 / 0	18 / 711
VKK, S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	18 / 711	0 / 0
VKK, S.R.O. subtotal		0 / 0	0 / 0	0 / 0	18 / 711	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
WEIDEMANN GMBH	Small contracts /Various titles	0 / 0	0 / 0	18 / 710	0 / 0	0 / 0
WEIDEMANN GMBH subtotal		0 / 0	0 / 0	18 / 710	0 / 0	0 / 0
ZOOLOGICKA ZAHRAHA H	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	18 / 707
ZOOLOGICKA ZAHRAHA H subtotal		0 / 0	0 / 0	0 / 0	0 / 0	18 / 707
VELLERIN, A. S.	Small contracts /Various titles	0 / 0	0 / 0	18 / 701	0 / 0	0 / 0
VELLERIN, A. S. subtotal		0 / 0	0 / 0	18 / 701	0 / 0	0 / 0
MAYER & CIE. CZ, S.R	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	18 / 679	0 / 0
MAYER & CIE. CZ, S.R subtotal		0 / 0	0 / 0	0 / 0	18 / 679	0 / 0
SLOVENSKA TECHNICKA Materiálovotechnologická fakulta	Small contracts /Various titles	0 / 0	0 / 0	12 / 471	0 / 0	5 / 198
SLOVENSKA TECHNICKA Materiálovotechnologická fakulta subtotal		0 / 0	0 / 0	12 / 471	0 / 0	5 / 198
KEYTEC CESKE BUDEJOV	Small contracts /Various titles	0 / 0	0 / 0	17 / 663	0 / 0	0 / 0
KEYTEC CESKE BUDEJOV subtotal		0 / 0	0 / 0	17 / 663	0 / 0	0 / 0
QUANTUM, A.S.	Small contracts /Various titles	0 / 0	0 / 0	9 / 327	0 / 0	9 / 327
QUANTUM, A.S. subtotal		0 / 0	0 / 0	9 / 327	0 / 0	9 / 327
KOVOLIS HEDVIKOV A.S	Small contracts /Various titles	6 / 221	0 / 0	11 / 415	0 / 0	0 / 0
KOVOLIS HEDVIKOV A.S subtotal		6 / 221	0 / 0	11 / 415	0 / 0	0 / 0
TECHSIM ENGINEERING	Small contracts /Various titles	16 / 632	0 / 0	0 / 0	0 / 0	0 / 0
TECHSIM ENGINEERING subtotal		16 / 632	0 / 0	0 / 0	0 / 0	0 / 0
MIGNEN CR S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	16 / 630	0 / 0
MIGNEN CR S.R.O. subtotal		0 / 0	0 / 0	0 / 0	16 / 630	0 / 0
MGR. DANIEL VASA, AD	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	16 / 614	0 / 0
MGR. DANIEL VASA, AD subtotal		0 / 0	0 / 0	0 / 0	16 / 614	0 / 0
LEAR CORPORATION ENG	Small contracts /Various titles	16 / 612	0 / 0	0 / 0	0 / 0	0 / 0
LEAR CORPORATION ENG subtotal		16 / 612	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
MALCOM CZ S.R.O.	Small contracts /Various titles	16 / 612	0 / 0	0 / 0	0 / 0	0 / 0
MALCOM CZ S.R.O. subtotal		16 / 612	0 / 0	0 / 0	0 / 0	0 / 0
ACCELERATOR S.R.O.	Small contracts /Various titles	15 / 592	0 / 0	0 / 0	0 / 0	0 / 0
ACCELERATOR S.R.O. subtotal		15 / 592	0 / 0	0 / 0	0 / 0	0 / 0
METAL TRADE COMAX, A	Small contracts /Various titles	0 / 0	0 / 0	15 / 592	0 / 0	0 / 0
METAL TRADE COMAX, A subtotal		0 / 0	0 / 0	15 / 592	0 / 0	0 / 0
PRAZSKE SLUZBY A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	15 / 592
PRAZSKE SLUZBY A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	15 / 592
VALEO AUTOKLIMATIZAC E81 - Driving Assistance Prague R&D	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	15 / 592
VALEO AUTOKLIMATIZAC E81 - Driving Assistance Prague R&D subtotal		0 / 0	0 / 0	0 / 0	0 / 0	15 / 592
WALTER PRAGUECAST A.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	15 / 592	0 / 0
WALTER PRAGUECAST A. subtotal		0 / 0	0 / 0	0 / 0	15 / 592	0 / 0
WEPPLER CZECH S.R.O.	Small contracts /Various titles	15 / 572	0 / 0	0 / 0	0 / 0	0 / 0
WEPPLER CZECH S.R.O. subtotal		15 / 572	0 / 0	0 / 0	0 / 0	0 / 0
BAK STAVEBNI SPOLECN	Small contracts /Various titles	0 / 0	0 / 0	15 / 561	0 / 0	0 / 0
BAK STAVEBNI SPOLECN subtotal		0 / 0	0 / 0	15 / 561	0 / 0	0 / 0
FAIVELEY TRANSPORT C	Small contracts /Various titles	14 / 553	0 / 0	0 / 0	0 / 0	0 / 0
FAIVELEY TRANSPORT C subtotal		14 / 553	0 / 0	0 / 0	0 / 0	0 / 0
JK MONT S. R. O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	14 / 553	0 / 0
JK MONT S. R. O. subtotal		0 / 0	0 / 0	0 / 0	14 / 553	0 / 0
MITSUBISHI ELECTRI	Small contracts /Various titles	0 / 0	0 / 0	6 / 237	8 / 316	0 / 0
MITSUBISHI ELECTRI subtotal		0 / 0	0 / 0	6 / 237	8 / 316	0 / 0
SYSCAE, S.R.O.	Small contracts /Various titles	14 / 549	0 / 0	0 / 0	0 / 0	0 / 0
SYSCAE, S.R.O. subtotal		14 / 549	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
MORAVSKE KOVARNY, A.	Small contracts /Various titles	14 / 545	0 / 0	0 / 0	0 / 0	0 / 0
MORAVSKE KOVARNY, A. subtotal		14 / 545	0 / 0	0 / 0	0 / 0	0 / 0
KNORR-BREMSE SYSTEMY	Small contracts /Various titles	14 / 537	0 / 0	0 / 0	0 / 0	0 / 0
KNORR-BREMSE SYSTEMY subtotal		14 / 537	0 / 0	0 / 0	0 / 0	0 / 0
VAPENKA CERTOVY SCHO	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	13 / 513	0 / 0
VAPENKA CERTOVY SCHO subtotal		0 / 0	0 / 0	0 / 0	13 / 513	0 / 0
AMCON EUROPE S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	13 / 505	0 / 0	0 / 0
AMCON EUROPE S.R.O. subtotal		0 / 0	0 / 0	13 / 505	0 / 0	0 / 0
CONTINENTAL VUK S.R.	Small contracts /Various titles	13 / 505	0 / 0	0 / 0	0 / 0	0 / 0
CONTINENTAL VUK S.R. subtotal		13 / 505	0 / 0	0 / 0	0 / 0	0 / 0
GREENWOOD	Small contracts /Various titles	13 / 505	0 / 0	0 / 0	0 / 0	0 / 0
GREENWOOD subtotal		13 / 505	0 / 0	0 / 0	0 / 0	0 / 0
NEDCON BOHEMIA	Small contracts /Various titles	13 / 486	0 / 0	0 / 0	0 / 0	0 / 0
NEDCON BOHEMIA subtotal		13 / 486	0 / 0	0 / 0	0 / 0	0 / 0
S.A.F. PRAHA SPOL. S	Small contracts /Various titles	9 / 332	4 / 154	0 / 0	0 / 0	0 / 0
S.A.F. PRAHA SPOL. S subtotal		9 / 332	4 / 154	0 / 0	0 / 0	0 / 0
AVCR	Small contracts /Various titles	13 / 483	0 / 0	0 / 0	0 / 0	0 / 0
AVCR subtotal		13 / 483	0 / 0	0 / 0	0 / 0	0 / 0
ALPHA VEHICLE SECURI	Small contracts /Various titles	0 / 0	13 / 482	0 / 0	0 / 0	0 / 0
ALPHA VEHICLE SECURI subtotal		0 / 0	13 / 482	0 / 0	0 / 0	0 / 0
FARMET A.S.	Small contracts /Various titles	12 / 474	0 / 0	0 / 0	0 / 0	0 / 0
FARMET A.S. subtotal		12 / 474	0 / 0	0 / 0	0 / 0	0 / 0
ING. DAVID KAIL - AK	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	12 / 474
ING. DAVID KAIL - AK subtotal		0 / 0	0 / 0	0 / 0	0 / 0	12 / 474
KRPA FORM, A.S.	Small contracts /Various titles	12 / 474	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
KRPA FORM, A.S. subtotal		12 / 474	0 / 0	0 / 0	0 / 0	0 / 0
ROBA SERVICE S.R.O.	Small contracts /Various titles	12 / 474	0 / 0	0 / 0	0 / 0	0 / 0
ROBA SERVICE S.R.O. subtotal		12 / 474	0 / 0	0 / 0	0 / 0	0 / 0
SLEVARNA, SPOL. S R.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	12 / 474
SLEVARNA, SPOL. S R. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	12 / 474
SMAPRO DESIGN S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	12 / 474
SMAPRO DESIGN S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	12 / 474
VANAD DESIGN S.R.O.	Small contracts /Various titles	5 / 198	0 / 0	0 / 0	7 / 277	0 / 0
VANAD DESIGN S.R.O. subtotal		5 / 198	0 / 0	0 / 0	7 / 277	0 / 0
UNITREX MANAGEMENT S	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	12 / 466
UNITREX MANAGEMENT S subtotal		0 / 0	0 / 0	0 / 0	0 / 0	12 / 466
BENVIG HEAT TRANSFER	Small contracts /Various titles	0 / 0	0 / 0	12 / 458	0 / 0	0 / 0
BENVIG HEAT TRANSFER subtotal		0 / 0	0 / 0	12 / 458	0 / 0	0 / 0
INODO S.R.O.	Small contracts /Various titles	12 / 458	0 / 0	0 / 0	0 / 0	0 / 0
INODO S.R.O. subtotal		12 / 458	0 / 0	0 / 0	0 / 0	0 / 0
ING. JIRI MIREJOVSKY	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	12 / 454
ING. JIRI MIREJOVSKY subtotal		0 / 0	0 / 0	0 / 0	0 / 0	12 / 454
MATTONI 1873 A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	12 / 454
MATTONI 1873 A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	12 / 454
BUK CS, S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	11 / 419	0 / 0	0 / 0
BUK CS, S.R.O. subtotal		0 / 0	0 / 0	11 / 419	0 / 0	0 / 0
SUDOP PRAHA A.S.	Small contracts /Various titles	8 / 290	0 / 0	4 / 125	0 / 0	0 / 0
SUDOP PRAHA A.S. subtotal		8 / 290	0 / 0	4 / 125	0 / 0	0 / 0
TRELLEBORG BOHEMIA,	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	11 / 403
TRELLEBORG BOHEMIA, subtotal		0 / 0	0 / 0	0 / 0	0 / 0	11 / 403

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
GEOLOGICKY USTAV AV	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	11 / 401
GEOLOGICKY USTAV AV subtotal		0 / 0	0 / 0	0 / 0	0 / 0	11 / 401
ARKO TECHNOLOGY, A.S	Small contracts /Various titles	10 / 395	0 / 0	0 / 0	0 / 0	0 / 0
ARKO TECHNOLOGY, A.S subtotal		10 / 395	0 / 0	0 / 0	0 / 0	0 / 0
MELICHAR MICHAELA MG	Small contracts /Various titles	0 / 0	10 / 395	0 / 0	0 / 0	0 / 0
MELICHAR MICHAELA MG subtotal		0 / 0	10 / 395	0 / 0	0 / 0	0 / 0
SAFETUBE MEDICAL TUB Praha-Satalice	Small contracts /Various titles	0 / 0	0 / 0	10 / 395	0 / 0	0 / 0
SAFETUBE MEDICAL TUB Praha-Satalice subtotal		0 / 0	0 / 0	10 / 395	0 / 0	0 / 0
SVAZ STROJIRENSKE TE	Small contracts /Various titles	0 / 0	0 / 0	10 / 395	0 / 0	0 / 0
SVAZ STROJIRENSKE TE subtotal		0 / 0	0 / 0	10 / 395	0 / 0	0 / 0
UTAM AV CR V.V.I.	Small contracts /Various titles	0 / 0	10 / 395	0 / 0	0 / 0	0 / 0
UTAM AV CR V.V.I. subtotal		0 / 0	10 / 395	0 / 0	0 / 0	0 / 0
TRW CARR S.R.O.	Small contracts /Various titles	10 / 394	0 / 0	0 / 0	0 / 0	0 / 0
TRW CARR S.R.O. subtotal		10 / 394	0 / 0	0 / 0	0 / 0	0 / 0
CZECH SPORT AIRCRAFT	Small contracts /Various titles	10 / 388	0 / 0	0 / 0	0 / 0	0 / 0
CZECH SPORT AIRCRAFT subtotal		10 / 388	0 / 0	0 / 0	0 / 0	0 / 0
MATERIAL & TECHNOLOG	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	10 / 387	0 / 0
MATERIAL & TECHNOLOG subtotal		0 / 0	0 / 0	0 / 0	10 / 387	0 / 0
WABTEC RAIL LIMITED,	Small contracts /Various titles	0 / 0	0 / 0	10 / 387	0 / 0	0 / 0
WABTEC RAIL LIMITED, subtotal		0 / 0	0 / 0	10 / 387	0 / 0	0 / 0
ZPA NOVA PAKA	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	10 / 387	0 / 0
ZPA NOVA PAKA subtotal		0 / 0	0 / 0	0 / 0	10 / 387	0 / 0
AZD S.R.O. ZAVOD TEC	Small contracts /Various titles	0 / 0	0 / 0	10 / 379	0 / 0	0 / 0
AZD S.R.O. ZAVOD TEC subtotal		0 / 0	0 / 0	10 / 379	0 / 0	0 / 0
GZ MEDIA, A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	10 / 375

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
GZ MEDIA, A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	10 / 375
ELTRAF, A.S.	Small contracts /Various titles	0 / 0	0 / 0	5 / 178	5 / 178	0 / 0
ELTRAF, A.S. subtotal		0 / 0	0 / 0	5 / 178	5 / 178	0 / 0
ZVVZ-ENVEN-ENGINEERI	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	9 / 356
ZVVZ-ENVEN-ENGINEERI subtotal		0 / 0	0 / 0	0 / 0	0 / 0	9 / 356
BRAGEN S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	9 / 336
BRAGEN S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	9 / 336
SILNICE GROUP A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	9 / 336
SILNICE GROUP A.S. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	9 / 336
PRAGOSTROJ S.R.O.	Small contracts /Various titles	0 / 0	9 / 332	0 / 0	0 / 0	0 / 0
PRAGOSTROJ S.R.O. subtotal		0 / 0	9 / 332	0 / 0	0 / 0	0 / 0
ACTIVAIR S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	9 / 328	0 / 0	0 / 0
ACTIVAIR S.R.O. subtotal		0 / 0	0 / 0	9 / 328	0 / 0	0 / 0
ZAPADOESKE MUZEUM V Plzeň 3	Small contracts /Various titles	0 / 0	9 / 327	0 / 0	0 / 0	0 / 0
ZAPADOESKE MUZEUM V Plzeň 3 subtotal		0 / 0	9 / 327	0 / 0	0 / 0	0 / 0
AUTOSALON KLOKOCA C	Small contracts /Various titles	0 / 0	3 / 119	0 / 0	6 / 208	0 / 0
AUTOSALON KLOKOCA C subtotal		0 / 0	3 / 119	0 / 0	6 / 208	0 / 0
INTEGROVANA STREDNI	Small contracts /Various titles	9 / 326	0 / 0	0 / 0	0 / 0	0 / 0
INTEGROVANA STREDNI subtotal		9 / 326	0 / 0	0 / 0	0 / 0	0 / 0
AB CNC SERVIS S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	8 / 316
AB CNC SERVIS S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	8 / 316
BTL MEDICAL DEVELOPM	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	8 / 316
BTL MEDICAL DEVELOPM subtotal		0 / 0	0 / 0	0 / 0	0 / 0	8 / 316
CESKA SLEVARENSK 001	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	8 / 316
CESKA SLEVARENSK 001 subtotal		0 / 0	0 / 0	0 / 0	0 / 0	8 / 316

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
SHIMADZU HANDELS GMB	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	8 / 285	0 / 0
SHIMADZU HANDELS GMB subtotal		0 / 0	0 / 0	0 / 0	8 / 285	0 / 0
AUREL CZ S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	7 / 277	0 / 0
AUREL CZ S.R.O. subtotal		0 / 0	0 / 0	0 / 0	7 / 277	0 / 0
ECOSOND S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	4 / 139	4 / 139
ECOSOND S.R.O. subtotal		0 / 0	0 / 0	0 / 0	4 / 139	4 / 139
INVENO S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	6 / 237	0 / 0	1 / 26
INVENO S.R.O. subtotal		0 / 0	0 / 0	6 / 237	0 / 0	1 / 26
SEBAR S.R.O.	Small contracts /Various titles	0 / 0	7 / 261	0 / 0	0 / 0	0 / 0
SEBAR S.R.O. subtotal		0 / 0	7 / 261	0 / 0	0 / 0	0 / 0
DARTWORK S.R.O.	Small contracts /Various titles	0 / 0	7 / 257	0 / 0	0 / 0	0 / 0
DARTWORK S.R.O. subtotal		0 / 0	7 / 257	0 / 0	0 / 0	0 / 0
STAS SPOL. S R.O.	Small contracts /Various titles	0 / 0	7 / 257	0 / 0	0 / 0	0 / 0
STAS SPOL. S R.O. subtotal		0 / 0	7 / 257	0 / 0	0 / 0	0 / 0
D5T5 S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	7 / 244	0 / 0	0 / 0
D5T5 S.R.O. subtotal		0 / 0	0 / 0	7 / 244	0 / 0	0 / 0
KIEKERT-CS, S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	6 / 237	0 / 0	0 / 0
KIEKERT-CS, S.R.O. subtotal		0 / 0	0 / 0	6 / 237	0 / 0	0 / 0
MIKRON PLUS, S.R.O.	Small contracts /Various titles	0 / 0	6 / 237	0 / 0	0 / 0	0 / 0
MIKRON PLUS, S.R.O. subtotal		0 / 0	6 / 237	0 / 0	0 / 0	0 / 0
RATECH CZ S.R.O.	Small contracts /Various titles	6 / 237	0 / 0	0 / 0	0 / 0	0 / 0
RATECH CZ S.R.O. subtotal		6 / 237	0 / 0	0 / 0	0 / 0	0 / 0
STREDNI ODBORNE 001 Praha 4	Small contracts /Various titles	0 / 0	0 / 0	6 / 237	0 / 0	0 / 0
STREDNI ODBORNE 001 Praha 4 subtotal		0 / 0	0 / 0	6 / 237	0 / 0	0 / 0
USTAV MOLEKULARNI GE	Small contracts /Various titles	0 / 0	6 / 229	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
USTAV MOLEKULARNI GE subtotal		0 / 0	6 / 229	0 / 0	0 / 0	0 / 0
UNIVERZITA T. BATI Centrum polymerních systémů	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	6 / 217
UNIVERZITA T. BATI Centrum polymerních systémů subtotal		0 / 0	0 / 0	0 / 0	0 / 0	6 / 217
DUMEK JAN ING., PH.D	Small contracts /Various titles	6 / 214	0 / 0	0 / 0	0 / 0	0 / 0
DUMEK JAN ING., PH.D subtotal		6 / 214	0 / 0	0 / 0	0 / 0	0 / 0
STS OLBRAMOVICE, A.S	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	6 / 200
STS OLBRAMOVICE, A.S subtotal		0 / 0	0 / 0	0 / 0	0 / 0	6 / 200
BENES A LAT A.S.	Small contracts /Various titles	0 / 0	0 / 0	5 / 198	0 / 0	0 / 0
BENES A LAT A.S. subtotal		0 / 0	0 / 0	5 / 198	0 / 0	0 / 0
DECOLETA, A.S.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	5 / 198	0 / 0
DECOLETA, A.S. subtotal		0 / 0	0 / 0	0 / 0	5 / 198	0 / 0
ESON CZ S.R.O.	Small contracts /Various titles	0 / 0	5 / 198	0 / 0	0 / 0	0 / 0
ESON CZ S.R.O. subtotal		0 / 0	5 / 198	0 / 0	0 / 0	0 / 0
REDYST ,S.R.O. Praha-Libuš	Small contracts /Various titles	0 / 0	5 / 198	0 / 0	0 / 0	0 / 0
REDYST ,S.R.O. Praha-Libuš subtotal		0 / 0	5 / 198	0 / 0	0 / 0	0 / 0
SEBESTA-SLUZBY SLEVA	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	5 / 198
SEBESTA-SLUZBY SLEVA subtotal		0 / 0	0 / 0	0 / 0	0 / 0	5 / 198
TRISPORT HAVEL S.R.O	Small contracts /Various titles	5 / 198	0 / 0	0 / 0	0 / 0	0 / 0
TRISPORT HAVEL S.R.O subtotal		5 / 198	0 / 0	0 / 0	0 / 0	0 / 0
TYP AGENCY S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	5 / 198	0 / 0
TYP AGENCY S.R.O. subtotal		0 / 0	0 / 0	0 / 0	5 / 198	0 / 0
LADISLAV KRALOVSKY	Small contracts /Various titles	0 / 0	0 / 0	5 / 190	0 / 0	0 / 0
LADISLAV KRALOVSKY subtotal		0 / 0	0 / 0	5 / 190	0 / 0	0 / 0
SKODA JS A.S. SK	Small contracts /Various titles	0 / 0	0 / 0	5 / 190	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
SKODA JS A.S. SK subtotal		0 / 0	0 / 0	5 / 190	0 / 0	0 / 0
NARODNI TECHNICKE MU	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	5 / 178
NARODNI TECHNICKE MU subtotal		0 / 0	0 / 0	0 / 0	0 / 0	5 / 178
CONTRA PRAHA, S.R.O.	Small contracts /Various titles	0 / 0	4 / 158	0 / 0	0 / 0	0 / 0
CONTRA PRAHA, S.R.O. subtotal		0 / 0	4 / 158	0 / 0	0 / 0	0 / 0
HVM PLASMA SPOL. S R	Small contracts /Various titles	0 / 0	0 / 0	4 / 158	0 / 0	0 / 0
HVM PLASMA SPOL. S R subtotal		0 / 0	0 / 0	4 / 158	0 / 0	0 / 0
STEELTEC CZ, S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	4 / 158	0 / 0	0 / 0
STEELTEC CZ, S.R.O. subtotal		0 / 0	0 / 0	4 / 158	0 / 0	0 / 0
SPRAVA PRAZSKEHO HRA	Small contracts /Various titles	0 / 0	0 / 0	4 / 157	0 / 0	0 / 0
SPRAVA PRAZSKEHO HRA subtotal		0 / 0	0 / 0	4 / 157	0 / 0	0 / 0
RE-SHINE S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	4 / 152
RE-SHINE S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	4 / 152
EURO SITEX S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	4 / 150
EURO SITEX S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	4 / 150
RUML S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	4 / 148
RUML S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	4 / 148
NBB BOHEMIA, S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	4 / 127	0 / 0	0 / 0
NBB BOHEMIA, S.R.O. subtotal		0 / 0	0 / 0	4 / 127	0 / 0	0 / 0
NEO STAVEBNI S.R.O.	Small contracts /Various titles	0 / 0	3 / 103	0 / 0	0 / 0	0 / 0
NEO STAVEBNI S.R.O. subtotal		0 / 0	3 / 103	0 / 0	0 / 0	0 / 0
KOSAR JAN	Small contracts /Various titles	3 / 99	0 / 0	0 / 0	0 / 0	0 / 0
KOSAR JAN subtotal		3 / 99	0 / 0	0 / 0	0 / 0	0 / 0
UNITED BAKERIES A.S.	Small contracts /Various titles	2 / 60	0 / 0	1 / 40	0 / 0	0 / 0
UNITED BAKERIES A.S. subtotal		2 / 60	0 / 0	1 / 40	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
WELDINGPRO S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	3 / 99	0 / 0
WELDINGPRO S.R.O. subtotal		0 / 0	0 / 0	0 / 0	3 / 99	0 / 0
ABR STAVEBNI SPOL. S	Small contracts /Various titles	1 / 40	0 / 0	1 / 40	0 / 0	0 / 0
ABR STAVEBNI SPOL. S subtotal		1 / 40	0 / 0	1 / 40	0 / 0	0 / 0
CIRMON S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	2 / 79	0 / 0	0 / 0
CIRMON S.R.O. subtotal		0 / 0	0 / 0	2 / 79	0 / 0	0 / 0
PRECIOSA ORNELA, A.S	Small contracts /Various titles	0 / 0	2 / 79	0 / 0	0 / 0	0 / 0
PRECIOSA ORNELA, A.S subtotal		0 / 0	2 / 79	0 / 0	0 / 0	0 / 0
VOGELSANG FASTENERS	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	2 / 79	0 / 0
VOGELSANG FASTENERS subtotal		0 / 0	0 / 0	0 / 0	2 / 79	0 / 0
ENERGETIKA SERVIS S.	Small contracts /Various titles	0 / 0	2 / 77	0 / 0	0 / 0	0 / 0
ENERGETIKA SERVIS S. subtotal		0 / 0	2 / 77	0 / 0	0 / 0	0 / 0
CECHO - BOHUMIL CEMP	Small contracts /Various titles	0 / 0	2 / 72	0 / 0	0 / 0	0 / 0
CECHO - BOHUMIL CEMP subtotal		0 / 0	2 / 72	0 / 0	0 / 0	0 / 0
JOBMAN, S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	2 / 72
JOBMAN, S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	2 / 72
KARNIK LUBOS	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	2 / 72
KARNIK LUBOS subtotal		0 / 0	0 / 0	0 / 0	0 / 0	2 / 72
RUS PAVEL	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	2 / 72
RUS PAVEL subtotal		0 / 0	0 / 0	0 / 0	0 / 0	2 / 72
PAVEL HORSKY	Small contracts /Various titles	0 / 0	2 / 66	0 / 0	0 / 0	0 / 0
PAVEL HORSKY subtotal		0 / 0	2 / 66	0 / 0	0 / 0	0 / 0
CEMAT TRADING, SPOL.	Small contracts /Various titles	0 / 0	2 / 64	0 / 0	0 / 0	0 / 0
CEMAT TRADING, SPOL. subtotal		0 / 0	2 / 64	0 / 0	0 / 0	0 / 0
MAGNA EXTERIORS	Small contracts /Various titles	0 / 0	0 / 0	2 / 60	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
MAGNA EXTERIORS subtotal		0 / 0	0 / 0	2 / 60	0 / 0	0 / 0
MARTIN WERUNSKY	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	2 / 60
MARTIN WERUNSKY subtotal		0 / 0	0 / 0	0 / 0	0 / 0	2 / 60
TQM SYSTEM S.R.O.	Small contracts /Various titles	0 / 0	2 / 52	0 / 0	0 / 0	0 / 0
TQM SYSTEM S.R.O. subtotal		0 / 0	2 / 52	0 / 0	0 / 0	0 / 0
TRUSTWORTHY INVESTME Praha 10	Small contracts /Various titles	0 / 0	2 / 52	0 / 0	0 / 0	0 / 0
TRUSTWORTHY INVESTME Praha 10 subtotal		0 / 0	2 / 52	0 / 0	0 / 0	0 / 0
ELEKTROTECHNICKY ZKU	Small contracts /Various titles	0 / 0	1 / 27	1 / 23	0 / 0	0 / 0
ELEKTROTECHNICKY ZKU subtotal		0 / 0	1 / 27	1 / 23	0 / 0	0 / 0
TECHNOVO S.R.O.	Small contracts /Various titles	0 / 0	1 / 20	0 / 0	0 / 0	1 / 26
TECHNOVO S.R.O. subtotal		0 / 0	1 / 20	0 / 0	0 / 0	1 / 26
KLUTHE CR S.R.O. Praha 9	Small contracts /Various titles	0 / 0	0 / 0	1 / 40	0 / 0	0 / 0
KLUTHE CR S.R.O. Praha 9 subtotal		0 / 0	0 / 0	1 / 40	0 / 0	0 / 0
LONTECH - SURFACE TR	Small contracts /Various titles	0 / 0	0 / 0	1 / 40	0 / 0	0 / 0
LONTECH - SURFACE TR subtotal		0 / 0	0 / 0	1 / 40	0 / 0	0 / 0
MW-DIAS, A.S.	Small contracts /Various titles	0 / 0	0 / 0	1 / 40	0 / 0	0 / 0
MW-DIAS, A.S. subtotal		0 / 0	0 / 0	1 / 40	0 / 0	0 / 0
OTTO KUHNEN PRAHA S.	Small contracts /Various titles	0 / 0	0 / 0	1 / 40	0 / 0	0 / 0
OTTO KUHNEN PRAHA S. subtotal		0 / 0	0 / 0	1 / 40	0 / 0	0 / 0
SAO PLUS S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	1 / 40	0 / 0	0 / 0
SAO PLUS S.R.O. subtotal		0 / 0	0 / 0	1 / 40	0 / 0	0 / 0
SYSTHERM S.R.O.	Small contracts /Various titles	1 / 40	0 / 0	0 / 0	0 / 0	0 / 0
SYSTHERM S.R.O. subtotal		1 / 40	0 / 0	0 / 0	0 / 0	0 / 0
TRUMPF PRAHA, SPOL.	Small contracts /Various titles	0 / 0	0 / 0	1 / 40	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
TRUMPF PRAHA, SPOL. subtotal		0 / 0	0 / 0	1 / 40	0 / 0	0 / 0
EUROPRINT A.S.	Small contracts /Various titles	0 / 0	1 / 27	0 / 0	0 / 0	0 / 0
EUROPRINT A.S. subtotal		0 / 0	1 / 27	0 / 0	0 / 0	0 / 0
MACONER GAP S.R.O.	Small contracts /Various titles	0 / 0	1 / 26	0 / 0	0 / 0	0 / 0
MACONER GAP S.R.O. subtotal		0 / 0	1 / 26	0 / 0	0 / 0	0 / 0
SUPERCO S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	0 / 0	0 / 0	1 / 26
SUPERCO S.R.O. subtotal		0 / 0	0 / 0	0 / 0	0 / 0	1 / 26
BUHLER PRAHA S.R.O.	Small contracts /Various titles	1 / 25	0 / 0	0 / 0	0 / 0	0 / 0
BUHLER PRAHA S.R.O. subtotal		1 / 25	0 / 0	0 / 0	0 / 0	0 / 0
STREDISKO SPOLECNÝC.	Small contracts /Various titles	0 / 0	1 / 22	0 / 0	0 / 0	0 / 0
STREDISKO SPOLECNÝC. subtotal		0 / 0	1 / 22	0 / 0	0 / 0	0 / 0
VOLKSWAGEN SLOVAKIA,	Small contracts /Various titles	0 / 0	0 / 0	1 / 21	0 / 0	0 / 0
VOLKSWAGEN SLOVAKIA, subtotal		0 / 0	0 / 0	1 / 21	0 / 0	0 / 0
ALLGARD CZ S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
ALLGARD CZ S.R.O. subtotal		0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
AQUA S.P.P., S.R.O. Praha 15	Small contracts /Various titles	0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
AQUA S.P.P., S.R.O. Praha 15 subtotal		0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
ATALIAN CZ S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
ATALIAN CZ S.R.O. subtotal		0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
AUTOSALON KLOKOČKA B Praha 5	Small contracts /Various titles	0 / 0	1 / 20	0 / 0	0 / 0	0 / 0
AUTOSALON KLOKOČKA B Praha 5 subtotal		0 / 0	1 / 20	0 / 0	0 / 0	0 / 0
BEMI, SPOL. S R.O.	Small contracts /Various titles	0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
BEMI, SPOL. S R.O. subtotal		0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
DOTERM SERVIS S.R.O.	Small contracts /Various titles	1 / 20	0 / 0	0 / 0	0 / 0	0 / 0

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
DOTERM SERVIS S.R.O. subtotal		1 / 20	0 / 0	0 / 0	0 / 0	0 / 0
EKOVA ELECTRIC A.S. Martinov	Small contracts /Various titles	0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
EKOVA ELECTRIC A.S. Martinov subtotal		0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
EVERSTAR S. R. O.	Small contracts /Various titles	1 / 20	0 / 0	0 / 0	0 / 0	0 / 0
EVERSTAR S. R. O. subtotal		1 / 20	0 / 0	0 / 0	0 / 0	0 / 0
ICECO, S.R.O.	Small contracts /Various titles	1 / 20	0 / 0	0 / 0	0 / 0	0 / 0
ICECO, S.R.O. subtotal		1 / 20	0 / 0	0 / 0	0 / 0	0 / 0
K A R C H E R SPOL. S	Small contracts /Various titles	1 / 20	0 / 0	0 / 0	0 / 0	0 / 0
K A R C H E R SPOL. S subtotal		1 / 20	0 / 0	0 / 0	0 / 0	0 / 0
LINET SPOL. S R.O.	Small contracts /Various titles	0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
LINET SPOL. S R.O. subtotal		0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
MEGA-TEC S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
MEGA-TEC S.R.O. subtotal		0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
PRECIOSA - LUSTRY, A	Small contracts /Various titles	0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
PRECIOSA - LUSTRY, A subtotal		0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
PRO.MED.CS PRAHA A.S	Small contracts /Various titles	1 / 20	0 / 0	0 / 0	0 / 0	0 / 0
PRO.MED.CS PRAHA A.S subtotal		1 / 20	0 / 0	0 / 0	0 / 0	0 / 0
RDK SERVIS,S.R.O.	Small contracts /Various titles	1 / 20	0 / 0	0 / 0	0 / 0	0 / 0
RDK SERVIS,S.R.O. subtotal		1 / 20	0 / 0	0 / 0	0 / 0	0 / 0
SLOVCEM, SPOL. S.R.O	Small contracts /Various titles	0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
SLOVCEM, SPOL. S.R.O subtotal		0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
STACHEMA CZ S.R.O.	Small contracts /Various titles	0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
STACHEMA CZ S.R.O. subtotal		0 / 0	0 / 0	1 / 20	0 / 0	0 / 0
Total		44655 / 1761519	42074 / 1659694	50179 / 1979415	47571 / 1876549	47736 / 1883061

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁹, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

Software [Modular software platform for distributed production process monitoring, control, and optimization](#) is an open system for supporting the optimization, monitoring and control of industrial processes developed in scope of the Center for Applied Cybernetics 3 (TACR NCC) in cooperation with the teams of CTU FME, CTU CIIRC and the industrial partner PT Solutions Worldwide, s.r.o.

The software platform vertically integrates control systems from the controlled process itself through the level of basic automation with the help of industrial control machines, through the level of advanced control layer, to higher corporate and business control systems so that it provides resources for the entire process control system both for design, control and monitoring, but also for subsequent optimization and tuning. The platform primarily provides functions for controlling heating and melting furnaces and rolling processes. The presented summary result contains the following sets of software modules: M1) A set of modules for controlling and monitoring a continuous heating furnace based on a mathematical-physical model; M2) Modules for data processing and optimization of rolling processes; M3) Crane anti-sway system for handling metallurgical material; M4) Extended module for temperature estimation in the continuous casting process based on a reduced CFD model.

The expected benefits of the modular platform are closely related to the availability and prices of both energy and materials. Its functionalities increase the quality of material heating (M1, M4), prevent of disruption of the solid shell with fatal consequences (M4), help to optimize the rolling process and increase the quality of rolled sheets (M2) shorten production times (M3). Individual components of the platform, i.e. software applications and tools, have already been applied in four commercial projects, which also document the international dimension of the presented applied research result. Gender dimension is not relevant for this result.

Prototype [TOS Varnsdorf-2019 Machine tool management system](#) is a result in the form of software called TOS Control, which is implemented directly into the machine tool WHT110C.

CTU in Prague, Faculty of Mechanical Engineering, Institute of Production Machines and Equipment participated in the development of the TOScontrol system from the very beginning. CTU played a key role in the conceptual design of the entire system and the principle of implementation into individual control systems. Based on the collaborative results of research and development, the TOScontrol system was successfully implemented into the first machine tools. Following the successful implementation, an independent development team for the TOScontrol system was created and stabilized at TOS VARNSDORF a.s., which is closely connected with the CTU development team. The development and updating of the whole system itself and individual applications was and is therefore performed in close cooperation between TOS VARNSDORF a.s. and CTU in Prague.

²⁹ See Terms definition.

This result is implemented directly into the machine control system and uses its hardware and software resources. The result is a complex machine management system consisting of a set of application modules (sub-applications) and an interface for their implementation. This interface consists mainly of tools for communication with the control system and production control systems, user management, data storage databases and user interface, which is implemented directly on the control system panel. TOS Control was implemented on the Siemens Sinumerik 840D sl and Heidenhain TNC640 control systems and represents the result on the machine tool WHT110C. The result on the machine tool in the form of an additional TOS Control management system contributes to the achievement of the main project objective by improving the following SVA objectives: [o2] Quality; [o4] Reliability; [o5] Economy. The control system is independent of the gender of its users.

Mixing equipment comprising a vessel and at least one axial hydrofoil impeller. A hydrodynamically optimized impeller is the result of systematic research in the field of mixing multiphase systems, reactors, bioreactors, and tanks. The hydrofoil impeller was specifically designed to minimize the energy requirements at coagulation and flocculation processes which are used in water treatment and purification technologies. The impeller shape is designed not only to minimize the energy for mixing, but also to be gentle on the batch regarding the shear stresses arising on the leading and trailing edges of the impeller blades because during the flocculation, the goal is to ensure formation of particle clusters and too high shear stress breaks them. The impeller can be used in vessels of various plan shapes and sizes. The specification of possible geometric arrangements of the mixing system is part of the result, as well as the process parameters of the impeller, which are necessary for the design of the operating parameters of mixing device, i.e., operating speed, power required for mixing, the time required to achieve a certain degree of homogenization. The result is in the form of an industrially protected utility model, which is provided for use based on a license agreement. Currently, a license agreement is in force with the ENVI-PUR, s.r.o. company, which is a leading manufacturer of equipment for water treatment, purification, and recycling technologies with representation in the Czech as well as in the world market. Several industrial implementations have already been carried out based on the license, e.g., water disinfection equipment, flocculation tanks, or sorption units. Currently, there are at least five industrial implementations per year, not only by the licensee in the field of water treatment but also by the authors as part of contractual research applied to multiphase chemical reactors and bioreactors. Due to its nature, the result does not consider the gender dimension.

The **Heat recovery ventilation unit** has an optimized air flow through the unit, in order to prevent generation of noise. It was developed based on the cooperation between CTU in Prague and RECUAIR Company, within a research project implemented under the Operational Program Enterprise and Innovation for Competitiveness. The ventilation unit was designed for installation directly into inhabited rooms, thus the noise is one of the mayor issues. Numerical CFD simulation of air flow, experimental measurement of noise characteristics in acoustic laboratory and measurement of efficiency in laboratory conditions were performed during the development of the new type of ventilation unit. The recuperation unit is used for local ventilation of inhabited rooms. It is connected with the outdoor environment by the tube, housing a recuperative heat exchanger for recovery of heat from the exhaust air. The unit operates with an air flow rate of 15 to 45 m³/h and it is equipped with air filters of class M5. The efficiency of heat recovery is up to 94 %, thanks to the unique design that prevents icing of the heat exchanger. The unit contains a rotary recuperative heat exchanger with a servo drive, which rotates 180°. This enables alternation of the exhaust air flow and fresh air flow through the heat exchanger channels. The exchanger rotates at defined intervals controlled according to the outdoor air temperature. The biggest potential for use is in cold areas where outside air temperature falls below freezing point. The device enables year-round operation with a high year-round efficiency of heat recovery. The result considers the gender dimension in the customisation of the control panel and system. Moreover, the tonal components of noise were reduced during development, taking into account the fact that women are generally more sensitive to noise.

Prototype of [Short Take-Off and Landing \(STOL\) aircraft](#) in the Light Sport Aircraft (LSA) category, with a maximum take-off weight of 600 kg, marketed as the STOL Cruiser was developed through close collaboration between Direct Fly s.r.o. and the CTU FME Department of Aerospace Engineering (DAE carried out the conceptual design, aerodynamic and strength analyses, determination of flight performance, dimensioning of the airframe and testing) with support by TACR.

Thanks to a tailor-made high-lift system and an aerodynamically optimized design, this aircraft achieves significant fuel savings compared to other STOL aircraft in the LSA category, making it both more economical and environmentally friendly. Recently the common approach to achieving higher performance in existing STOL LSA aircrafts is the use of more powerful engines, which increases acquisition costs, fuel consumption, and reduces payload capacity, making them more suited for recreational use rather than practical transport. The uniqueness of the STOL Cruiser lies in the comprehensive design approach considering the need for high flight performance combined with advanced manufacturing technology minimizing production costs. As a result, the STOL Cruiser enters the market as a cost-efficient aircraft with an unprecedented combination of flight characteristics in this category, allowing for significantly more economical and environmentally friendly operation. As the design of aircrafts doesn't depend on gender, these aspects are not applicable in this result. Compared to its competitors, the STOL Cruiser offers a significantly broader range of operational speeds (max. 220–225 km/h, min. 40 km/h, cruise speed 180 km/h) while requiring less engine power (100 hp compared to typical >140 hp) and, providing an exceptionally spacious luggage compartment (payload up to 60 kg compared with typical <30 kg). Serial production of the aircraft is being prepared from 2024 (parts are being produced for the first 6 aircraft).

The Certified methodology [A set of recommended measures for the protection of persons during the transport of found unexploded ordnance](#). The main benefit is the increased protection of the technicians, i.e. the highly qualified specialists who make up the vehicle crew. The "Certified Methodology" is a direct result of the research project of the Ministry of Internal Affairs [Protection of persons in the vicinity of explosion](#) of the safety research program for the needs of the state. This result was requested by the research contract provider/awardee. This result is significant in particular because, if the conditions in the methodology are followed, it is possible to protect the bomb disposal technicians and other people in the vicinity, from the pressure and shrapnel effect of an accidental explosion of the transported found ammunition. The result represents general recommendation that do not recognize gender of protected persons.

The proposed modifications for the protection of the crew against accidental explosion of found unexploded ordnance are intended to be incorporated into a commercially produced and available production VW transporter, or any vehicle of similar type. The proposed modifications of the vehicle consist of built in barriers made of ballistic plates mounted on lightweight construction from aluminium profiles. The built-in prototype of the protective barrier was tested in real explosion of a mortar mine.

The [Optimized gas ICE for vehicle decarbonization](#) is functional prototype of a piston internal combustion engine, primarily focused on an advanced system equipped with an actively scavenged pre-chamber, that represents a future universal combustion system for spark ignition engines regarding new fuels, higher efficiency (significantly over 40%) and lower emissions (mainly NOx). The principle is already used, e.g. for racing purposes (F1, WEC), it is expected to be used in a future (new generation of ICE optimized for the use of alternative fuels is estimated more like around 2030 and later). Our current solution is roughly at the TRL 3-5 level (so far only Maserati has it in passive mode, probably only because of engine performance), standard spark plug thread was centrally mounted in the pre-chamber that is actively cooled by the engine coolant for reduced thermal stress and a safe operation even at high load, a new 2022 design of the fuel delivery (check valve and solenoid injector) was experimentally validated. This solution enables more precise fuel flow metering and control of

charge mixing in the prechamber. There are still quite a few practical obstacles to be solved. Advanced combustion system for future gasoline engines brings higher efficiency of the combustion engine (and therefore lower CO₂) while simultaneously reducing some pollutants (mainly NO_x) and enabling high combustion rates for various fuels (the flexibility suitable for the transition period from classic fossil fuels to an alternative fuels), which also positively affects the tendency to knock.

From a global perspective, this solution contributes to decarbonization, the transition to renewable sources and sustainable mobility, including strengthening the competitiveness of the Czech manufacturer (Škoda Auto). This functional sample was created in cooperation with Škoda Auto, within the NCC 1 project JOBNAC. There is no gender dimension—equal impact on all.

The [Prototype chimney system with a new type of joint for W3G chimney systems](#) is the joint know-how reached within the common R&D activities of CTU FME and RHI Magnesita Czech Republic a.s. - the world's leading manufacturer of refractory materials (particularly in the scope of common TACR projects), that have created a chimney system using a new principle of joining ceramic chimney liners (or pipes) and an optimized method of building the chimney system. Thanks to the combination of a unique method of constructing the entire chimney system, low acquisition costs of the system and high utility properties, it was possible to create a new, very durable chimney system for all types of operations while meeting strict certification tests, which, among other things, meets the highest standard for chimney operation, namely T400 N1 W3 G50.

Through the new product, especially chimney liners with a new type of joint, the position of RHI Magnesita Czech Republic a.s. on world markets as a major player in terms of the achieved product quality and their utility properties is significantly strengthened. Already in the first year after the end of the project (2023), the project results (based on the prototype) were used in the company's business activities. Sales using the project results for the year were EUR 680,000, with a profit of EUR 80,000. A full 100% of this volume was exported abroad. The share of sales using the project outputs in the company's total sales in 2023 was 1%.

Based on the project results, the CTU FME concluded the license agreement (based on considering the number of products) with the company. The license agreement is valid for 2023-2025. The gender aspects had not been considered as they have no impact onto the product. Cooperation between individual institutions and team members continues.

The essence of the patent [Composite Blood Vessel Substitute and the Method for Producing It](#) is a sandwich wall combined from biological and synthetic polymers. It is primarily intended for domains with blood flow <200 ml/min, and for vein diameter <6 mm. This prosthetics has not yet been satisfactorily solved, although cardiovascular disease is increasing worldwide (e.g. the Czech Republic is the country with high cardiovascular risk that accounts for up to 42% of total mortality). Considering patients gender is necessary in healthcare, for example, varicose veins affecting small diameter veins occur in 25-30% of women and in 10-20% of men. The result was based on many years of cooperation of an interdisciplinary scientific and research team of experts (doctors, technicians, material and process engineers) within the framework of the acquired projects NT13302-4/2012, NV15-27941A.

Grafts typically used in vascular surgery are often unavailable due to vascular disease. Therefore, synthetic vascular substitutes are used, the limitations of which include low resistance to infection, increased risk of occlusion or stenosis, or conversely, temporal dilation due to the environment and conditions in the body.

The patented vascular substitute made of fish collagen and an integrated knitted scaffold made of associated monofilament polyester fibers is relevant for the healthcare, and prosthetic industry. The matrix of collagen obtained from freshwater fish is produced by extrusion technology, in which the collagen bundles are oriented in a train. This technology introduces anisotropy into the vascular wall material, even though the original raw material is isotropic. This makes it closer to the native vein in terms of internal structure and mechanical response.

A great advantage is the minimization of the allergic reaction of the recipient organism, the elimination of the risk of transmission of zoonoses known in warm-blooded animals is essential. Performed preclinical tests on sheep were promising.

The result is [dataset Measured experimental data of the properties of the GE Catalyst turboprop engine](#), for the use of which a license agreement is being concluded.

At the request of the Czech government, CTU FME has built an ecosystem for aircraft engines and concluded a research agreement on collaborative cooperation with GE Aviation Czech. The ecosystem is based on four ground-based aircraft engine test cells (dynamometric, core, two propeller) and a flying test bed in the form of an experimental aircraft. In the test facilities, many demanding experiments with the GE Catalyst engine being developed were carried out in the years 2017-2024, which were subsequently verified by simulation experiments. In addition to the basic test facilities, auxiliary experimental facilities were also built, for example for testing aircraft engine oil coolers with controlled air flow temperature at altitude, for measuring aircraft engine emissions, etc. This has resulted in a lot of measured experimental data, the use of which GE Aviation Czech is interested in. According to the collaborative agreement, a license agreement is concluded for the use of these data. The value of this license is then partly paid for by the value of the knowledge provided by GE Aviation Czech used in the construction and operation of test facilities and in modeling the properties of the GE Catalyst turboprop engine.

The result was created while solving the OP VVV CAAT (Centre for Advanced Aviation Technologies) project and in fulfilling the research collaboration agreement with GE Aviation Czech.

The significance of the created data is great for both GE Aviation Czech and CTU FME. The significance of the experimentally determined engine properties is great for its manufacturer and CTU FME can create its own engine simulation models for its research from the measured data.

Gender dimension: none – it has the same effect on everyone.

Table 3.4.1 - Overview of research results in the period under evaluation

Type of result ³⁰	Year of application	Name
Software	2019	Modular software platform for distributed production process monitoring, control, and optimization
Prototype	2019	TOS Varnsdorf - 2019 Machine tool management system
Utility model	2020	Mixing equipment comprising a vessel and at least one axial hydrofoil impeller
Patent/US patent	2020/2021	Heat recovery ventilation unit
Prototype	2021	Short Take-Off and Landing (STOL) aircraft
Methodology certified by an authorised body	2022	A set of recommended measures for the protection of persons during the transport of found unexploded ordnance
Functional sample	2022	Optimized gas ICE for vehicle decarbonization
Prototype	2022	Prototype chimney system with a new type of joint for W3G chimney systems
EU Patent	2023	Composite Blood Vessel Substitute and the Method for Producing
Miscellaneous	2019-2023	Dataset Measured experimental data of the properties of the GE Catalyst turboprop engine

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication

³⁰ Specify the specific type of result. Add rows as needed.

outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)³¹, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).³²

Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

Self-assessment:

In collaborative applied research, agreements are concluded on the use of results, in which the partners discuss the shares of ownership of the result, including an agree on the method of financial settlement, which is realized after the result implementation (intellectual property with protection may also arise, which is later licensed). In basic research, results with application potential are more often protected as intellectual property and are licensed for use in practice. In the case of contractual research, the result is delivered directly for an agreed price. We acquire new partners in various ways: we use contacts with our graduates, we try to address the customers of our existing partners, we publish results, we participate in conferences, we meet with company representatives, we are members of professional societies. We try to offer our competencies through the CTU FME website. In case of interest from a company, we offer to conclude a simple framework cooperation agreement including a brief NDA. Then we hold an innovation brainstorming - a meeting of company representatives and our professors from the given field. Experience shows that after discussion, the company and CTU FME arrive at 1-2 areas that are so interesting that they are worth further investigation, even if the result is not certain. However, a dialogue about cooperation has been initiated.

The most typical users of our results are companies:

Škoda Auto, a.s. is a member of the research center project consortiums led by CTU FME for more than 20 years, there is close cooperation in the field of R&D of passenger cars (classic and hybrid drives, transmission/distribution systems, motor sports) consisting of experiments, simulations, construction, jointly led diploma and doctoral theses. Ad hoc research and commercial cooperation with specific tasks is also performed. For example, In the field of technology, we have long-standing cooperation within the framework of contractual research focused on testing the formability of steel sheets, weldability using electric resistance welding, service life of welding electrodes and analyses of anti-

³¹ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

³² If the commercialisation of R&D&I results is carried out in this way.

corrosion measures, or on systematic optimization of processes in the area of quality control, increasing measurement productivity, reducing measurement uncertainties, process automation, professional training and testing of ŠA employees in the fields of Corporate Metrology Management and Measurement, Testing and Calibration. Another topic is the development and testing of heat exchangers, aerodynamics of the engine compartment of vehicles and cooling of components using synthesized flows, or dust analysis and filtration of engine intake air. Specific projects or orders are negotiated informally within formalized structures, based on personal contacts and meetings and also brings to us links to ŠA partners.

TOS Varnsdorf is one of the biggest Czech machine tool producers. The company is known mainly due to the production of horizontal boring machines and portal milling machines. Collaboration of TOS Varnsdorf with CTU FME became intensive since 2000 when the Research Center of Manufacturing Technology was founded. The collaboration topics were in the field of research and innovation of the machine tool structural design, feed drive control and machining technology. During 2019-2023, the collaboration was focused on research of physics-based machine tool digital twin for machining process prediction and optimization, research of machine tool industrial communication, increasing of machine tool accuracy and reliability and increasing of accuracy and productivity in five axis milling of complex parts. The TOS Control application – a superior SW system integrated to the machine tool control system – is one of the most significant collaboration results of this period. The collaboration has been funded by own company resources or co-funded by public money. The CTU, FME, U12135 and TOS Varnsdorf participated together in these most significant research projects: Machine Tools and Precision Engineering (2019 – 2022), National Center of Competence ENGINEERING (2023 – 2028), New machine tool integrating Industry 4.0 features (2023-2025), Highly productive machines for digital factory environments (2021 – 2024), Smart Machine Tool (2018 – 2021).

Compotech PLUS spol.s r.o. is a hi-tech manufacturing company based in Sušice, which was co-founded in 1994 by a graduate of engineering and doctoral studies at CTU FME, who used the results of his diploma and dissertation and, together with a partner, developed a filament winding machine for winding paddle shaft for white water canoe. Today, Compotech PLUS spol.s r.o. is a respected company in the field of complex composite solutions with an overlap in applied research and development. Contact between the company and the faculty enables fast and effective cooperation in development with the necessary follow-up to verify technological possibilities and production procedures in complex procedures of composite parts and structures production technology using long-fiber winding, integrated joints, bonding, 3D printing and other technologies. Possibilities of building "quasi-intelligent" structures with an integrated system of electrical resistance / magnetic sensors, optical fibers, etc. for the possibility of on-line / off-line monitoring and tracking of the condition of the structure. Creation of software for big-data processing, monitoring and identification of types and locations of extreme deformations and stresses, as well as possible partial or global damage. Another area of recent cooperation is the research and development of mechatronic solutions for increasing the stiffness and damping of composite components.

ProsPon s.r.o. is a Czech company engaged in the development, production and distribution of orthopedic and traumatological implants, instruments and other medical devices (joint replacements, internal spinal fixators, implants and instruments for cruciate ligament plastic surgery, oncological replacements of all human joints and parts of bones ...) an example of a long-term partnership between the employees of the Department of Biomechanics of the CTU FME. with manufacturing companies in the healthcare sector. In the monitored period, we solved several applied research and development projects focused, for example, on using the method of direct 3D printing of titanium alloy Ti6Al4V for the construction of a new type of small joint implants, enabling new anchoring components that improve long-term osteointegration and surface treatments that improve the abrasion properties of contact surfaces. The connection of knowledge of the application, clinical and academic spheres from the Czech Republic and the United States has the potential to significantly

accelerate the development and introduction of small-scale production of new types of implants with high added value and significant competitive advantages on the Euro-American and Asian markets. In another project, we worked on the development of nanofibrous biopolymer surfaces with controlled elution of pharmaceuticals to increase the osteointegration of implants.

With the company; **Robert Bosch, s.r.o.** in České Budějovice, that is one of the subsidiaries of Robert Bosch GmbH Stuttgart operating in the Czech Republic, CTU FME has a long-term cooperation, which was implemented, in the monitored period, within The National Competence Center for Mechatronics and Smart Technologies for Mechanical Engineering. One of the tasks was research and development for improving the properties of vibration testing equipment, which consists in optimizing thermo-barriers for vibration tests with a temperature chamber and in the mechatronic test frame for vibration tests with intellectual property protection in the form of a utility model using advanced vibration test control. The results are used directly by RB when testing its products. The second task was related to the development of components made of conductive plastics, (e.g. a functional sample of a heating part made of conductive plastic with integrated contacts for direct heating of cooling liquids suitable for installation directly into a tank or dosing system or a functional sample of a new system of electrical contacting of plastic for supplying energy potential suitable for series production). The research results were further developed in the following years and a patent application is now being prepared.

Examples of commercialized results:

The **Modular software platform for distributed production process monitoring, control, and optimization components** have so far been applied in four commercial projects in Pakistan, Egypt, India, and France.

The machine tool management system **Tos Control** has been supplied with all machine tools produced by TOS Varnsdorf since 2020. (>100 implementations on machines delivered to customers worldwide) Thanks to the financial settlement agreement, the sale of machines with the TOS Control system also has a financial effect for CTU.

The result **Prototype chimney system with a new type of joint for W3G chimney systems** brought RHI Magnesita Czech Republic an additional revenue of CZK 17,000,000 per year, with a profit of CZK 2,000,000. CTU Faculty of Mechanical Engineering concluded a license agreement with the company for the years 2023-2025.

A license agreement is concluded for the **Dataset Measured experimental data of the properties of the GE Catalyst turboprop engine**, partly covered by the knowledge provided by GE Aviation Czech used in the construction and operation of test facilities and in the modeling of the properties of the GE Catalyst turboprop engine.

Utility model **Mixing equipment comprising a vessel and at least one axial hydrofoil impeller** was applied in practice in the form of a license agreement concluded by FME CTU as the owner of the result with the company ENVI-PUR, s.r.o., which is a major Czech manufacturer of water purification and treatment equipment with global representation. The license agreement was concluded in 2023 for a period of 10 years. Currently, at least five industrial implementations per year are commercialized under this license agreement.

Revenues from sold licenses are continuously realized based on contracts for the use of results in science and research. Revenues from donations from legal entities are mainly earmarked for the support of aerospace research, automotive and support of student creative activities. This part of the own resources from the profit of the Faculty of Mechanical Engineering (approx. 70%) is earmarked for the support of scientific research projects and support of student scientific research activities, in accordance with the approved budget of the faculty.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

Type of revenue	Revenue (in thousands CZK/EUR)				
	2019	2020	2021	2022	2023
revenues from the sale of licenses	70 / 2741	599 / 23600	814 / 32101	1294 / 51027	579 / 22822
targeted support for science and research - donations	2725 / 107479	1500 / 59164	1948 / 76820	13249 / 522622	97626 / 3851097
support for science and research projects from own resources - from profits from additional activities	11201 / 441854	7534 / 297199	8332 / 328679	8579 / 338422	8910 / 351479
Total	13996 / 552074	9633 / 379963	11094 / 437600	23122 / 912071	107115 / 4225398

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

During the period under review, CTU FME had various activities in the field of popularization of science, research and development and communication with the public. Our academic staff appeared on television and radio programs, in the press and on social networks. We participated in the creation of the feature-length television documentary film *Budiž voda* ([Let There Be Water!](#)). We appeared in the popular TV program for children *Wifina* on the topics of S.A.W.E.R. and 3D printing, as well as in popular programs for such as the morning broadcast of TV Seznam and in radio reports, e.g. *Robot ovocnářem* (A robot fruit grower). We provided interviews to the popular magazine *Žena a život* (the topic of water as a life-giving fluid from various perspectives, assoc. prof. Matuška) or *Týdeník Květy* on the topic of *Biomaterials: Artificial body replacement*. We published popular science articles, e.g. [Machining is transformed by digital twins](#) in the newspaper *Hospodářské noviny* or [From endoprostheses to vascular replacements](#) in the *VědaVýzkum.cz* - supplement of the *Technický týdeník*. To popularize our field, we also use social networks such as Youtube ([Popularization video of cardiovascular biomechanics](#) on the CTU FS channel, a series of lectures within the [Young Manufacturing Leaders](#)). Another form of communication is articles in popular science magazines (*Pražská technika*, *TecniCall*, *MM průmyslové spektrum*, *Letectví a kosmonautika*, *Svět motorů*, *Automobil Revue*) lectures and presentations (e.g. in cooperation with Unipetrol, the Czech Automobile Company or the organization *Technologická gramotnost*). These are aimed at both the general public and professionals, as well as specific groups, such as secondary and primary school students. CTU FME participates in a number of contact events, such as trade fairs, festivals, seminars. We regularly present ourselves at the International Industrial Fair in Brno, we actively participate in events for the public such as the Night of Scientists, the Science Fair, Vědafest. We participated in the organization of the exhibition [Až na kost](#) (To the Bone) at the Technical Museum in Brno. A regular event for the professional public are seminars for secondary school teachers, where we discuss current

attractive topics with regard to their presentation to a given age group. We offer to secondary and primary schools excursions to our laboratories according to requirements.

The CTU FME is involved in the Erasmus+ program and participates in international bilateral agreements; in hosting international trainees; in the postdoc program advertised on the University's website and on the Euraxess portal. Our English study programs were presented on the CTU's website studyatctu.cz, on the website studyinprague.cz and also on studyin.cz, we also used the Keystone portal to promote English programs.

The CTU FME has been active in the Athens programs well as in the EuroTeQ association. CTU FME, in collaboration with Grenoble INP, Slovak University of Technology, University of Tartu, Mondragon University and Uni Porto has established a doctoral school within the EIT Manufacturing project. CTU FME actively took part in EIT Manufacturing Young Leaders initiative, which aimed to create a network of students and young people who will be mobilized as ambassadors of the manufacturing sector.

The **Škoda EDU Lab mobile laboratory** (2022-2025) was created as a unique interactive project of Škoda Auto to support technical education among primary and secondary school students. The aim of the project is to show students modern technologies and to inspire them to study technology at secondary and higher education institutions. During the campaign, students and staff of the CTU FME prepared and demonstrated a robotic station equipped with the ABB Yumi robot with the necessary powered tools and fixtures. The Yumi robot is completely collaborative, stops when in contact with an obstacle or a person and can perform very precise operations. The workplace was designed to be modular and to make it possible to easily change the subject of the process and as well as the entire process. In 2022, the station served as a demo workplace for assembling flash drives, and in 2023 it helped with the preparation of tea, coffee, and chocolate. By the end of 2024, Edu Lab had been visited by 10,600 elementary school students and over 10,700 high school students in 42 cities in the Czech Republic/Slovakia, including activities directly on the CTU campus.

Career Days of the Faculty of Electrical Engineering and the Faculty of Mechanical Engineering of CTU is an annual action that addresses the hunger for graduates of mechanical engineering, computer science and electrical engineering CTU on the labour market as well as the communication between not only the students of both faculties with employers of various sizes, ranging from giants of Czech industry to small progressive start-ups. Eighty companies represented themselves at 2023 The 4th edition of this event will take place in 2025, following the zero online edition during the COVID-19 pandemic. The online edition also included chat channels with representatives of individual companies, a professional program in the form of a live stream, and online presentations of individual companies. The main partners of Career Days had been ČEZ, Škoda Auto, GE, Bosch, Valeo, Continental, Rohde & Schwarz, Qminers, ÚJV, or Altron. Representatives of the companies were available to students from 9.00 to 16.00 on both days in the corridors of the lecture halls of both faculties. Part of the Career Days will also include an accompanying programme in which companies in presentations or workshops will address students through their professional topics.

The Faculty of Mechanical Engineering of the Czech Technical University in Prague presents its research, development and innovation activities every year at the **International Industrial Fair in Brno**. In [2019](#), for example, the unique 3D metal printing technology developed together with the company Kovosvit MAS or the composite air duct for the L-39 NG trainer jet aircraft in cooperation with VZLU and Aero Vodochody Aerospace. In [2021](#), the prototype of the STOL Cruiser aircraft - a collaboration between the Brno manufacturer Direct Fly, s.r.o. and the CTU FME - attracted an attention. In [2022](#), we brought the intelligent TRIO textile with graphene application and the smart Boxie shipping box. Professor Jan Macek from our faculty was awarded the gold medal for his lifelong creative technical work and innovative achievements. In [2023](#), our exhibition featured a hybrid power unit for small sport aircraft or large unmanned aerial vehicles, the PRIMOCO UAV ONE 150 drone, or the innovative CDuro mountain bike frame. At the Congress of the Confederation of Industry of the Czech Republic,

the P-D Refractories company won the Industry 4.0 Award for the implementation of an automatic line to produce ceramic chimney liners, in which the Faculty of Mechanical Engineering of the Czech Technical University in Prague participated.

In 2023 students of the Faculty of Mechanical Engineering of the Czech Technical University built within the framework of Strategy AV21 with the support of the Institute of Plasma Physics of the CAS, an educational **DEMO tokamak model from a LEGO® kit** to illustrate what fusion reactors in fusion power plants will look like. The model contains more than 4200 pieces. At the [Science Fair](#), the model attracted the attention not only of children and teenagers but also of the Minister of Science, Research and Innovation Mgr. Helena Langšádlová accompanied by the President of the CAS Prof. RNDr. Eva Zažímalová, CSc., dr. h.c.

Italian astronaut **Paolo Nespoli** opened the first Czech training and research centre for simulated space missions **Little Moon City (LMC)** Prague on November 14 2023. As part of this festive event, Paolo Nespoli's performed [lecture – "Human Space Endeavours: Today, Tomorrow, After-Tomorrow, After-after Tomorrow"](#), in the auditorium of the Faculty of Mechanical Engineering of the Czech Technical University in Prague. From September 2023, the LMC consisting of the Deep Lab H03 Hydronaut Project deepwater station, including the control centre and its IT and project infrastructure has been located on the CTU campus in Prague 6, in front of the CTU FME and FEE, that have been also involved together with the CTU FBMI and the Department of Psychology of Palacký University in Olomouc. The Planetum, the Department of Aerospace Engineering of the Faculty of Mechanical Engineering of the CTU in Prague and especially Ambasciata d'Italia and Praga participated in the preparation and organization of Paolo Nespoli's visit to the Faculty of Mechanical Engineering of the CTU in Prague.

Many CTU FME students are active in [specialized student teams](#) that participate in international competitions, cooperate with the application sphere and regularly represent CTU to the public at university and other events. Historically, the first team is the [eForce Formula Prague](#) (in the monitored period CTU CarTech), which has been building cars and competing in international Formula Student races continuously since 2009. The [CTU AeroLab](#) student team deals with the design and production of unmanned aircraft and competes with them. The [CTU Space Research](#) team founded in 2021 has currently over 50 members from 10 different faculties and schools deals with project of ILLUSTRIA - high-power rocket developed for EuRoC in Portugal, powered by own hybrid rocket engine and reaching target apogee 3 km. The newest team [CTU Robotics](#), which is developing a space rover, with which it plans to represent CTU at international competitions, such as ERC. Similar activities include the long-term projects as [Cenelín](#) (a model of a nuclear reactor in VR) and the activities of the Young Manufacturing Leaders group, who have prepared [popular educational videos](#) in the field of high technologies for both students and public.

November 23, 2023, the Institute of Aeronautical Engineering of the Faculty of Mechanical Engineering of the Czech Technical University in Prague and AERO Vodochody AEROSPACE a.s. prepared a meeting of academics and representatives of industrial companies with students of secondary schools and universities and the professional public [Aerospace Talks](#). Enthusiastic fans of aerospace technology listened to engaging lectures and personal stories. First, however, the president of AERO Vodochody AEROSPACE a.s. Ing. Viktor Sotona, MBA, welcomed all those present with a completely informal contribution about the heart of a mechanical engineer and aerospace engineer. Representatives of AERO Vodochody or, for example, CompoTech shared their experiences from the development of the Aero L-39NG training jet aircraft and composite technologies for aerospace. And the same interest was also aroused by the amazing presentation of aerobatic pilot Marek Hyka or Space Engineer Jan Lukačevič. The presentation of Spacemanic about their successful small satellite CubeSat was also motivating. Great interest was also aroused by the presentation of projects by our student teams, CTU

AeroLab and CTU Space Research, which achieve excellent results and even cooperate with ESA BIC Czech Republic, presented by Marie Němečková.

CTU FME is a regular participant and co-organizer of the [Scientists' Night](#) event, organized annually since 2005 at the initiative of the European Commission. We did not abandon this event even during the COVID-19 pandemic, even though it was only in an online version. For example, On October 6, 2023, the part of the Night of Scientists taking place at the CTU FME was organized in the Dejvice and Karlovo náměstí locations from 5:00 p.m. to 10:00 p.m. and brought tours of the aerodynamic tunnel of the 3D Volumetric Laser Anemometry Centre; a model of cooling tower; acoustic laboratory; the C-Duro bike trainer; photobioreactors that can transform wastewater and flue gases into food supplements or pharmaceuticals; a cyber-physical factory; 3D printing and computer tomography laboratory; an aircraft technology laboratories, including a tour of the all-composite blower aircraft UL-39 Albi, a life-size model of the first Czech moon-module LVCE, and the opportunity to sit in an ultralight Typhoon aircraft; tour of the microscopic laboratory of the Department of Material Engineering

Starting in 2022, CTU FME is organizing a two-day workshop for high school students entitled "**Taste Mechanical Engineering**". The main goal of this event is to expand information about study programs, the scope of study, the equipment of faculty laboratories and the results of the development of ongoing projects, in an interesting form with an interactive part, which is a team project and the associated competition. In [2022](#), mini-lectures were held on a common topic-suspension of the chassis of the student formula. They praised the fact that, e.g., they understood the concept of a square matrix here thanks to a practical example, while they failed in doing so at their school. The afternoon program was reserved for excursions. There, they received a brief explanation of the follow-up teaching and the projects being solved. In [2023](#), mini-lectures in the field of aerospace engineering were held, where students gained basic information about the nature of flying and the principles of building a throwing aircraft, which they would build themselves the next day and compete in teams. Participants in an anonymous survey confirm that the organization of the event pleasantly surprised them and some of them are considering applying to study at the CTU FME.

The faculty organizes an [Open Day](#) (OD) event 4 times a year, during which a larger group of interested students (from 150 to 350 people) has the opportunity to get to know the CTU FME. During the presentations of all bachelor's study profiles, they meet teachers and students who will introduce them to the content of the study through real projects and demonstrations. The presentation then continues with a large lecture about the study and everything is concluded with guided visits to the laboratories. During the entire event, student teams of the faculty also present their projects and share their experiences with student life. In addition to the offer of our study programs, this event aims to offer the public a tour of the faculty, including laboratories, and to obtain information about our professional and scientific activities. Since 2023, we have been organizing the Open Day 4 times a year, two of which on Saturdays, to make the event accessible to the widest possible public.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

Several recommendations were highlighted in the evaluation of the previous period:

Perhaps, the participation in more international projects, and/or the application for international funds could provide sufficient advertisement for the faculty to attract more international clients ...

In an effort to strengthen our participation in international projects, we focused on supporting staff in obtaining international projects by engaging in research networks, especially in Europe, but also beyond. CTU is a member of the *European Association of Research Managers and Administrators – EARMA*. For CTU FME, this membership brought, among other things, an interesting connection to *Politecnico di Torino*. Based on this contact, the project *Twinning for Excellence in Morphing and Aero-Mechatronic Wing Control: A Leap Towards Eco-Smart Aviation -MECHATWIN* was submitted and supported, which is the first twinning project at CTU FME and the only H2020 project in which CTU FME is the coordinator. In 2022, CTU became a co-founder of the *Czech Association of Research Managers and Administrators CZARMA*, in which the main project manager from CTU FME, Mgr. Radka Preclíková, is the head of the thematic group *Professional Development*. We are members of other professional groups such as *The European Automotive Research Partners Association – EARPA*, that brings together the most prominent R&D providers in the automotive sector throughout Europe. We use the *Crowdhelix Network* tool to set up a consortium or participate in international research projects. In the monitored period, we managed to participate in several *HORIZON Europe* projects (*Sustainable production of Cellulose-based products and additives to be used in SMEs and rural areas, LASERWAY: Extremely High-Speed Laser at the Right Place at the Right Time, InnovAtive DeMonstrator for hyBrid-Electric Regional Application, Innovation in Supercritical CO2 Power generation systems, A Global as well as Local Flexibility Marketplace to Demonstrate Grid Balancing Mechanisms through Crosssectoral Interconnected and Integrated Energy Ecosystems enabling Automatic Flexibility Trading*) and, in 2024 and 2025 we are involved in 4 more.

... More emphasis can also be put on your innovative projects (e.g. biomedical technology, alternative/renewable energy sources), and boost their commercial implementation, in order to gain more innovative fame, which in turn will yield more international grants and contracts, as well as they can result in some notable gifts for your further activities.

In the field of innovative biomedical technologies, CTU FME continued its tradition of active cooperation not only with academic partners, including medical universities, but also with the industrial sector. In Chapter 3.5, a paragraph describing specific cooperation with the company *ProsPon* is dedicated to this. The area of innovative applications of biosciences partly includes projects that we have in the basic research project *Mechanical engineering of biological and bio-inspired systems - MeBioSys* (call OP JAK), which is focused on finding non-traditional concepts in mechanical engineering inspired by living nature. Another innovative research of CTU FME is the development of components made of conductive plastics, in cooperation with the company; Robert Bosch, s.r.o. In České Budějovice under *The National Competence Center for Mechatronics and Smart Technologies for Mechanical Engineering*.

A note can be offered for the other projects in the list (3.5.1), which sound equally promising, and could have a much greater financial and environmental impact than some of the selected ones (e.g. Complex and environmental technologies of composites surface treatment development based on zinc with low friction coefficient, ...

It was given in the document as an example of commercialization, but it was created based on an applied research grant (FR-TI1/047) implemented in 2009-2012. Despite the considerable time gap, the topic of composites and surfaces is being further developed at our Institute of Materials, e.g. in the internal doctoral grant *Nano-modified piezoelectric composites for improved osseointegration and antibacterial behaviour in medical implants*.

... Wave Micro-Power Station Designed for the Production of Heat and Electricity from Biomass, ...

It is a project by the team of associate prof. Maščuch (which also won an award for environmental friendliness). In the monitored period the team brought the solution to commercial implementation (in 2022), but it turned out that the interest in the market was not very great, so the team's activities were newly focused on the topic of energy accumulation.

... PHOENIX AIR U-15 AFL –Advanced Flying Laboratory ...

Aircraft development activities continued at the Department of Aircraft Engineering CTU FME, as shown by the presented STOL Cruiser project.

... Ideally, the emergence of more spin-offs and start-ups could accelerate this technology transfer and attract the attention of the public to FME's activities, ...

FME co-founded the CTU MediaLab foundation focused on supporting the research and innovative ideas of FME students. Our graduates, Ing. Megi Mejdrechová and Ing. Ladislav Dvořák founded the spin-off RoboTwin.

...as well as more customers, i.e. further collaborations. Intensifying the interdisciplinary cooperation and activities is also encouraged.

We continue to support the cooperation of CTU FME with the application sphere in the form of collaborative and contractual research. We emphasize multidisciplinary approach, providing coordination and participating in consortia of biomechanics, energy, manufacturing industry and biotechnology, environmental technology, material sciences in a wide spectrum from biosciences to design.

Furthermore, a frequent exchange of scientists is a good tool to achieve further recognition in international research ...

We also strive for membership in editorial boards, and exchange stages of scientists as a tool for international recognition. We are developing support for international cooperation in the form of student and staff exchanges, and we have significantly expanded the university program for creating postdoc positions so that every scientific workplace can obtain a high-quality postdoc from abroad, including financial support. Emphasis is placed on the quality of both the mentor and the applicant. We have expanded active support for sabbaticals by creating an internal regulation for our faculty.

The interest of the public could also be further attracted by organizing public and open days and popular scientific conferences, as well as workshops for university and high-school students.

In the monitored period, CTU FME organized events for high schools (Taste mechanical engineering, seminars, excursions according to the requirements of high schools), participated in public events such as the Night of Scientists, and presented itself at professional (MSV) and educational fairs. We emphasize the openness of the faculty to the public, both in the field of science and education in the form of open days, which we started organizing on Saturdays as well to allow access to the widest possible public. As part of the promotion of mechanical engineering, we also participate in events with our industrial partners (e.g. Roadshow with ŠA, a.s.)

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)
Bozek Vehicle Engineering National Center of Competence – BOVENAC	3.3	https://fs.cvut.cz/en/science-research/applied-research-projects/ncc/bozek-vehicle-engineering-national-center-of-competence/
Josef Bozek National Center of Competence for Surface Vehicles - JOBNA	3.3	https://fs.cvut.cz/en/science-research/applied-research-projects/ncc/josef-bozek-national-center-of-competence-for-surface-vehicles/
Center of electron and photonic optics - CEPO	3.3	https://fs.cvut.cz/en/science-research/applied-research-projects/ncc/centre-of-advanced-electron-and-photonic-optics/
The National Centre of Competence ENGINEERING - NCCE 1	3.3	https://fs.cvut.cz/en/science-research/applied-research-projects/ncc/national-centre-of-competence-engineering/
National Competence Center for Mechatronics and Smart Technologies for Mechanical Engineering	3.3	https://fs.cvut.cz/en/science-research/applied-research-projects/ncc/national-competence-centre-of-mechatronics-and-smart-technologies-for-mechanical-engineering/
Center for Advanced Aerospace Technologies - CAAT	3.3	https://fs.cvut.cz/en/science-research/applied-research-projects/en-research-centres/center-of-advanced-aerospace-technology/
Research centre for low-carbon energy technologies – BIO-CCS/U	3.3	https://fs.cvut.cz/en/science-research/applied-research-projects/en-research-centres/research-centre-for-low-carbon-energy-technologies-bio-ccs-u/
Mechanical engineering of biological and bio-inspired systems – MeBioSys	3.3	https://fs.cvut.cz/en/science-research/applied-research-projects/en-results-other-than-economic/mebiosys-mechanical-engineering-of-biological-and-bio-inspired-systems/
You can also reduce emissions – uCARE	3.3	https://fs.cvut.cz/en/science-research/applied-research-projects/en-results-other-than-economic/ucare-you-can-also-reduce-emissions/
Innovative Demonstrator for hybrid-Electric Regional Application – AMBER	3.3	https://fs.cvut.cz/en/science-research/applied-research-projects/en-results-other-than-economic/amber-

Document name	No. criteria	Location (link in HTML)
		innovative-demonstrator-for-hybrid-electric-regional-application/
Modular software platform for distributed production process monitoring, control, and optimization	3.4	https://fs.cvut.cz/en/science-research/applied-research-projects/en-applied-research-results/modular-software-platform-for-distributed-production-process-monitoring-control-and-optimization/
Prototype TOS Varnsdorf-2019 Machine tool management system	3.4	https://fs.cvut.cz/en/science-research/applied-research-projects/en-applied-research-results/prototype-tos-varnsdorf-2019-machine-tool-management-system/
Mixing equipment comprising a vessel and at least one axial hydrofoil impeller	3.4	https://fs.cvut.cz/en/science-research/applied-research-projects/en-applied-research-results/mixing-equipment-comprising-a-vessel-and-at-least-one-axial-hydrofoil-imepeller/
Heat recovery ventilation unit	3.4	https://fs.cvut.cz/en/science-research/applied-research-projects/en-applied-research-results/local-ventilation-unit-with-a-rotary-recuperative-heat-exchanger/
Short Take-Off and Landing (STOL) aircraft	3.4	https://fs.cvut.cz/en/science-research/applied-research-projects/en-applied-research-results/stol-cruiser-aircraft/
A set of recommended measures for the protection of persons during the transport of found unexploded ordnance	3.4	https://fs.cvut.cz/en/science-research/applied-research-projects/en-applied-research-results/a-set-of-recommended-measures-for-the-protection-of-persons-during-the-transport-of-found-unexploded-ordnance/
Optimized gas ICE for vehicle decarbonization	3.4	https://fs.cvut.cz/en/science-research/applied-research-projects/en-applied-research-results/optimized-gas-ice-for-vehicle-decarbonization/
Prototype chimney system with a new type of joint for W3G chimney systems	3.4	https://fs.cvut.cz/en/science-research/applied-research-projects/en-applied-research-results/prototype-chimney-system-with-a-new-type-of-joint-for-w3g-chimney-systems/

Document name	No. criteria	Location (link in HTML)
Composite Blood Vessel Substitute and the Method for Producing It	3.4	https://fs.cvut.cz/en/science-research/applied-research-projects/en-applied-research-results/composite-blood-vessel-substitute-and-ahe-method-for-producing-it/
Dataset Measured experimental data of the properties of the GE Catalyst turboprop engine	3.4	https://fs.cvut.cz/en/science-research/applied-research-projects/en-applied-research-results/dataset-measured-experimental-data-of-the-properties-of-the-ge-catalyst-turboprop-engine/

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED:

Faculty of Electrical Engineering

FORD: 2. Engineering and Technology

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment: The Faculty of Electrical Engineering of the CTU in Prague (FEE) is a key educational and scientific research institution in the field of electrical engineering, computer science and robotics and related areas in the Czech Republic. Its **mission** is to prepare top professionals, to develop excellence in scientific knowledge, to apply innovative technologies and support the community and the government in order to contribute to the development of the society and the industry, both at the national and international level.

The **vision** of FEE is to be an internationally-recognised institution of excellence in education and research. FEE **aspires** to be the first choice for students, researchers and industrial partners looking for quality in education and for innovative solutions to the current challenges.

FEE affects the society via **extensive cooperation** with **high-tech companies**, by collaborative projects as well as joint laboratories e.g. with Avast, CRRC, Rohde & Schwarz, and Toyota, which are located on faculty premises. Faculty R&D contributes to **projects** responding to the needs of the **government**, especially **health, security and defence institutions**. FEE also participates in space research projects and receives funding from foreign grant agencies, including DARPA. During the monitored period, we completed **international** and **domestic grant-funded projects** in basic and applied research, including European structural fund projects, totalling CZK 1,874 million/EUR 74 million. FEE is a sought-after partner for industry: the **annual income** from **contract research** increased from EUR 2.4 million to EUR 3.8 million in the 2019-2023 period, reaching EUR 14.1 million.

FEE contributes to society by educating **highly skilled professionals** in **Electrical Engineering (EE)**, **Computer Science (CS)** as well as in Software Engineering, Biomedical Engineering and Space and Aeronautical Engineering. In 2022, a survey among FEE graduates found that only one of 348 graduates had been looking for work for more than 8 months, at the time of the survey there was

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

not a single respondent unemployed. A dominant majority of graduates (87 %) are satisfied with what FEE has provided towards preparing for employment. According to the survey, the average starting salary in the first job was EUR 2,100, which was 1.5 times the national average in 2019, and after getting settled at work, the respondents received an average of EUR 3,200, double the national average in 2023.

The strategic goals are driven by the **FEE key values**:

- People come first.
- Quality in all faculty roles, in all aspects of our activities.
- Collaboration - we compete with the world, not with each other.
- Openness to the world and to new disciplines.
- The strength of FEE is the strength of CTU, the strength of CTU is the strength of FEE.
- We make decisions by consensus and with transparency.
- We always consider the ethical dimension of our actions.
- We respect and promote the principles of sustainable development, societal needs, and the protection of nature and the planet.

The **strategic long-term goals**, listed below, include seven areas. The first four address the roles of a modern university and the other three are seen as supportive without which the quality of the activities of the first four roles cannot be developed. In line with the FEE key values, we strive to achieve high quality in all aspects of our activities by which we support and develop society and the world in which we live, and we must not stumble on any of these four "legs". Area 5 turns inward and concerns the quality management of the faculty and its human resources. Area 6, a comfortable environment for study and work, is both a goal and a means. The final area, 7, is public relations. The impact of faculty that the community knows about often opens up new opportunities and inwardly creates a sense of justified pride in the institution we work in and build.

1. **Ensure excellence in education** - to provide modern and practice-oriented study programmes, to expand cooperation with industry and supporting international mobility of students and academics.
2. **Foster scientific excellence and interdisciplinary collaboration** - to promote cutting-edge research in key areas, to win prestigious grants, and to develop collaborations with research institutions at home and abroad.
3. **Promote innovation and technology transfer** - to strengthen links between academia and industry, to establish spin-off companies and encourage entrepreneurship among students and staff.
4. **Support society, community, government** - to support decision-making of government bodies, activities of secondary schools, third age education, technical education in general.
5. **Quality of faculty management and human resources policy** - to strengthen the quality and efficiency of management activities, to support for human resources development, including gender aspects and reconciliation of professional and personal life
6. **Comfortable environment for study and work** - to support for efficient use of space and improvement of facilities, to create zones for self-study and rest, support for student activities and staff needs
7. **Open and clear public relations** - to communicate a complete, true and comprehensible picture of all roles and activities of the faculty, to promote the importance of technical education, to develop and build relationships with all relevant target groups, both external and internal (prospective students, employees, alumni, lay and professional public, government and private entities) for mutual benefit in the long term

FEE is **one of the most important** research institutions in the Czech Republic. It has been contributing approximately 1/3 to the overall research output of the CTU, measured by the number of quality publications and the number of citations. In particular, predominantly due to FEEs scientific output,

the **QS World Rankings**, in both **Computer Science** and **Electrical Engineering (CS & EE)**, have consistently placed CTU within the 151th to 250th range.

FEE supports and develops **basic** and **applied research and development** in the field of **EE and CS** with overlaps into **natural, medical, economic** and **humanities sciences**: Aeronautical and Space, Biomedical, and Power Engineering; Acoustics, Applied physics, Automation Control; Cybernetics; Computer Science; Graphics; History of Science, Management and Energy Economics; Mathematics; Material Science, Microelectronics; Radioengineering; Robotics; and Telecommunication.

FEE **commercialises research** through the sale of patent licences, support for start-up companies and partnerships with leading industrial companies.

FEE **intensively popularizes science and research**. From 2019 to 2023, we registered over **7 700 media appearances** of our academic staff on TV, radio, in the press, and on the Internet.

In 2023, at the end of the reporting period, the FEE had the following **structure** and **size**:

- Departments: The faculty consists of 17 departments with 200+ doctoral advisors
- Staff (FTE, [annual report 2023](#)): Approximately 442 academic and research staff members including 51 professors, 73 associated professors, 104 assistant professors, 2 assistants, 36 lecturers, 176 researchers including 22 postdocs, supported by 135 administrative and technical staff.
- Students: 3,251 students, including 1,960 bachelor, 855 master, and 436 doctoral students in present form.
- Study Programs: 9 bachelor and 13 master degree programs. One bachelor's and 6 master's degree programs of the above were taught only in English.

Table 3.1.1 - Staffing per FTE²

Academic/ Professional position	Total / Of which women					
	2019	2020	2021	2022	2023	Total
Professor	47.4/2.2	48.2/2	49.2/2	51.7/2	50.7/2	247.4/10.2
Associate Professor	66.8/3	69.2/3	72.1/3	72.6/3	73.3/3	353.9/15
Assistant Professor	114.8/14.1	114.4/13.6	109.6/11.6	106.3/11.6	104.3/11.6	549.3/62.7
Assistant	1.4/0	1.4/0	1.2/0	1.2/0	2/0	7.2/0
R&D Personnel ³	89.5/13.9	87.1/14.6	80/10	92.5/18	99.1/22.2	448.1/78.7
Researchers in other categories ⁴	194.9/16.6	199.6/15.9	216.1/17.1	218.9/22.9	229.6/29.2	1059.2/101.7
Technical and economic staff ⁵	141.3/106.9	143.1/105	138/102.3	132/96.9	134.7/103	689.2/514.1

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

Scientific, research and development staff involved in teaching activities	231.4/19.3	234.2/18.6	233.1/16.6	232.8/16.6	231.3/16.6	1162.8/87.9
Early career researchers ⁶	113.8/7.3	118.8/7.2	126.3/6.9	129.2/7.9	132.6/9.1	620.7/38.4
post-docs ⁷	18.1	23.9	31.7	31.1	21.7	126.5
Total ⁸	656.1/156.7	663/154.2	666.2/146.1	675.2/154.4	693.7/171	3354.2/782.3

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁹

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	12	0	15	0	18	2	15	1
Associate Professor	0	0	10	1	30	1	14	1	14	0	8	0
Assistant Professor	2	0	53	3	48	7	21	4	17	4	0	0
Assistant	0	0	3	0	0	0	0	0	0	0	0	0
R&D Personnel ¹⁰	18	4	34	4	34	6	18	2	13	2	10	1
Researchers in other categories ¹¹	129	14	135	8	37	2	8	0	4	1	1	0
Technical and economic staff ¹²	6	0	11	2	3	1	0	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	2	0	67	4	90	8	50	5	49	6	23	1
Early career researcher ¹³	19	0	126	7	9	2	1	1	0	0	0	0
Total ¹⁴	155	18	246	18	164	17	76	7	66	9	34	2

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ PhD outside CTU, and less than 6 years after PhD

⁸ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&D personnel, researchers in other categories and technical and economic staff.

⁹ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁰ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹¹ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹² Who participates in the management and support of R&D&I in the institution.

¹³ See Definition of Terms in Methodology HEI2025+.

¹⁴ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁵

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	8	0	14	0	18	1	23	1
Associate Professor	0	0	3	0	38	2	21	1	9	0	11	0
Assistant Professor	0	0	18	0	64	6	20	2	16	6	7	1
Assistant	0	0	2	0	1	0	0	0	0	0	0	0
R&D Personnel ¹⁶	25	11	29	3	24	9	31	6	15	0	9	1
Researchers in other categories ¹⁷	130	18	146	15	64	7	12	1	4	1	1	0
Technical and economic staff ¹⁸	1	0	9	1	1	0	1	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	0	0	23	0	112	8	55	3	43	7	41	2
Early career researcher ¹⁹	13	2	146	9	15	0	1	0	1	0	0	0
Total ²⁰	156	29	207	19	200	24	99	10	62	8	51	3

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students

Type of study	2019		2020		2021		2022		2023		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate	1729	254	1838	263	1729	235	1723	256	1886	293	8905	1301

¹⁵ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁶ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁷ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁸ Who participates in the management and support of R&D&I in the institution.

¹⁹ See Definition of Terms in Methodology HEI2025+.

²⁰ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

Master's ²¹	788	128	748	121	771	110	771	117	833	106	3911	582
Doctoral	301	37	329	42	334	39	315	44	333	48	1612	210
Lifelong Learning Courses	130	85	236	149	161	108	145	95	230	146	902	583
Total	2948	504	3151	575	2995	492	2954	512	3282	593	15330	2676

Table 3.1.5 - Study programmes in Czech/English

Type of study programme	Total ²² / Of which professional study programmes											
	2019		2020		2021		2022		2023		Total	
Undergraduate	14/2	0/0	14/2	0/0	14/1	0/0	14/1	0/0	12/1	0/0	68/7	0/0
Master's	18/8	0/0	17/6	0/0	16/7	0/0	16/6	0/0	13/6	0/0	80/33	0/0
Doctoral	15/6	0/0	20/8	0/0	27/13	0/0	30/11	0/0	31/12	0/0	123/50	0/0
Lifelong Learning courses	10/0	0/0	21/0	0/0	22/0	0/0	17/0	0/0	23/0	3/0	93/0	3/0
Total	47/16	0/0	51/16	0/0	57/21	0/0	60/18	0/0	44/16	3/0		

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
1. Natural Sciences	1.1 Mathematics	3,6	Basic Research	48,02
	1.2 Computer and information sciences	34,03	Balanced basic and applied research	
	1.3 Physical sciences	9,11	Balanced basic and applied research	
	1.4 Chemical sciences	0,25	Balanced basic and applied research	
	1.5 Earth and related environmental sciences	0,38	Balanced basic and applied research	
	1.6 Biological sciences	0,65	Balanced basic and applied research	
	1.7 Other natural sciences	0	Balanced basic and applied research	
2. Engineering and Technology	2.1 Civil engineering	0,35	Balanced basic and applied research	46,95
	2.2 Electrical engineering, Electronic engineering, Information engineering	37,63	Balanced basic and applied research	
	2.3 Mechanical engineering	0,28	Balanced basic and applied research	

²¹ All master's degree students are listed, regardless of the length of their programme of study.

²² The total number of study programmes for which admissions have been announced in a given academic year.

	2.4 Chemical engineering	0,03	Balanced basic and applied research	
	2.5 Materials engineering	3,44	Balanced basic and applied research	
	2.6 Medical engineering	2,48	Balanced basic and applied research	
	2.7 Environmental engineering	2,03	Balanced basic and applied research	
	2.8 Environmental biotechnology	0,01	Balanced basic and applied research	
	2.9 Industrial biotechnology	0	Balanced basic and applied research	
	2.10 Nanotechnology	0,21	Balanced basic and applied research	
	2.11 Other engineering and technologies	0,49	Balanced basic and applied research	
3. Medical and Health Sciences	3.1 Basic medicine	0,31	Balanced basic and applied research	1,83
	3.2 Clinical medicine	1,52	Balanced basic and applied research	
	3.3 Health sciences	0	Balanced basic and applied research	
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries	0	Balanced basic and applied research	0
	4.2 Animal and Dairy science	0	Balanced basic and applied research	
	4.3 Veterinary science	0	Balanced basic and applied research	
	4.4 Other agricultural sciences	0	Balanced basic and applied research	
5. Social Sciences	5.1 Psychology and cognitive sciences	0,48	Balanced basic and applied research	1,74
	5.2 Economics and Business	0,29	Balanced basic and applied research	
	5.3 Education	0,92	Balanced basic and applied research	
	5.4 Sociology	0	Balanced basic and applied research	
	5.5 Law	0	Balanced basic and applied research	
	5.6 Political science	0,03	Balanced basic and applied research	
	5.7 Social and economic geography	0	Balanced basic and applied research	
	5.8 Media and communications	0,02	Balanced basic and applied research	
	5.9 Other social sciences	0	Balanced basic and applied research	
6. Humanities and the Arts	6.1 History and Archaeology	0,35	Balanced basic and applied research	1,45
	6.2 Languages and Literature	0,33	Balanced basic and applied research	
	6.3 Philosophy, Ethics and Religion	0,77	Balanced basic and applied research	

	6.4 Arts (arts, history of arts, performing arts, music)	0	Balanced basic and applied research	
	6.5 Other Humanities and the Arts	0	Balanced basic and applied research	
Total		100 %	-	100 %

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment: The Faculty of Electrical Engineering, Czech Technical University in Prague has long been producing dominant scientific research results and activities connected with them. The faculty employs teachers and researchers whose results reach world-class standards. Employees are invited to participate in various committees of professional societies, world conferences with a high professional level, as evaluators of European projects, but also of projects proposed outside Europe. Leading experts at the faculty are invited to give lectures at important world institutions, universities or companies. Leading world experts from various fields of electrical engineering, communication technologies, cybernetics, and robotics accept invitations to give expert lectures at the faculty. They achieve excellent results in the field of artificial intelligence, as well as in the control of robots or in the development of unmanned or autonomous systems. The activities of the employees of the university system are evaluated by various criteria. In addition to the monitored criteria listed in the tables below, it is necessary to add criteria such as: Member of a professional society, distinguished member (fellow) of a scientific society, visiting professor, award in a competition, award for popularization, member of a professional body, member of the program, organizational or editorial committee of a conference, review of articles in a major foreign journal, membership in the editorial board of a journal, membership in a committee of a scientific society, review of a professional book. The evaluated area "Recognition by the scientific community" is one of many other areas of monitored professional results of faculty staff.

Faculty employees are members of evaluation committees in multinational companies, they act as expert experts in committees at the level of government ministries, they are members of educational committees at the Ministry of Education, Sports and Youth, they are members of the National Accreditation Office for granting accreditation to study programs of Czech universities. Workers are members of professional bodies at the government level, serve on the boards of directors of multinational companies, and have the position of CEO of companies. The workers also prepare professional expert opinions for the Czech judiciary, etc.

The sample of the top 10 results presented includes only a very small portion of the results of the monitored categories listed in Tables 3.2.1 to 3.2.5.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
Tomáš Svoboda, Jan Faigl, Karel Zimmermann, Tomáš Krajník, Martin Saska and team	2x 1st place among self-funded teams (3rd overall)	DARPA, event: DARPA SubTerraanean Challenge, Tunnel and Urban Circuits https://www.darpa.mil/news-events/2019-08-22 , https://www.aic.fel.cvut.cz/news/bronz-from-the-darpa-subterranean-challenge-urban-circuit
Tomáš Svoboda, Martin Saska, Jan Faigl, Karel Zimmermann and team	2nd place in DARPA SubT Challenges - Final Event Virtual Competition 2021	DARPA SubTerraanean Challenge, Final Event Virtual Competition https://www.darpa.mil/news-events/2021-09-24a
Martin Saska, Tomáš Krajník and team	1st place in Robotic MBZIRC Grand Challenge 2020	Khalifa University in Abu Dhabi https://mrs.fel.cvut.cz/competitions/mbzirc2020-compe
Zdeněk Hurák, doc. Ing. Ph.D. Ing. Jekatěrina Jaroslavceva and her supervisor prof. Ondřej Chum and also to dr. Vojtěch Spurný and his supervisor doc. Martin Saska	Prize Werner von Siemens 2022 Prize Werner von Siemens 2023	Werner von Siemens Prize, https://www.cenasiemens.cz/minule-rocniky/vitezove-2022/#prumysl-40 https://cyber.felk.cvut.cz/news/werner-von-siemense-awards-2023/
Miloslav Čapek, prof. Ing. Ph.D.	IEEE Antennas and Propagation Edward E. Altshuler Prize Paper Award 2023	IEEE AP-S Awards 2023, https://ieeeps.org/awards/winners-of-2023-ap-s-awards-announced
Alan Lukezic (University of Ljubljana), Žiga Trojer (University of Ljubljana), Jiri Matas (Czech Technical University, Prague), Matej Kristan (University of Ljubljana)	Best paper award BMCV2022	The British Machine Vision Association and Society for Pattern Recognition. https://bmvc2022.org/programme/paper-awards/
Jan Hlavnička, Ing. Ph.D.	Joseph Fourier Prize: second place in computer science, 2020	Joseph Fourier Prize, http://sami.fel.cvut.cz/CenaJF.pdf
Zuzana Kúkelová, RNDr. Ph.D.	Neuron Prize 2023	Winner of the Neuron Award 2023 for Young Promising Scientists in the field of Computer Science, one of the most prestigious Czech national scientific prizes (Award 20 000 EUR) https://www.nadaceneuron.cz/person/computer-science
Petr Pošík, Ing. Ph.D.	SIGEVO Impact Award	This award recognizes up to three papers a year that were published in the GECCO conference 10 years earlier and which are both highly cited and essential for the field. https://dl.acm.org/doi/10.1145/1830761.1830790
Dominika Burešová, Bc.	The Global Undergraduate Awards -Mathematics & Physics	Winner in the Highly Commended, Mathematics and Physics category of The Global Undergraduate Awards 2023, often referred to as the "Junior Nobel Prize." https://cyber.felk.cvut.cz/cs/news/dominika-buresovas-achievement-in-the-global-undegraduate-awards/

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of scientific journal, ISSN
Chum Ondřej, prof. Mgr., Ph.D.	International Journal of Computer Vision, ISSN 0920-5691, (IF 11.6, D1), https://www.springer.com/journal/11263
Matas Jiří, prof. Ing. Ph.D.	International Journal of Computer Vision, ISSN 1556-6013, (IF 11.6 D1), http://www.ijcv.org/ (Editor-in-Chief)
Pevný Tomáš, doc. Ing. Ph.D.	IEEE Transactions on Information Forensics and Security, ISSN 1556-6013, (IF 6.3 Q1), http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=10206
Faigl Jan, prof. Ing. Ph.D.	IEEE Transactions on Automation Science and Engineering, ISSN 1545-5955, (IF 5.9 Q1), https://www.ieee-ras.org/publications/t-ase/editorial-board
Havlena Vladimír, prof. Ing. CSc.	Control Engineering Practice, ISSN 0967-0661, (IF 5.4 D1), https://www.sciencedirect.com/journal/control-engineering-practice
Haasz Vladimír, prof. Ing. CSc.	Measurement, ISSN 0263-2241, (IF 5.2 Q1), https://www.journals.elsevier.com/measurement
García Sebastián, Ing. Ph.D.	Computers & Security, ISSN 0167-4048, (IF 4.8 Q1), https://www.journals.elsevier.com/computers-and-security
Jakub Mareček, Mgr. Ph.D.	IEEE Open Journal of Intelligent Transportation Systems, ISSN 2687-7813, (IF 4.6), https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=8784355
Pošík Petr, Ing. Ph.D.	Evolutionary Computation, ISSN 1063-6560, (IF 4.6 Q1 Q2), http://www.mitpressjournals.org/loi/evco
Železný Filip, prof. Ing. Ph.D.	Machine Learning, ISSN 0885-6125, (IF 4.32 Q2), https://link.springer.com/journal/10994

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
Jiri Matas, prof. Ing. Ph.D.	Robust Fitting of Multiple Models in Computer Vision	14th International Conference on Computer Graphics Theory and Applications VISIGRAPP2019	2019
Michal Janošek, Ing. Ph.D.	Geomagnetic data sampling and acquisition – requirements and effects to avoid artifacts	SANSA Space Science, Hermanus, Pretoria	2022
Miloslav Čapek, prof. Ing. Ph.D.	Characteristic Modes for Antenna Analysis and Synthesis	EurAAP Organization board, Düsseldorf, https://www.eucap2021.org/conference/invited-and-keynote-speakers_new	2021
Zvánovec Stanislav, prof. Ing. Ph.D.	Transmission of millimeter wave signals over free space optical networks	IEEE Future Networks, Montreal, https://ieee-wf-5g.org/optical-wireless-communication-owc/	2021
Václav Knap, MSc. Ph.D.	Lithium-ion batteries in CubeSats	Lancaster University	2021

Tomáš Krajník, doc. Ing. Ph.D.	Chronorobotics: Cyclic Spatio-Temporal Models for Long-term Mobile Robot Autonomy	Autonomus Systems Lab., ETH Zurich	2019
Matěj Hoffmann, doc. Mgr. Ph.D.	Whole-body awareness for safe and natural interaction: from brains to collaborative robots	Laboratory of Molecular Biology, Cambridge, https://www3.mrc-lmb.cam.ac.uk/sites/gsasymposium/	2019
Martin Saska, ass. prof. Dr. rer. nat.	Deployment of closely cooperating aerial robots in demanding real-world environment	20th IEEE Latin American Robotics Symposium - LARS 2023	2023
Jan Sýkora, prof. Ing. CSc.	Cooperative coding and processing in radio networks	Universidad Distrital Francisco José de Caldas, Bogota https://comunidad.udistrital.edu.co/ciect14/programacion/	2019
Tomáš Krajník, doc. Ing. Ph.D.	Chronorobotics: Modeling Time for Service Robots	Queen Mary University in London	2019

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year
Pietro Michiardi, prof.	EURECOM, Sophia Antipolis, France	Generative Diffusion Models: Key Ideas, Current Practice and Research Challenges	2023
Prof. John Collomosse	Adobe Research	Content Provenance: To Authenticity and Beyond!	2023
Julia Frankenstein, Dr.	TU Darmstadt, Germany	Symmetry and Human Perception	2022
Amita Shrestha, Dr.	German Aerospace Center, Germany	FSO Satellite to ground links	2022
Richard Sutton (PIS)	University of Alberta, Canada	The Alberta Plan for AI Research	2022
Werner Magnes	Space Research Institute (IWF) of the Austrian Academy of Sciences - vice director, Austria	Spaceborne Magnetic Field Measurements	2020
dr. Calvanese Strinati	CEA-Leti, Grenoble, France	Green Communications as an enabler for Future 5G Mobile Networks	2020
Sajeev John, prof.	University of Toronto, Canada	Photonic Crystal Light Trapping: The Key to Breaking Photovoltaic Efficiency Barriers,	2019
Zabih Ghassemlooy, Prof.	Northumbria University, Newcastle upon Tyne, Great Britain	Visible Light Communications	2019
Bogdan Savchynskyy, Dr.	University of Heidelberg, Germany	Overview of first-order optimization methods for the LP relaxation of discrete energy minimization	2019

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the research project/programme call	Name of the contracting authority/guarantor of the project/programme call	Year
Jiří Matas, prof. PhD. Ing.	ERC Synergy Panel	European Research Council	2019-2022
Daniel Novak, doc. Ing. Ph.D.	EU Horizont, SME Phase I, II, now Accelerator	European Research Council	2019-2023
Pavel Ripka, prof. Ing. CSc.	MINT	Swiss National Science Foundation	2023
Pavel Ripka prof. Ing. CSc.	VV 2021 for basic research	APVV (Slovak Research Agency)	2021, 2022
Roman Čmejla, prof. Ing. CSc.	Evaluation panel of Czech Health Research Council (AZV ČR)	Czech Ministry of Health	2020-2022
Pavel Hazdra, prof. Ing. CSc.	CSF Standard, Bilateral, and Lead Agency projects, Panel 102	Czech Science Foundation	2019,2021-2023
Jan Kybic, prof. Dr. Ing.	CSF (GAČR), panel 202	Czech Science Foundation	2013-2021
Jiří Matas, prof. PhD. Ing.	CSF (GAČR), panel 103	Czech Science Foundation	2013-2021
Pavel Ripka, prof. Ing. CSc.	CSF (GAČR), panel 202	Czech Science Foundation	2020-2023

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²³) that it has implemented or participated in during the period of 2019–2023²⁴. This should be done from the full list in annex tables (Table 3.3.1-3.3.2)²⁵, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in a listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

In the reporting period, a total of 414 applied research projects were started (230 with FEE CTU as the main coordinator). 303 were supported by national sources, 91 from within the EU, and the rest received support from the USA, Canada, Taiwan and other developed countries.

More than 450 commercial contracts were signed with large corporations and with small or medium-size enterprises (SME). The income from the contracted research totals approx. EUR 14.1M. The revenues from these activities represent a significant part of the faculty budget, and they have been growing in recent years; revenues in the reporting period: EUR 2.4M (2019), EUR 2.3M (2020), EUR 2.1M (2021), EUR 3.4M (2022), EUR 3.8M (2023).

²³ For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²⁴ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁵ The evaluated unit shall only fill tables that are relevant to it.

National funded projects

Research Center for Informatics (RCI) - funded by the Operational Programme Research, Development and Education under the call for Excellent Research with a total budget of CZK 610M/ EUR 24.2M during the period 2018-2023. The RCI facilitated and supported collaboration between experts from three faculties on a range of areas of informatics (computer vision, graphics, AI and CS theory, cybersecurity, high-performance computing, bioinformatics, robotics). Given the wide span of AI, Informatics and CS, it had an interdisciplinary feel. A significant part of the funding was spent on building the RCI computational cluster worth CZK 41.6M/EUR 1.65M. The goals of the Center in the first five years included were specified as a certain number of new researchers to be hired, a number of quality papers published and, last but not least, a requirement on the number of patents filed. All the milestones were met. Besides increasing both the HR and computational capacities of CTU in the area of AI and CS, it integrated the distributed research and allowed best practices to be shared. It allows certain high-profile researchers, like [Jakub Marecek](#), to get established at CTU.

Centre of Advanced Photovoltaic (CEP), faculty www - funded by the Ministry of Education, Youth and Sports with a total budget of CZK 151M/ EUR 6M during the period 2016-2023. FEE was principal investigator. The main objective of the project was to create a Centre for advanced photovoltaics under the auspices of the Czech Technical University in Prague, which unified previously fragmented activities in the field of photovoltaics. The new center, on the one hand, involved academics, technologists, system engineers, architects, etc., and on the other hand it provided a single technical support on a sufficiently large scale. CAP brought together top experts in the field of photovoltaics from the CTU in Prague and abroad. The unique connection between experts from the material engineering and architectural concepts brought many new opportunities to utilize photovoltaics.

Future Electronics for Industry 4.0 and Medical 4.0 (FEIM) - funded by Technology Agency of the Czech Republic under the call National Centres of Competence. The total funding is CZK 461M/EUR 18.3M. The project started in 2023, bringing together four largest technical universities in Czechia, and 22 industrial partners. FEE is the main coordinator. Main objective of the project is to create a synergic interdisciplinary cooperation between research and commercial companies. The goal is to realize intelligent structures, components, sensors, modules and systems and connectivity with reduced production costs, high reliability and competition in global markets to meet the trend of Industry 4.0, Medical 4.0. Sub-objectives include the development of smart technologies for structural electronics, sensors, embedded systems including interfaces for data transmission and processing, all common to support the development of industrial and medical systems. The results will be used for modern industrial, transport, defence and security systems, for increasing the safety of production processes and for improving the quality of life of people in society.

Human-Compatible Artificial Intelligence with Guarantees – funded by the European Commission under the Horizon Europe programme, with the Czech Technical University (CTU) as coordinator and the Faculty of Electrical Engineering (FEE) allocated a budget of EUR 2.5 million in the evaluated period – is a major initiative focused on the ethical development of artificial intelligence (AI). Within this framework, the project addresses fairness in AI by designing explainable and transparent algorithms to enhance both their functionality and user understanding.

The project integrates expertise from computer and data sciences, control theory, optimization, ethics, and law to develop AI systems that are not only technically robust but also aligned with ethical standards. To validate its methodologies, the project includes three key case studies:

1. Fair Evaluation in Recruitment – Developing AI tools that eliminate biases in hiring processes.
2. Gender Equality in Advertising – Ensuring AI-driven marketing strategies do not reinforce gender bias.
3. Fairness in Financial Services – Preventing discrimination in banking and credit assessments.

The project consortium consists of eight organizations across five countries, including Imperial College London, Technion, Athena Research Center, and the National and Kapodistrian University of Athens, and industry partners (IBM Research, Workable and Date.io) that contribute practical

insights and data. Led by Jakub Mareček from FEE CTU, the project aims to set new standards for fairness in AI, ensuring trust, transparency, and ethical alignment in its applications.

Research Infrastructure for Doctoral Programmes at CTU FEE - funded by the Operational Programme Research, Development and Education under the call Research infrastructures for educational purposes - development or modernisation with a total budget of CZK 199M/EUR 7,9M. The project was focused on the significant development and modernisation of infrastructure (i.e. mainly instrumentation and laboratory equipment) that will be used for the newly formed doctoral study programmes at the FEL. The modernisation of instrumentation enables doctoral students to work on topics related to the requirements of the knowledge economy and other future challenges in particular industries and in the approach to solving scientific research problems. Upon graduation, they will be prepared to work in international companies and at excellent scientific research institutes. Practical acquaintance and mastery of modern technologies at the top level will provide them with a competitive advantage when entering the labour market in the Czech Republic and abroad. That will also increase the interest of foreign students and excellent academic and scientific staff in working at CTU FEL, which will support the necessary internationalization of the environment at the faculty. In such an environment, international scientific teams with results comparable to scientific teams from abroad will be created.

Novel nanostructures for engineering applications (NANO) - funded by the Ministry of Education, Youth and Sports from OP - EU Operational Programme resources in the total amount of CZK 100M/EUR 4M during the period of 2018-2023. Two commercial companies were involved. The project exploited the potential of new plasma-based deposition methods supported by atomistic and large-scale simulations to design, prepare and test new classes of thin films and 2D materials, and laser treatment of surfaces. It initiated new intra (Departments of Control Engineering, Physics, Economics/Humanities) and inter (with the Faculty of Mechanical Engineering and Faculty of Nuclear Sciences) faculty collaborations, and stimulated international collaboration resulting in more than 30 joint papers with leading UK, US and Chinese universities. The project supported 7 successful PhD students and 14 BSc/MSc these (half co-supervised by industrial experts) and resulted in more than 50 papers in leading journals, including Nature Materials 2022 (led by our junior researcher and co-authored by our PhD student, >160 citations) or Nature Comm 2020 (>200 citations). Three postdoctoral researchers hired for the project were promoted to tenure track assistant professor positions, and one was later promoted to associate professor. Newly established Thin film laboratory with industrial size magnetron deposition and analytics (project investment of €1.2m) opened pathway for direct industrial collaborations in the Czech Republic (3 industrial TACR projects) and abroad (coordination of mERA-Net project Lubriccoat with Fraunhofer and 4 companies, €2m). Project produced two ES/EU patents; another notable result is novel coating reducing friction now applied in actuators of fighter jet L-39NG. One part of project activities, development of protective coating, is now being commercialized through CTU spin-off AdvaMat Coatings.

Contracted projects

TOYOTA: Computer vision and AI - Among FEE industrial contracts, the collaboration with Toyota Motor Europe headed by prof. J. Matas stands out within the company-funded research in many ways. First, it is very long term, starting in 2003. Since 2016, i.e. in the last 10 years, the project's total income has been above EUR 5M (EUR 3.5M in the evaluated period), almost all covering personnel costs. The focus of the collaboration has changed overtime, from computer vision research related to assistive driving to general AI and machine learning research motivated by a wide range of current and future Toyota activities, including robotics, smart cities and autonomous vehicles. Mostly, the activities fall in the basic research rubric; the typical outcome of a TME-supported activity is a paper at a major conference or a patent, typically both. The patents are co-owned by Toyota and CTU FEE. The contract allows funding of PhDs, usually 2-3. The project guarantees that FEE research stays relevant for the industry. The participating academics get familiar with various aspects of Toyota's way of achieving reliability and general technical excellence, which

are partially transferable to the academic domain. The institutions collaborating with Toyota are organised in the so-called TRACE Lab, <https://www.trace-lab.com/>, and include, besides CTU, prestigious organisations - the University of Cambridge, ETH Zurich, Max-Planck Inst. for Informatics, and KU Leuven.

DARPA Subterranean Challenge

The Subterranean (SubT) Challenge was three year-long (2018-2021) a Defense Advanced Research Projects Agency (DARPA) program to develop innovative technologies that can augment underground operations. The SubT Challenge program explored new approaches to rapidly map, navigate, search, and exploit complex underground environments such as human-made tunnel systems, urban underground, and natural cave networks. These difficult settings present challenges for military and civilian first responders; hazards vary drastically across terrain that can change over time, making it too risky for personnel to enter. CTU team started as a self-funded team and scored very well in tunnel (2019) and urban (2020) circuits winning 200 thousand and 500 thousand USD respectively. Based on these excellent results, the joint team CTU and Uni Lavalgot additional 1.5 mil USD funding (1.2 mil for CTU). In the final round (2021) the team won additional 500 thousand USD in the virtual challenge totaling the DARPA support 2.7 mil USD (~67 mil CZK), most of it went to our faculty for covering personal cost and new robots and other robotic equipment. The DARPA project supported many PhD and undergraduate students, topping in around 20 members' team in the final round. This challenge proved faculty's excellent world-top competence in autonomous robotics. The robotic team included wheeled, walking, tracked and flying robots. The competence in flying robots has been also demonstrated within project TII Abu Dhabi - funded by Technology Innovation Institute in total amount of CZK 19.4M/EUR 769k in the evaluated period. The project aimed to develop a system for precise localization, mapping and navigation in the cluttered environment of a multi-floor office building. In addition to that, the flying robots, supported by some ground ones, also won the [MBZIRC Challenge](#) in 2020.

VRUT system development (Virtual Reality Universal Toolkit) - funded by Škoda Auto, a.s. in the total amount of CZK 32.2M/EUR 1.3M in the evaluated period. A long-term cooperation with the leading car manufacturer in the Czechia (Škoda Auto) led to the creation of a complex software package VRUT. This software is designed for interactive and photorealistic rendering of large 3D data in the design phase of new cars. It uses the latest scientific knowledge in the field (coming from our researchers) and it is constantly being improved (in collaboration between programmers from our university, Škoda company, and several third parties). In Škoda Auto, it replaced previous commercial software solutions. The key person from the Faculty of Electrical Engineering of the CTU responsible for the further development of VRUT is Prof. Jiri Bittner from the Department of Computer Graphics and Interaction.

Avast AI and Cybersecurity Laboratory at FEE CTU (AAICL) – established in 2019 and funded by AVAST [LSE: AVST] in the total amount of CZK 18.4M/EUR 731k in the evaluated period – was a joint research lab dedicated to advancing artificial intelligence (AI) and machine learning (ML) in the field of cybersecurity. This collaboration between Avast, a global leader in digital security, and the Faculty of Electrical Engineering at the Czech Technical University in Prague (FEE CTU) aimed to address the growing sophistication of cyber threats.

By integrating Avast's extensive threat data, collected from over 400 million devices globally, with CTU's expertise in analysing complex and evasive threats, the laboratory strived to anticipate and counteract emerging cybercriminal tactics that exploit new technologies, including AI, to orchestrate sophisticated cyberattacks. The laboratory's objectives encompassed publishing research and enhancing Avast's malware detection engine, particularly its AI-based detection algorithms.

The five-year funding has facilitated scientific research in AI and ML, helping CTU expand its talent pool and establish itself as a leading academic institution in AI and cybersecurity. AAICL employed

three full-time senior researchers and up to ten PhD students from CTU FEE, fostering collaboration between industry and academia. This partnership addressed significant cybersecurity challenges, including detecting evolving malware, securing IoT devices, and analysing fake news.

Table 3.3.1 Projects supported by public funds

In the role of beneficiary						
Provider ²⁶	Project name	Support (in thousands CZK/EUR) ²⁷				
		2019	2020	2021	2022	2023
GA CR	Advanced structures and characterization methods of nonlinear backscattering for identification and sensing (2023–2025)					1376/54280
GA CR	Novel ionic crystals and their surfaces as the key to future photovoltaic materials (NicePV) (2023–2025)					1930/76134
GA CR	Agile swarms of aerial robots with reliable multimodal sensing and state-estimation capabilities (2023–2025)					3562/140513
GA CR	Intelligent Radio Resource and Mobility Management based on Federated Learning (2023–2025)					1954/77081
GA CR	Superlubricity: sliding of 2D materials (2023–2025)					2771/109310
GA CR	Learning Models of Quantum Systems as a Non-Commutative Polynomial Optimization Problem (2023–2025)					2662/105010
GA CR	The study of z-pinch physics with novel diagnostic methods using fast ions (2023–2025)					2187/86272

²⁶ If the provider is from abroad, please indicate the provider's country of origin in brackets. For the determination of the country of origin of the provider, the place of residence of the provider is decisive.

²⁷ Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

GA CR	Statistical Relational Learning in Dynamic Domains (2023–2025)					2343/92426
GA CR	Advanced methods of sound and elastic wave field control: acoustic black holes, metamaterials and functionally graded materials (2022–2024)				973/38383	1435/56607
GA CR	Sampling-based motion planning in scenarios with narrow passages (2022–2024)				1191/46982	1612/63590
GA CR	Advanced microwave photonics techniques based on hollow-core optical fibers (2022–2024)				1693/66785	1777/70099
GA CR	Unsupervised learning from heterogeneous structured data (2022–2024)				3642/ 143669	3522/139
GA CR	Multi-Goal Task-Motion Planning (2022–2024)				3650/ 143984	3410/134517
GA CR	Algorithms for Playing Massive Imperfect-Information Games (2022–2024)				2906/ 114635	2906/114635
GA CR	Towards Optimal Solution of Robotic Routing Problems (2022–2024)				1939/76489	2008/79211
GA CR	Persistent problems of repetitive control (2021–2023)			2092/82525	2208/87101	2203/86903
GA CR	Autonomous time-critical exploration of communication and perception constrained environment by team of robots (2020–2023)		3893/153570	3992/ 157475	4207/ 165957	
GA CR	End-to-end learning of optimal portfolios (2020–2022)		2240/88363	2032/80158	2298/90651	185/7298
GA CR	To the origin of the fluxgate noise (2020–2022)		3058/120631	2925/ 115385	3345/ 131953	

GA CR	Reliable sensing-driven compact groups of micro aerial robots with adaptive shapes (2020–2022)		2273/89665	2280/89941	2280/89941	
GA CR	NanoFluxGate (2020–2022)		2372/93570	2516/99250	2516/99250	
GA CR	Essential Elements of Diamond Power Electronics (2020–2022)		1505/59369	1505/59369	1505/59369	
GA CR	Antenna Arrays with Quantized Controlling (2020–2022)		1005/39645	1165/45957	1159/45720	
GA CR	Population standard of acoustic-phonetic characteristics in children's speech (2019–2021)	804/31716	817/32229	817/32229		
GA CR	Distributed Control of Vehicle Formations and Networked Systems (2019–2021)	2695/106312	2781/109704	2797/110335		
GA CR	Fundamental bounds on electromagnetic radiation and scattering phenomena and associated realizable subforms (2019–2021)	1985/78304	1897/7832	1863/73491		
GA CR	Multi-Robot Persistent Monitoring of Dynamic Environments (2019–2021)	1561/61578	2211/87219	2524/99567	1012/40	
GA CR	Aerodynamic bodies with actively controlled morphing (2019–2021)	2375/93688	2509/98974	2199/86746	203/8	
GA CR	Current disruption and magnetic energy dissipation during acceleration of electrons and ions in z-pinch plasmas (2019–2021)	1639/64655	1644/64852	1685/66469		
GA CR	Generalized Image Retrieval and Relation Discovery (2019–2021)	1465/57791	1542/60828			
GA CR	Compositional Architectures for	2240/88363	2126/83866	2641/104181	120/4734	

	Pattern Recognition (2019–2021)					
GA CR	Complex prediction models and their learning from weakly annotated data (2019–2021)	1204/47495	1392/54911	1323/52189	133/5247	
GA CR	On-Demand Fleet Management with Quality of Service Guarantees (2018–2020)	775/30572				
GA CR	Robotic Lifelong Learning of Multi-legged Robot Locomotion Control in Autonomous Data Collection Missions (2018–2020)	1883/74280	1864/73531			
GA CR	Communication in Self-optimizing Mobile Networks with Drones (2018–2021)	1730/68245	2058/81183	103/4063		
GA CR	Hierarchical models for detection and description of anomalies (2018–2020)	1679/66233	1620/63905	147/5799		
GA CR	Interactive Rendering with Distributed Illumination Computations (2018–2020)	2062/81341	2105/830375			
GA CR	Incorporation of Prior Knowledge for Identification of Nonlinear Systems (2018–2020)	1662/65562	1703/67179			
GA CR	Propagation of acoustic waves through phononic materials and structures (2018–2020)	1044/41183	1127/44458			
GA CR	Learnable Models for Dense Image Matching (2018–2020)	1048/41341				
GA CR	Transaction costs of energy efficiency programmes: the effect of learning (2018–2019)	667/26312				

GA CR	Multicriteria Optimization of Shift-Variant Imaging System Models (2017–2019)	1159/45720				
GA CR	Deep relational learning (2017–2019)	1715/67653				
GA CR	Combined Radio Frequency and Visible Light Bands for Device-to-Device communication (2017–2019)	2404/94832				
GA CR	New methods for the measurement of electric currents (2017–2019)	1661/65523				
GA CR	Complex Artificial Electromagnetic Structures and Nanostructures (2017–2019)	970/38264				
GA CR	Radiation damage tolerant nanomaterials: design of interfaces with self-healing properties (2017–2019)	3411/134556				
GA CR	Learning local concepts from global training data for biomedical image segmentation and classification (2017–2019)	936/36923				
GA CR	Robust motion planning and control on rough unstructured terrain (2017–2019)	1262/49783				
GA CR	Localized Electronic Effects of Antibody Binding on NanoComposite Materials (LEEFAB) (2017–2019)	1619/63866				
GA CR	Wireless Sensing of Physical Quantities in Complex Environment (2017–2019)	1288/50809				
GA CR	Otoacoustic emissions in normal cochlea and cochlea with					1106/43629

	endolymphatic hydrops: modeling and experiments (2023– 2025)					
GA CR	Learning Complex Motion Planning Policies (2021–2023)			1128/44497	1958/77239	2203/86903
GA CR	Towards long-term autonomy through introduction of the temporal domain into spatial representations used in robotics (2020–2021)		1230/48521	1485/58580		
GA CR	Non-invasive temperature estimation inside of human body based on physical aspects of ultra-wideband microwave channel (2017–2019)	1463/57712				
GA CR	Reducing speech- related side-effects of deep brain stimulation in Parkinson's Disease via automated speech analysis (2021–2023)			2352/92781	2415/95266	2415/95266
GA CR	Game Over Eva(sion): Securing Deep Learning with Game Theory (2019–2021)	411/16213	767/30256	1430/56410	589/23234	
GA CR	Koopman operator framework for control of complex nonlinear dynamical systems (2020–2022)		1596/62959	1823/71913	2051/80907	
GA CR	Generative Relational Models (2020–2022)		2306/90966	2229/87929	2547/ 100473	
GA CR	Sampling-based planning of actions and motions using approximate solutions (2019–2021)	1377/54320	1523/60079	1476/58225		
GA CR	Computing Equilibrium Strategies in Dynamic Games (2019–2021)	1672/65927	1475/58185	1682/66351	399/15740	
GA CR	Online Solution Methods for Imperfect-Information Games (2018–2020)	1488/58698	1591/ 62761	46/1815		

GA CR	Privacy Preserving Multi-agent Planning (2018–2020)	1480/58383	1484/58			
GA CR	Spatio-temporal representations for life-long mobile robot navigation (2017–2019)	1967/77594				
GA CR	Nanoscale Strategies for Transition Metal Dichalcogenides Exfoliation (2017–2019)	1875/73 964				
GA CR	Robot self-calibration and safe physical human-robot interaction inspired by body representations in primate brains (2017–2019)	2330/91913				
GA CR	Stabilization and control of teams of relatively-localized micro aerial vehicles in high obstacle density areas (2017–2019)	1229/48481				
GA CR	TOPFLIGHT: Trajectory and Mission Planning for Agile Flight of Aerial Robots in Cluttered (2023–2027)					4524/178462
GA CR	Strong electromagnetic pulses: their generation, characterization and control (2023–2027)					3747/147811
GA CR	New generation of camera geometry solvers (2022–2027)					2408/94990
GA CR	Learning Universal Visual Representation with Limited Supervision (2021–2025)			2327/91795	3992/ 157475	5233/206430
GA CR	Optimal Electromagnetic Design Based on Exact Reanalysis (2021–2025)			2319/91479	3777/ 148994	3882/153136
GA CR	Whole-body awareness for safe and		2911/114832	4992/ 196923	4480/ 176726	4420/174

	natural interaction: from brains to collaborative robots (2020–2024)					
(other CZ provider)	Pilotní implementace schématu QKD založeného na provázaných fotonech v bezdrátovém optickém spoji (2022– 2023)				56/2209	297/11716
(other CZ provider)	FEEL: FEderatEd Learning for network security (2021–2022)			82/3235	471/18580	
(other CZ provider)	An Improved IDS for IoT Threats Detection using Federated AI Learning and P2P cooperation (2020– 2021)		266/10493	34/1341		
(other CZ provider)	Spreading innovative results from European University Alliances to other higher education institutions (2023– 2023)					18/1
(other CZ provider)	Posilování kapacit Národní technické univerzity Ukrajiny „Kyjevský polytechnický institut Igora Sikorského“ v oblasti kvality a inkluze vzdělávacího procesu, internacionalizace a podpory spolupráce (2020–2021)		204/8473			
Min Cult CR	A Century of Information: The World of Informatics and Electrical Engineering – The Computer World Inside Us (2018–2021)	880/34714	887/34990	899/35463		
Min Cult CR	Safe scanning of historical objects by unmanned helicopters - assistive technologies, methodics and exploitation in heritage protection (2018–2022)	2491/98264	2446/96489	2446/96489	2367/93372	

Min Def CR	COE - Rezognize whether the analyzed data stream is compressed or encrypted (2018–2020)	974/38422	412/16252			
Min Ind Trade CR	Systém pro sociální zdrženlivost založený na prediktivních prostoročasových modelech (2020–2021)		356/14043	2079/82011		
Min Edu Youth Sports CR	Generalized Image Retrieval and Relation Discovery (2020–2022)		7686/303195	7226/285049	2162/85286	
Min Edu Youth Sports CR	Support of Sustainability for the Development and Implementation Laboratories of the Czech Technical University in Prague (2015–2020)	3600/142012	1600/63116			
Min Edu Youth Sports CR	Cell electromagnetic structures with higher symmetries (2020–2023)		605/23866	1132/44655	1185/46746	965/38067
Min Edu Youth Sports CR	Cooperation with International Research Centre in Area of Digital Communication Systems (2020–2024)		2669/105286	3766/148560	4016/158422	4016/158422
Min Edu Youth Sports CR	Miniature Antenna Development for Communication between Airborne Drones in Swarm (2020–2023)		442/17436	442/17436	598/23590	
Min Edu Youth Sports CR	Towards Optimal Curvature-Constrained Tours in Robotic Applications (2019–2022)	423/16686	1272/50178	1098/43314	932/36765	
Min Edu Youth Sports CR	Transmission of Millimeter Waves over Fiber and Free-space Optical Infrastructures (TraFFic) (2018–2021)	1233/48639	1233/48639	991/39093		
Min Edu Youth Sports CR	Cooperation with the International Research Centre in Area of Communication Systems (2018–2019)	3099/122249				

Min Edu Youth Sports CR	Cooperative Coding and Processing in Dense Radio Cloud Communication Networks (2017–2020)	962/37949	375/14793			
Min Edu Youth Sports CR	High-energy processes in plasmas generated by pulsed-power devices (2017–2020)	562/22170	563/22209			
Min Edu Youth Sports CR	Reserch in frame International Center for Dense Magnetized Plasmas (2018–2021)	2223/87692	2223/87692	1510/59566		
Min Edu Youth Sports CR	Key technologies for Time-Of-Flight sensor data processing and visualization (2017–2019)	2356/92939				
Min Edu Youth Sports CR	Study on Power Electronics Based Energy Router and Its Control Strategy (2017–2019)	463/18264				
Min Edu Youth Sports CR	Predictive allocation of edge computing resources for autonomous driving (2022–2025)				539/21262	1015/40039
Min Edu Youth Sports CR	Robosoutěž 2022 (–)				248/9783	
Min Edu Youth Sports CR	ROBOSOUTĚŽ (2020–2021)		88/3471			
Min Edu Youth Sports CR	Lifelong learning of dynamic objects detection and tracking in adverse conditions for autonomous vehicles (2018–2019)	54/2130				
Min Edu Youth Sports CR	Life-long learning of environmental dynamics for socially-aware navigation of autonomous robots (2023–2024)					78/3077
Min Edu Youth Sports CR	Engineers and managers in Europe in (re)construction from the 19th to the 21st century. Technicians, organizers and managers in Czech lands/Czechoslovakia					78/3077

	and in France. (2023–2024)					
Min Edu Youth Sports CR	MHD instabilities and anisotropy of neutrons emission in Plasma Focus devices (2019–2020)	90/3550		96/3787		
Min Edu Youth Sports CR	Identifying Undoable Actions and Events in Automated Planning by Means of Answer Set Programming (2019–2020)	92/3629	52/2051	52/2051		
Min Edu Youth Sports CR	Digitization of Historical Astronomical Photographic Records (2018–2019)	22/868				
Min Edu Youth Sports CR	Polymer Composites as Functional Materials for Embedded Sensors and Optical Waveguides (2018–2019)	57/2249				
Min Edu Youth Sports CR	Exploration of nonlinear predictive control approaches for vehicle dynamics applications (2020–2022)		40/1578	104/4103	104/4103	
Min Int CR	Improvement of the region's resistance to risk of blackout using new technologies and crisis management procedures (2019–2022)	2217/87456	4464/176095	4467/176213	2219/87535	
Min Int CR	Strategic infrastructure protective system detecting illegal acts intentionally affecting GNSS signals (2017–2021)	6013/237199				
Min Int CR	Unique versatile security camera based on nanotechnologies (2015–2019)	1438/56726				
Min Health CR	Automatic detection and objective parametrization of hypometabolism in					1640/64694

	PET brain imaging (2023–2026)					
Min Health CR	Video analysis of hypomimia in Parkinson's disease and other synucleinopathies (2023–2026)					610/24063
Min Health CR	Hippocampal involvement in neocortical epilepsy networks: Implications for surgical planning (2021–2024)			644/25404	937/36963	977/38540
Min Health CR	Smart Speech Biomarkers for Parkinson's Disease and Other Synucleinopathies (2020–2024)		2366/93333	3210/126627	3554/140197	3129/123432
TA CR	Evaluating the behaviour of automated vehicles in terms of compliance with ethical and legal principles in mixed traffic (2023–2025)					4008/158107
TA CR	GNSS signal interference detector for integrated safety means in road transport (2021–2024)			4751/187416	4217/166351	4464/176095
TA CR	Electrochemical system for recycling industrial copper cable waste (2020–2023)		1649/65049	1981/78146	2020/79684	995/39250
TA CR	Advanced sensors and sensor data processing methods (2014–2019)	6000/236686				
TA CR	Integrated Satellite and Terrestrial Navigation Technologies Centre (2012–2019)	5143/202880				
TA CR	AI-enabled Multimodal Semantic Communications and Computing (2023–2026)					252/9941
TA CR	Superhard solid lubricant coatings (2021–2024)			1794/70769	3113/122801	3174/125207

TA CR	Interactive Perception-Action-Learning for Modelling Objects (2019–2022)	645/25444	1109/43748	1005/39654	257/10138	
TA CR	Optical planar channel polymer waveguides for high-capacity and high-speed data transmission (2019–2021)	2113/83353	2053/80986	2053/80986		
TA CR	Technology for competencies assessment using virtual reality and eye tracking (2018–2020)	1068/42130	1681/66312			
TA CR	Ludus: Machine Learning and Game Theory to Collaboratively Defend Against Internet Threats (2016–2019)	3023/119250				
TA CR	Design of Large Master-Key Systems through Artificial Intelligence (CyberCalc) (2016–2019)	2120/83629				
TA CR	Quality Assurance System for Internet of Things Technology (2017–2020)	2887/113886	3013/118856			
TA CR	Development of a Probe for Preventive Protection of IoT Devices against Takeover Attempts (2017–2019)	1063/41933				
TA CR	Evaluation of energy efficiency policy instruments (2018–2019)	702/27692				
TA CR	Development of optical cables for use in special applications and in extreme conditions (2023–2025)					2045/806706
TA CR	Optimization of AMM deployment based on pilot projects and testing of value-added communication (2022–2024)				2200/86785	2200/86785

TA CR	Models and procedures for the optimal mix of support and regulatory tools for the development of clean mobility (2022–2023)				1212/47811	1582/62406
TA CR	Methodological tools for impact assessment of the introduction of smart metering to consumers (2019–2020)	1114/43945	957/37751			
TA CR	Methodological Framework for the Future Energy Market Design of the Czech Republic (2019–2020)	954/37633	1745/68836			
TA CR	Climate-energy plan for heating branch in the Czech Republic (2018–2019)	529/20868				
TA CR	Future Electronics for Industry 4.0 and Medical 4.0 (FEIM) (2023–2028)					13072/ 515660
EC	Cybersecurity for the Future (2023–2026)					2816/111085
EC	Techniques, Heritage, Territories of Industry (TPTI) (2022–2027)				149/5878	72/2840
EC	Digital Technologies for Lecturing and Learning (2021–2023)			2205/86982	2349/92663	2629/103708
EC	Modernisation of VET through Collaboration with the Industry (2017–2020)	2460/97041	1086/42840	419/16529		
EC	Optical and Wireless Sensors Networks for 6G Scenarios (2023–2027)					26287/ 1036966
EC	2nd training school COST project CA19111 (2022–2022)				49/1935	
EC	Human-Compatible Artificial Intelligence with Guarantees (2022–2026)				52477/ 2070108	11859/468

EC	Convergence of Electronics and Photonics Technologies for Enabling Terahertz Applications (2016–2020)	1537/60631	779/30730			
EC	CA19111 - European Network on Future Generation Optical Wireless Communication Technologies (2022–2022)				45/1765	
ESF through Prague Municip	CTU FEE - Smart solutions for Prague (2019–2021)	8079/318698	9929/391677	5027/198304		
ESF through Prague Municip	CTU - Information for Prague (2019–2021)	5280/208284	5581/220158	2892/114083		
ESF through Prague Municip	Preparation of commercialization of new education methods for the needs of the economy digitalization and industry 4.0 (2017–2019)	4275/168639				
ESF through Prague Municip	ČVUT FEL - ICT for Prague (2018–2020)	11882/468718	6041/238304			
ESF through Prague Municip	CTU FEL - Knowledge for Prague (2017–2020)	9820/387377	619/24418			
ESF through Min Edu Youth Sports CR	International Mobility of Researchers MSCA-IF II in CTU in Prague (2018–2021)	13636/537909	8099/319487			
ESF through Min Edu Youth Sports CR	Novel nanostructures for engineering applications enabled by emerging techniques supported by advanced simulations (2018–2022)	36229/1429152	16427/648008	17320/683235	5094/200947	
ESF through Min Edu Youth Sports CR	Advanced Testing of Automotive Radars (2018–2020)	4268/168363	3925/154832			
ESF through Min Edu	Development of capacity for strategic	10000/394477	3000/118343	4000/157791	4000/157791	

Youth Sports CR	research management at CTU in Prague (2018–2022)					
ESF through Min Edu Youth Sports CR	Research Center for Informatics (2017–2023)		120282/ 4744852	172805/ 6816765	85140/ 3358580	
ESF through Min Edu Youth Sports CR	Development and Transformation of the Doctoral Degree Study at FEE CTU (2016–2022)	1600/63116	357/14083	616/24300	1/39448	
ESF through Min Edu Youth Sports CR	Research Infrastructure for Doctoral Programmes at CTU FEE (2016–2022)	49902/ 1968521	14796/ 583669	37938/ 1496568	14899/ 587732	
ESF through Min Edu Youth Sports CR	Centre of Advanced Photovoltaics (2017–2023)	20860/ 822880	34278/ 1352189	10211/ 402801	20905/ 824655	
Intl Visegrad Fund	Reconstruction of dynamic visual stimuli from fMRI data (2023–2024)					7/276
Intl Visegrad Fund	Mental state classification and prediction using fMRI and EEG (2021–2022)				35/1381	
Intl Visegrad Fund	Visegrad Scholarship Program - Dmytrii Lekhovitskyi (2020–2021)			39/1538		
Intl Visegrad Fund	V4 Seminars for young scientists on publishing techniques in the field of engineering science (2018–2019)	16/631				
(other foreign provider)	Expert assistance to economic and regulatory questions arising from the district heating sector transformation in Czechia (2022–2023)					347/13676
(other foreign provider)	Surface and Waveguide Enhancement Raman Spectroscopy (SERS and WERS) for					150/5917

	detecting trace cortisol in saliva (2022–2023)					
(other foreign provider)	Realization of silicon nanophotonic active optical waveguide and circuits with rare earth ion implantation (2022–2023)					150/5917
(other foreign provider)	Policy, regulatory, economic and technology framework for low-carbon transformation of the Czech district heating sector (2021–2022)				360/14185	
(other foreign provider)	Uplink OFDMA Random Access (UORA) in Next Generation WiFi Networks (2021–2022)				160/6312	
(other foreign provider)	Digital Fluxgate Design with Temperature Compensation (2021–2022)				155/6114	
(other foreign provider)	Construction and autonomous verification of an indoor radio environment map using deep learning and robot based-on LoRaWAN (2021–2022)				140/5523	
(other foreign provider)	Utilizing flexible substrates for enhanced SERS (surface-enhanced Raman scattering) detection (2021–2022)				140/5523	
(other foreign provider)	DARPA SUBTERRANEAN CHALLENGE - PHASE 3 (2020–2021)			19384/764655		
(other foreign provider)	Game Theory for Adversarial Machine Learning (2020–2021)		717/28284	1150/45365		
(other foreign provider)	Using deep reinforcement learning to simulate security analyst (2018–2021)	303/11953	414/16331	1297/51164	1449/57160	

(other foreign provider)	Automatic acoustic speech analysis and REM sleep behaviour disorder for detecting subjects at high risk for Parkinson's disease and other alpha-synucleinopathies (2017–2019)	2018/79606	549/21,657	499/19684		
Total		249108/ 9826746	327960/ 12937278	375559/ 14814951	260243/ 10265996	156713/ 6181972
In the role of another participant						
Provider ²⁸	Project name	Support (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
GA CR	Interplay of algebraic, metric, geometric and topological structures on Banach spaces (2023–2025)					1119/44142
GA CR	Structural changes induced by light soaking in mixed-halide perovskites (2023–2025)					1282/50572
GA CR	Printed heterogeneous gas sensor arrays with enhanced sensitivity and selectivity (2022–2024)				1411/55661	1453/57318
GA CR	Enriched categories and their applications (2022–2024)				654/25799	654/25799
GA CR	Network modelling of complex systems: from correlation graphs to information hypergraphs (2021–2024)			415/16371	912/35976	524/20671
GA CR	Investigation of atmospheric pressure plasma slit jet with complex electromagnetic excitation and plasma chemistry (2020–2022)		363/14320	505/19921	505/19921	
GA CR	Meteor clusters: An evidence for fragmentation of meteoroids in		663/26154	698/27535	641/25286	57/2249

²⁸ Ibid.

	interplanetary space (2020–2022)					
GA CR	New algorithms for accurate, efficient and robust analysis of large-scale systems (2020–2023)		920/36292	968/38185	968/38185	
GA CR	Circular RNAs and their relation to the RNA splicing in the pathogenesis of myelodysplastic syndromes (2020–2022)		270/10651	556/21933	618/24379	
GA CR	Towards AbloCAM: fundamental approaches to automated ablation-desorption imprinting of focused X-ray laser beams (2020–2023)		658/25957	505/19921	678/26746	296/11677
GA CR	Injectivity and Monads in Algebra and Topology (2019–2021)	1036/40868	685/27022	614/24221		
GA CR	New approaches to modeling and statistics of random sets (2019–2022)	547/21578	546/21538	547/21578		
GA CR	MoRePlan: Modeling and Reformulating Planning Problems (2018–2020)	967/38146	846/33373			
GA CR	Solving inverse problems for the analysis of fast moving objects (2018–2021)	1054/41578	1037/40907	122/4813		
GA CR	Manipulating properties of transition metal oxides interfaces (2018–2020)	832/32821	859/33886			
GA CR	Topological and geometrical properties of Banach spaces and operator algebras II (2017–2019)	553/21815				
GA CR	Methods of Identification and Visualization of Tunnels for Flexible Ligands in Dynamic Proteins (2017–2019)	482/19014				

GA CR	Charge transfer and microbiological interactions of hybrid metal oxide nanostructures (2019–2021)	1030/40631	1042/41105	1078/42525		
GA CR	The many facets of orthomodularity (2020–2022)		926/36529	1057/41696	1355/53452	
GA CR	Diffusion control reducing friction of nanocomposite materials (2019–2021)	2642/104221	2970/117160	2756/108718		
Min Cult CR	3D digital objects presentation and preservation in museum collections (2020–2022)		1393/54951	1882/74241	1401/55266	
Min Cult CR	Laterna magika. Past and present, documentation, preservation and acces (2016–2019)	897/35385				
Min Cult CR	Complex care for cultural heritage in the field of gaming applications (2023–2027)					1356/53491
Min Ind Trade CR	Intelligent control of processes depending on the noise intensity (2019–2022)	556/21933	1598/63037	1650/65089	588/23195	
Min Ind Trade CR	High-speed optical source modules for data centers (2019–2022)	1620/63905	1620/63905	1620/63905	1620/63905	
Min Ind Trade CR	Radio-optical transmission terminal for 5G networks (2018–2020)	1684/66430	1684/66430			
Min Ind Trade CR	Mobile radio with digital signal processing (2018–2021)	1705/67258	885/34911	522/20592		
Min Ind Trade CR	NANOTROTEX - Composite nanostructured electrode materials with textile matrix (2018–2021)	2620/103353	2600/102564	1285/50690		

Min Ind Trade CR	High-precision fiber collimator arrays (2018–2020)	1687/66548	1717/67732			
Min Ind Trade CR	Control Platform for High-Accuracy Microelectronics Assembly (2017–2021)	3120/123077	3198/126154	1639/64655		
Min Ind Trade CR	Real time video detection of persons in tunnels (2017–2019)	1349/53215				
Min Ind Trade CR	Automated system for spatial noise monitoring (2016–2019)	531/20947				
Min Ind Trade CR	Unit for large-scale plasma-based modification of materials surface properties (2016–2019)	278/10966				
Min Ind Trade CR	Analyzer of modal structure in optical components (2016–2019)	1880/74162				
Min Ind Trade CR	Support for increasing the impact, innovation and sustainability of CEDMO in the Czech Republic (2022–2025)				293/11565	503/19826
Min Edu Youth Sports CR	Research Infrastructure for Diachronic Czech Studies (2016–2019)	2611/102998				
Min Edu Youth Sports CR	Auto-ID technology and the Internet of Things to enhance the quality of health services (2017–2020)	1235/48718	770/30375			
Min Edu Youth Sports CR	National institute for Neurological Research (2022–2025)				619/24418	1291/50927
Min Edu Youth Sports CR	SACON - Smart Access Control for Smart Buildings (2019–2022)	1007/39724	1200/47337	1192/47022	200/7890	
Min Int CR	Detection of a carry improvised explosive devices (2017–2019)	663/26154				
Min Int CR	Comprehensive fiber optic sensor security of critical	1380/54438	271/10690			

	infrastructures and objects using modern information systems (2015–2020)					
Min Int CR	A set of forensic analytic tools for image and video processing for the criminal police and investigation service (2022–2025)				2272/89625	2272/89625
Min Int CR	Artificial Intelligence based SEarch Environment for photo/video (2022–2025)				1554/61302	1529/60316
Min Int CR	Monitoring the position of IRS members even during an intervention in large buildings using elements of artificial intelligence (2022–2025)				5707/225128	6165/243195
Min Int CR	AiDojo: Game-based testbed for rapid development of AI-driven cybersecurity (2022–2025)				2261/89191	2261/89191
Min Int CR	Automated system for critical infrastructure protection using cyber-physical technologies (2023–2025)					1901/74990
Min Health CR	Role of transposable elements and PIWI-interacting RNAs in myelodysplastic syndromes and their potential clinical applications (2020–2024)		262/10335	539/21262	643/25365	556/21933
Min Health CR	Operational tolerance in kidney transplantation (2019–2022)	236/9310	502/19803	502/19803	502/19803	
Min Health CR	Clinical, Imaging and Biological predictors of effects associated with deep brain stimulation in Parkinson's disease (2019–2023)	215/8481	349/13767	358/14122	287/11321	71/2801

Min Health CR	Evaluation of atherosclerotic plaque stability in carotids using digital image analysis of ultrasound images (2019–2023)	939/37041	1477/58264	1356/53491	1069/42170	544/21460
Min Health CR	Objective investigation of distinct speech phenotypes in newly diagnosed Parkinson's disease including effects of pharmacotherapy (2019–2022)	799/31519	1055/41617	981/38698	1129/44536	
Min Health CR	Integrative analysis of high-throughput genomics and multiparameter flow cytometry to improve diagnosis and monitoring of childhood acute leukemia (2018–2021)	252/9941	228/8994	289/11400		
Min Health CR	Functional and structural reorganization of brain networks after stroke: implications for diagnosis and therapy of associated comorbidities. (2017–2020)	985/38856	985/38856			
Min Health CR	System for Continuous Early Postoperative Monitoring of Kidney Graft Blood Perfusion (2016–2019)	721/28442				
Min Health CR	Long non-coding RNAs in myelodysplastic syndromes: clinical relevance and implication in the pathogenesis (2017–2021)	428/16884	422/16647			
TA CR	Advanced methods for on-board data processing in V2X systems (2022–2024)				2329/91874	2329/91874
TA CR	Digital twin for increased reliability and sustainability of concrete bridges (2022–2024)				2225/87771	2319/91479

TA CR	Automatic workplace for magnetic particle inspection of parts (2023–2026)					765/30178
TA CR	Development of measurement system for voice services quality provided by 5G+ networks (2023–2025)					1972/77791
TA CR	Research and development of self-cleaning technology for application to glass in architecture and interior decorative objects (2023–2025)					1829/72150
TA CR	Development of innovative biocompatible coatings preventing cold-welding effect (2023–2025)					977/38540
TA CR	Advanced technologies of microwave-photonics modules (2023–2025)					2001/78935
TA CR	Multichannel interconnection of photonic chips for high-speed optical networks 5G + (2023–2025)					1803/71124
TA CR	Communication optical module for microwave systems (2023–2025)					1350/53254
TA CR	Development of 5G + networks test system with multi-gigabit throughput and millimeter waves support (2023–2025)					2916/115030
TA CR	Fiber optic elements with new standards for optical connectors for safety-intensive applications (2023–2025)					1500/59172
TA CR	Advanced nano-optical elements on rigid planar and curved substrates for next-					1500/59172

	generation lighting systems (2023–2025)					
TA CR	Pre-charging unit for HCB or SSCB circuit breakers (2023–2024)					2260/89152
TA CR	Guidance and Localization upgrade creating Autonomous Mobile Robots (2021–2023)			2248/88679	2248/88679	2248/88679
TA CR	Monitoring of parameters of rocks disintegration of small and large in scale by fiber-optic sensors (2021–2023)			1500/59172	1500/59172	1500/59172
TA CR	Metrology and quality control of optical infrastructure of 5G and VHCN networks (2021–2023)			1255/49507	1332/52544	1288/50809
TA CR	Fiber optic resonator structures for sensoric systems (2021–2024)			1617/63787	1733/68363	1613/63629
TA CR	The Choice of Profession Orientation Based on Virtual Reality and Eye-tracking (2021–2024)			1689/66627	1811/71440	1725/68047
TA CR	Platform for reliable operation, provisioning and management of massive distributed IIoT structures (2021–2023)			2482/97909	2600/102564	2642/104221
TA CR	High Sensitive and Scalable Microbolometer Thermal Imaging Module with AI processing and High Resolution Sensor (2021–2023)			2459/97002	2341/92347	2318/91440
TA CR	Transferability of AI-based fraud-detection models to support expansion on foreign markets (2020–2022)		37/1460	1387/54714	228/8994	
TA CR	LED module technology for fiber		1762/69507	1849/72939	1938/76450	913/36016

	optic lighting (2020–2023)					
TA CR	Localization of sources of ionizing radiation using a group of small unmanned aircrafts with Compton camera detectors (2020–2022)		1435/56607	1507/59448	1420/56016	
TA CR	Precise positioning for autonomous train operation with secure communications on new 5G + network standards (2020–2022)		1639/64655	2667/105207	2711/106943	
TA CR	Detection of the Arc Fault in DC Applications (2020–2022)		1242/48994	1180/46548	1180/46548	
TA CR	Detection, identification and monitoring of animals by advanced computer vision methods. (2022–2024)				970/38264	970/38264
TA CR	Air quality Research, Assessment and Monitoring Integrated System (2020–2026)		113/4458	341/13452	1025/40434	1238/48836
TA CR	Center for Intelligent Drives and Advanced Machine Control (CIDAM) (2014–2019)	2188/86312				
TA CR	Centre for Advanced Nuclear Technologies (CANUT) (2012–2019)	3651/144024				
TA CR	V3C - Visual Computing Competence Center (2012–2019)	6600/260355				
TA CR	System for Situational Awareness Improvement and UAS Operation Management (2019–2021)	170/6706	413/16292	301/11874		
TA CR	Automated magnetizer for testing parts of complex shape by means of magnetic particle testing (2019–2021)	487/19211	487/19211	421/16607		

TA CR	System for implementing the concept of Mobility as a service into practice (2019–2021)	590/23274	725/28600	725/28600		
TA CR	Agroforestry systems for protection and restoration of landscape functions endangered by the effects of the climate change and human activity (2019–2022)	500/19724	500/19724	500/19724	500/19724	
TA CR	Apparatus for non-invasive automatic analysis of hemodynamic parameters (2019–2021)	822/32426	835/32939	953/37594		
TA CR	Virtual Prototyping and Validation of Electromagnetic Systems (2018–2021)	1597/62998	1248/49231	1204/47495		
TA CR	Micro and nanostructured waveguides for controlled distribution of light (2019–2021)	1199/47298	1188/46864	1121/44221		
TA CR	System for early prediction of failure modes of electro-mechanical actuators for aerospace (2019–2022)	2304/90888	2631/103787	1530/60355	1009/39803	
TA CR	Development of a cybernetic assistant for small arms for the increased probability and safety of hitting a target. (2018–2021)	954/37633	828/32663	81/3195		
TA CR	Intelligent public transport using V2X (2018–2020)	1100/43393	1100/43393			
TA CR	TRIOX Advanced oxidation technology for water, disinfectants and environmental applications (2018–2020)	840/33136	840/33136			
TA CR	Absolute and relative positioning within 4th industrial revolution	519/20473	1275/50296	2391/94320		

	environment (2018–2021)					
TA CR	Integration the services for route planning and navigation system for the disabled with the city management systems and open data of cities (2018–2020)	1125/44379	1125/44379			
TA CR	MEMS ESO - MEMS sensors with optical scanning (2018–2021)	1608/63432	1719/67811	1908/75266		
TA CR	Hybrid navigation system for autonomous vehicles in environment with denied GNSS services (2018–2020)	839/33097	795/31361			
TA CR	The compact diagnostic system for operating high voltage condition monitoring of electrical machines using DC and low-frequency AC test voltage (2017–2019)	1161/45799				
TA CR	The Multichannel Communication Platform for the Internet of Things (IoT) (2017–2019)	1069/42170				
TA CR	Development of the methodology of estimation of interior heat parameters by the wood residential constructions, reduction of the energy intensity and environmental factors related of the reducing of the greenhouses gases (2017–2019)	1794/70769				
TA CR	New advanced integrated fiber optic connectors for demanding applications (2023–2025)					1904/75108
TA CR	Comprehensive environment for the development of energy communities -				995/39250	995/39250

	proposal of legislative, organizational and motivational measures to remove barriers to development (2022–2023)					
TA CR	Comprehensive solutions of local and regional energy systems as part of GreenDeal's measures to achieve sustainable agricultural and forestry management (2022–2024)				897/35385	1296/51124
TA CR	Energetic cable with added sensors to measure working parameters along the cable length on IoT principle to optimize transferred power and energetic losses (2020–2022)		713/28126	1538/60671	1538/60671	
TA CR	A comprehensive evaluation of potentials of the bioenergy development in relation to the landscape functions (2018–2021)	1136/44813	1029/40592	563/22209		
TA CR	Virtual digital wardrobe (2021–2023)			462/18225	908/35819	970/38264
TA CR	Artificial intelligence and human rights: risks, opportunities and regulation (2021–2023)			340/13412	525/20710	380/14990
TA CR	The Signal and the Noise in the Era of Journalism 5.0 - A Comparative Perspective of Journalistic Genres of Automated Content (2021–2023)			553/21815	1140/44970	1290/50888
TA CR	Arts and design as solution of traffic changes connected to ascent of autonomous driving (2020–2023)		93/3669	155/6114	155/6114	155/6114
TA CR	Transformation of Journalisms Ethics in	749/29546	1555/61341	1241/48955		

	the Advent of Artificial Intelligence (2019–2021)					
TA CR	Historylab: using technology to foster historical literacy (2018–2021)	1229/48481	1229/48481	205/8087		
TA CR	Development of autonomous driving smart air cleaner and safety control services platform for improving indoor air quality(IAQ) in industrial and public sites (2023–2025)					2375/93688
TA CR	Risk-Aware Trajectory Planning and Optical Image Recognition Assisted Landing System for Fixed-Wing UAVs (2022–2024)				408/16095	995/39250
TA CR	Development of correlative AFM and SEM/AirSEM microscope (2022–2025)				1675/66075	3118/122998
TA CR	Biorefining and circular economy for sustainability (2023–2028)					3107/122564
TA CR	Center for advanced machines and manufacturing technology (2023–2028)					1700/67061
TA CR	Biorefining as circulation technology (2019–2022)	2034/80237	2120/83629	2119/83590	1442/56884	
TA CR	Newsroom AI: public service in the era of automated journalism (2023–2026)					73/2880
EC	Central European Digital Media Observatory (2021–2024)			504/19882	2100/82840	2307/91006
EC	Novel energy and propulsion systems for air dominance (2023–2025)					1093/43111

EC	Digital Transformations for Supporting Next-Generation Labour (2023–2026)					65/2564
EC	New Rules for Assessing Mathematical Competencies (2017–2020)	334/13176	114/4497	169/6667		
EC	Trustworthy Planning and Scheduling with Learning and Explanations (2023–2026)					1732/68315
EC	COMBATTING DIET RELATED NON-COMMUNICABLE DISEASE THROUGH ENHANCED SURVEILLANCE (2022–2026)				3/133	3469/136858
EC	Acoustic and Thermal Retrofit of Office Building Stock in EU (2022–2026)				25/976	205/8074
EC	Development of an efficient steganalysis framework for uncovering hidden data in digital media (2021–2024)			600/23669	1433/56529	885/34911
EC	RoboRoyale: ROBOTic Replicants for Optimizing the Yield by Augmenting Living Ecosystems (2021–2026)			98/3866	1123/44300	3300/130178
EC	MSCA-RISE-2020 - Research and Innovation Staff Exchange (2021–2025)				464/18317	19/768
EC	GaN for Advanced Power Applications (2021–2023)				1026/40473	990/39053
EC	New metrological methods for biofuel materials analysis (2020–2023)		404/15937	324/12781	385/15187	185/7298
EC	AERIAL COgnitive integrated multi-task Robotic system with		2488/98146	4271/168481	4416/174201	1780/70211

	Extended operation range and safety (2020–2023)					
EC	Integrated Activities for the High Energy Astrophysics Domain (2020–2024)		533/21019	580/22893	704/27765	920/36304
EC	European Training Network on Visible light based Interoperability and Networking (2017–2021)	3746/147771	3724/146903	565/22288		
EC	Unlocking Large-Scale Access to Combined Mobility through a European MaaS Network (2017–2019)	2797/110320				
EC	Wide band gap Innovative SiC for Advanced Power (2017–2020)	955/37654				
EC	Controller Tools and Team Organisation for the Provision of Separation in Air Traffic Management (2016–2019)	765/30187				
EC	SOLUTION - Solid lubrication for emerging engineering applications (2017–2021)	2889/113964	2476/97673	85/3353		
EC	Enabling seamless electromobility through smart vehicle-grid integration (2016–2019)	1444/56963				
EC	Energy for Smart Objects (2016–2019)	5872/231649				
EC	European initiative to enable validation for highly automated safe and secure systems (2016–2019)	945/37274				
EC	Integrated Activities for the High Energy Astrophysics Domain (2015–2019)	152/5996	162/6391			

EC	Certification of clean energy SMEs (2022–2025)				78/3095	1796/70862
EC	DNS4EU and European DNS Shield (2023–2025)					1553/61279
EC	Support to the preparation of territorial Just Transition Plans in Czech Republic (2020–2021)		112/4418	575/22682		
ESF through Min Ind Trade CR	RESEARCH OF THE INFLUENCE OF USED COMPONENTS ON THE LED CHIP IN THE FRAMEWORK OF THE DEVELOPMENT OF A NEW LED MODULE, INTENDED FOR DEMANDING APPLICATIONS IN THE CHEMICAL INDUSTRY (–)				3558/140355	
ESF through Min Ind Trade CR	Univerzální bezpečnostní platforma pro budovy, infrastrukturu a průmysl (2020–2022)		595/23471	1572/62012	1487/58659	
ESF through Min Ind Trade CR	Safety analysis of collaborative robots applications (2020–2022)		20/789	781/30809	960/37870	
ESF through Min Ind Trade CR	Innovative charging station with GaN transistors (2019–2022)			1326/52308	1435/56607	2292/90414
ESF through Min Edu Youth Sports CR	Langweilův model jako školní historický pramen (2019–)		582/22959	1652/65168	1900/74951	
ESF through Min Edu Youth Sports CR	Podpora učitelům (2018–2021)	1216/47968	1189/46903	498/19645		
ESF through Min Edu Youth Sports CR	Inovace VOV_ zdravotnická oblast (2018–2021)	1638/64615	1551/61183	917/36174		
ESF through Min Edu	VOV - ekonomická sekce (2018–2021)	1512/59645	1712/67535	603/23787		

Youth Sports CR						
ESF through Min Edu Youth Sports CR	Inovace VOV_pedagogická oblast (2018–2021)	903/35621	781/30809	282/11124		
ESF through Min Edu Youth Sports CR	Inovace VOV_techická oblast (2018–2021)	3200/126233	3343/131874	3065/120907		
ESF through Min Edu Youth Sports CR	Research Center of Cosmic Rays and Radiation Events in the Atmosphere (2016–2023)			25087/989625		
ESA	IR Polarization Camera and Acousto-Optic Tuneable Filter for Hyperspectral Imaging Development for LWIR Applications - Phase 1 (2023–2025)					257/10148
ESA	Development and Verification of Earth-Space Statistical Clutter Loss Model (2021–2021)		106/4181	792/31243	519/20473	
(other foreign provider)	Towards a true 8-digit digitiser (2023–2026)					126/4959
(other foreign provider)	Ekologické transformátorové oleje - alternativní izolační kapaliny (2017–2020)	390/15365	126/4967			
(other foreign provider)	Remote Control of Robot in Inter-connected 5G Testbeds in Prague and Munich (2022–2023)					341/13442
(other foreign provider)	Connection of the two 5G testbeds in Prague and Munich (2022–2022)				186/7320	
(other foreign provider)	Flexible and Resilient Autonomus Systems (2018–2023)	1497/59042	1771/69842	2238/88272	4728/186492	3253/128305
(other foreign provider)	Climate investment capacity (CIC): climate finance dynamics&structure	588/23207	1316/51904	420/16551		

	for financing the 2030 targets (2018–2021)					
(other foreign provider)	Defeating the Dark Triad in Cyber Security Using Game Theory (2016–2019)	337/13290	115/4554	1726/68087	870/34308	434/17126
Total		105986/ 4180907	85364/ 3367416	112278/ 4429112	92902/ 3664773	108231/ 4269467

Table 3.3.2 - Contract research activities

Client ²⁹	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
ABB, Semiconductors	Charakterizace výkonových diod	112/4430				
ABB, Semiconductors	CV analýza křemíkových desek	80/3160				
Eurosecur s.r.o.	Eurosecur: Vývoj modulárního dronu	2230/87968				
ATE Cheb	ATE Cheb	105/4157				
AVAST Software s.r.o.	Aposemat project	1143/45088				
AVAST Software s.r.o.	Avast AI and Cybersecurity Laboratory at FEE CTU - AAICL	781/30792				
AŽD Praha	Modelování a analýza neohraničených kolejových obvodů	104/4102				
AŽD Praha	Ověření kybernetické bezpečnosti	636/25081				
AŽD Praha	Konzultační činnost a technická asistence	100/3940				
	Mobile Edge Computing and Functional Splitting for Scheduling of Radio Resources	2543/100307				
BREMA, spol. s r.o.	Expertiza a měření pohonů eskalátorů metra	290/11440				
BRISK Tábor a.s.	Diagnostika příčiny iontové migrace	150/5917				
Brownline Nizozemi	Fine alignment as a part of the North seeking	128/5038				

²⁹ If the client is from abroad, indicate in brackets the country of origin of the client.

CESNET z.s.p.o.	CESNET: Systém a metodologie snímání historických objektů bezpilotními helikoptéry a přenos nasnímaných velkých objemů dat pro jejich odborné zpracování	117/4603				
CETIN - Česká telekomunikační infrastruktura a.s.	Analýza operačních rizik na telekomunikační infrastruktuře	1270/50081				
CETIN - Česká telekomunikační infrastruktura a.s.	Zhotovení software	2370/93491				
CZ Biom Praha	Studie ekonomiky bioplynových stanic	200/7890				
Český svaz kanoistů, z.s.	Shotclock	295/11637				
Český metrologický institut	Návrh a realizace elektronických obvodů aktivních koaxiálních tlumivek včetně nabíjecího managementu	78/3077				
Ředitelství vodních cest ČR	RIS COMEX -Napájecí systém pro elektronické vybavení říční bóje charakteru ATON	300/11834				
Český telekomunikační úřad	Technický audit cenové kalkulačky	91/3570				
DELTA ADVISORY a.s.	Zpracování metodik tvorby nástrojů pro implementaci Národní strategie elektronického zdravotnictví	370/14596				
dis5 Praha	Technicko-ekonomická analýza zabezpečení dat	98/3866				
Dopravní podnik hl. města Prahy	Metodika testů systému určování polohy	398/15711				
ENISA - Finance Unit	Stratosphere Proposal for Study on Encrypted Traffic Analysis for ENISA	377/14853				
Grant Thornton Advisory s.r.o.	Konzultace pro projekt NGA	83/3254				
KOMIX s.r.o.	Podpora a úpravy AIS SE	371/14623				
KOPR Praha	Měření mg. pole při svařování Bosal	65/2564				

Faurecia Emission Technologies GmbH	Magnetic field measurement at Jasza plant	133/5238				
Faurecia Emission Technologies GmbH	Magnetic field measurement at Augsburg plant	121/4787				
Faurecia Emission Technologies GmbH	Measurement of magnetic field during welding process at Faurecia Plant/Heilbronn.	167/6598				
Mapradix s.r.o.	Multi-resolution Processor	431/17003				
Markify AB	Consultation services on the topic of "discovery of similar trademarks"	77/3031				
Medicton Polička	Analýza očních pohybů	220/8679				
Mendelova univerzita v Brně / Lesnická a dřevařská fakulta	Práce dle harmonogramu projektu č. FVF40031 "Víceúčelový modulární systém těžby pařezů a dalších komodit (Zdroj: 2503 SPP prvek: OV4190021)	93/3651				
Misterine s.r.o.	Projekt V.I.P.E.R.	203/8027				
MPO Praha	Posouzení a vyhodnocení přiměřenosti poskytování provozní podpory elektřiny u výroben uvedených do provozu v roce 2009 podle závazků v rozhodnutí Evropské komise o slučitelnosti podpory s vnitřním trhem EU - 1. etapa	250/9862				
Khalifa University of Science and Technology	MBZIRC: MOHAMMED BIN ZAYED INTERNATIONAL ROBOTICS CHALLENGE 2020	505/19939				
Masarykova univerzita / Ústav výpočetní techniky	Analýza, návrh řešení simulací v laboratoři pro AMM/SG technologie instalované v distribuční soustavě	492/19391				
PREdistribuce, a.s.	Vyhodnocení datové komunikace v pilotních projektech AMM	180/7101				
PREdistribuce, a.s.	Analýza provozu bezdrátových komunikací	122/4828				

PREdistribuce, a.s.	Vyhodnocení datové komunikace v pilotních projektech AMM	109/4292				
PREdistribuce, a.s.	Návrh koncepce pro hl. m. Prahu	295/11637				
Facesoft Ltd	Consultation services on the topic of "efficient nearest neighbour search in high dimensional spaces""	72/2828				
Software Competence Center Hagenberg	SCCH Rakousko FExFE	663/26150				
Schaeffler Technologies A.G. & Co. KG	Evaluation of material transfer (coverage, thickness, volume) on both parts of sliding couple	112/4403				
SEVEN Energy s.r.o.	Mapování potenciálu biomasy pro Olomoucký kraj - 1. etapa	200/7890				
Synergy Logistics Limited of Synergy House	Implementnation of a vision-based navigation system, capable of learning a set of paths via tele-operation and report its position with accuracy	402/15864				
dpstar Thermo Control Electric	Testování integrovaných obvodů	423/16695				
UNIS, spol. s r.o.	Simulace manuálního měření frekvenční charakteristiky řízeného systému	50/1972				
UNIS, spol. s r.o.	Simulace manuálního měření frekvenční charakteristiky řízeného systému, část II.	50/1972				
UNIS, spol. s r.o.	Citlivostní a frekvenční analýza, analýza pracovních oblastí motoru	50/1972				
ÚNMZ - Úřad pro technickou normalizaci, metrologii a státní zkušebnictví	Vývoj vn měřicích metod pro ÚNMZ	165/6520				
Ústav teoretické a aplikované mechaniky Akademie v	Ontologický model formulářů pro sběr dat šablony CONSEH20	57/2233				

Ředitelství vodních cest ČR	Analýza přesné satelitní navigace malých plovoucích objektů na říčních úsecích vodních cest - RIS COMEX	136/5365				
Whalebone Brno	Výzkum a vývoj algoritmů pro detekci a blokaci závadného DNS provozu	206/8137				
WTtech.CZ s.r.o.	Robotický manipulátor	130/5128				
Mendelova univerzita v Brně / Lesnická a dřevařská fakulta	Práce dle harmonogramu projektu pro GS LESY ČR č. 4: Metody likvidace kůrovce založené na účinku elektrického proudu. (Zdroj: 9510 SPP prvek: SV4190021)	208/8216				
CNR (Czech) Science and Technology Development Corporation Limited s.r.o	130028C000 K13114 CNR (CZECH) sp.lab.JC	1728/68166				
ATE Cheb	ATE Cheb		90/3532			
AVAST Software s.r.o.	Avast AI and Cybersecurity Laboratory at FEE CTU - AAICL		3807/150195			
Aveco s.r.o.	Vývoj zařízení pro Aveco Praha		219/8634			
Avekon Praha	Měření činitele směrové difuze a zvukové pohltivosti		50/1980			
BeiT s.r.o.	Vývoj zařízení pro BEIT Praha		211/8314			
BeiT s.r.o.	Vývoj zařízení pro BEIT Praha		469/18498			
CESNET z.s.p.o.	CESNET: Systém a metodologie snímání historických objektů bezpilotními helikoptéry a přenos nasnímaných velkých objemů dat pro jejich odborné zpracování		146/5772			
CETIN - Česká telekomunikační infrastruktura a.s.	Zhotovení software		3298/130099			
Czech CRRC Science and Technology Devel.s.r.o.	8302006C000 CRRC osobní		1407/55515			

Czech CRRC Science and Technology Devel.s.r.o.	8302007C000 CRRC sp. lab. JC		1728/68166			
Český metrologický institut	Vývoj a výroba magnetického kompenzačního systému		61/2406			
Český telekomunikační úřad	Sestava 3 ks zařízení F-Tester včetně příslušenství a HW a SW úpravy		199/7861			
Český telekomunikační úřad	SW modul pro skenování WiFi		66/2604			
Elektrotechnika, a.s.	Tokamak Compass U - model		284/11203			
Elektrotechnika, a.s.	Tokamak Compass U - výpočty		284/11195			
Energetický regulační úřad	Zajištění činností projektového managementu v rámci projektu „Majetek včetně odpisů a WACC“		295/11637			
Euroenergy, spol. s r.o.	Analýzy vstupních parametrů dle Zásad cenové regulace a zajištění simulačních výpočtů regulovaných cen v elektroenergetice pro rok 2021		950/37475			
Faurecia Emission Technologies GmbH	Magnetic field analysis and measurement at Faurecia Bezdecin		80/3138			
Funny Fish, s.r.o.	Vývoj zařízení pro Funny Fish Praha		499/19684			
HUAWEI TECHNOLOGIES OY(FINLAND) CO. LTD	RESEARCH & DEVELOPMENT AGREEMENT		395/15579			
Logiline Einkauf GmbH	Magnetic field measurement at Faurecia plant		137/5393			
Faurecia Emission Technologies GmbH	Magnetic field measurement at Faurecia Bakov plant		78/3094			
Markify AB	Consultation services on the topic of "discovery of similar trademarks"		131/5178			

Mendelova univerzita v Brně / Lesnická a dřevařská fakulta	Smluvní výzkum pro Mendelovu univerzitu		169/6651			
MPO Praha	Posouzení a vyhodnocení přiměřenosti poskytování provozní podpory elektřiny u výroben uvedených do provozu v roce 2009 podle závazků v rozhodnutí Evropské komise o slučitelnosti podpory s vnitřním trhem EU - 1. etapa		210/8284			
Khalifa University of Science and Technology	MBZIRC: MOHAMMED BIN ZAYED INTERNATIONAL ROBOTICS CHALLENGE 2020		3535/139440			
MŽP Praha	Smluvní výzkum pro MŽP		160/6311			
PREdistribuce, a.s.	Vyhodnocení datové komunikace v pilotních projektech AMM		51/2020			
PREdistribuce, a.s.	Hodnocení pilotních projektů AMM - SEGW		192/7574			
PREdistribuce, a.s.	Metodika ukončování vláken optických kabelů		240/9467			
PROFiber Networking CZ, s.r.o.	Zařízení F-tester		114/4485			
Software Competence Center Hagenberg	SCCH Rakousko FExFE		259/10211			
Sensority, s.r.o.	Vývoj zařízení pro Sensority Praha		499/19696			
Sensority, s.r.o.	Vývoj zařízení pro Sensority Praha		50/1972			
SEVEN Energy s.r.o.	Mapování potenciálu biomasy pro Olomoucký kraj - 1. etapa		130/5128			
Státní fond životního prostředí	Model FV systému		50/1972			
Technology Innovation Institute	TII Abu Dhabi I		79/3124			
ÚNMZ - Úřad pro technickou	Smluvní výzkum pro UNMZ		215/8476			

normalizaci, metrologii a státní zkušebnictví						
Ústav teoretické a aplikované mechaniky Akademie v	Ontologický model formulářů pro sběr dat šablony CONSEH20		58/2304			
Vitesco Technologies Czech Republic s.r.o.	Elektrochemická migrace na DPS		100/3945			
Funny Fish, s.r.o.	Vývoj zařízení pro Funny Fish Praha		500/19721			
Sensority, s.r.o.	Vývoj zařízení pro Sensority Praha		498/19659			
Akustika Praha, s.r.o.	Analýza možnosti úniku akustických informací šířených konstrukcemi budov			113/4446		
ATE, a.s.	Vývoj a výroba vzorků			250/9862		
BeIT s.r.o.	Vývoj zařízení pro BEIT Praha			289/11386		
CETIN - Česká telekomunikační infrastruktura a.s.	Zhotovení software			2802/11051 7		
CLIMCOM Berlin–Climate & Company Advisory Services	Financing the European Green Recovery – Addressing barriers and opportunities of the new EU financial framework			364/14373		
Colsys s.r.o.	Analýzy dodaných podkladů a konzultace v problematice UHF RFID			150/5917		
CoolTherm, s.r.o.	Analýza sériové komunikace			50/1972		
Czech CRRC Science and Technology Devel.s.r.o.	8302006C000 CRRC osobní			854/33672		
Czech CRRC Science and Technology Devel.s.r.o.	8302007C000 CRRC sp. lab. JC			1728/68166		
Český telekomunikační úřad	Smlouva o zpracování znaleckých posudků na ocenění rádiových kmitočtů			546/21538		

	v pásmech 1920–1980 / 2110–2170 MHz, 28,2205–28,4445 GHz a 29,2285–29,4525 GHz					
CZ Biom – České sdružení pro biomasu, z.s.	Studie ekonomiky bioenergetiky			300/11834		
Český metrologický institut	Vývoj a výroba magnetického kompenzačního systému			149/5878		
Deloitte Advisory s.r.o.	VR Space Escape Room Experience			735/29001		
Ernst & Young, s.r.o.	Konzultace k Výsledkové tematické evaluaci Dohody o partnerství pro programové období 2014-2020			58/2268		
Euroenergy, spol. s r.o.	Zpracování typových diagramů dodávek plynu pro rok 2022.			730/28797		
Euroenergy, spol. s r.o.	Zajištění subdodávky projektového managementu			200/7890		
Euroenergy, spol. s r.o.	Analýzy vstupních parametrů dle Zásad cenové regulace a zajištění simulačních výpočtů regulovaných cen v elektroenergetice pro rok 2021			740/29191		
CETIN - Česká telekomunikační infrastruktura a.s.	F-Tester 4drive-box 5G			472/18619		
Český telekomunikační úřad	Dodávka analyzátorů kvalitativních parametrů v mobilních sítích			877/34593		
HUAWEI TECHNOLOGIES OY(FINLAND) CO. LTD	RESEARCH & DEVELOPMENT AGREEMENT			523/20649		
Kolibrik.net, s.r.o.	Návrh a vývoj čtyřkanálového digitalizátoru využívající sigma-delta převodníky se frekvencí vzorkování 2,5 MSPS			280/11045		
Ministerstvo průmyslu a obchodu ČR	Posouzení a vyhodnocení přiměřenosti poskytování provozní podpory elektřiny			130/5128		

	u výroben uvedených do provozu v roce 2009 podle závazků v rozhodnutí Evropské komise o slučitelnosti podpory s vnitřním trhem EU - doplnění					
Nave France	Visual Representation learning and matching for object and action recognition			696/27458		
PRO - ZETA, a.s.	Osazování a výroba vzorků			55/2180		
Univerzita Karlova v Praze / Přírodovědecká fakulta	Vývoj a dodání páru tříosého fluxgate magnetometru pro měření na UAV			149/5868		
Software Competence Center Hagenberg	SCCH Rakousko FExFE			254/10037		
SCILIF s.r.o.	Nové řídicí jednotky pro výrobky firmy Scilif			410/16174		
Sorbenta NT	Analýza a experimentální měření vlivu kompozitových materiálů na omezení průniku RF signálu			2509/98970		
Stellenbosch University	Development and manufacturing of a low noise magnetic variometer			129/5098		
Technology Innovation Institute	TII Abu Dhabi I			1645/64888		
Technology Innovation Institute	TII Abu Dhabi II - Catamarans (TII-CTU - UAV-USV)			386/15237		
Ústav teoretické a aplikované mechaniky Akademie v	Ontologický model formulářů pro sběr dat šablony CENSEH20			96/3787		
Vysoká škola báňská - Technická univerzita Ostrava / Fakulta elektrotechniky a informatiky	Studie proveditelnosti vlastní sítě LTE			120/4734		
Akustika Praha, s.r.o.	Analýza možnosti úniku akustických informací				128/5037	

	šířených konstrukcemi budov – II. etapa					
ALIS Tech s.r.o.	Metody UWB pro určování polohy objektů				349/13758	
ATE Cheb	Vývojové práce pro ATE Cheb				250/9862	
Aveco s.r.o.	Vývojové práce pro společnost AVECO				112/4433	
Aveco s.r.o.	Zakázka AVECO Praha				237/9331	
AVETON s.r.o.	Měření činitele směrové difuze a zvukové pohltivosti				89/3511	
BeiT s.r.o.	Zakázka pro BeiT s.r.o.				300/11815	
CETIN - Česká telekomunikační infrastruktura a.s.	Zhotovení software				3862/152363	
Com - Pakt Energy, a.s.	Studie Kabelové vedení V205/206 400 kV				60/2367	
Czech CRRC Science and Technology Devel.s.r.o.	8302006C000 CRRC osobní				939/37045	
Czech CRRC Science and Technology Devel.s.r.o.	8302007C000 CRRC sp. lab. JC				1728/68166	
CZ Biom – České sdružení pro biomasu, z.s.	Studie ekonomiky bioenergetiky				300/11834	
ČEPS, a.s.	Posouzení metodiky vyhodnocení přínosů snížení rizik				140/5523	
ČEPS, a.s.	Studie proveditelnosti - Monitoring optických spojkových krabic				230/9073	
ČEPS, a.s.	Studie Stanovení ceny v prostředí trhu se SVR				200/7890	
Český rozhlas	Vývoj a realizace SW pro digitalizaci archivních fotomateriálů				120/4734	
Decci servis s.r.o.	Konzultace v oblasti fotovoltaiky				420/16568	
Dekonta, a.s.	Diagnostika baterií				62/2456	

Deloitte Advisory s.r.o.	VR Space Escape Room Experience				223/8789	
ECORETAN s.r.o.	Konfigurace mikrovlnného reaktoru pro ohřev směsi etykenglykolů				72/2840	
Enginn Effect	Vývojové práce na 3D grafickém jádře softwaru VRUT				922/36364	
Energetický regulační úřad	Analýza technicko - ekonomických parametrů pro stanovení výše podpory v cenovém rozhodnutí				100/3945	
Euroenergy, spol. s r.o.	Subdodávky činností projektového managementu v rámci projektu ERÚ - nová tarifní soustava				200/7890	
Euroenergy, spol. s r.o.	Potenciál vývoje bioplynových zdrojů do roku 2050				80/3156	
Euroenergy, spol. s r.o.	Analýza vstupních parametrů dle Zásad cenové regulace a zajištění simulačních výpočtů regulovaných cen v elektroenergetice pro rok 2023				490/19329	
Euroenergy, spol. s r.o.	Odhad vývoje biometanu do roku 2040				110/4339	
Euroenergy, spol. s r.o.	Zpracování typových diagramů dodávek plynu pro jednotlivé kalendářní roky 2022–2023				730/28797	
Euroenergy, spol. s r.o.	Studie „ZMĚNA CENOTVORBY NA NAPĚŤOVÝCH HLADINÁCH VVN A VN“				180/7101	
Český telekomunikační úřad	Dodávka analyzátorů kvalitativních parametrů v mobilních sítích				3344/131916	
itSound, s.r.o.	Analýza vibrací povrchu reproduktorové soustavy				170/6706	
itSound, s.r.o.	Změření amplitudové a fázové frekvenční charakteristiky soustavy				70/2761	
Ministerstvo průmyslu a obchodu ČR	Posouzení a vyhodnocení sektorového šetření přiměřenosti provozní podpory elektřiny u				345/13609	

	výroben uvedených do provozu v roce 2010 podle zákona č. 165/2012 Sb., o podporovaných zdrojích energie					
Ministerstvo průmyslu a obchodu ČR	Oponentní posudek k nastavení výše podpory pro aktivitu "Modernizaci distribuce tepla v rámci soustav zásobování teplem"				120/4734	
Ministerstvo průmyslu a obchodu ČR	Zpracování posouzení a vyhodnocení sektorového šetření přiměřenosti provozní podpory elektřiny u výroben uvedených do provozu v letech 2011 - 2015 podle zákona č. 165/2012 Sb., o podporovaných zdrojích energie rozhodnutí				230/9073	
Nave France	Visual Representation learning and matching for object and action recognition				942/37140	
PIKRON, s.r.o.	Návrh měřicí aparatury pro plně automatizované testy a provedení statických a dynamických testů předložených A/D převodníků -				56/2219	
Realistic a.s.	Dohoda o podmínkách spolupráce při realizaci projektu vývoje mikrovlnné tunelové sušárny a výzkumu nastavení mikrovlnného záření na různé druhy keramických a stavebních materiálů				200/7890	
REMA PV Systém, a.s.	Studie znovuvyužití PV modulů				138/5444	
RFspin, s.r.o.	Near Field to Far Field Transformation for Near-Field Scanning System				80/3156	
	Technology Development and Licence Agreement s Rio Algom Exploration Inc.				655/25841	
Rohde&Schwarz Vimperk s.r.o.	Testování pájitelnosti povrchů desek plošných spojů				80/3156	
Software Competence	SCCH Rakousko FExFE				243/9580	

Center Hagenberg						
Sorbenta NT	Analýza a experimentální měření vlivu kompozitových materiálů na omezení průniku RF signálu				2347/92592	
STRATOSYST s.r.o.	Vývoj funkčního vzorku systému zajišťující telekomunikační úlohy				1500/59172	
Státní fond životního prostředí České republiky	Podmínky a výpočetní nástroj NZÚ				98/3850	
Testia Consult	Životnostní zkoušky vzorků vinutí				106/4181	
Technology Innovation Institute	TII Abu Dhabi I				1342/52958	
Technology Innovation Institute	TII Abu Dhabi II - Catamarans (TII-CTU - UAV-USV)				783/30886	
PROFiber Networking CZ, s.r.o.	Vývoj a dodání F-Tester 5G				74/2910	
Aveco s.r.o.	Zakázka AVECO Praha					255/10072
EPSA Market Place Romania S.R.L	EPSTOP Project – Consultancy services					184/7275
CETIN - Česká telekomunikační infrastruktura a.s.	Zhotovení software					3031/11956 5
CRRC Čína	Electric Drive Diagnostics					2100/82840
CZ Biom – České sdružení pro biomasu, z.s.	Studie ekonomiky bioenergetiky					360/14201
Decci servis Praha	Expertní a poradenská činnost v oblasti diagnostiky řízení a provozu velkých fotovoltaických systémů					420/16568
Ernst & Young, s.r.o.	Konzultace k Výsledkové tematické evaluaci Dohody o partnerství pro programové období 2014-2020					52/2041

Euroenergy, spol. s r.o.	Subdodávky činností projektového managementu v rámci projektu Energetického regulačního úřadu ohledně propojení nového designu trhu v elektroenergetice s požadavky na změny v regulovaných cenách a tarifech					110/4339
EZÚ Praha	Zkoušky dle ČSN EN 62561-1 ed.2:2017					230/9067
Frankfurt School	REFORM/SC2022/116 - "Support to the Implementation of the Just Transition in the Czech Republic"					522/20605
Fyzikální ústav AV ČR, v. v. i.	Příprava elektricky vodivých senzorových nanovrstev					62/2462
Garrett Motion	Spolupráce a případné konzultace na vývoji					60/2367
INOX Technology	Magnetická měření a konzultace BOSAL / IINOX technology					80/3156
IOZ	Tvorba výukových materiálů pro kurz "Elektromontér fotovoltaických systémů" (26-014-H)					65/2564
MAN	Off-line LiDAR and Camera System Calibration Software					415/16351
Mapradix s.r.o.	Enhanced Spatiotemporal Land Change Monitoring Based on Sentinel-2 Time Series and VHR Images					625/24664
Markify AB	Consultation services on the topic of "discovery of similar trademarks"					178/7028
Ministerstvo průmyslu a obchodu ČR	Zpracování posouzení a vyhodnocení sektorového šetření přiměřenosti provozní podpory elektřiny u výroben uvedených do provozu v letech 2011 - 2015 podle zákona č. 165/2012 Sb., o podporovaných zdrojích energie rozhodnutí					230/9073
Naver France	Visual Representation learning and matching for					774/30550

	object and action recognition					
TERMS	Terms a.s. - Roboton					820/32347
Povodí Ohře, státní podnik	Studie stavebně-technologického řešení					100/3945
PREdistribuce, a.s.	Demonstrátor HAN					240/9467
Realistic a.s.	Dohoda o podmínkách spolupráce při realizaci projektu vývoje mikrovlnné tunelové sušárny a výzkumu nastavení mikrovlnného záření na různé druhy keramických a stavebních materiálů					200/7890
Software Competence Center Hagenberg	SCCH Rakousko FExFE					397/15672
Sensority, s.r.o.	Realizace vzorků					300/11842
Sorbenta NT	Analýza a experimentální měření vlivu kompozitových materiálů na omezení průniku RF signálu					1834/72357
STRATOSYST s.r.o.	Vývoj funkčního vzorku systému zajišťující telekomunikační úlohy					3000/11834 3
Technology Innovation Institute	TII Abu Dhabi I					16104/6352 67
Technology Innovation Institute	TII Abu Dhabi II - Catamarans (TII-CTU - UAV-USV)					14068/5549 66
URC Systems, spol. s r.o.	Vývoj a dodávka F-Tester 5G					75/2943
Sensority, s.r.o.	Realizace vzorků pro firmu Sensority					72/2838
AXIS	Testování použití kamer Axis na robotických platformách					75/2959
Czech Hydro s.r.o.	Posouzení důvodnosti zachování podpory pro špičkové MVE v režimu vysokého a nízkého tarifu					100/3945
Siemens, s.r.o.	Analýza desek PCB					50/1972

Brema, spol. s r.o.	Měření a analýza esk na stanicích BU, HA, MU					83/3266
RFspin, s.r.o.	Měření základních parametrů širokopásmových antén, hybridních členů					220/8679
Euroenergy, spol. s r.o.	Zpracování typových diagramů dodávek plynu pro jednotlivé kalendářní roky 2024-2026					400/15779
PREdistribuce, a. s.	Ucelený návrh SW pro frekvenční měniče					250/9862
Undisclosed Clients (271)	Various Titles	48094/ 1897194	35498/ 1400324	30483/ 1639145	41552/ 1639145	46036/ 1816026
Small Contracts (463)	Various Titles	1622/64004	1672/65951	1572/62006	1107/43690	774/30539
Total		72649/ 2865838	59163/ 2333846	50844/ 2005680	68214/ 2690888	94953/ 3745680

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts³⁰, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment: During the evaluated period, a total of 216 research outcomes were reported, including 62 patents, 81 software applications, 23 prototypes, 4 pilot plants, 36 utility models, 1 result incorporated into legislation and standards, 1 result reflected in agreed strategy and policy documents, and 8 certified methodologies. Additionally, during this period, the total value of licenses sold exceeded 2.65 million CZK.

Generally speaking the nature of the selected results primarily revolves around technical, mathematical, and engineering advancements, where gender as a variable does not directly influence the methodologies or outcomes. The technology is designed for all users, ensuring accessibility without gender bias. It should be emphasized, though, that one of the selected technical results detailed below addresses the gender and equality concerns directly. A NATO STO sponsored grant on gender aspects of secure low-bit-rate voice communication gave rise to the result “Gender-related aspects of listening quality and effort in speech communication systems”, reflected in a technical recommendation from the European Telecommunications Standards Institute (ETSI). It

³⁰ See Terms definition.

provides guidelines on test procedures and measures for human speech communication systems to balance transmission quality among genders.

The evaluated research outputs significantly contribute to sustainability through technological efficiency, environmental monitoring, healthcare innovation, and creative digitalization, demonstrating their broad societal impact.

Hierarchical resource scheduling method of wireless communication system

(2020, Patent, US10849139 and US10624105)

<https://patents.google.com/patent/US10849139B2/en>

<https://patents.google.com/patent/US10624105B2/en>

This patent addresses the challenge of fronthaul delay in cloud radio access network (C-RAN) architecture, a key component of current and future mobile networks. In C-RAN, base station functions are split between distributed units (remote radio heads) and a centralized baseband unit. The fronthaul connection between them introduces delays, negatively impacting radio resource management, such as scheduling. Since scheduling relies on real-time channel quality information, any delay results in outdated data, reducing user throughput by several to dozens of percent. The patent introduces a hierarchical scheduling framework that mitigates this issue by dynamically distributing scheduling tasks between centralized and distributed units. The centralized unit prioritizes scheduling for cell-edge users, who experience inter-cell interference, while distributed units handle resource allocation for non-cell-edge users. The classification of users is dynamically adjusted based on network conditions, user mobility, and quality of service requirements. This approach allows network operators to optimize throughput while balancing energy consumption—centralizing more scheduling improves performance but increases energy costs. This way, the patent addresses and solves the problem of Flexible functional split of network control functionalities between the central and distributed units defined by major international body for standardization of mobile networks – 3GPP – in the standardization document 3GPP TR 38.801 v 14.0.0, March 2017, pages 59 a 60, Note that basically all companies related to mobile networks (including 5G and beyond 5G) are involved in activities of 3GPP, for example, Apple, Nokia, Samsung, Ericsson, Meta, LG, Huawei, Microsoft, Google, Xiaomi, STMicroelectronics, Qualcomm, Intel, all mobile operators, just to name a few. This highlights the importance of the problem addressed by the patent for the practice. This patent is followed by two US patents elaborating the idea from the implementation point of view: US10849139B2 - Hierarchical resource scheduling method of wireless communication system, granted 11/2020.

Illumination-guided example-based stylization of 3D renderings

(Patent, CN107492143 (2021), GB2551873 (2019) and US10176624B2 (2019))

<https://patents.google.com/patent/CN107492143B>

<https://patents.google.com/patent/GB2551873B>

<https://patents.google.com/patent/US10176624B2>

This U.S. patent presents a new approach to the example-based stylization of 3D objects. Unlike previous techniques, which used only information about colors or surface normals for the synthesis, the method presented in this patent builds upon the knowledge of light propagation in the scene. Thanks to this new source of information, the technique can distinguish between individual context-dependent illumination effects, for which artists usually use different stylization techniques. Historically, the proposed method is the first, which can create synthetic images that could pass an NPR version of the Turing test. An artist can hardly distinguish original artwork from a synthetically generated image. Adobe, Inc. announced its possible future integration into its products at the prestigious Adobe MAX conference. CTU in Prague jointly owns this patent together with Adobe, Inc.

We are negotiating possible licensing of this patent with the following companies/studios: Walt Disney Animation Studios, Walt Disney Imagineering, ABC (Disney), Liberty Films, Animatrik, Fractal Systems, Augmently, Nexus Studios, NetDragon, Goldtooth, Rune Spaans, Anifilm, Tornante, Int./Night, MAUR film.

Off-line LiDAR and Camera System Calibration Software

(2022, Software, licences sold 1,651.676 CZK, MAN Truck & Bus SE)

<https://cordis.europa.eu/project/id/688652>

The calibration of exteroceptive automotive sensors is the determination of internal and external sensor parameters. It is vital for vehicle control and sensor data fusion in assisted and autonomous driving. It is also a very frequent task as it is strictly required after many service operations. The LiCaCal software calibrates the external parameters of individual sensors in an omnidirectional system of cameras and LiDARs distributed over the body of a vehicle relative to each other and in the vehicle's coordinate system. In addition, it computes internal camera calibrations (including nonlinear radial distortion parameters) Its angular accuracy is better than the angular resolution of the sensors, which exceeds the performance of available solutions. It also calibrates shifts in the time-base of the individual sensor subsystems. The approach is state-of-the-art in the models used (Lie group representations, efficient hierarchical bundle adjustment), uses some novel global robust algorithms for matching geometric primitives, and does not require sophisticated, high-precision, specially manufactured calibration targets used by the manufacturers of sensor subsystems. The first version of LiCaCal has been developed in the H2020 project UP Drive. Since the end of the project, several upgrades have been released and licensed to research divisions of major manufacturers in the transportation domain, specifically in the Volkswagen Group. So far, the total income for the license and subsequent maintenance and upgrade contracts has exceeded EUR 160,000 (including contracts that have not been closed). The ease of use and the calibration accuracy allows for faster development of robust sensor systems for automated or autonomous driving. LiCaCal helped our partners with the successful completion of several autonomous transportation projects (disclosing the projects would indirectly disclose our partners, which is not permitted by the agreements). The licensor and contractor of the follow-up contracts is FEL CVUT in all cases.

Orthogonal fluxgate sensor

(2020, Patent, EP3460499)

<https://register.epo.org/application?number=EP18181052&tab=main>

The presented patent offers a new solution of an orthogonal fluxgate sensor that significantly reduces the noise compared to the state-of-the-art solution. This technology produced sensors with noise below 1 pT/ $\sqrt{\text{Hz}}$ at 1 Hz, which is the best result ever reported for room-temperature magnetic sensors. The unique solution of the sensor is based on the special performance of a ferromagnetic coil partially embedded in a filler material with specific thermal conductivity and hardness. The effect of the layer of the filler material is temperature homogenization of the core and minimization of mechanical stresses acting on the core. Such a solution reduces the noise by a factor of 4 compared to the best competitor. The European patent office examined this solution's novelty, and the result is protected by European patent EP3460499. New sensors will find applications in medical magnetocardiography, geophysical prospection, security, and non-destructive testing. CTU has already signed a development and non-exclusive license agreement with a major international company. The contract is confidential, but it was partly anonymized, and it is disclosed to the evaluator under strict confidentiality. The license fee consists of a one-time fee and royalties per every built sensor.

A Method of Determining Systolic and Diastolic Blood Pressure and the Unit for This Method

(2019, Patent, EP3010400)

<https://worldwide.espacenet.com/publicationDetails/biblio?CC=EP&NR=3010400B1&KC=B1&FT=D&ND=4&date=20190731&DB=EPODOC&locale=en> EP

The patent provides a unique method for calculating systolic and diastolic blood pressure from a plethysmographic curve. The patented method eliminates the disadvantages of the existing de facto only applicable method for determining SP/DP using a pressure gauge with a throttling pressure cuff attached to the arm. However, this current method is energy-intensive, manipulative and, above all, annoying. The invention lies in the continuously or once obtained plethysmographic curve is mathematically processed by the invented method (digitization, filtration and selection of valid segments of the curve for determination of both blood pressure values). The invention and its implementation, the HeRo (Health Robot) technology, represents a key component for remote, automatic and inconspicuous monitoring of human health by non-contact sensing and calculation of systolic and diastolic blood pressure. This unit is the basis for long-term health control of the individual and is expected to be part not only of a "smart watch", but of an overall change in healthcare, where robots and expert systems take over the basic tasks of a doctor. This means that a device that independently manages important functions and communicates with the home center, medical center, and first aid center. The most significant advantage of the developed HeRo robot is its contactless data acquisition and complete evaluation of systolic and diastolic blood pressure continuously at set intervals during the day and corresponding summary of other necessary measurements for health monitoring (heart rate, temperature, blood oxygen content, etc. ..). Additional functions can be easily added. HeRo technology has been successfully tested in practice. It is patented in the Czech Republic, the EU and also in the USA. European patent EP3010400 is validated practically throughout Europe. Currently, 3 negotiations are underway on the license agreement (iSmarties s.r.o., Witty Trade s.r.o, S-Case.io) and an action for patent infringement is being prepared.

Simulator of skills of dispatchers of Emergency Medical Dispatch

(2021, Software, <https://operatorzos.fel.cvut.cz/>, Sold licences 511k CZK)

The "Operator" software simulator (<https://operatorzos.fel.cvut.cz/>), developed through extensive research and creative activity, is the first Czech simulator for training Emergency Medical Services (EMS) dispatch center operators. It helps operators make timely decisions on ambulance dispatches, considering patients' health conditions. The simulator provides a stress-free, repeatable, and measurable training environment, covering routine operations to mass disaster scenarios. The software's social significance lies in enhancing the training and experience of key personnel, crucial for life-saving interventions and patient care improvement. Available in English, the system is ready for additional language versions, making it applicable beyond the Czech and Slovak Republics. In 2023, the simulator received the Rector's Award for its impactful application in scientific and creative work. It has been promoted through various events, including the "Rallye Rejvíz" (<https://rallye-rejviz.cz/en/>) competition and prime-time coverage on Czech Television. Concrete applications include its use by EMS dispatch centers in the South Moravian, Karlovy Vary, and Pilsen Regions (cooperation with the company Life Support s.r.o.), and Prague Emergency Medical Services (2-year contract including support and customized scenarios). It has also been implemented at Vysoká škola zdravotnická for preparing future dispatchers. The software has generated revenue through licenses and training programs. Additionally, there are ongoing negotiations with the Czech Police Presidium to modify the simulator for police training needs. These applications demonstrate the simulator's broad impact on improving emergency response and training across various sectors.

Gender-related aspects of listening quality and effort in speech communication systems

(2023, Result Reflected in Legislation and Standards)

https://www.etsi.org/deliver/etsi_tr/103900_103999/103950/01.01.01_60/tr_103950v010101p.pdf

The present document addresses the effects of the speaker's gender-related aspects on transmission quality. It provides recommendations on test procedures and measures for future technologies for human speech communication systems to balance transmission quality among genders. A natural requirement is that male and female voices are transferred with similar quality; in other words, the transmission technology, including coding algorithms, frequency filters, or sampling rates, should not privilege one gender over the other to maintain similar working conditions and opportunities for all. Potential imbalance can affect professionals who deploy distant voice communication in their daily duties - e.g. female airport approach control dispatchers or other professionals (policewomen) who are principally disadvantaged by technological aspects of their job - worse voice transmission quality means higher listening effort is needed. It may lead to consequent (subconscious) discomfort of their communication partners. Gender transmission quality misbalance is not surprising for narrow-band transmissions due to the generally higher pitch region of female voices; however, it is often observed also in contemporary digital wideband or even full-band communications. As a direct consequence of ETSI document TR 103 950 approval and publication, the author was awarded a NATO Chief Scientist Grant on "Gender-related Aspects of Low Bit-rate Secure Voice Communications", see:

<https://www.sto.nato.int/SitePages/newsitem.aspx?ID=3959>

Nine projects were selected to receive support from a total of 231 applications. The project includes a set of subjective listening tests performed on simulated military secured voice channels to evaluate potential gender imbalance of their transmission quality by application of the ETSI TR 103 950. If the project results are significant, the process of the ETSI TR adoption into NATO standard (STANAG) will be initiated.

Concept of public lighting in the capital city Prague - Technical state and development in the field of lighting technology

(2022, Result Reflected in the Agreed Strategy and Policy Documents)

This study presents key research findings on public lighting, summarizing information and providing a foundation for further development in the capital city of Prague. It serves as a basis for defining the characteristics and parameters of individual elements within the public lighting system. The first section examines public lighting as an essential public infrastructure, outlining its operational characteristics and key components. Research results have been applied to contributing to the systematic management of Prague's public lighting. In alignment with the city's strategic approach, these efforts are reflected in the Concept of Prague Public Lighting, a comprehensive policy framework defining the city's nighttime visual identity. This concept integrates both public and architectural lighting while addressing critical factors such as safety, environmental impact, and the aesthetic quality of public spaces. Research findings have informed the renewal and modernization plans for public lighting, ensuring consistency with the city's financial planning and long-term sustainability goals. Moreover, these results establish technical and operational standards for public lighting activities and products within the system.

The MRS UAV System

(2023, Software, https://github.com/ctu-mrs/mrs_uav_system)

The MRS (Multi-Robot System) UAV system, developed by the CTU MRS Group, was open-sourced in May 2020 after winning the MBZIRC 2020 (<https://mrs.fel.cvut.cz/mbzirc2020>) robotics competition in Abu Dhabi. The competition included 20 pre-selected teams from the 200 best robotic teams worldwide, and the CTU MRS Group received over 7 million CZK in prize money and

support. The MRS group published the robot software used in the competition as open source (https://github.com/ctu-mrs/mrs_uav_system) to allow other robotics departments to compare their solutions and contribute to the system's development. The software package includes the core MRS UAV System for controlling UAVs, navigation, localization, object detection, and simulations. The system incorporates real-time dynamic simulation of UAV dynamics for large-scale swarms and high-fidelity simulation using a Gazebo/ROS simulator. Moreover, an abstract plugin API connects the system to any available robotic simulator or underlying hardware. The system enables safe real-world deployment of user-based software onboard autonomous drones. Since its release, the software has been used worldwide for research in autonomous drones. The system is continuously maintained and improved, with over 200 issues addressed and 1,000 downloads globally. It is also used in summer schools, educating over 600 students in drone technology. In 2023, a commercial updated version was released, selling 55 licenses to companies Foxfour (Tallinn, Estonia) and TII (Abu Dhabi, UAE). Additionally, the system was used in contracts with German company EO.N, Research lab in Munich, for multi-robot inspection of high-voltage power lines, earning 6.2 million CZK for deploying this SW. The project has had a positive societal impact, contributing to education, research, and industry applications.

A System of Sensory-equipped Helicopter with a Mechanism for Safe Flight in Historical-documentation Applications in Building Interiors

(2021, Functional Sample)

This worldwide unique fully autonomous UAV system is designed for the safe documentation of historical monuments (<http://mrs.felk.cvut.cz/projects/dronument>). It integrates state-of-the-art methods of autonomous stabilization, localization, and navigation of cooperative UAVs inside large historical buildings. The system enables safe scanning without the need for expensive scaffolding, flying beyond the visual line of sight, and operating in low lighting conditions using smart illumination by cooperating UAVs. It has been successfully deployed in various historical sites, including UNESCO buildings and large cathedrals worldwide, such as Saint Nicholas Church in Prague and Archbishop's Chateau in Kroměříž. These campaigns provided valuable data for restoration planning and public documentation through pictures, 3D models, and videos. Approved by the National Heritage Institute (NPÚ) for indoor use, the system is accompanied by a Methodology of using unmanned helicopter technology for documentation of interiors and exteriors of historical buildings. It is the first methodology for using UAVs indoors in historical buildings and so prescribes the system to be a standard in this application. This work was supported by project NAKI II DG18P02OVV069, Safe scanning of historical objects by unmanned helicopters - assistive technologies, methodics and exploitation in heritage protection.

Table 3.4.1 - Overview of research results in the period under evaluation

Type of result ³¹	Year of application	Name
Patent	2020	Hierarchical resource scheduling method of wireless communication system
Patent	2019, 2021	Illumination-guided example-based stylization of 3D renderings
Software	2022	Off-line LiDAR and Camera System Calibration Software
Patent	2020	Orthogonal fluxgate sensor
Patent	2019	A Method of Determining Systolic and Diastolic Blood Pressure and the Unit for This Method

³¹ Specify the specific type of result. Add rows as needed.

Software	2021	Simulator of skills of dispatchers of Emergency Medical Dispatch
Result Reflected in Legislation and Standards	2023	Gender-related aspects of listening quality and effort in speech communication systems
Result Reflected in the Agreed Strategy and Policy Documents	2022	Concept of public lighting in the capital city Prague - Technical state and development in the field of lighting technology
Software	2023	The MRS UAV System
Functional Sample	2021	A System of Sensory-equipped Helicopter with a Mechanism for Safe Flight in Historical-documentation Applications in Building Interiors

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.).³², providing a brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in the annex table (Table 3.4.1).³³ Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in the annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

Self-assessment: Transferring results into practice is organized by **Technology Transfer Team (TTT)** in close connection with the Department of Science and Research. TTT is methodically managed by the Vice-Dean for Cooperation with Industry and Commercialization.

TTT supports employees in the preparation of the notification of results with application potential, patent applications, utility models, trademarks, protection of trade secrets. All registered in the database EZOP.

TTT provides IP search by expert using professional database prior to invention disclosure by faculty members, registration of IP, monitoring of license agreement terms, keeping records of all forms of commercialization of business transactions, research capacities and know-how available at the faculty to be transferred into practice, continuous search for opportunities for using the scientific potential of the faculty by active offers of cooperation and their presentation on the faculty website. Researchers are supported by providing standard draft cooperation agreements with external entities, provision of legal support in establishing contractual relationships, coordination of negotiations with those interested in cooperation, preparation of the project plan, setting the conditions of cooperation in cooperation with departments, financial support of Proof-of-Concept projects resulting from internal tendering, market evaluation with the aim of developing a

³² In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

³³ If the commercialisation of R&D&I results is carried out in this way.

commercialization plan, project management, preparation of documents for invoicing. TTT is also acting as a contact point for contacts with industry by accepting requests for cooperation, evaluating requests and making offers.

In cooperation with the Transfer Team of the Rectorate, the TTT provides support for setting start-up, spin-off, spin-in, spin-out, and joint venture companies. On top of it, the spin-off ČVUT Tech s.r.o., 100 % daughter company of the CTU, has been established to speed-up the transfer of the University IP to industry.

Forms of transfer in brief:

Short-term collaborations: provision of one-off services, analytical work, consultations, educational services, assessments, measurement and use of know-how, implementation of specialized training in the field of our expertise or unique know-how.

Mid-term collaborations: custom research or consultations that are carried out personally by a specialist on a specific customer problem. The subject is usually a more complex problem, the solution of which requires the use of the capacity of our departments.

Long-term collaborations: joint research and development activities - contract research. More comprehensive research with the aim of building strategic alliances.

Example1: Toyota Research Lab – algorithms for autonomous driving. 2019 - 2023: 3,478 kEUR.

Example2: Škoda Auto - Virtual Reality Universal Toolkit. 2019 - 2023: 1,275 kEUR

Miscellaneous: Patent sales, licensing, application of technologies at the proof-of-concept stage.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

Type of revenue	Revenue (in thousands CZK/EUR)				
	2019	2020	2021	2022	2023
Revenues from cooperation with industry including licences sold	2785/ 109881	2466/ 97267	3411/ 134541	6908/ 272496	9987/ 393956
Donations	8044/ 317308	8931/ 352302	8744/ 344942	8834/ 348490	11385/ 449108
Revenues from the organisation of conferences	195/ 7692	339/ 13389	340/ 13395	520/ 20513	2131/ 84043
Total	10951/ 431967	11562/ 456113	12418/ 489870	16077/ 634225	23356/ 921310

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment: FEE implements an **extensive** and **comprehensive programme of popularisation of science and technology**, involving hundreds of teachers and students. We target a wide range of audiences - not only pupils, students and teachers, but also families with children and adults in the context of lifelong learning. We reach hundreds of thousands of people on social media, and tens of thousands of visitors attend our events each year. FEE is also the most active part of CTU in terms of

media presentation. In the period under review, our media monitoring recorded more than **7,700 media appearances** of our academic staff on television, radio, in print and on the Internet. Ten examples of our PR activities include:

Media presentation of FEE CTU

As of 2021, we have the highest number of media outputs of all faculties and in 2024 we will reach 28% share. Popularisation in the media is possible due to the fact that our researchers are very actively involved.

Knowledge competitions and Olympiads for secondary schools

FEE organises a successful [Robo Competition](#) in programming robots from the Lego Mindstorms kit and an [Electrotechnical Olympiad](#). We are also partners of the [Energy Olympiad](#) and the [Technology Olympiad](#).

[eForce Prague Formula](#)

A team of students from FEE CTU and FS CTU develops autonomous electroformulas, with which they score points on European Formula Student race tracks. eForce is also the most successful student electroformula team in the Czech Republic.

Events for the general public

FEE participates in the [Night of Scientists](#), [Comic-Con](#), [ABC Festival](#), [Science Fair](#) and [ScienceFest](#) - it presents robots, eForce, soldering courses, etc. It is also involved in the [Open House](#) urban architecture festival.

Social networks

Social media videos are a great way to get the younger generation excited about technology and to dispel the preconception that science is only for the chosen few. Every year we [publish](#) more than 15 videos in this way.

Programmes for secondary schools

FEE [Open Days](#) are held twice a year in person and once online. FEE organizes excursions for students of secondary schools. Within the [framework of partnership](#), it currently cooperates with 14 secondary schools - 10 secondary schools and 4 grammar schools.

[Physics Thursdays](#) (in Czech)

A free series of lectures and seminars organised by the Department of Physics of FEE CTU for students, teachers and professionals as well as the wider public. Each week, scientists from different disciplines come to FEE.

Adventure Pedagogy - Summer Camps

The [CTU Children's University](#) is for primary school students in grades 1-8; after workshops and competitions, they will have a graduation ceremony at Bethlehem Chapel. [FEL Camp](#) is for high school students who learn technology through a full-camp play.

Popularizing science and technology for women and girls

FEE is committed to engaging women and girls in science. With FJFI, it organizes the [Become a Woman Scientist](#) for a Day event, full of lectures and exercises. In addition, FEE students from [wITches](#) organise programming workshops for children.

Afternoon clubs

The [ECT22](#) club teaches pupils the basics of electrical and electronics engineering through experiments before they start university. The [Radio club](#) teaches interested students from both university and high school how to make a working radio receiver and transmitter.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Improvement of the weak departments.

To support the R&D activities of departments with development potential we use "[CTU FEE Grant: 'PhD Study with a Distinguished External Co-Supervisor'](#)" which is aimed at departments placed in the latest quartil in department order sorted according to the R&D performance measured by our [Criteria for the Evaluation of Scientific Research Activities at FEE](#). Another measure adopted to support these departments is [Vice-Dean's Award for PhD-authored Papers in Top Journals](#), which financially supports students who publish in the relevant journals of Q1, Q2 according to their IF. The CTU FEE Grant has been awarded 9 times since 2021.

Intellectual property rights (IPRs).

We are using various European Patent Attorney offices according to the field of invention. For the cooperation with partners outside Europe, the non-European Patent Attorney offices of our partners are utilized. Czech Patent Attorneys are preferably committed to taking care of the locally protected IP by the Industrial Property Office of the Czech Republic.

We are striving for high-quality IP with high commercialization potential. Our strategy for high royalties is based on supporting the patents with a high content of attractive industrial secrets.

The relative share of US, Japanese, and EU patents in the total number of patents in 2019-23, compared to 2014-18, has increased to 27/62 from 12/53.

The duration of PhDs. 4 years is a must.

In order to shorten the study period until the submission of the dissertation to the standard period (4 years), we are gradually taking a number of measures. At the university level, we have legislatively (restrictively) reduced the maximum time to submit a dissertation from 7 to 6 years in the Study and Examination Code in 2021. At the faculty level, we take more motivational measures, e.g. we award the Dean's Prize for an outstanding dissertation to those theses that are submitted in less than 5 years from the start of the candidate's studies, we directly financially motivate supervisors of those students who submit their theses within 4 or 5 years, at the departmental level, within the rules of distribution of financial resources, we bonus the submission of theses within the standard time (double weight compared to those submitted later), and we try to come up with other motivational measures. In 2014-2018, the number of dissertations submitted within five years of enrolment was 23%, 24%, 23%, 25%, and 20%, respectively. In 2019-2023, the figures were 23%, 23%, 30%, 36%, and 48%.

Applied research, contract projects

The Faculty intentionally keeps the administration overhead at a minimum by providing a one-page template to investigators. Smaller projects are often used to test the initial cooperation, with the possibility of following larger projects.

PhD students are primarily supported by basic and applied research grants, secondarily by industrial R&D contracts. However, some of the contractual research agreements directly support PhD students in their research.

The continuous growth of income from non-public sources can be documented by the total income of CZK 89M in 2022, followed by CZK 134M in 2023.

Applied research results with an existing or prospective economic impact on society

Our faculty has repeatedly [contributed](#) significantly to the national list of selected results with social impact within the governmental [Methodology Evaluation of Research Organizations](#) in both categories - Contribution to the current state of science and Social relevance. The selected results are explicitly peer-evaluated and are reflected in the faculty scheme for evaluating scientific results.

Significant applied research results with other than economic impact one on society

The number of projects between units within CTU and in collaboration with other universities has been growing quite rapidly in recent years. There were, for example, [CAP](#) (2017-2023) where FEE cooperated with another CTU part, University Center for Energy Efficient Buildings, [EcoStor](#) (which officially started in January 2024, but was prepared and approved in the period under review) where FEE participates on the project lead by University of Chemistry and Technology (VŠCHT) in work packages: Batteries and supercapacitors, Power-2-X, Solar-2-X, Molecular design in energy storage and conversion, Engineering of storage and conversion systems.

FEE is also active in the program [EuroTeQ Collider](#), a new type of student project course organized within the EuroTeQ alliance, where multidisciplinary students from partnering schools solve real-world challenges provided by a company or research institute.

System and support of technology transfer and intellectual property protection

We have established a new Technology Transfer Team (TTT) at the faculty, which is methodically managed by the Vice Dean for Cooperation with Industry and Commercialization who has been working for a long time (2007-2025) in companies like ABB Switzerland Ltd., Semiconductors. The TTT provides support in obtaining industrial property protection for results with application potential, contract preparation, market research, and support for the establishment of spin-off and start-up companies. He works closely with the Rectorate's Technology Transfer Department.

Faculty TTT, in cooperation with the CVUT Technology Transfer and Fundraising Office (TTFO), supports the set-up of **spin-off companies** according to a defined strategy: simple & transparent licensing of IP generated and owned by CVUT under standard conditions to the newly established CVUT spin-off. Starting from the proposal for commercialization, the new company staff is guided by the TTT and TTFO teams through the initial legal procedure. Hereby, the set-up time of a spin-off is significantly shortened to a few weeks.

Recognition by the international R&D&I community

In order to adopt good practices from abroad more widely, we have adopted a measure aimed at PhD students called ["PhD Study with a Distinguished External Co-Supervisor"](#), which aims to promote international co-supervision of PhD students and to establish an international relationship. We have also launched a faculty program to financially support doctoral students' internships at foreign institutions. Similar support is provided to academic staff by the university, with the faculty participating financially.

Detailed responses, broken down according to the original numbering used in the 2020 report, are provided in Appendix A.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)
Annual report 2023	3.1	annual report 2023 https://fel.cvut.cz/dokumenty/ke-stazeni/vyrocnizprava2023.pdf

DARPA – News - Rolling, Walking, Flying, and Floating, SubT Challenge Teams Traverse The Tunnel Circuit	3.2.1	https://www.darpa.mil/news-events/2019-08-22
FEE CTU – AI Center – Award - Bronz from the DARPA Subterranean Challenge Urban Circuit	3.2.1	https://www.aic.fel.cvut.cz/news/bronz-from-the-darpa-subterranean-challenge-urban-circuit
DARPA – News - SubTerraanean Challenge, Final Event Virtual Competition	3.2.1	https://www.darpa.mil/news-events/2021-09-24a
Multi-Robot Systems Group – FEE CTU - MBZIRC 2020 – about the Competition	3.2.1	https://mrs.fel.cvut.cz/competitions/mbzirc2020-compe
Werner von Siemens Prize – Winner 2022	3.2.1	https://www.cenasiemens.cz/minule-rocniky/vitezove-2022/#prumysl-40
Werner von Siemens Prize – Winner 2023	3.2.1	https://cyber.felk.cvut.cz/news/werner-von-siemense-awards-2023/
IEEE AP-S Awards 2023	3.2.1	https://ieeeaps.org/awards/winners-of-2023-ap-s-awards-announced
The British Machine Vision Association and Society for Pattern Recognition	3.2.1	https://bmvc2022.org/programme/paper-awards/
Joseph Fourier Prize	3.2.1	http://sami.fel.cvut.cz/CenaJF.pdf
Neuron Prize 2023	3.2.1	https://www.nadaceneuron.cz/person/computer-science
SIGEVO Impact Award	3.2.1	https://dl.acm.org/doi/10.1145/1830761.1830790
The Global Undergraduate Awards -Mathematics & Physics	3.2.1	https://cyber.felk.cvut.cz/cs/news/dominika-buresovas-achievement-in-the-global-undergraduate-awards/
International Journal of Computer Vision – Springer nature link - Home	3.2.2	https://www.springer.com/journal/11263
International Journal of Computer Vision – Current Issue	3.2.2	http://www.ijcv.org/

IEEE Transactions on Information Forensics and Security - Home	3.2.2	http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=10206
IEEE Transactions on Automation Science and Engineering – T-ase – Editorial Board	3.2.2	https://www.ieee-ras.org/publications/t-ase/editorial-board
Control Engineering Practice – about the Journal	3.2.2	https://www.sciencedirect.com/journal/control-engineering-practice
Measurement - about the Journal	3.2.2	https://www.journals.elsevier.com/measurement
Computers & Security - about the Journal	3.2.2	https://www.journals.elsevier.com/computers-and-security
IEEE Open Journal of Intelligent Transportation Systems - Home	3.2.2	https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=8784355
Evolutionary Computation – about the Journal - Current Issue	3.2.2	http://www.mitpressjournals.org/loi/evco
Machine Learning - Springer Nature Link - Home	3.2.2	https://link.springer.com/journal/10994
VISIGRAPP 2019 – Keynote Lectures	3.2.3	14th International Conference on Computer Graphics Theory and Applications VISIGRAPP2019
EUCAP 2021 – Invited and Keynote Speakers	3.2.3	https://www.eucap2021.org/conference/invited-and-keynote-speakers_new
IEEE Events Hosting Service - Home	3.2.3	https://ieee-wf-5g.org/optical-wireless-communication-owc/
MRC - LMB Symposium - Welcome	3.2.3	https://www3.mrc-lmb.cam.ac.uk/sites/gsasymposium/
IEEE LARS 2023 – Keynote Speakers	3.2.3	20th IEEE Latin American Robotics Symposium - LARS 2023
	3.2.3	https://comunidad.udistrital.edu.co/ciect14/programacion/
STARFOS – RCI - Finance	3.3	Research Center for Informatics (RCI) https://starfos.tacr.cz/en/projekty/EF16_019%2F0000765#project-finance
Jakub Mareček – Google Scholar	3.3	Jakub Marecek https://scholar.google.com/citations?hl=en&user=Ew8TNsMAAAAJ
STARFOS – Projects – Centre of Advanced Photovoltaics – Basic information	3.3	Centre of Advanced Photovoltaic (CEP) https://starfos.tacr.cz/en/projekty/EF15_003%2F0000464#project-main

FEE CTU – Centre of Advanced Photovoltaics - Home	3.3	faculty www http://cap.fel.cvut.cz/en/
STARFOS – Projects - Future Electronics for Industry 4.0 and Medical 4.0 – Basic information	3.3	Future Electronics for Industry 4.0 and Medical 4.0 (FEIM) https://starfos.tacr.cz/en/projekty/TN02000067#project-main
Humancompatible.org - Home	3.3	Human-Compatible Artificial Intelligence with Guarantees https://humancompatible.org/
STARFOS – Projects - Research Infrastructure for Doctoral Programmes at CTU FEE – Basic information	3.3	Research Infrastructure for Doctoral Programmes at CTU FEE https://starfos.tacr.cz/en/projekty/EF16_017%2F0002280
FEE CTU – Advanced Materials Group – Nano - Home	3.3	Novel nanostructures for engineering applications https://nano.cvut.cz/nanostructures-for-engineering-applications
TRACE Lab - Home	3.3	https://www.trace-lab.com/
Center for Robotics and Autonomous Systems – DARPA Sub-T	3.3	DARPA Subterranean Challenge https://robotics.fel.cvut.cz/cras/darpa-subt/
Multi-Robot Systems Group – FEE CTU - MBZIRC 2020 – about the Competition	3.3	MBZIRC Challenge https://mrs.fel.cvut.cz/mbzirc2020
Green Code – About VRUT	3.3	VRUT system development (Virtual Reality Universal Toolkit) https://www.greencode.cz/en-blog/about-vrut
Department of Computer Science, FEE CTU – AAICL - Home	3.3	Avast AI and Cybersecurity Laboratory at FEE CTU (AAICL) https://cs.fel.cvut.cz/en/page/aaicl-avast-ai-and-cybersecurity-laboratory
Patent US10849139 - Hierarchical resource scheduling method of wireless communication system	3.4	https://patents.google.com/patent/US10849139B2/en
Patent US10624105 - Hierarchical resource scheduling method of wireless communication system	3.4	https://patents.google.com/patent/US10624105B2/en
Patent CN107492143 (2021) - Illumination-guided example-based stylization of 3D renderings	3.4	https://patents.google.com/patent/CN107492143B

Patent GB2551873 (2019) - Illumination-guided example-based stylization of 3D renderings	3.4	https://patents.google.com/patent/GB2551873B
Patent US10176624B2 (2019) - Illumination-guided example-based stylization of 3D renderings	3.4	https://patents.google.com/patent/US10176624B2
CORDIS - EU research results – Automated Urban Parking and Driving – Fact Sheet	3.4	https://cordis.europa.eu/project/id/688652
European Patent Register - Orthogonal fluxgate sensor	3.4	https://register.epo.org/application?number=EP18181052&tab=main
Espacenet – Data of Patent - A Method of Determining Systolic and Diastolic Blood Pressure and the Unit for This Method	3.4	https://worldwide.espacenet.com/publicationDetails/biblio?CC=EP&NR=3010400B1&KC=B1&FT=D&ND=4&date=20190731&DB=EPODOC&locale=en_EP
Operator – FEE CTU - Home	3.4	https://operatorzos.fel.cvut.cz/
ETSI – Technical Report - Gender-related aspects of listening quality and effort in speech communication systems	3.4	https://www.etsi.org/deliver/etsi_tr/103900_103999/103950/01.01.01_60/tr_103950v010101p.pdf
Science & Technology Organization - NATO STO announces winners of 2025 NATO Chief Scientist Grants	3.4	https://www.sto.nato.int/SitePages/newsitem.aspx?ID=3959
ctu-mrs/mrs_uav_system - Code	3.4	https://github.com/ctu-mrs/mrs_uav_system
Multi-Robot Systems Group – FEE CTU - MBZIRC 2020 – about the Competition	3.4	https://mrs.fel.cvut.cz/mbzirc2020
Multi-Robot Systems Group – FEE CTU - Dronument	3.4	http://mrs.felk.cvut.cz/projects/dronument
Robo Competition – FEE CTU - Home	3.6	Robo Competition https://robosoutez.fel.cvut.cz/?gad_source=1&gclid=Cj0KCQjw-e6-BhDmARIsAOxxlxXH0RmJStnygW8ROHviYjm3zPK43u-ODmFSNejukur6p79JjqK9MadcaAi15EALw_wcB
Electrotechnical Olympiad – FEE CTU - Home	3.6	Electrotechnical Olympiad https://go2.fel.cvut.cz/
Energy Literacy - Olympiad	3.6	Energy Olympiad

		https://www.energeticka-gramotnost.cz/olympi%C3%A1da
Technology Literacy - Olympiad	3.6	Technology Olympiad https://www.technologicka-gramotnost.cz/olympiada/
EFORCE Prague Formula – FEE CTU - Home	3.6	eForce Prague Formula https://eforce.cvut.cz/
FEE CTU - What's on - News	3.6	Night of Scientists https://fel.cvut.cz/cs/aktualne/novinky/36022-noc-vedcu-na-fel-ukaze-jak-planovat-trasy-s-roboty-i-efektni-mlznou-komoru
FEE CTU – What's on - News	3.6	Comic-Con https://fel.cvut.cz/en/what-s-on/news/33750-fel-entertained-people-with-robots-van-de-graaff-soldering-and-vr-applications-at-comic-con-prague
FEE CTU – What's on - News	3.6	ABC Festival https://fel.cvut.cz/cs/aktualne/novinky/33799-fel-cvut-na-festivalu-abc-ukaze-roboty-i-technologicky-cirkus-vyzkousite-si-i-simulator-formule
FEE CTU – What's on - News	3.6	Science Fair https://fel.cvut.cz/en/what-s-on/news/35344-fee-ctu-will-show-a-balancing-robot-at-sciencefest-you-can-also-try-a-formula-simulator-or-soldering
FEE CTU – What's on - News	3.6	ScienceFest https://fel.cvut.cz/en/what-s-on/news/33946-fee-will-show-a-robotic-zoo-and-robot-rescuers-at-the-science-fair-you-will-also-get-an-unusual-souvenir
FEE CTU – What's on - News	3.6	Open House https://fel.cvut.cz/en/what-s-on/news/33887-open-house-prague-fee-ctu-will-make-santini-chapel-accessible-through-virtual-and-augmented-reality
Instagram – Profile FEE CTU	3.6	publish https://www.instagram.com/cvutfelpraha/?hl=cs
FEE CTU – What's on - News	3.6	Open Days https://fel.cvut.cz/en/what-s-on/news/33423-open-day-photo-gallery
FEE CTU - Cooperation	3.6	framework of partnership https://fel.cvut.cz/en/cooperation/for-high-school-associated-with-our-faculty

FEE CTU – Department of Physics – Teaching and Popularization	3.6	Physics Thursdays https://phys.fel.cvut.cz/en/about-the-department/#
FEE CTU – What's on - News	3.6	CTU Children's University https://fel.cvut.cz/en/what-s-on/news/35614-science-and-technology-are-cool-fresh-graduates-of-the-ctu-children-s-university-know
FEL Camp - Home	3.6	FEL Camp https://camp.fel.cvut.cz/
FEE CTU – What's on - News	3.6	Become a Woman Scientist https://fel.cvut.cz/en/what-s-on/news/33366-dozens-of-female-students-at-the-become-a-scientist-for-a-day-event-got-a-glimpse-into-physics-electrical-engineering-mathematics-and-it-research
wITches – FEE CTU - Home	3.6	wITches https://witches.fel.cvut.cz/
Embedded server – FEE CTU – Courses – ETC22	3.6	ECT22 https://embedded.fel.cvut.cz/kurzy/etc22
RADIOCLUB – FEE CTU - News	3.6	Radio club https://radioklub.fel.cvut.cz/en/category/news/
FEE CTU – What's on - News	3.7	contributed https://fel.cvut.cz/en/what-s-on/news/36949-fee-ctu-holds-the-leading-position-in-the-evaluation-of-research-at-electrical-engineering-faculties-in-the-czech-republic
Ministry of Education, Youth and Sports – Research and Development – Documentation for Evaluation	3.7	Methodology Evaluation of Research Organizations https://msmt.gov.cz/research-and-development-1/documentation-for-evaluation-of-research-organisations-in?lang=2
FEE CTU – Intranet - Research	3.7	Criteria for the Evaluation of Scientific Research Activities at FEE, https://intranet.fel.cvut.cz/en/research/vvvs/kriteriavvc.html
CAP - FEE CTU - Home	3.7	CAP http://cap.fel.cvut.cz/en/

University of Chemistry and Technology – Research - EcoStor	3.7	EcoStor https://www.vscht.cz/veda-a-vyzkum/vyzkumny-profil-vscht-praha/resene-projekty/esf/op-jak-2021-2027/ecostor-cz
EUROTEQ - CTU– Students – EuroTeq Collider	3.7	EuroTeQ Collider https://euroteq.cvut.cz/en/students/euroteq-collider/
FEE CTU – Intranet – Students – PhD Study with a Distinguished External Co-Supervisor	3.7	CTU FEE Grant: 'PhD Study with a Distinguished External Co-Supervisor https://intranet.fel.cvut.cz/en/education/phd/ctu-fee-grant.html
EUROTEQ - CTU – About us	3.7	EuroTeQ https://euroteq.cvut.cz/en/about-us/
FEE CTU – Intranet – Students – Vice-Dean's Award for PhD-authored Papers in Top Journals	3.7	Vice-Dean's Award for PhD-authored Papers in Top Journals https://intranet.fel.cvut.cz/cz/education/phd/ViceDean%20Award%20Top%20Journal%20_v7
CTU FEE Grant	3.7	https://intranet.fel.cvut.cz/en/education/phd/ctu-fee-grant.html
Vice-Dean's Award	3.7	https://intranet.fel.cvut.cz/cz/education/phd/ViceDean%20Award%20Top%20Journal%20_v7
1. – FEE CTU – What's on – News – First Award	3.7	https://fel.cvut.cz/cs/aktualne/novinky/35598-prvni-oceneni-vice-dean-s-award-for-phd-authored-papers-in-top-journals-ziskal-ing-filip-baum
2. – FEE CTU – What's on – Events – Presentation	3.7	https://fel.cvut.cz/en/what-s-on/events/35953-presentation-by-ing-filip-baum

Appendix A

Detailed responses for section 3.7, broken down according to the original numbering used in 2020 report.

Self-assessment: Recommendations of MEP 2020 to individual sections and in general and our response to them. The verbatim text of the recommendation is in *italics*.

3.2 Applied research projects

Recommendation: *It might be discussed in FEE whether the overhead for establishing many very small projects still ensures a balance between effort and benefit.*

Response: Small projects are also very beneficial for us. Faculty intentionally keeps the administration overhead at minimum, by providing a one-page template to investigators. A small project is often used to test the initial cooperation with a company, with possible following of larger projects.

3.3 Contract research

Recommendation: *It might be discussed in FEE if the workload on the research staff for industrial R&D is in a good balance with the scientific work, particularly considering the partly extremely long duration of PhDs.*

Response:

PhD students are primarily supported by basic and applied research grants, secondarily by industrial R&D contracts, which are short-term and cannot be aligned with the topic of the PhD. Most of the contract research work is done by researchers, R&D personnel, assistant professors and postdocs. For the academics, participation in industrial R&D is always a matter of their personal preferences, the income and the work are treated as “on top of the standard contract”. It is the role of the head of the department to reduce involvement of an academic, if it interferes with his other duties.

3.4 Revenues from non-public sources (besides grants or contract research) from research work

Recommendation: *Over the years, the budget from non-public sources could be maintained on high levels better.*

Response: The continuous growth of income from non-public sources can be documented by the total income of CZK 89M in 2022 followed by CZK 134M in 2023. The total income from license agreements was CZK 102k in 2022 followed by CZK 342k in 2023.

3.5 Applied research results with an existing or prospective economic impact on society

Recommendation: *Excellent. Should be continued and extended, where possible, trying to increase the quality of publications in terms of publishing journals, as well as in terms of improving the number of publications in the mentioned weak departments.*

Response: We continued and extended. Our faculty has repeatedly [contributed](#) significantly to the national list of selected results with social impact within the governmental [Methodology Evaluation of Research Organizations](#) in both categories - Contribution to the current state of science and Social relevance. The selected results are explicitly peer-evaluated and are reflected in the faculty scheme of evaluating scientific results. Scientific results of the faculty are also peer-evaluated at the regular 5-year evaluation/attestation procedure. The quality of publications is monitored, including IF, and bonused in the [Criteria for the Evaluation of Scientific Research Activities at FEE](#), which are the basis for the allocation of budget funds for the conceptual development of our 17 departments.

3.6 Significant applied research results with other than an economic impact one on society

Recommendation: *It might be discussed in FEE how to increase this kind of interdisciplinary projects and furthermore, how to create a scientific culture at CVUT for institutionally incubating this kind of cross-faculty project initiatives. Also inside of FEE, there could be more pro-active consideration of cross-department projects with global impact, i.e. on global challenges such as “Smart Grids and Smart Cities” (combining power engineering, control systems, communication engineering, economy, and humanities).*

Response: The number of projects between units within CTU and in collaboration with other universities has been growing quite rapidly in recent years. In the period under review, in the mentioned areas, there were, for example, [CAP](#) (2017-2023) where FEE cooperated with another CTU part, University Center for Energy Efficient Buildings (UCEEB), [EcoStor](#) (which officially started in January 2024, but was prepared and approved in the period under review) where FEE participates on the project lead by University of Chemistry and Technology (VŠCHT) in work packages: Batteries and supercapacitors, Power-2-X, Solar-2-X, Molecular design in energy storage and conversion, Engineering of storage and conversion systems.

FEE is also active in the program [EuroTeQ Collider](#), a new type of student project course organized within the EuroTeQ alliance, where students solve real-world challenges provided by a company or research institute. Students work in multidisciplinary teams and come from multiple faculties. Additionally, the Collider is open to all students from the partner schools, so the teams can also have foreign students.

3.7 The evaluated unit's most significant interactions with the non-academic application/corporate sphere

Recommendation: *Excellent!*

Response: Thank you for appreciation.

3.8 System and support of technology transfer and intellectual property protection

Recommendation: *It might be discussed in FEE whether the basic and applied research are well balanced. More importantly, it is necessary to perform the optimum exploitation strategy with respect to the results achieved.*

Response: We have established a new Technology Transfer Team (TTT) at the faculty, which is methodically managed by the Vice Dean for Cooperation with Industry and Commercialization, prof. Jan Vobecký, who has been working for a long time (2007-2025) in the private company ABB Switzerland Ltd. Semiconductors and Hitachi Energy as the Bipolar business unit portfolio manager of the company's IP department.

The TTT provides support in obtaining industrial property protection for results with application potential (inventions, utility models, trademarks, trade secret protection), contract preparation, market research, support for the establishment of spin-off and start-up companies. He works closely with the Rectorate's Technology Transfer Department. More information can be found in section 3.5.

3.9 Strategy for setting up and support of spin-off firms or other forms of commercialisation of R&D&I results:

Recommendation: - (any)

Response: Our newly established Technology Transfer Team (TTT) at the faculty in cooperation with the CVUT Technology Transfer and Fundraising Office (TTFO) supports the set-up of spin-off firms according to defined strategy: simple & transparent licensing of IP generated and owned by CVUT under standard conditions to the newly established CVUT spin-off. Starting from the proposal for commercialization, the new company staff is guided by TTT and TTFO teams through the initial legal

procedure up to the CVUT Tech s.r.o. Board of supervisors. Hereby, the set-up time of a spin-off is significantly shortened.

3.10 The most significant individual awards for R&D&I

Recommendation: *excellent*

Response: Thank you for appreciation.

3.11 Recognition by the international R&D&I community (elected membership in international scientific societies, participation on the editorial boards of international scientific journals, invited lectures at institutions abroad etc.)

Recommendation: *FEE might discuss how to set incentives for the others who are not yet internationally engaged.*

Response: In order to adopt good practices from abroad more widely, we have adopted a measure aimed at PhD students called "[CTU FEE Grant: 'PhD Study with a Distinguished External Co-Supervisor'](#)", which aims to promote quality supervision of PhD students and to establish a relationship with an expert with the potential to improve the quality of research of the PhD student and the department. This instrument is available only to departments with below average performance and it is intended both to contribute to the PhD income and to cover the student's travel and living expenses at the distinguished supervisor's workplace and the supervisor's stay at the FEE.

We have also launched a faculty program to financially support doctoral students' internships at foreign institutions. Similar support is provided to academic staff by the university, with the faculty participating financially.

3.12 The most significant activities in the popularisation of R&D&I and communication with the public

Recommendation: *Follow the example of sensor on line courses.*

Response: Covid restrictions in 2020-2022 have forced us to record our lectures and provide them as supplementary material to courses in general via our Moodle and CourseWare learning repositories. We are trying to expand our online course offering, for example, through the activities of the [EuroTeQ](#) joint executive program including micro certifications.

General recommendations

After the evaluation, the main points for improvement of the general assessment are related to:

1. Recommendation: *Improvement of the weak departments. Improvement of the already good FEE is the improvement of the relatively weak departments. The weak departments have to add new subjects, which are scientifically and socially attractive and interesting, namely:*

- *Micro-grids (concerning the power engineering and economics of energy). This is the major current issue in Europe, including renewables and storage.*
- *Micro- and nano- engines, MEMS and linear motors (concerning the electrical machines department). For these activities, proper personnel have to be engaged.*

Response: To support the R&D activities of "weak" departments (we rather officially call them departments with development potential, to speak positively about them), we use the same measure as mentioned in paragraph 3.11, "[CTU FEE Grant: 'PhD Study with a Distinguished External Co-Supervisor'](#)" which is aimed at departments placed in the latest quartil in department order sorted according to the R&D performance measured by our [Criteria for the Evaluation of Scientific Research Activities at FEE](#). Another measure adopted to support these departments is [Vice-Dean's Award for PhD-authored Papers in Top Journals](#) which financially supports students who publish in the relevant

journals of Q1, Q2 according to their IF. Until now, we supported these students with the following results:

CTU FEE Grant: has been awarded 9 times since 2021. Targeted departments have participated as follows: K113 Electrotechnology 4x, K115 Electrical Power Engineering 1x, K116 Economics, Management, and Humanities 4x. The number of journal publications has increased in the targeted departments (battery performance and their sustainability, engine control, etc. ...).

Vice-Dean's Award was awarded 2x to Ing. F. Baum for two IF papers in IEEE Transaction on Power Electronics, Q1 ([1.](#), [2.](#)).

2. Recommendation: *Intellectual property rights (IPRs). A carefully selected international patent agency will help in the optimum exploitation of the outcomes of the applied and basic research of FEE. The basis of collaboration will be royalties on their exploitation, thus not affecting the CTU budget.*

Response: We are using various European Patent Attorney offices according to the field of invention. For the cooperation with partners outside Europe, the non-European Patent Attorney offices of our partners are utilized. Czech Patent Attorneys are preferably committed to taking care of the locally protected IP by the Industrial Property Office of the Czech Republic.

We are striving for high quality IP with high commercialization potential. Our strategy for high royalties is based on supporting the patents with high content of attractive industrial secrets.

The share of US, Japanese and EU patents in the total number of patents in 2019-23 compared to 2014-18 was 27/62 and 12/53 respectively; see table. The numbers in 2019-20 are slightly higher than in other years due to the handling of large R&D projects where patents were one of the required outputs.

Result type / year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Patents US+Japan+EU	1	2	2	4	3	12	8	1	2	4
Patents totally	16	10	9	17	7	23	16	12	3	8

3. Recommendation: *The duration of PhDs. 4 years is a must. In order to avoid transient problems, a possible proposal could be the reduction of the maximum time of the PhD duration from 2N down to N+2, i.e. the reduction of the maximum time of the PhD duration from 8 years to 6 years.*

Response: In order to shorten the study period until the submission of the dissertation to the standard period (4 years), we are gradually taking a number of measures. At the university level, we have legislatively (restrictively) reduced the maximum time to submit a dissertation from 7 to 6 years in the Study and Examination Code in 2021. At the faculty level, we take more motivational measures, e.g. we award the Dean's Prize for an outstanding dissertation to those theses that are submitted in less than 5 years from the start of the candidate's studies, we directly financially motivate supervisors of those students who submit their theses within 4 or 5 years, at the departmental level, within the rules of distribution of financial resources, we bonus the submission of theses within the standard time (double weight compared to those submitted later), and we try to come up with other motivational measures. Here we show the numbers of students who have submitted a dissertation within a given number of years from enrolment, over a 10-year period covering the previous and current assessment period:

Year/ years	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
up to 4	5 (10%)	7 (14 %)	4 (9 %)	9 (14 %)	3 (6 %)	5 (11 %)	2 (6 %)	6 (15 %)	5 (19%)	7 (20%)
4 to 5	6 (13 %)	5 (10 %)	6 (14 %)	7 (11 %)	7 (14 %)	6 (13 %)	6 (17 %)	6 (15 %)	2 (7%)	10 (28%)

5 to 6	11 (23%)	5 (10 %)	8 (18 %)	6 (9 %)	5 (10 %)	9 (19 %)	3 (9 %)	3 (8 %)	2 (7 %)	1 (3 %)
6 to 7	26 (54%)	32 (65%)	26 (59%)	43 (66%)	34 (69%)	27 (57%)	23 (67%)	23 (61%)	18 (63%)	17 (49%)
Totally	48	49	44	65	49	47	34	38	27	35

In 2014-2018, the number of dissertations submitted within five years of enrolment was 23%, 24%, 23%, 25% and 20% respectively. In 2019-2023, the figures were 23%, 23%, 30%, 36% and 48%. It can be seen that in the last three years of the current evaluation period, the number of earlier submissions has been increasing, and even significantly in the last year.

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: Faculty of Nuclear Sciences and Physical Engineering

FORD: 1 - Natural sciences

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

The main purpose for which the Faculty of Nuclear Sciences and Physical Engineering (FNSPE) of the Czech Technical University (CTU) in Prague was founded in 1955, was to educate nuclear engineers in the Czech Republic (former Czechoslovakia), to foster and develop nuclear sciences in the country, and to maintain knowledge related to nuclear fields. Although we have approached many new areas of science and education since then, we remain faithful to this original purpose. It is as important as ever, due to the renaissance of nuclear energy in the Czech Republic.

The mission of FNSPE is to educate highly skilled professionals equipped with a robust foundation in mathematics, physics, and computer science, enabling them to excel in various sectors, including science, technology, informatics, medicine, and environmental policy. The faculty emphasizes interdisciplinary problem-solving and actively involves students in scientific and research teams early in their studies and academic career, fostering their personal and professional development.

In alignment with its mission, FNSPE envisions itself as an internationally competitive, research-oriented faculty with an international reputation based on long term excellence in science and engineering and for research and development outcomes that significantly contribute to scientific knowledge and societal well-being. The faculty is committed to conducting research in strategic areas of vital importance to society, to design and develop state-of-the-art technologies with

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

particular emphasis on environmental aspects, safety, and security, and in collaboration with top national and international partners face the contemporary challenges of the modern world.

FNSPE's research, development, and innovation activities have a profound societal impact, particularly in the following areas:

1. Energy Sector: The faculty plays a pivotal role in the energy sector by focusing on nuclear engineering and the development of advanced nuclear technologies. This includes research on fusion nuclear reactors and new generations of fission nuclear reactors, contributing to the global pursuit of clean, sustainable and environmentally friendly energy solutions. By training experts in nuclear engineering and fusion, FNSPE addresses the growing demand for clean energy and the need for a new generation of nuclear professionals, thereby supporting efforts to combat climate change.
2. Quantum Technologies: Recognizing the transformative potential of quantum technologies, FNSPE has established dedicated study programs and research initiatives in this field. Faculty collaborates with leading academic institutions, government bodies, and industry partners to explore and implement practical applications of quantum computing, communication, and cryptography. These efforts aim to revolutionize sectors such as cybersecurity, defence, and information processing, positioning the Czech Republic as a significant contributor to the global quantum technology landscape.
3. Radiological Physics and Environmental Monitoring: FNSPE's research extends to medical physics, where it develops advanced diagnostic and therapeutic techniques, and to environmental monitoring, focusing on the detection and analysis of radioactive substances. These contributions improve public health and safety by improving medical treatments and ensuring effective environmental protection measures.

The faculty operates a training light water zero power reactor VR-1. Its design satisfies the requirement of easy access to the reactor core to provide education to students and training to qualified staff in the nuclear industry. In 2023, a new nuclear facility (VR-2 reactor) was constructed and commissioned at the FNSPE. This subcritical assembly controlled by a neutron generator will also be used in the teaching of laboratory tasks for BSc, MSc, and PhD student theses, and, in addition to teaching activities, it will be used to carry out research experiments. Since 2020, the faculty has offered a doctoral study programme Safety and Security of Nuclear Installations and Forensics Analyses of Nuclear Materials with an ambition of global reach.

FSNPE is a significant player in the fusion community due to the combination of education and research with strong international involvement. FSNPE has full fusion curriculum on the national level (BSc, MSc and PhD), moreover is involved in the European Master programme Fusion EP, and has a Joint PhD Degree with the Gent University (since 2020). The students are involved in and getting familiar with all aspects of fusion technology since the very first year. Having programmes on the national level plus being part of the international degrees is a combination which covers the needs of Czech student, attracting students from abroad, and creating a multicultural environment. Students are supported by the international association for fusion education FuseNet, and the consortium EUROfusion, the key entities for fusion research and education in Europe. Faculty has its own fusion facilities, the Golem tokamak and the laboratory PlasmaLab@CTU, which places it among the best equipped universities for experimental training. Very important is a vivid connection with the Institute of Plasma Physics (IPP) of the Czech Academy of Sciences (CAS): many students

get trained at the CTU, working on their BSc, MSc and PhD thesis topics at the IPP, and are directly involved in high level international research including facilities such as ITER.

Since 2019, the faculty has offered a doctoral study programme Quantum Technologies, which is a multidisciplinary study programme and aims to educate top experts in the fields of quantum technologies, especially quantum physics based applications to information and communication, quantum optics, lasers, solids, nanomaterials, nanostructures and advanced methods of their characterisation and modelling, who will be involved in research and scientific and technical practice. This programme is closely linked to many faculty's research projects in the concerned fields.

Looking ahead, FNSPE has outlined several long-term goals to boost its impact on these fields:

- **Progress in Nuclear Technologies:** The faculty aims to continue its research into innovative nuclear reactor designs and fuel cycles, enhancing the safety, efficiency, and sustainability of nuclear energy production. This includes exploring fusion and next-generation reactors that promise cleaner and more efficient energy solutions.
- **Leadership in Quantum Research:** FNSPE aspires to be at the forefront of quantum technology research, focusing on developing practical applications and integrating quantum solutions into existing technological infrastructures. By fostering a collaborative network, the faculty seeks to drive innovation and maintain a competitive edge in the rapidly evolving field of quantum technologies.
- **Enhancement of Interdisciplinary Collaboration:** Recognizing the value of interdisciplinary approaches, FNSPE is committed to strengthening partnerships across various scientific domains and industries including space, medical and economic research. Emphasis is on developing various mathematical models for a wide range of applications to help understand and predict the behaviour of complex systems in these areas. This strategy aims to address multifaceted societal challenges through comprehensive research and knowledge-based teaching.

The faculty recognizes that it must align research and innovation and their outcomes with the values, needs and expectations of modern society. This means, naturally, conducting activities in a way that supports science education and top research through transparent management, commitment to gender, racial and ethnical equality, equal opportunities, ethical behaviour and open access to knowledge and data.

Through their initiatives, the FNSPE continues to contribute significantly to scientific advancement and societal progress, preparing its students and young researchers to become leaders and innovators in their respective fields.

Table 3.1.1 - Staffing per FTE²

Academic/ Professional position	Total / Of which women					
	2019	2020	2021	2022	2023	Total
Professor	24.3/3.0	24.3/3.0	24.3/3.0	26.0/3.0	28.2/3.0	127.0/15.0
Associate Professor	33.2/1.0	36.2/1.0	38.5/1.0	42.5/1.0	39.8/1.0	190.2/5.0
Assistant Professor	97.0/21.0	96.0/22.0	89.9/21.0	82.9/22.0	83.6/22.0	449.3/107.8
Assistant	1.0/0.0	1.0/0.0	1.0/0.0	1.0/0.0	1.0/0.0	5.0/0.0
R&D Personnel ³	21.4/10.5	22.5/11.3	24.0/12.5	25.7/12.7	28.1/12.0	121.7/58.9
Researchers in other categories ⁴	113.0/29.9	110.7/29.8	109.6/27.9	113.7/31.0	113.2/31.5	560.2/150.2
Technical and economic staff ⁵	64.9/50.5	71.1/54.7	70.6/55.3	66.0/50.9	66.5/50.6	339.1/261.9
Scientific, research and development staff involved in teaching activities	153.5/24.0	154.5/25.0	150.7/24.0	149.4/25.0	149.5/25.0	757.4/122.8
Early career researchers ⁶	141.3/33.6	135.5/34.1	129.9/30.7	123.3/32.6	111.4/32.2	641.3/163.3
Total ⁷	354.8/115.8	361.7/121.7	357.9/120.7	357.8/120.5	360.3/120.0	1792.4/598.7

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁸

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	1	1	4	0	11	1	16	1
Associate Professor	0	0	5	1	12	0	7	0	7	0	8	0
Assistant Professor	2	2	44	6	37	9	8	0	12	6	8	1
Assistant	0	0	0	0	0	0	1	0	0	0	0	0
R&D Personnel ⁹	18	8	8	5	3	2	7	2	2	1	1	0
Researchers in other categories ¹⁰	90	29	78	18	20	5	4	1	6	1	5	0
Technical and economic staff ¹¹	1	1	1	1	4	3	2	1	0	0	0	0
Scientific, research and development staff involved in teaching activities	2	2	49	7	50	10	20	0	30	7	32	2
Early career researcher ¹²	92	31	127	25	0	0	0	0	0	0	0	0
Total ¹³	111	40	136	31	77	20	33	4	38	9	38	2

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁴

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	5	1	4	0	9	1	17	1
Associate Professor	0	0	0	0	21	1	6	0	9	0	8	0
Assistant Professor	0	0	25	6	43	11	12	2	10	5	4	1
Assistant	0	0	0	0	0	0	1	0	0	0	0	0

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

R&D Personnel ¹⁵	17	8	19	9	4	2	3	0	3	2	2	1
Researchers in other categories ¹⁶	62	20	89	24	33	7	6	1	1	0	5	1
Technical and economic staff ¹⁷	2	1	0	0	1	0	3	3	1	0	0	0
Scientific, research and development staff involved in teaching activities	0	0	25	6	69	13	23	2	28	6	29	2
Early career researcher ¹⁸	62	20	114	30	0	0	0	0	0	0	0	0
Total ¹⁹	81	29	133	39	107	22	35	6	33	8	36	4

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students

Type of study	2019		2020		2021		2022		2023		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate	628	227	706	251	691	230	889	275	792	226	3706	1209
Master's ²⁰	195	74	208	68	211	68	204	67	206	62	1024	339
Doctoral	273	62	287	72	281	78	273	79	264	81	1378	372
Lifelong Learning Courses	28	17	105	52	96	44	64	32	107	38	400	183
Total	1124	380	1306	443	1279	420	1430	453	1369	407	6508	2103

Table 3.1.5 - Study programmes in Czech/English

Type of study programme	Total ²¹ / Of which professional study programmes											
	2019		2020		2021		2022		2023		Total	
Undergraduate	2/0	0/0	11/0	0/0	13/0	0/0	16/3	0/0	16/3	0/0	58/6	0/0
Master's	2/1	0/0	17/2	0/0	18/1	0/0	20/3	0/0	17/1	0/0	74/8	0/0
Doctoral	4/2	0/0	9/4	0/0	15/7	0/0	15/7	0/0	22/9	0/0	65/29	0/0

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

Lifelong Learning courses	1/0	0/0	13/0	9/0	20/0	17/0	16/0	14/0	23/0	16/0	73/0	56/0
Total	8/3	0/0	37/6	0/0	46/8	0/0	51/13	0/0	55/13	0/0	197/43	0/0

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
1. Natural Sciences	1.1 Mathematics	10.8	Balanced basic and applied research	80.5
	1.2 Computer and information sciences	1.7	Applied Research	
	1.3 Physical sciences	57.9	Balanced basic and applied research	
	1.4 Chemical sciences	8.6	Balanced basic and applied research	
	1.5 Earth and related environmental sciences	0.7	Applied Research	
	1.6 Biological sciences	0.4	Applied Research	
	1.7 Other natural sciences	0.4	Balanced basic and applied research	
2. Engineering and Technology	2.1 Civil engineering	0.2	Applied Research	18.2
	2.2 Electrical engineering, Electronic engineering, Information engineering	4.6	Balanced basic and applied research	
	2.3 Mechanical engineering	4.4	Balanced basic and applied research	
	2.4 Chemical engineering			
	2.5 Materials engineering	6.2	Balanced basic and applied research	
	2.6 Medical engineering	0.2	Applied Research	
	2.7 Environmental engineering			
	2.8 Environmental biotechnology			
	2.9 Industrial biotechnology			
	2.10 Nanotechnology	2.1	Balanced basic and applied research	
	2.11 Other engineering and technologies	0.5	Applied Research	
3. Medical and Health Sciences	3.1 Basic medicine			0.9
	3.2 Clinical medicine	0.4	Applied Research	
	3.3 Health sciences			

	3.4 Medical biotechnology	0.5	Applied Research	
	3.5 Other medical sciences			
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries			
	4.2 Animal and Dairy science			
	4.3 Veterinary science			
	4.4 Other agricultural sciences			
5. Social Sciences	5.1 Psychology and cognitive sciences			0.3
	5.2 Economics and Business	0.1	Applied Research	
	5.3 Education	0.2	Applied Research	
	5.4 Sociology			
	5.5 Law			
	5.6 Political science			
	5.7 Social and economic geography			
	5.8 Media and communications			
	5.9 Other social sciences			
6. Humanities and the Arts	6.1 History and Archaeology	0.1	Applied Research	0.1
	6.2 Languages and Literature			
	6.3 Philosophy, Ethics and Religion			
	6.4 Arts (arts, history of arts, performing arts, music)			
	6.5 Other Humanities and the Arts			
Total		100 %	-	100 %

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

The faculty is highly research-oriented and is closely collaborating with the Academy of Sciences and other Czech and international research universities and institutes, both through research collaboration and the involvement of their scientists in teaching. The organization of lectures and short and/or long research stays for invited foreign guests is one of the traditional enrichments of both teaching for students and everyday scientific life of the faculty staff.

The faculty aims not only on fundamental research but also on mathematical solutions of engineering problems; the development of novel mathematical algorithms, new physical methods of measurements, control, and modelling; and the development of new technologies used, for example, for lasers, semiconductors, materials, physical chemistry, cosmic research, biomedicine; etc., which allows the faculty to be well integrated into international research networks.

Faculty members are very active in the international scientific community. The scientific level of the faculty staff is also reflected in the fact that they are often invited to international collaborations, including positions of high responsibility. Among the most prestigious collaborations is certainly the participation in CERN, but other collaborations are also very important, such as the participation in Brookhaven National Laboratory, Fermilab, ITER via EuroFusion, FuseNet, COST or the cooperation with EUROATOM, International Atomic Energy Agency and many others.

The contributions of the faculty members are also recognized by invitations to serve the community in various roles in editorial boards, committees and supervising bodies as well as in evaluation panels. Serving on these committees, editorial boards, and panels is highly encouraged and is also reflected in career advancement and upgrading at the faculty (e.g., during habilitation procedures and professorships).

Dissemination through publication in scientific journals and presentation of the latest results at conferences is an integral part of scientific work. Faculty encourages the publication in high-impact journals and high-end conferences by supporting the participation. The outputs of faculty members are often recognized both by awards for the best paper/presentation/poster and by the very fact that faculty members are often among the invited speakers at prestigious conferences.

The faculty also cares about and emphasizes the involvement of young research staff and students at all levels of study, which is reflected in numerous awards received. The awards received are announced every year in the annual reports and communicated to the public via the faculty web pages and social media.

All of this can only be possible through the connection between science and teaching and through the consistent involvement of students at all levels of study from undergraduate, through master's and doctoral (postdoctoral) in cutting-edge research performed at the faculty.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
Tomáš Čechák Prof. Ing., CSc.	Extraordinary award for his contribution to the development of the Czech Metrology Institute and the national metrology system of the Czech Republic, 2023	Czech Metrology Institute
Igor Jex, Prof. Ing. DrSc., Craig Hamilton, Ph.D.	Award of the Rector of the CTU in Prague for the best scientific result, 2020	Czech Technical University in Prague
Petr Hauschwitz, Ing. Ph.D.	Werner von Siemens award 2021 – best dissertation thesis	Siemens
Igor Jex, Prof. Ing. DrSc.	Member of Academiae Europae 2021	Academiae Europae
Jaroslav Klusoň, doc. Ing. CSc, Tomáš Urban, Ing. Ph.D.	Award of the Minister of the Interior for extraordinary results in the field of security research for the year 2020	Minister of the Interior of the Czech Republic
Monika Kučeráková, Ing. Ph.D.	Otto Wichterle Prize for outstanding young scientists, 2022	Academy of Sciences of the Czech Republic
Marek Matas, Ing. Ph.D.	Henri Becquerel Prizes for Nuclear Research, 2020	French Embassy, EDF, ATMEA
Jana Matoušková, Ing. Ph.D.	Henri Becquerel Prizes for Nuclear Research, 2023	French Embassy, EDF
Martin Ševeček, Ing. Ph.D.	Nuclear Innovation Prize, 2023	EURATOM, European Commission
Vojtěch Vaněček, Ing.	Milan Odehnal award 2022	Czech Physical Society

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of scientific journal, ISSN
Michal Beneš, prof. Dr. Ing.	IAENG International Journal of Applied Mathematics, ISSN: 1992-9978
Pavel Exner, prof. RNDr. DrSc.	Journal of Mathematical Analysis and Applications, ISSN: 0022-247X Reports on Mathematical Physics, ISSN: 0034-4877 Complex Analysis and Operator Theory, ISSN: 1661-8254
Helena Jelínková, prof. Ing. Dr.Sc.	Progress in Quantum Electronics, ISSN: 0079-6727
Jan John, prof. Ing. CSc.	Radiochimica Acta, ISSN: 0033-8230 Journal of Radioanalytical and Nuclear Chemistry, ISSN: 0236-5731
Václav Klika, prof. Ing. Ph.D.	Continuum Mechanics and Thermodynamics, ISSN: 1432-0959 Journal of Nonequilibrium Thermodynamics, ISSN:1437-4358
Ján Kozempel, doc. Ing. Ph.D.	Artificial Cells, Nanomedicine, and Biotechnology, ISSN: 2169-1401
Zuzana Masáková, prof. Ing. Ph.D.	Acta Polytechnica, ISSN: 1805–2363
Ladislav Musílek, prof. Ing. CSc.	Radiation Physics and Chemistry, ISSN: 1879-0895
Tomáš Urban, Ing. Ph.D.	Radiation Physics and Chemistry, ISSN: 1879-0895
Jan Vybírál, prof. RNDr. Ph.D.	Journal of Complexity, ISSN: 0885-064X

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
Michal Beneš, prof. Dr. Ing.	Mathematical Modelling of Interface Motion in Material Science	Invited lecture at Mathematical Aspects of Surface and Interface Dynamics 18 Conference, Tokyo, Japan	2019
Jana Bielčíková, doc. RNDr. Ph.D.	Experimental results from Heavy Ion collisions	Invited lecture at ICHEP 2022: International Conference on High Energy Physics, Bologna, Italy	2022
Pavel Exner, prof. RNDr. DrSc.	Topologically induced spectral behavior: the example of quantum graphs, a distinguished lecture	Invited lecture at 8 th International Congress of Chinese Mathematicians, China	2019
Petr Haušild, prof. Dr. Ing.	Some remarks on the indentation size effect at small indentation depths	Invited opening lecture at Indentation 2021 Colloquium, Lorient, France	2021
Igor Jex, prof. Ing. DrSc.	Quantum networks and open system dynamics	Invited lecture at PQE 2023, Snowbird, USA	2023
Ján Kozempel, doc. Ing. Ph.D.	Nuclear recoil effect in targeted alpha therapy - do we need to concern about it?	Invited lecture at ORNL ARIA workshop November 2-3, 2022 Oak Ridge TN, USA	2022
David Krejčířík, prof. Mgr. Ph.D. DSc.	The virial theorem and the method of multipliers in spectral theory (Paris)	Invited lecture at WAVES 15 th International Conference on Mathematical and Numerical Aspects of Wave Propagation; Palaiseau, France	2022
Zuzana Masáková, prof. Ing. Ph.D.	Infinite words connected to numeration: β -integers and Erdős spectrum	Invited lecture at WORDS'21, 13th International Conference on Words, Rouen, France	2021
Martin Štefaňák, doc. Ing. Ph.D.	Survival probability and quantum transport in Grover walk on finite graphs	Invited lecture at Symmetries: Algebras and Physics, Centre de recherches mathématiques, Montreal, Canada	2022
Jan Vysoký, Ing. Ph.D.	Introduction to Graded Manifolds	Invited lecture at Workshop on Quantum Geometry, Field Theory and Gravity, Corfu, Greece	2021

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year

Prof. Olaf Post	Universität Trier, Germany	Spectral gaps, discrete magnetic Laplacians and spectral ordering	2019
Prof. Xiaolin Hou	Technical University of Denmark, Center for Nuclear Technologies	Analysis of environmental radionuclides and its application for tracing environmental processes	2019
Prof. Barry Barish	University of California, Riverside, USA	Understanding our universe with gravitational waves	2020
Prof. Stephen M. Barnett	School of Physics and Astronomy, University of Glasgow, UK	Introduction to optical angular momentum	2021
Dr. G. Ivan Maldonado	University of Tennessee, Department of Nuclear Engineering, USA	Fuel Cycle Reload Analysis of US LWRs	2021
Prof. Dr. Rainer Heintzmann	Leibniz Institute of Photonic Technology, Institute for Physical Chemistry, Friedrich Schiller University Jena, Germany	Structured Illumination and the Analysis of Single Molecules in Cells	2022
Prof. Christine Silberhorn	University of Paderborn, Germany	Quantum optics and information science in multi-dimensional photonics networks	2022
Prof. Jeremy Faupin	Université de Metz, France	Spectral decomposition of some non-self-adjoint operators	2022
Prof. Ram Band	Israel Institute of Technology	Dry Ten Martini Problem for Sturmian Hamiltonians	2023
Prof. Julien Royer	Université de Toulouse, France	Local energy decay for the Schrödinger equation	2023

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the research project/programme call	Name of the contracting authority/guarantor of the project/programme call	Year
Michal Beneš, prof. Dr. Ing.	Member of the jury for Barrande Fellowship Programme	French Embassy	2019-2023
Tomáš Čechák, prof. Ing. CSc.	Member of the Committee for Cooperation of the Czech Republic with CERN	Ministry of Education, Youth and Sports of the Czech Republic	2019-2023
Petr Haušild, prof. Dr. Ing.	Panel member of the Horizon Euratom Programme: H2020-Euratom -NFRP-2019-2020 call HORIZON-EURATOM-2021-NRT-01 Fission call JRC Ex Post panel member (Ex post evaluation of the activities of the Joint Research Centre under Horizon 2020 and Euratom 2014-2020)	European Commission	2019 2021 2022

Igor Jex, prof. Ing. DrSc.	EU Structural Funds Unit for Scientific Research	Research council of Lithuania	2019-2023
Ondřej Klimo, doc. Ing. Ph.D.	Member of the ERC Advanced Grant Panel 2022 (Fundamental Constituents of Matter)	European Research Council	2022
Jiří Kunz, prof. Ing. CSc.	Member of the expert advisory body for THETA programme	Technology Agency of the Czech Republic	2019-2023
Jiří Mikyška, prof. Ing. Ph.D.	Member of the panel 105 - Structural Mechanics and Construction, Fluid Mechanics and Geotechnics	Czech Science Foundation	2023
Ladislav Musílek, prof. Ing. CSc.	Member of the external examiner council of the Inter Action Programme of the Inter-Excellence II	Ministry of Education, Youth and Sports of the Czech Republic	2019-2023
Ivan Richter, prof. Ing. Dr.	Member of the QuantERA Scientific Evaluation Panel Member of the panel 102 - Electrical Engineering and Electronic Engineering	QuantERA - collaborative initiative of Quantum Technologies in Europe, European Union's Horizon Research and Innovation Programme Czech Science Foundation	2021, 2022 2019-2023
Pavel Šťovíček, prof. Ing. DrSc.	Member of the panel 202 - Mathematics and Informatics	Czech Science Foundation	2021-2023

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the period of 2019–2023²³. This should be done from the full list in annex tables (Table 3.3.1–3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

The faculty considers the following projects to be of utmost importance for the development of its capabilities and in line with its mission:

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

Centre of Advanced Applied Sciences (CAAS) funded within the Czech Operational Programme "Research, Development and Education" for the implementation of the European Social Fund (ESF) and the European Regional Development Fund (ERDF).

The CAAS (<https://caas.cvut.cz/en/>) established a common university platform integrating research work in advanced sciences in physics, mathematics, chemistry, nuclear engineering, material science, photonics, detector technology and several other progressive fields. For the faculty, several objectives defined in the strategic long-term plan have been achieved. The project helped to boost the potential and capacity of specialized laboratories and facilities. It helped to acquire specialized equipment in laboratories for material science, plasma physics, laser physics, particle detection and nuclear chemistry. It enhanced the collaboration with large research facilities like ELI, Hilase, the Institute of Plasma Physics and the Heyrovský Institute (a partner in CAAS). The project was instrumental in creating the infrastructure needed for new research directions like quantum information and communication. The consolidated team successfully applied for EU funded projects like CZ.QCI (CTU is a member of the national consortium) and EPIQUE (European optical quantum computer, FNSPE is one of the partners in the EU consortium). The CZ.QCI is part of the European Quantum Communication infrastructure and is allowed to create a testing polygon at the CTU making it a technological background for quantum communication in the Czech Republic and the corresponding training and teaching infrastructure. It is also worth mentioning the contract research for the Federal Mint of Germany (Berlin). This collaboration explored the technological possibilities of quantum informatics by solving concrete problems of interest for the partner. Of particular interest are projects in particle physics detection which are described independently. The project is the fundament for further work on high-tech challenges of modern society like space-research (detection, communication), quantum enhanced computing, modern materials and many others.

The faculty was the (main and only) investigator of the project **"Strengthening and development of research at the Czech Technical University in Prague with the use of the VR-1 Training Reactor research infrastructure for research activities"**. The main objective of the project was to strengthen the research activities of the faculty in three areas of nuclear engineering:

- Research on neutron transport through materials
- Research on the behaviour of neutron detection systems under the conditions of nuclear reactor core and external neutron sources
- Research on dynamics, diagnostics and monitoring of nuclear reactor cores

The project has provided not only the expansion of the faculty's research activities in the field of nuclear engineering, but also the establishment of promising research teams. Through the project, new collaborations were obtained for a large research infrastructure from industry, research and academic institutions. These include CEA in France, Westinghouse Electric Company, KAERI, KHNP, Czechatom, Aalto University in Finland, KEPCO International Nuclear Graduate School in Korea, and many others. The development of collaboration and the use of large research infrastructure operated by faculty continues to show a significantly increasing trend.

The project has significantly supported the faculty's publishing activities in nuclear engineering and has resulted in several important research results, some of which are included in the evaluation (experimental instrumentation NIFFLER, Neutron flux monitor with gamma compensation based on diamond detectors, High-density Nuclear Fuel).

As a follow-up to this project (in the framework of project CZ.02.1.01/0.0/18_046/0015833), a new nuclear facility was built at the faculty, the VR-2 subcritical reactor. Therefore, the faculty has become one of the most important nuclear education and training institutions in the world. Students from the USA, UK, Sweden, Finland, Poland, Slovakia and other countries come to the

faculty for the training courses. Training is also provided for the personnel of Czech and Slovak nuclear power plants.

Collaboration with CERN - CERN-CZ Large Research Infrastructure (LRI) project

Three faculties and institutes of the Czech Technical University in Prague (FNSPE, IEAP, FME) actively collaborate with CERN, the world's leading laboratory for particle physics, in cutting-edge experiments that push the frontiers of scientific knowledge and technological innovation. Through the CERN-CZ LRI project, the faculty contributes to groundbreaking research, strengthening its expertise and fostering scientific excellence. While we have strong participation in a variety of other smaller experiments at CERN (such as DIRAC), our primary focus lies in the ATLAS and ALICE experiments, two of the large experiments at LHC. These experiments explore the fundamental building blocks of matter and the forces that govern the universe, pushing the boundaries of modern physics. FNSPE's contributions span both hardware development and data analysis. Our teams play a crucial role in designing, constructing, and upgrading detector subcomponents and also in ensuring their smooth operation. Highlights of this work are the construction of the Forward Diffractive Detector (now in operation at CERN), the participation in the construction of the MFT (now in operation at CERN), the participation in the upgrade project of ATLAS and the development of new detector technologies of silicon pixel detectors with applications in other areas (Medipix, Timepix). Beyond scientific advancements, CERN provides invaluable opportunities for students and researchers, fostering collaboration with leading international experts, allowing our Ph.D. students to perform experiments to answer questions at the frontier of knowledge, and equipping the next generation of physicists and engineers with world-class expertise. By engaging in CERN's research programs, faculty gains access to a unique scientific and technological ecosystem that drives innovation and discovery. This collaboration not only enhances the university's global standing but also provides invaluable experience for students and researchers, preparing them to tackle complex challenges in particle physics and beyond.

Participation in Brookhaven National Laboratory – Czech Republic's participation (BNL-CZ)

CTU Prague, via FNSPE, is hosting the large research infrastructure BNL-CZ, which supports the participation of Czech research, engineering, and education institutions and facilitates their access to one of the world's leading research facilities, Brookhaven National Laboratory. BNL-CZ has been on the Roadmap for Large Research Infrastructures since 2016. BNL is a single-site operating research infrastructure, founded in 1947, with a primary focus on nuclear and particle physics research. The main facility at BNL is the RHIC accelerator, which is uniquely positioned to study strongly interacting QCD matter at high temperatures, as well as to map the QCD phase diagram and search for its critical point. It also allows for detailed studies of cold QCD matter properties and the origin of proton spin, thanks to the unique capability of colliding polarized proton beams. The FNSPE teams are actively involved in two international experimental collaborations based at BNL: STAR and ePIC. The STAR collaboration includes 75 institutions from 14 countries, while the ePIC collaboration consists of 173 institutions from 25 countries. We play an important role in these collaborations. For example, Jana Bielcikova has served as the chair of the STAR collaboration council for the past four years, and Barbara Trzeciak is currently the Deputy Physics Analysis Coordinator, responsible for the entire physics program of the STAR collaboration. In the ePIC collaboration, Jaroslav Adam leads the development of detector subsystems as a co-convener of the ePIC far-backward detectors group. As part of STAR and ePIC, we collaborate with many world-leading universities and research groups, with the most intensive collaborations being with Yale University, Lawrence Berkeley National Laboratory, and Ohio State University.

The **SpacePix2: Advancing Space Radiation Monitoring with First In-Orbit Deployment** project marked a major milestone in space radiation detection, culminating in its first in-orbit operation aboard the VZLUSat-2 satellite. Developed between 2019 and 2021 with funding from the European Space Agency (ESA), the project was a collaboration between FNSPE CTU in Prague, VZLU Aerospace, OHB SE (Germany), and Evolving Systems Consulting Ltd. The monolithic silicon pixel detector designed within SpacePix2 introduced radiation-hardened, low-power electronics, essential for long-term space missions. Its integration into VZLUSat-2 enabled real-time space weather monitoring, a critical step in protecting both spacecraft and future crewed missions from harmful cosmic radiation. The detector's advanced energy deposition measurement allowed it to classify electrons, protons, and heavy ions, providing valuable data on the space radiation environment in Low Earth Orbit (LEO). With its radiation-hardened ASIC technology, SpacePix2 achieved high performance in an environment where traditional electronics degrade rapidly due to Total Ionizing Dose (TID) and Single Event Effects (SEE). The low-power architecture ensured continuous operation with minimal energy requirements, making it suitable for small satellites and deep-space exploration. Rigorous testing in particle accelerators and vacuum chambers confirmed its resilience before deployment, validating its capability for future missions. The successful demonstration of SpacePix2 in orbit represents a breakthrough in miniaturized space radiation monitoring, establishing a path toward autonomous, long-duration radiation measurement systems. Its technology paves the way for next-generation space dosimetry, supporting applications from satellite mission planning to interplanetary exploration.

Research support for the safety assessment of a deep geological repository. This contractual research aimed to improve the knowledge about the behaviour of radionuclides in the environment of radioactive waste repositories, with a strong emphasis on the planned deep geological repository. This particular research has been carried out mainly on request and on behalf of SÚRAO (Radioactive Waste Repository Authority of the Czech Republic), the statutory duty of which is to provide safe operation of nuclear waste repositories and to verify that the waste intended for disposal complies with the strict standards set by the State Office for Nuclear Safety. Several topics were addressed, for example, "Input parameters and process models for the evaluation of radionuclide transport through engineered barriers" or "Transport of radionuclides through cement-based materials", including the consideration of changes in materials properties due to the ageing in the radioactive waste repository environment. As part of this contractual research for SÚRAO, a number of comprehensive technical reports based on laboratory results and transport modelling reviewed by the contracting authority with the participation of foreign experts. The obtained experimental results and theoretical knowledge are used as input data for modelling the behaviour of radionuclides during their potential migration from the repositories. The experts of the faculty participate in the preparation of the necessary simulation programmes and perform numerical calculations with them in order to contribute to the safety assessment of the repositories - SÚRAO uses them in the design of the deep geological repository of radioactive waste in the Czech Republic. In addition, through such projects, the faculty helps SÚRAO to familiarise the public with the technical solutions for repositories and the high level of assurance of their safety.

A-CINCH – Augmented Cooperation in Education and Training in Nuclear and Radiochemistry, H2020 project (<https://cordis.europa.eu/project/id/945301>) with 16 project partners across the Europe was coordinated by FNSPE. Nuclear and radiochemistry is of strategic relevance in the nuclear energy sector and in many vital applications - from safe nuclear power plant operation to

decontamination and decommissioning, waste management, and environmental monitoring; the non-energy fields of nuclear and radiochemistry applications are even much broader ranging from life sciences – radiopharmaceuticals, radiological diagnostics and therapy – through dating in geology and archaeology, (nuclear) forensics and safeguards operations, to radiation protection and radioecology.

The A-CINCH project primarily addresses the loss of the interest of young generation in nuclear knowledge by focussing on secondary / high school students and teachers and involving them by the “Learn through Play” concept. The A-CINCH project augmented CINCH teaching tools developed in the three previous projects – CINCH, CINCH II and MEET-CINCH – to the A-CINCH HUB – a user-friendly and easy-to-navigate single point of access (<https://www.cinch-project.eu>). Among the developed tools, a state-of-the-art virtual radiochemistry laboratory, virtual reality exercises, augmented reality app for radiation and shielding demonstration, Massive Open Online Courses, Hands-on Training courses, High School Teaching packages, RoboLab distance operated robotic experiments, Interactive Screen Experiments, NucWik database of teaching materials, or Flipped Classroom, CINCH videos, CINCH Talks etc. should be mentioned. All the tools are used to increase the number of students and trainees in the field of nuclear and radiochemistry, and to improve nuclear awareness in the field. After the end of the project, CINCH was transferred under Division of Nuclear Chemistry of the European Chemistry Society as Working group for education and nuclear chemistry awareness, led by FNSPE. CINCH outputs are used among European university units teaching nuclear and radiochemistry.

GAČR EXPRO project **"New challenges for spectral theory: geometry, artificial materials and complex fields"** (principal investigator: David Krejčířík) has significantly strengthened the excellence of the faculty in its areas of interest (this type of projects is intended only for excellent scientists and their teams with the greatest potential to be part of a breakthrough in their field). This fundamental research project has achieved its goals by developing unconventional tools in spectral theory to tackle various newly born, or more classical but recently revived, open problems in mathematics and physics. Among the variety of achievements, let us point out: (1) the establishment of new uncertainty principles behind the stability of matter for discrete models in quantum mechanics; (2) the resolution of an almost 100-year old open problem about the existence of embedded eigenvalues in quasi-cylindrical domains; (3) the construction of non-semiclassical pseudomodes for the Dirac operator describing graphene; (4) the establishment of a measuring scheme to determine nanostructure surface curvature by using spectroscopy of Stark-localised states with help of microlocal methods. The latter has been shown to be feasible experimentally by numerical evidence as well as by recent contributions of experts with advanced materials.

ELLECTRA - Efficient Low-energy Electron Cancer Therapy with Terbium-161 project (<https://electtra.cz/>) in KAPPA Programme (an applied research, experimental development, and innovation programme funded by the EEA and Norway Grants). Due to its expertise and long-term involvement in the field, the faculty was selected as the principal investigator and project coordinator. The ELLECTRA project was focused on the preparation of the prospective low-energy conversion and Auger electron emitter ^{161}Tb via neutron irradiation of enriched ^{160}Gd and the preparation of its novel targeting vectors. The main aim of the proposed project was the development of novel radiopharmaceuticals based on ^{161}Tb and novel vectors for targeted tumour therapy. The advantage of ^{161}Tb is in the emission of large numbers of low energy electrons followed by low energy gamma radiation allowing therapy follow-up. This will allow targeting of single cancer cells, micro-metastases and whole tumours, particularly in early stages of diseases to

increase the treatment efficiency. Project results include production methodology and production routines for 161Tb and novel 161Tb products in therapeutically relevant doses, as well as novel targeting molecules including peptides, monoclonal antibodies and advanced brachytherapy systems based on polymers and nanoparticles. The collaboration between Czech (Research Centre Řež, and Institute of Macromolecular Chemistry, Czech Academy of Sciences), and Norwegian partners (Institute for Energy Technology, and Oslo University Hospital) with extensive experience in research and development and commercialisation of the results fulfilled all prerequisites for this project to succeed and to reach all the proposed results. The achieved results are having continuous and direct impact on the applicants in terms of increased competitiveness on the market, development of Czech and Norwegian radiopharmaceutical industry together with impact on society and its benefits from innovative cancer treatment methods. In the final phase of the project, the research team was contacted through TACR by foreign partners from Switzerland and cooperation was established.

Quantum secured communication in a critical infrastructure over lines with possible interferences, implemented as part of the **OpenQKD** open call 2. The research team from the faculty has demonstrated the robustness of quantum key distribution (QKD) technology by testing the performance of two QKD technologies on railway trackside optical communications fibre infrastructure. Trackside fibre constitute vast networks across Europe, used for both critical transport infrastructure-related and private sector communications. Our demonstration underlines the applicability of quantum-secured communication networks over existing infrastructure even in the harsh environments represented by heavy rail traffic in close proximity. The testbed was based on a 46-km length of fibre, running within five metres of the main railway line from Prague to Beroun. The fiber experienced significant vibrations and mechanical noise due to high railway traffic, with a train typically passing every five minutes during the day. Performance of QKD solutions from Toshiba and IdQuantique were simultaneously monitored over the timespan of more than two weeks, using a remote configuration and monitoring software developed with the Faculty of Electrical Engineering of CTU. We found that the average quantum bit error rates were comparable to those measured in the laboratory, indicating that QKD keys can then be used for regular rekeying of encryptors despite the railway-induced noise.

Implementation of the project involved close collaboration with the OpenQKD consortium, the Austrian Institute of Technology, CyberSecurity Hub z.ú., Faculty of Informatics, Masaryk University, Toshiba Europe and IdQuantique. The project represents the faculty's ambition to be the central enabler of the use of quantum technologies in the Czech Republic. The experience gained in the use of QKD technology is being utilized in the construction of the Czech national QKD backbone infrastructure implemented in the CZ_QCI project with planned use-cases involving security agencies, government organizations, and private sector such as banks.

Table 3.3.1 Projects supported by public funds

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
MEYS Ministry of Education, Youth and Sports	Centre of advanced applied science	190901 / 7531	107645 / 4246	140484 / 5542	90390 / 3566	23766 / 938
MEYS Ministry of Education, Youth and Sports	Strengthening and development of research at Czech Technical University in Prague with the use of research infrastructure VR1 Training Reactor for research activities	6759 / 267	3668 / 245	2659 / 105	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	VR-1 – Training Reactor for Research Activities	1973 / 78	0 / 0	0 / 0	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	VR-1 - Support for reactor operation for research activities	0 / 0	2514 / 99	2329 / 92	2299 / 91	0 / 0
MEYS Ministry of Education, Youth and Sports	The VR-1 Nuclear Experimental Hub	0 / 0	0 / 0	0 / 0	0 / 0	13203 / 521
MEYS Ministry of Education, Youth and Sports	Research Infrastructure for Experiments at CERN	10954 / 432	0 / 0	0 / 0	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	Research Infrastructure for experiments at CERN	0 / 0	14330 / 565	14240 / 562	13600 / 536	0 / 0
MEYS	Research infrastructure for	0 / 0	0 / 0	0 / 0	0 / 0	13125 / 518

²⁵ If the provider is from abroad, please indicate the provider's country of origin in brackets. For the determination of the country of origin of the provider, the place of residence of the provider is decisive.

²⁶ Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

Ministry of Education, Youth and Sports	experiments at CERN					
MEYS Ministry of Education, Youth and Sports	Getting new knowledge of the microworld using the CERN infrastructure	3494 / 138	1604 / 63	2243 / 88	742 / 29	0 / 0
MEYS Ministry of Education, Youth and Sports	Study of new properties of nuclear matter in the international experiment STAR	2990 / 118	2990 / 118	2990 / 118	1963 / 77	0 / 0
MEYS Ministry of Education, Youth and Sports	Facility for Antiproton and Ion Research – participation of the Czech Republic	835 / 33	0 / 0	0 / 0	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	Facility for Antiproton and Ion Research - participation of the Czech Republic	0 / 0	2430 / 96	2989 / 118	3019 / 119	0 / 0
MEYS Ministry of Education, Youth and Sports	Facility for Antiproton and Ion Research - participation of the Czech Republic	0 / 0	0 / 0	0 / 0	0 / 0	2524 / 100
MEYS Ministry of Education, Youth and Sports	Research Infrastructure for Fermilab Experiments	2335 / 92	0 / 0	0 / 0	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	Research Infrastructure for Fermilab Experiments	0 / 0	2376 / 94	2270 / 90	2300 / 91	0 / 0
MEYS Ministry of Education, Youth and Sports	Research Infrastructure for Fermilab Experiments	0 / 0	0 / 0	0 / 0	0 / 0	2999 / 118
MEYS Ministry of Education, Youth and Sports	Collaboration on experiments in Fermi National Accelerator Laboratory, USA	1142 / 45	973 / 38	1278 / 50	1285 / 51	0 / 0
MEYS Ministry of Education, Youth and Sports	Brookhaven National Laboratory – participation of the Czech Republic	6705 / 264	0 / 0	0 / 0	0 / 0	0 / 0

MEYS Ministry of Education, Youth and Sports	Brookhaven National Laboratory - Participation of the Czech Republic	0 / 0	0 / 0	0 / 0	0 / 0	13049 / 515
MEYS Ministry of Education, Youth and Sports	Hadron structure in heavy ion collisions	1371 / 54	1165 / 46	0 / 0	0 / 0	0 / 0
TACR Technology Agency of the Czech Republic	Technological demonstrator - Radiation orbital monitor based on the Spacepix sensor	1200 / 47	3611 / 142	2589 / 102	600 / 24	0 / 0
ESA	SpacePix2 - advanced monolithic space radiation detector	1901 / 75	1901 / 75	1901 / 75	0 / 0	0 / 0
GACR Czech Science Foundation	New challenges for spectral theory: geometry, advanced materials and complex fields	0 / 0	5040 / 199	6801 / 268	6447 / 254	6526 / 257
TACR Technology Agency of the Czech Republic	Efficient Low- energy Electron Cancer Therapy with Terbium-161	0 / 0	0 / 0	6607 / 261	20577 / 812	21703 / 856
European Commission	Augmented cooperation in education and training in nuclear radiochemistry	0 / 0	5260 / 208	21042 / 830	21042 / 830	15781 / 623
European Commission	Czech National Quantum Communication Infrastructure	0 / 0	0 / 0	0 / 0	0 / 0	6013 / 237
TACR Technology Agency of the Czech Republic	Advanced mathematical- physical methods for modeling of traffic flow microstructure	0 / 0	565 / 22	1004 / 40	976 / 39	1011 / 40
TACR Technology Agency of the Czech Republic	Separation of radionuclides for targeted alpha particle therapy	0 / 0	1387 / 55	3198 / 126	1354 / 53	0 / 0
TACR Technology Agency of the Czech Republic	Cyclotron preparation of Tb- 161 as an alternative to Lu-	0 / 0	1867 / 74	2835 / 112	959 / 38	0 / 0

	177 for therapy in nuclear medicine					
TACR Technology Agency of the Czech Republic	Advanced dosimetry for biological systems in near-earth space	0 / 0	1889 / 75	4015 / 158	1925 / 76	0 / 0
TACR Technology Agency of the Czech Republic	System integration analysis of nuclear sources (SMR and / or large units) and P2G into the Czech power and heating industry	0 / 0	0 / 0	0 / 0	3042 / 120	2835 / 112
TACR Technology Agency of the Czech Republic	Decommissioning of research nuclear installation in the Czech Republic	0 / 0	0 / 0	0 / 0	1668 / 66	1740 / 69
TACR Technology Agency of the Czech Republic	Methodology for neutron and gamma spectra measurement in mixed fields especially for personal dosimetry	0 / 0	0 / 0	0 / 0	1964 / 77	2166 / 85
TACR Technology Agency of the Czech Republic	Reference sites for aerial unmanned radiometric survey	0 / 0	0 / 0	0 / 0	0 / 0	2150 / 85
TACR Technology Agency of the Czech Republic	Advanced Detection Systems of Ionizing Radiation	31000 / 1223	0 / 0	0 / 0	0 / 0	0 / 0
Mol Ministry of the Interior	Composite filters for radioactive wash-fluids purification	3661 / 144	3683 / 145	0 / 0	0 / 0	0 / 0
Mol Ministry of the Interior	Utilisation of radiation based methods for detection and identification of CBRNE materials	3233 / 128	3869 / 153	4123 / 163	2007 / 79	0 / 0
Mol Ministry of the Interior	Ground and airborne training center for radiation emergency preparedness teams	0 / 0	0 / 0	0 / 0	0 / 0	6744 / 266

MEYS Ministry of Education, Youth and Sports	Support of the activities in the Division of Nuclear and Radiochemistry (DNRC) EuCheMS	77 / 3	0 / 0	0 / 0	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	Study of the detection and imaging of X-rays for astrophysics	1198 / 47	1417 / 56	1274 / 50	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	Computational Models and Experimental Investigation of Fluid Dynamics, Mass Transfer and Transport, and Phase Transitions in Porous Media for Environmental Applications	0 / 0	1500 / 59	1500 / 59	1500 / 59	0 / 0
GACR Czech Science Foundation	Photonic Quantum Networks	2437 / 96	0 / 0	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Aspects of strong interactions in extreme conditions	1431 / 0	0 / 0	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Superintegrable systems in magnetic fields in three spatial dimensions	1078 / 43	0 / 0	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Investigation of shallow subsurface flow with phase transitions	2208 / 87	0 / 0	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	An information-theoretical perspective on complex systems	1003 / 40	0 / 0	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Quantum mechanics with non-self-adjoint operators: transition from spectra to pseudospectra	1162 / 46	1226 / 48	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Plasma optics for ultra-intense laser physics experiments	2389 / 94	2495 / 98	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Advanced Lagrangian and ALE methods for	992 / 39	936 / 37	0 / 0	0 / 0	0 / 0

	compressible fluids and elasto-plastic solids dynamics					
GACR Czech Science Foundation	Optimization of the solid-state laser active materials for spectral range from near- up to mid-infrared	2334 / 92	2340 / 92	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Searching for signatures of saturation: energy dependence of J/Psi photoproduction with ALICE proton - lead data	1497 / 59	1525 / 60	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Modeling of the color structure of the events in hadron-hadron collisions	1190 / 47	1190 / 47	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Advanced functionalities in subwavelength photonic and plasmonic structures	2325 / 92	2342 / 92	2323 / 92	44 / 2	0 / 0
GACR Czech Science Foundation	Quantum and classical random walks	1761 / 69	1715 / 68	1677 / 66	100 / 4	0 / 0
GACR Czech Science Foundation	Fourier methods of special functions of affine Weyl groups	934 / 37	913 / 36	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Dynamic properties of Quark Gluon Plasma	0 / 0	2349 / 93	2181 / 86	2943 / 116	0 / 0
GACR Czech Science Foundation	Multiscale thermodynamics: boundary conditions, integration and applications	0 / 0	1194 / 47	1331 / 53	1397 / 55	190 / 7
GACR Czech Science Foundation	Multiphase flow, transport, and structural changes related to water freezing and thawing in the subsurface	0 / 0	0 / 0	2479 / 98	2604 / 103	2683 / 106
GACR Czech Science Foundation	Nanostructured multilayers with controlled plasmonic response	0 / 0	0 / 0	1268 / 50	2550 / 101	2562 / 101

	for sensor applications and quantum technologies					
GACR Czech Science Foundation	Matter in extreme conditions and relativistic heavy-ion collisions	0 / 0	0 / 0	0 / 0	1665 / 66	3322 / 131
GACR Czech Science Foundation	Signatures of saturation for future electron-ion colliders at a new level of precision	0 / 0	0 / 0	0 / 0	1602 / 63	2136 / 84
GACR Czech Science Foundation	Multipartite quantum dynamics on graphs and hypergraphs – theory and applications	0 / 0	0 / 0	0 / 0	0 / 0	3218 / 127
GACR Czech Science Foundation	Novel approaches to surface-enhanced optical spectroscopy for the ultimate and specific biosensing	2365 / 93	2363 / 93	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Nonlinear interaction of elastic waves with a single crack	1627 / 64	1661 / 66	1766 / 70	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	Brookhaven National Laboratory - participation of the Czech Republic	6703 / 264	1688 / 67	0 / 0	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	Nuclear Safety, Security and Forensics	2610 / 103	1800 / 71	200 / 8	126 / 5	0 / 0
MEYS Ministry of Education, Youth and Sports	Laboratories for doctoral programme Nuclear Safety, Security and Forensics	4336 / 171	7000 / 276	3995 / 158	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	Novel research-oriented doctoral program Quantum Technologies	967 / 38	1000 / 39	500 / 20	116 / 5	0 / 0
MEYS Ministry of Education,	Computer and technical infrastructure platform for the	19551 / 771	10000 / 394	10000 / 394	5438 / 215	0 / 0

Youth and Sports	realization of novel doctoral program Quantum technologies					
MEYS Ministry of Education, Youth and Sports	International doctoral programme in high-temperature plasma and nuclear fusion	1558 / 61	1060 / 42	786 / 31	1 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	High Temperature Plasma and Fusion Technology Laboratory PlasmaLab@CTU	9589 / 378	3908 / 154	3908 / 154	3908 / 154	0 / 0
EEA and Norway Grants	Improved skills and competences of students and academics in application of AMS in radioecology (AMSIR)	0 / 0	203 / 8	203 / 8	0 / 0	0 / 0
IAEA (AT) International Atomic Energy Agency, Vienna, Austria	Scientific and Education Activities on the GOLEM Tokamak in the Framework of the IAEA CRP	254 / 10	254 / 10	254 / 10	254 / 10	0 / 0
IAEA (AT) International Atomic Energy Agency, Vienna, Austria	Testing of Advanced Cladding Materials and Code Benchmarking	0 / 0	0 / 0	127 / 5	127 / 5	127 / 5
Visegrad Fund (SK)	V4 Nuclear Training Course	0 / 0	867 / 34	0 / 0	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	Asymptotic Dynamics of Quantum Markov Processes	55 / 2	0 / 0	0 / 0	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	New challenges for extension theory of operators in modern physics	54 / 2	0 / 0	0 / 0	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	Bioconjugates of nanoparticles as new carriers of ²²³ Ra for targeted alpha radiotherapy	0 / 0	0 / 0	41 / 2	160 / 6	0 / 0

MEYS Ministry of Education, Youth and Sports	Jets in heavy ion collisions at the Large Hadron Collider	0 / 0	0 / 0	78 / 3	39 / 2	0 / 0
MEYS Ministry of Education, Youth and Sports	Super-resolution microscopy with topological beams	0 / 0	0 / 0	0 / 0	172 / 7	130 / 5
MEYS Ministry of Education, Youth and Sports	Spectral analysis of Dirac materials	0 / 0	0 / 0	0 / 0	0 / 0	92 / 4
Total		322814 / 12734	196234 / 7741	235218 / 9278	181409 / 7156	125134 / 4936
In the role of another participant						
Provider ²⁷	Project name	Support (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
TACR Technology Agency of the Czech Republic	Improvement of nuclear power reactor neutron-physical characteristics using reactor operation records	448 / 18	407 / 16	0 / 0	0 / 0	0 / 0
TACR Technology Agency of the Czech Republic	Assurance of Safe and Long Term Operation of Nuclear Reactor Pressure Vessel Internals	415 / 16	378 / 15	0 / 0	0 / 0	0 / 0
TACR Technology Agency of the Czech Republic	LPopt2 - Effective and reliable tool for optimized design of nuclear reactor loading patterns based on pareto optimality approach	435 / 17	140 / 6	0 / 0	0 / 0	0 / 0
TACR Technology Agency of the Czech Republic	Innovative methods of welding of high pressure devices using laser technologies	1000 / 39	693 / 27	0 / 0	0 / 0	0 / 0
TACR Technology Agency of	The Automated Atlas Segmentation of Anatomical	580 / 23	610 / 24	0 / 0	0 / 0	0 / 0

²⁷ Ibid.

the Czech Republic	Structures for the Radiotherapy Planning Systems (RT ATLAS)					
TACR Technology Agency of the Czech Republic	ANDREA 3: Advanced SW for steady state and transient analysis of nuclear reactors	570 / 22	448 / 18	425 / 17	244 / 10	0 / 0
TACR Technology Agency of the Czech Republic	Innovative methods for nuclear plant safety evaluation based on SHM technologies and related procedures -NEMENUS (NEw MEthods for NUclear Safety)	1124 / 44	1124 / 44	1124 / 44	562 / 22	0 / 0
TACR Technology Agency of the Czech Republic	LaTrAx - Laser Treated Axles	1000 / 39	1000 / 39	1000 / 39	1000 / 39	0 / 0
TACR Technology Agency of the Czech Republic	Material utilization of waste thermoplastics in the production of building materials for shielding of ionizing radiation	720 / 28	840 / 33	66 / 3	0 / 0	0 / 0
TACR Technology Agency of the Czech Republic	Multicomponent single crystal materials for solid state lasers	0 / 0	585 / 23	585 / 23	585 / 23	585 / 23
TACR Technology Agency of the Czech Republic	Utilization of Advanced Materials for New Types of Nuclear Fuels	0 / 0	552 / 22	1852 / 73	2099 / 83	2195 / 87
TACR Technology Agency of the Czech Republic	Tolerant Nuclear Fuels for Small Modular Reactors and Safety Evaluation	0 / 0	0 / 0	0 / 0	1721 / 68	1758 / 69
TACR Technology Agency of the Czech Republic	Ultra-fast soft X-ray sensorics for spectral monitoring of high-temperature plasmas	0 / 0	0 / 0	0 / 0	2622 / 103	4374 / 173
TACR Technology Agency of	Semiconductor detector systems for quality assurance of	0 / 0	0 / 0	0 / 0	439 / 17	439 / 17

the Czech Republic	radiotherapy photon beams.					
TACR Technology Agency of the Czech Republic	Critical analysis of strategies of decommissioning of nuclear facilities	0 / 0	0 / 0	0 / 0	162 / 6	396 / 16
TACR Technology Agency of the Czech Republic	Joint Cooperative Research on Technology Familiarisation and the Development of the Accident-Tolerant Fuel for New Nuclear Power Plant	0 / 0	0 / 0	0 / 0	0 / 0	2046 / 81
TACR Technology Agency of the Czech Republic	IIS medic-patient	0 / 0	0 / 0	0 / 0	0 / 0	2307 / 91
TACR Technology Agency of the Czech Republic	R&D of Radiation Tolerant Semiconductor Solutions	0 / 0	0 / 0	0 / 0	0 / 0	3714 / 147
TACR Technology Agency of the Czech Republic	Advanced methods for diagnostics and interpretation of power distribution measurement using Self Powered Neutron Detectors (SPND)	0 / 0	0 / 0	0 / 0	0 / 0	437 / 17
TACR Technology Agency of the Czech Republic	Criteria Basis for Evaluation of Research Reactors Safety	0 / 0	0 / 0	0 / 0	0 / 0	595 / 23
TACR Technology Agency of the Czech Republic	Development of process for the solidification of high level radioactive wastes after NPP severe accident and evaluation of their disposal in radioactive waste repository	0 / 0	0 / 0	0 / 0	0 / 0	570 / 22
TACR Technology Agency of the Czech Republic	Center of Advanced Nuclear Technology II	0 / 0	0 / 0	0 / 0	0 / 0	17151 / 677

MoH Ministry of Health of the Czech Republic	New multistage nanodiagnostics for cancer imaging and prediction of antiangiogenic therapy efficacy	1260 / 50	0 / 0	0 / 0	0 / 0	0 / 0
MoH Ministry of Health of the Czech Republic	Analysis of flow character and prediction of evolution in endovascular treated arteries by magnetic resonance imaging coupled with mathematical modeling	962 / 38	1443 / 57	1444 / 57	1493 / 59	0 / 0
MoH Ministry of Health of the Czech Republic	Development of terbium-161-labelled biomolecules as theranostic tools in nuclear medicine	0 / 0	0 / 0	0 / 0	0 / 0	841 / 33
Mol Ministry of the Interior	More accurate prediction of radiological consequences of severe accidents at NPP aimed in identification of their risks	2250 / 89	1092 / 43	0 / 0	0 / 0	0 / 0
Mol Ministry of the Interior	Multicriteria operational radiation protocol	0 / 0	0 / 0	0 / 0	441 / 17	309 / 12
MIT Ministry of Industry and Trade	New laser rods and discs for modern diode pumped lasers	650 / 26	0 / 0	0 / 0	0 / 0	0 / 0
MIT Ministry of Industry and Trade	Research and development of new tungsten pseudoalloys for industrial applications and manufacturing technology optimisation	1200 / 47	400 / 16	0 / 0	0 / 0	0 / 0
MIT Ministry of Industry and Trade	Recyclable decontamination solution for decommissioning of nuclear facilities	900 / 36	225 / 9	0 / 0	0 / 0	0 / 0
MIT	Material and process capability of thin Al foil	700 / 28	700 / 28	0 / 0	0 / 0	0 / 0

Ministry of Industry and Trade						
MIT Ministry of Industry and Trade	Dose Guided Radiotherapy System	1637 / 65	2455 / 97	2401 / 95	0 / 0	0 / 0
MIT Ministry of Industry and Trade	Lightweight Orbital Radiation Detection System	2860 / 113	2920 / 115	0 / 0	0 / 0	0 / 0
MIT Ministry of Industry and Trade	Monolithic pixel detector for the detection of ionizing radiation	3548 / 140	4225 / 167	0 / 0	0 / 0	0 / 0
MIT Ministry of Industry and Trade	Research and development of technological methods for radiation-induced production of advanced nanomaterials	1022 / 40	1022 / 40	253 / 10	0 / 0	0 / 0
MIT Ministry of Industry and Trade	Multilayer, Large-Area, Mosaic, Pixel Detector for Cosmic Radiation Measurement	300 / 12	1200 / 47	1400 / 55	1580 / 62	0 / 0
MEYS Ministry of Education, Youth and Sports	Cooperation of the Czech Republic with JINR Dubna in the theoretical and nuclear physics and application of nuclear methods in other fields	299 / 12	299 / 12	319 / 13	323 / 13	0 / 0
GACR Czech Science Foundation	Thermal Energy Storage Materials: Thermophysical Characteristics for the Design of Thermal Batteries	692 / 27	0 / 0	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Synthesis, characterization and tailoring the properties of luminescent nanocomposites	952 / 38	0 / 0	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Processing of innovative iron-based intermetallics by mechanical alloying and spark plasma sintering	951 / 38	0 / 0	0 / 0	0 / 0	0 / 0

GACR Czech Science Foundation	Large structures in the boundary layers over complex surfaces in high Reynolds numbers	837 / 33	857 / 34	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Radiation processes generated by runaway electrons in tokamaks	1202 / 47	1100 / 43	0 / 0	0 / 0	0 / 0
GACR Czech Science Foundation	Study of electron densities and spontaneous magnetic fields by means of multi-channel complex interferometry	731 / 29	696 / 27	725 / 29	7 / 0	0 / 0
GACR Czech Science Foundation	High temperature preparation of advanced refractory materials by inductively coupled plasma in controlled atmosphere	975 / 38	935 / 37	972 / 38	0 / 0	0 / 0
GACR Czech Science Foundation	Nonlinear interactions and information transfer in complex systems with extreme events	1035 / 41	895 / 35	1063 / 42	0 / 0	0 / 0
GACR Czech Science Foundation	Low dimensional scintillating structures for biomedical applications.	0 / 0	1183 / 47	1196 / 47	1196 / 47	0 / 0
GACR Czech Science Foundation	Design of nanocrystalline composite alloys with high entropy and controllable properties	0 / 0	0 / 0	1090 / 43	1114 / 44	1102 / 43
GACR Czech Science Foundation	Simulation of meteoroid and asteroid explosion event by terawatt-class laser	0 / 0	0 / 0	330 / 13	330 / 13	330 / 13
GACR Czech Science Foundation	New perspectives in magnetic fabric interpretation through 3D microstructural analysis, numerical modelling and quantum	0 / 0	0 / 0	0 / 0	699 / 28	946 / 37

	mechanical description					
GACR Czech Science Foundation	Fine properties of functions, operators and function spaces	0 / 0	0 / 0	0 / 0	0 / 0	1238 / 49
GACR Czech Science Foundation	Scintillating multimodal materials and quantum heterostructures.	0 / 0	0 / 0	0 / 0	0 / 0	1648 / 65
GACR Czech Science Foundation	Study of quark-gluon plasma with hard probes and limits of its formation	0 / 0	0 / 0	0 / 0	0 / 0	1911 / 75
MEYS Ministry of Education, Youth and Sports	Ultra-trace isotope research in social and environmental studies using accelerator mass spectrometry	16958 / 669	5454 / 215	5511 / 217	4837 / 191	0 / 0
MEYS Ministry of Education, Youth and Sports	Facility for Antiproton and Ion Research - participation of the Czech Republic - OP II.	0 / 0	0 / 0	0 / 0	1914 / 76	0 / 0
MIT Ministry of Industry and Trade	Research of methods for high-precise measurement, and development of instrumentation for evaluation of nuclear-physical quantities and safe control of critical processes.	5308 / 209	1348 / 53	0 / 0	0 / 0	0 / 0
MIT Ministry of Industry and Trade	Development of an automatic device for high-capacity scanning of surfaces by digital radiography	0 / 0	0 / 0	199 / 8	317 / 13	367 / 14
European Commission	GEN IV Integrated Oxide fuels recycling strategies	534 / 21	534 / 21	267 / 11	0 / 0	0 / 0
European Commission	Fuel recycle and experimentally demonstrated manufacturing of	0 / 0	0 / 0	0 / 0	777 / 31	777 / 31

	advanced nuclear solution for safety					
European Commission	PRE-DISposal management of radioactive waste	0 / 0	361 / 14	361 / 14	361 / 14	361 / 14
European Commission	European Nuclear Experimental Educational Platform (ENEEP)	1893 / 75	1893 / 75	1893 / 75	1893 / 75	0 / 0
European Commission	Scintillating Porous Architectures for RadioacTivE gas detection	0 / 0	1741 / 69	1741 / 69	1741 / 69	1741 / 69
European Commission	Building European Nuclear Competence through continuous Advanced and Structured Education and Training Actions	0 / 0	0 / 0	0 / 0	501 / 20	501 / 20
European Commission	DigiQ	0 / 0	0 / 0	0 / 0	1025 / 40	1025 / 40
European Commission	Implementation of activities described in the Roadmap to Fusion during Horizon Europe through a joint programme of the members of the EUROfusion consortium	0 / 0	0 / 0	500 / 20	500 / 20	500 / 20
European Commission	A Modular European Education and Training Concept In Nuclear and RadioCHemistry	1249 / 49	1249 / 49	0 / 0	0 / 0	0 / 0
MEYS Ministry of Education, Youth and Sports	Time-Frequency Representations for Function Spaces (TIFREFUS)	0 / 0	0 / 0	20 / 1	20 / 1	0 / 0
Total		82049 / 3238	71220 / 2809	57237 / 2257	54012 / 2130	74825 / 2952

Table 3.3.2 - Contract research activities

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023

²⁸ If the client is from abroad, indicate in brackets the country of origin of the client.

ÚJV Řež	Research Support for Safety Assessment of a Deep Geological Repository	1613/64	114/4			
TrisKem International	Materials for Chromatography	71/3				
WITS JAR Škoda	WITS JAR	130/5				
SÚJB (The State Office for Nuclear Safety)	Independent Assessment of Unusual Events in the Operation of the Temelín Nuclear Power Plant	154/6				
NUVIA a.s.	Performing Simulations and Calculations to Verify the Shielding Structures of the Cyclotron Vault	67/3				
Škoda Auto	Mathematical-Stochastic Model for Optimizing the Inspection Process of the Engine Compartment on KB8	1733/68				
ČEZ a.s.	Ensuring Biomonitoring of Atmospheric Deposition of Radionuclides Using Bioindicators around the Temelín Nuclear Power Plant	280/11				
ČZ Strakonice	Fractographic Analyses of Damaged Turbochargers	182/7				
CHARVÁT AXL, a.s	Diffraction Tensometric Measurements of Surface Residual Stress of Two Cylinder Samples	86/3				
JRC Petten	Fractographic Analysis in a Special Environment	366/14	525/21	599/24	705/28	276/11
UJP Praha a.s.	Evaluation of Fracture Surfaces Using SEM and Determination of Nanohardness Gradient on Metallographic Sections of Oxidized Zr-Alloys	150/6				
Škoda JS a.s.	Preparation of an Opponent's Report on Calculation Reports for Type Approval of the OS Škoda 1000/19M Packaging Set	459/18				
ÚJV Řež, a.s	X-ray Diffraction Analysis of Residual Stresses in Test Samples of Austenitic Superalloys Based on Chromium and Nickel	150/6				
UJP Praha	Evaluation of Fracture Surfaces Using SEM	80/3				
ALVEL a.s.	Tritium Production Calculations Using the ORIGEN Code	69/3				
CHARVÁT AXL, a.s	X-ray Tensometric Measurements of Surface Residual Stress of Ground Surfaces	92/4				
UJP Praha a.s.	Contract Research on Optimization of Protective Coating Application, Experimental Verification, and Modeling of Coating Behavior on Coating Material	116/5	658/26			

CHARVÁT AXL	X-ray Tensometric Measurements of Surface Residual Stress of Ground Surfaces of Two Samples "Wheel Axis XL 3211006-2"	63/2				
ÚJV Řež a.s.	X-ray Diffraction Analysis of Residual Stresses in Test Samples of Austenitic Superalloys Based on Chromium and Nickel	56/2				
SÚRO	Independent Assessment of Unusual Events in the Operation of the Temelín Nuclear Power Plant	181/7	316/12	155/6	585/23	347/14
UIP a.s.	Study of Fracture Surfaces and Polished Sections of Zr-Samples after Corrosion Transition Experiment on E110 Alloy ETE	100/4				
CHARVÁT AXL a.s	X-ray Tensometric Measurements of Surface Residual Stress of Ground Surfaces of Two Samples "Wheel Axis D1"	60/2				
ŠKODA AUTO a.s.	X-ray Tensometric Analysis in the Field of Camshaft and Camshaft Lifespan Solutions for 1.0 MPI EVO Engines	106/4				
SÚJB (The State Office for Nuclear Safety)	Testing and Comparison in the Field of Personal Dosimetry, Contract 141500024	248/10				
SÚRO	Measurement of Chemical Purity	145/6				
Elements Materials Technolog	X-ray Diffraction Analysis of Residual Stresses in Four Test Specimens	72/3				
TEDIKO	Analysis of Fractures of Damaged Turbine Bolts	86/3				
SÚJB (The State Office for Nuclear Safety)	Issues of Proton Therapy	83/3				
ŠKODA JS a.s	Assessment of Reports for Type Approval of OS Škoda 1000/19, 1000/19M	99/4				
Česká zbrojovka a.s	Analysis of Residual Stresses on Delivered Samples	106/4				
CHARVÁT AXL,a.s.	X-ray Tensometric Measurements	76/3				
CHARVÁT AXL, a.s	X-ray Tensometric Measurements		115/5			
Element materials Technology	Residual Stress Measurements		81/3			
Rail Safety Inspection (Dražní inspekce)	Fractographic Analysis of a Damaged Switch Tongue No. 10b		50/2			
JE Temelín	Biomonitoring of the Environmental Impacts of the Temelín Nuclear Power Plant		280/11			
VUJE a.s.	Measurements with SNM-18 and CC-83 Chambers on the VR-1 Reactor		145/6			

ŠKODA AUTO, a.s.	X-ray Tensometric Analysis of Rollers		79/3			
SÚRO, v.v.i	In-situ Gamma Spectrometry and Determination of Depth Profile of Natural Radionuclides within the TA CR Project		124/5			
Ústav chemických procesů AV (Institute of Chemical Process Fundamentals CAS)	Analysis of Fatty Acids in the Delivered Sample		76/3			
ČZ a.s	Work Execution in 2020		200/8			
Vakuum servis, s r.o.	Sample Analysis		50/2			
BOSCH DIESEL s.r.o.	X-ray Diffraction Determination of Depth Distribution of Residual Stresses		184/7			
AERO Vodochody	Analysis of Main Landing Gear Lock Failure		60/2			
SÚJB (THE STATE OFFICE FOR NUCLEAR SAFETY)	Testing and Comparison in the Field of Personal Dosimetry		248/10			
CAN SUPERCONDUCTORS, s.r.o.	Deposition of Thin Layers of Superconducting Material Using IJD Technology		92/4			
ÚJV Řež, a.s.	X-ray Diffraction Analysis of a Sample for Surface Treatment Sponge Jet			70/3		
MEDICAL TECHNOLOGIES	Characterization of Radiation Transfer Er:Glass, Er:YAG Based on the Offer from 18.12.2020			100/4		
ČEZ a.s.	Biomonitoring of the Environmental Impacts of the Temelín Nuclear Power Plant			280/11		
Bosch	Scratched samples for testing OEM Number: NRI039311			255/10		
UJP Praha a.s.	Study of Fracture Surfaces and Polished Sections of Zr-Samples after Transition Experiment			160/6		
CHARVÁT AXL, a.s	X-ray Tensometric Measurements of Surface Residual Stress of Ground Surfaces of Forging Samples "P"			94/4		
TRISKEM	DGA SHEET 5x20 cm, package of 10, DGA SHEET 10x20 cm, package of 10, DGA SHEET 20x20 cm, package of 10			82/3		
Rail Safety Inspection (Dražní inspekce)	Fractographic Analysis and Determination of Causes of Fracture of Switch Tongue No. 32 at MU Station Kladno			157/6		
UJP Praha a.s	Development of Methodology for Measuring Stress in Oxide and			50/2		

	Adjacent Metal of Zr-Alloys and Verification on Known Samples					
MPO	Preparation of Training Materials for Employees of Affected State Administration and Local Government Authorities Involved in the Licensing Processes of NJZ Construction in the Czech Republic			299/12		
ÚJP Praha a.s.	Analysis of Residual Stresses and Structural Parameters on Oxide Layers and Adjacent Metal of Alloy from 29.4.-31.10.21			100/4		
Multi-Wing CZ.a.s	Analysis of Fractures of Plastic Blades Type 4HR/40/PAG			50/2		
Mondi Steti a.s.	Analysis of Pap. According to Electron Microscopy/10			50/2		
UAM Brno	Analysis of Defect of Level Gauge Nozzle PG43 EDU4			50/2		
NCK MESTEC	Determination of the Course of Instrumental Microhardness of Structural Objects after Model Aging			130/5		
SÚJB (THE STATE OFFICE FOR NUCLEAR SAFETY)	Testing and Comparison in the Field of Personal Dosimetry			248/10		
ÚJV Řež	Calculation of Surface Temperature of UOS			82/3		
VZÚ Plzeň	Measurement of Residual Stress Distribution of HVOF Sprayed Coatings Based on Hard Metals			141/6		
TU Liberec	Research Support for Safety Assessment of Technical Solution of Deep Geological Repository VVZ 354205			79/3	211/8	60/2
ALVEL,a.s.	Application of Thin Protective Layers for Nuclear Fuel Coating				225/9	
SÚRAO (RADIOACTIVE WASTE REPOSITORY AUTHORITY)	Research Support for Safety Assessment of Technical Solution of Deep Geological Repository - FEPS Analysis				421/17	142/6
Czechatom	Independent Computational Verification of Small Modular Reactor DAVID				681/27	
ČZ	Material and Fracture Analyses in 2022				290/11	70/3
ČEZ a.s.	Ensuring Biomonitoring of Atmospheric Deposition of Radionuclides Using Bioindicators				280/11	
ÚJV Řež	Research Support for Safety Assessment of Technical Solution of Deep Geological Repository - Radionuclide Research				216/9	248/10
TRISKEM	DGA sheets				105/4	195/8

CHARVÁT AXL	X-ray Tensometric Measurements of Surface Residual Stress of Ground Surfaces of Cylinder Samples "D1"				77/3	
UJP PRAHA	Study of Fracture Surfaces and Polished Sections of Zr-Samples after Corrosion Transition Experiment				200/8	
AIT	Report on the Implementation of a Test Environment Demonstrating the Suitability of QKD in Optical Fibers Installed along Railway Tracks				513/20	501/20
UJP PRAHA	Analysis of Residual Stresses and Structural Parameters on Oxide Layers and Adjacent Metal of Alloy E110M				100/4	
ÚJV Řež	Implementation of Inventory Update and Properties of Radioactive Waste Designated for Deep Geological Repository - Part 1 Update of VJP					783/31
ČEZ	Analysis of Cut Sample of Feedwater Nozzle Pipe of Steam Generator at Dukovany Nuclear Power Plant				250/10	
DELTA	X-ray Diffraction Diagnostics of Saw Blades				74/3	
SÚJB (THE STATE OFFICE FOR NUCLEAR SAFETY)	Testing and Comparison in the Field of Personal Dosimetry				248/10	
ŠKODA JS a.s.	Preparation of Opponent Reports for SÚJB				155/6	
ÚAM Brno	Analysis of Delivered Pipe Section				60/2	
ÚJV Řež	Calculation of Dose Rate and Surface Temperature of UOS				95/4	
ÚVJ Řež	Research Reports for ÚJV Řež, a.s.					600/24
ESC Aerospace	Collaboration and Provision of Expert Support in the Lunar Vicinity Complex Environmental Explorer (LVICE2) Project					825/33
ČEZ a.s.	Ensuring Biomonitoring of Atmospheric Deposition of Radionuclides Using Bioindicators					280/11
AEROVodochod	Analysis of Damaged Partition 26					200/8
Rail Safety Inspection (Dražní inspekce)	Preparation of Fractographic Analysis of Damaged Parts of Closing Hooks					82/3
VZÚ Plzeň	Residual Stress Measurement - X-ray Diffraction					102/4

Narran	Development and Production of 2 Pieces of Temperature-Stabilized Crystal Furnaces with Control Electronics					200/8
AŽD Praha	Experiments Focused on Comparing Fatigue Behavior of Bodies from Original Cast Material and Bodies from Forged Material					75/3
UJP PRAHA	Fractographic Analyses of Fracture Surfaces of Zr-Alloy Samples					200/8
SÚJB (THE STATE OFFICE FOR NUCLEAR SAFETY)	Testing and Comparison in the Field of Personal Dosimetry					248/10
UJP PRAHA	Evaluation of ZrO ₂ and Fuel Coating Samples Using XRD					186/7
IFE	Radiation of 10 pellet Tantalum					201/8
SÚJB (THE STATE OFFICE FOR NUCLEAR SAFETY)	Update of Educational Publication "Radiation from Natural Radiation Source"					70/3
JRC (EUROPEAN COMMISSION)	Fractographic analysis					319/13
ÚJV Řež	Climate Change Calculations					94/4
ČEZ	Analysis of Damaged Blade from NT1 TG 11					50/2
AERO Vodochody	Analysis of Damaged Suspension Forging					90/4
SÚRAO (RADIOACTIVE WASTE REPOSITORY AUTHORITY)	Independent Assessment of Operational Events at the Temelín Nuclear Power Plant for 2023					157/6
ZČU Plzeň	Diffraction Analysis of Macroscopic Residual Stresses in Laser-Treated Fillet Welds					97/4
SÚRO	Independent Assessment of Operational Events at the Temelín Nuclear Power Plant for 2024, 2025, 2026, 2027					124/5
IRSN	Provision of Services and Research Work for IRSN					126/5
UJP PRAHA	Research and Development of Radiation-Resistant Chip for Signal Processing from Silicon Sensor					1000/39
TÚ Liberec	Research Support for Safety Assessment of Technical Solution of Deep Geological Repository					414/16
OHB Czechspac	RocketRoll-Preliminary European Reckon on Nuclear Propulsion for Space Applications					1357/54

SÚJB (THE STATE OFFICE FOR NUCLEAR SAFETY)	Preparation of Documentation on the Issue of Increased Concentrations of Radon Volume Activity in the Vicinity of Heaps and Dumps					314/12
Bundesdruckerei	Hardware efficient Consensus in Quantum Networks for Consistency Checks in Distributed Applications					446/18
Ministry of Defence	Undisclosed					690/27
Contract research under 50 000 CZK	Various titles	396/16	316/12	302/12	528/21	144/6
Total		7675/302	3713/146	3533/140	6019/238	11313/446

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁹, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

The faculty considers these selected results to be very important with the potential for positive impact on society*:

As part of the project „Modernization of the Large Research Infrastructure VR-1 - Training Reactor for Research Activities“ (CZ.02.1.01/0.0/0.0/18_046/0015833-1), the **VR-2 subcritical reactor** was designed, built and commissioned between 2020 and 2023. It is a new nuclear facility in the Czech Republic and the second (fission) nuclear reactor operated at CTU. The VR-2 reactor allows observing the behaviour of neutrons in fission systems under conditions of high inherent safety and was completely designed by the faculty. It is a nuclear facility operating with a combination of natural and enriched uranium fuel moderated by light water. The core is primarily controlled by a small, compact D-D neutron generator. The VR-2 reactor has been designed to be as flexible as possible and to offer a wide range of experimental possibilities. The facility allows for changes in the grid of the core (square or triangular arrangement), including changes in the fuel rod spacing, the use of an optional external neutron source (neutron generator or radionuclide neutron source), variable moderator level, and possible changes in moderator temperature (heating/cooling). The facility will significantly expand scientific research activities at the large research infrastructure and support educational activities in the field of nuclear engineering at the faculty. The facility will be used in both experimental neutron and reactor physics. Specifically, the VR-2 reactor will offer tasks

²⁹ See Terms definition.

for determining microscopic and macroscopic parameters of nuclear reactor cores, determining kinetic parameters of nuclear reactors, studying safety characteristics of nuclear devices, testing detection systems, and verifying computational programmes. Although the facility is in its early stages of operation, there is already considerable interest in its use. Cooperation agreements with two foreign partners have already been established. One is the Aalto University in Finland and the other is the Philippine Nuclear Research Institute.

Experimental instrumentation NIFFLER for neutron imaging. This functional sample of an experimental facility for neutron imaging is intended to research optically opaque objects' internal structures and material composition. The functional sample was developed over three years (2021-2023) at the large research infrastructure The VR-1 Nuclear Experimental Hub with the support of the research projects of the large research infrastructures VR-1 - School Reactor for research activity LM2018118 (2021-2022) and WCZV IV - Nuclear Experimental Center VR-1 - LM2023073 (2023) and the CTU doctoral research project Neutron radiography facility at the training reactor VR-1 SGS21/173/OHK4/3T/14 (2021- 2023). The functional sample is a unique experimental facility that has enabled research in the field of neutron imaging at very low power neutron sources. The use of neutron imaging at very low power neutron sources, such as low power research reactors, was very limited until its development. With the development, the FNSPE became one of five research institutions capable of performing neutron radiography on very low-power reactors and the only research organization in the world capable of performing three-dimensional neutron tomography. Studying the internal structure of objects of various origins and opening research opportunities for non-commercial users who do not have sufficient financial resources to conduct experiments in high-power research reactors abroad, or who have objects that cannot be transported abroad. For example, in the field of cultural heritage preservation, the facility can be used by the National Gallery Prague or the Institute of Archaeology of the Academy of Sciences of the Czech Republic, with whom FNSPE has already established cooperation in this area.

High-density Nuclear Fuel. This functional sample of high-density nuclear fuel for light water reactors has been designed and fabricated in cooperation with UJP Praha within the TACR Theta project "Utilization of Advanced Materials for New Types of Nuclear Fuels" that was successfully concluded and defended. The design and functional samples of high-density fuels are now being utilized within the CANUT2 – National Competence Centre for Nuclear Research framework and will be implemented into the VR-2 reactor during 2026-27. After the introduction of several fuel pins into the VR-2 core, neutronic benchmark will be measured and provided to the international community for code validation within the ICSBEP project of OECD/NEA. The concept developed, its introduction, and its experiment at VR-2 will thus lead to improved code capabilities through additional validation of new fuel designs. In addition, the developed concept can be adopted by one of the international fuel vendors (Westinghouse Electric Company, FRAMATOME, Kepco NF, GNF) and qualified for the current reactor fleet. Lower operating temperatures and higher uranium density will result in economic and safety benefits, improving the overall performance of current light water reactors, their safety, and their economy.

A sorbent, a set and a device for the separation of ^{213}Bi from the ^{225}Ac mixture and its radioactive transformation products (CZ patent). In the time of its creation, the only one ^{225}Ac - ^{213}Bi radionuclide generator for clinical use, restricted only for research use, was commercially available. It is using strong cation exchanger in the stationary phase eluted with 0.1M HCl/0.1M NaI solution with the yield about 76%, its disadvantage is mainly limited radiation stability at longer time

scales and limited separation factor. The developed system uses inorganic absorber based on zirconium hydrogenphosphate (ZrP) incorporated into polyacrylonitrile matrix with the possibility of variable ZrP load up to 85%. Such composite absorber ZrP-PAN has an advantage of much higher radiation stability – resulting in longer use and lower contamination of the eluted product – and with the elution 0.3 M NaI in 0.0075 M HCl reaches separation factor Bi/Ac of approx. 6000. The patent protects equipment and sorption material important for the design of the $^{225}\text{Ac}/^{213}\text{Bi}$ radionuclide generator, which is used in preclinical and clinical research. The invention substantially improves the radiation stability of the sorbent and therefore the generator itself. From an economic point of view, it helps to set up a source of an unavailable medical radionuclide - ^{213}Bi itself is a very important and socially valuable radionuclide for cancer therapy. The patent is used and continuously upgraded by its inventor FNSPE CTU to ensure appropriate reaction on the developments in the radiopharmaceutical clinical field.

The **SpacePix Radiation Monitor (SxRM)** is a next-generation space radiation instrument, developed and launched within the ESA-funded SpacePix2 project. It consists of five layers of SpacePix ASICs, separated by copper absorbers, enabling precise detection and characterization of charged-particle ionizing radiation. SxRM is capable of measuring Van Allen belt particles, galactic cosmic rays, and solar energetic particles, with an energy detection range of 0.1 to 10 MeV for electrons and 1 to 200 MeV for protons. Unlike conventional space radiation monitors, SxRM can simultaneously detect all relevant charged particles within a single instrument, enhancing its versatility for scientific and operational space missions. SxRM was successfully deployed on VZLUSat-2, a Czech satellite launched in January 2022, where it has been continuously collecting space weather data and validating its performance in Low Earth Orbit (LEO). Its superior performance, lower power consumption, and compact design surpass the capabilities of NGRM (Next Generation Radiation Monitor), a widely used radiation instrument in European satellites. Given its success, SxRM is planned for deployment onboard ESA's IoD/IoV mission, further demonstrating its potential for future space missions. SxRM integrates an onboard RISC microprocessor, performing real-time data processing, including calibration, cluster reconstruction, and track reconstruction using pattern recognition techniques based on energy deposition in multiple sensor layers. Additionally, it features a dosimetric mode, generating histograms for electrons, protons, and heavy ions, making it suitable for both real-time space weather monitoring and detailed radiation research. Building upon the technological advancements of SpacePix2, SxRM represents a new standard in space radiation monitoring, ensuring precise radiation measurements for satellites, space habitats, and interplanetary missions. Its miniaturized yet highly capable architecture is paving the way for enhanced radiation protection strategies in both commercial and scientific space exploration.

The **BICZEPS Flight Model** is the final operational version of the BICZEPS instrument, developed for precision radiation measurements in space missions. As the culmination of the BICZEPS project, it integrates advanced active and passive radiation detection technologies to monitor both charged and neutral ionizing radiation particles. In Low Earth Orbit (LEO), at the altitude of the International Space Station (ISS), neutral ionizing radiation, such as albedo neutrons, contributes to 20–25% of the total ionizing dose, making its detection crucial for radiation hazard assessment and astronaut safety. The BICZEPS Flight Model features a hybrid detection system, combining active silicon-based detectors with a suite of passive dosimeters for intercalibration. The active detectors include: SpaceDOS radiation monitor, a silicon diode-based sensor for precise real-time dose measurements. Silicon microstrip detector, offering a large detection area and broad angular coverage for accurate radiation flux mapping. A specialized variant of the SpacePix radiation monitor, optimized for

operation inside spacecraft, providing detailed particle identification and trajectory tracking. The BICZEPS project has already influenced next-generation space radiation detection, with its core technologies incorporated into SXR detectors aboard VZLUSat-2 and its methodology applied to outlined missions such as LVCE2. The flight model was initially planned for deployment on the BION M-2 spacecraft, intended to serve as the primary radiation monitor for radiobiological experiments in microgravity. However, due to geopolitical changes, the spacecraft and launch vehicle had to be reassigned. Despite these mission changes, BICZEPS has established a foundation for future space dosimetry, with its modular and adaptable design enabling integration into various space environments, from low-Earth orbit to deep-space exploration. Its highly versatile detection technology is paving the way for enhanced radiation protection strategies for both crewed and uncrewed space missions.

Method of decontamination of the internal surfaces of the primary circuit of a nuclear power plant and decontamination solution (CZ patent). The subject of the patent is a decontamination medium for decommissioning based on a solution of potassium peroxydisulfate in sulfuric acid, which can oxidize the basic building components of corrosion layers in primary circuits of VVER-type nuclear power plants with the help of supplied silver ions. The medium uses the oxidative capability of peroxydisulfate in the catalytic presence of Ag⁺ ions on Cr(III) and Fe(II) compounds building the corrosion layers, the oxidation of which causes disruption and dissolution of the corrosion layer and releases incorporated radionuclides. The advantage is the low temperature (35-60°C) at which the process proceeds with good efficiency, which well overcomes standard decontamination procedures and thus brings economic benefits. Additionally, this medium is recyclable by electrochemical oxidation of the sulphates present to peroxydisulfate at higher electrode current densities while separating the metals and radionuclides in the cathode space, what leads also to minimizing radioactive waste. The socio-economic relevance of this work aims on growing demand on decommissioning processes and methods in nuclear industry and, when nuclear power plants are being shut down at the end of their life cycle. In addition, current properties and technology of the developed medium have potential for low-cost application, minimization of radioactive waste and relatively simple application in nuclear industry. Currently, its improvement for operational decontamination is being developed and testing it on real power plant samples is planned. In nuclear sector, the application of the new developments requires long-term testing to make them ready and validated for operational application; FNSPE and UJV are in close collaboration with the end-user to tune and fulfil all the requirements.

Method for isolation of Ac from mixture of Radium, Actinium and Thorium (European patent). Actinium-225 is a therapeutic radiopharmaceutical that is entering the phase of a number of preclinical and clinical studies and its current availability is very limited. The isolation procedure of Ac-225 is important in the preparation of this medical radionuclide for targeted alpha particle therapy. Ac-225 has been shown to play an important role as a therapeutic radionuclide and thus its separation from irradiated target materials, as well as reprocessing of the original irradiated target with Ra-226, is important and highly desirable. The rapid and high-quality processing of irradiated material and the recovery of the target nuclide is crucial in the production of related radiopharmaceuticals. The subject of the patent protection is the isolation of actinium from a mixture of radionuclides. The separation procedure is carried out in multiple steps on ion-exchange columns in order to obtain a pure radionuclide fraction Ac. This process finds application in the production of Ac-225 from Ra-226 after target irradiation on a cyclotron and in a nuclear reactor. This is an intensively developed area of preparation and separation of desirable radionuclides for

alpha particle therapy. The FNSPE in cooperation with the Nuclear research institute (UJV Řež) plans further use in the production of actinium-225 at the accelerator at the UJV Řež, and related commercial applications. In summary, this European patent describes and protects a method for ²²⁵Ac isolation from a mixture of radionuclides. This method is therefore crucial for its further preparation and practical use, and the result will also help in the preparation of target material for further irradiation and recycling. With regard to medical applications, the result has a potential of a broad social and economic impact related to intensification of use of ²²⁵Ac and its daughters in clinical praxis.

Method of preparation of zirconium oxide nanoparticles (CZ patent). The invention describes a method of preparation of nanoparticle zirconium oxide or zirconium oxide doped with at least one other metal selected from the group including Ca, Mg, Y, Nb, and Er. Synthesis is based on the photoinduced precipitation of a nanocrystalline solid phase. This method was developed directly at FNSPE, keeping the know-how and using it for various preparations, while from a worldwide perspective, radiation methods are used relatively rarely, and only for some selected materials. The main advantage of this method is that it can be transferred to a large scale, allowing hundreds of grammes of product to be prepared, and it could be economically viable for industrial production. Another advantage is the procedure itself, which allows doping of the final phase with the chosen exact stoichiometry of the doped elements and with a relatively narrow particle diameter distribution. The prepared zirconium oxide can be used for further processing, for example as a high surface area active filling of a polymer composite sorbent usable for the sorption of radionuclides during the purification of decontamination solutions (<https://doi.org/10.1007/s10967-022-08598-2>) or optical material. This patented method is also applicable for the analogous preparation of nanocrystalline HfO₂, which has been investigated as an additive that increases the light yields of organic scintillators (<https://doi.org/10.1021/acs.nanolett.4c00681>). This special preparation method is now also being used by patentees to prepare mainly scintillation nanoparticles on a pilot plant scale to produce materials for collaborative and applied research. The method is universal and allows the production of various materials on the basis of a specification and for various highlighted fields, from detection physics (nanoscintillators), through separation and material chemistry (sorption materials) up to radiopharmaceuticals (photodynamic therapy, carriers).

MMG Medical Tools, 4DFlowDataProcessing (<https://geraldine.fjfi.cvut.cz/mmg-medical-tools/>)

A set of tools for processing medical data was developed by the Mathematical Modelling Group at FNSPE in collaboration with IKEM Hospital in the frame of the common project financed by the Ministry of Health (Analysis of flow character and prediction of evolution in endovascular treated arteries by magnetic resonance imaging coupled with mathematical modeling).

The toolkit includes the following tools:

MOLLI Registration – A tool for registering Modified Look-Locker Inversion (MOLLI) images from magnetic resonance imaging (MRI). MOLLI sequences consist of images with varying intensity, making standard registration methods ineffective, as they typically rely on the assumption of constant brightness intensity between the corresponding pixels. To handle MOLLI sequences, a new method has been developed.

ECV Evaluation – This tool calculates the extracellular volume (ECV) of myocardial tissue based on registered MOLLI images.

Bloch Simulator – An implementation of a solver for Bloch's equations that describe the relaxation of hydrogen atoms during MRI scanning. The software also includes an inverse problem solver, which

allows the extraction of relaxation-time maps from real MRI images. These maps can be used to diagnose myocardial tissue damage.

4DFlowDataProcessing – A tool for processing 4D-flow MRI data, which consists of time sequences of 3D images from magnetic resonance imaging. This tool enables better visualisation of measured data as well as quantification of blood flow in specific regions.

The MMG medical tools were tested by IKEM and are now being used in medical practice.

*In the natural sciences, the gender dimension does not usually affect the results of physical experiments or mathematical theories; i.e. the gender dimension cannot generally be considered in the results of fundamental research in the fields in which the faculty is involved. In applied research conducted by the faculty, the gender dimension is often inherent, for example in the development of nuclear reactor design (safety first principles) or advanced radiopharmaceuticals (targeted therapy). This applies to all the results presented. At the same time, we are strictly committed to ensuring that scientific advancements benefit everyone, regardless of gender.

The direct impacts of the results of both fundamental and applied research with regard to sustainability are difficult to quantify but undeniable. The focus on reprocessing nuclear waste, decommissioning old nuclear facilities and developing new nuclear technologies such as nuclear fusion creates a comprehensive approach to sustainability. By focusing on recycling and waste minimisation, these technologies can reduce the environmental impact of nuclear energy. This approach not only solves current problems but also supports the transition to cleaner energy sources, thereby ensuring a sustainable future for society. Space research fosters international cooperation, bringing together scientists, engineers, and policymakers from around the world to work on common goals. This collaboration promotes peace, understanding, and shared knowledge. It inspires future generations to pursue careers in science, technology, engineering, and mathematics, and encourages curiosity and innovation. It is impossible to sustain any responsible society without continuous progress in science and research.

Table 3.4.1 - Overview of research results in the period under evaluation

Type of result ³⁰	Year of application	Name
Large-scale design and technical work	2023	VR-2 subcritical reactor
Functional Sample	2023	Experimental instrumentation NIFFLER for neutron imaging
Patent, Industrial Property	2023	A sorbent, a set and a device for the separation of ²¹³ Bi from the ²²⁵ Ac mixture and its radioactive transformation products
Prototype, Functional Sample	2022	The SpacePix Radiation Monitor
Flight Model, Functional Sample	2022	Flight model of the BICZEPS instrument
Utility model, Functional Sample	2022	High-density Nuclear Fuel
Patent, Industrial Property	2021	Method of decontamination of internal surfaces of the primary circuit of a nuclear power plant and decontamination solution
European patent	2020	Method for isolation of Ac from mixture of Radium, Actinium and Thorium
Patent, Industrial Property	2020	Method of preparation of zirconium oxide nanoparticles

³⁰ Specify the specific type of result. Add rows as needed.

Open source code, Software	2019	MMG Medical Tools
All results from the period under evaluation can be found on https://v3s.cvut.cz/anonymous/searching		

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)³¹, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).³²

Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

Self-assessment:

FNSPE employs several methods to commercialise its research, development, and innovation (R&D&I) results:

Faculty can benefit from a dedicated Technology Transfer Office at CTU that facilitates the commercialisation of research results. Faculty and university support the patenting of results by financially supporting or fully paying for patent procedures.

FNSPE regularly participates in national and international innovation programs that support the commercialisation of research (provided by e.g., Technological agency of the Czech Republic, Ministry of Industry and Trade, or Horizon Europe). The faculty has established strong collaborations with industry partners, leading to the practical application of research findings in various sectors including joint research projects, and/or the development of innovative solutions.

Among the most important partners are those in the nuclear industry sector, such as, e.g., ČEZ, UJV, Škoda JS, UJP, Doosan Power. The faculty's revenue from non-public sources thus come also from donations from such companies e.g. to fund the Best Thesis Award, scholarships for students working on industry-related problems and the organisation of student and scientific conferences, or (last but not least) by covering the mandatory financial participation in projects.

As an example, long-term cooperation with **ŠKODA JS** can be mentioned. ŠKODA JS designed and constructed the first faculty nuclear reactor VR-1 and has been collaborating with the faculty in the

³¹ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

³² If the commercialisation of R&D&I results is carried out in this way.

field of research for many years. As an illustration can be cited recently completed joint research project "Optimization of the Pitch of Spent Fuel Disposal Canisters and Preliminary Thermal Analysis of the Deep Geological Depository" supported by TAČR and co-financed by ŠKODA JS. ŠKODA JS also cooperates with the faculty in the field of education by co-leading the student theses and arranging technical visits and internships for faculty students. This mutually beneficial cooperation led ŠKODA JS to decide to financially support the faculty. Since 2011, ŠKODA JS has provided the faculty with an annual donation of 100,000 CZK to support the education of students in the nuclear engineering study program.

Other significant donors include e.g. **IBM** (sponsoring the faculty's activities in the field of quantum informatics including the organisation of Quantum Day), **Korea Hydro and Nuclear Power Company** (within the framework of the agreement between KHNP and FNSPE to promote the activities in the nuclear field), **UJV Řež a.s.** (within the framework of the agreement between UJV and FNSPE on sponsoring activities for students in the nuclear field), **Czech Nuclear Society** (within the framework of the agreement between ČNS and FNSPE on sponsoring talented students in the nuclear field), **UJP PRAHA a.s.** (within the framework of the agreement between UJP and FNSPE on sponsoring activities for students in the nuclear field), **Broadcom CA CZ, s.r.o.** (within the framework of the agreement between CA CZ and FNSPE on sponsoring students talented in mathematics).

Without co-financing from industrial partners, the faculty would not be able to participate in key European or national projects such as **PREDIS** (The pre-disposal management of radioactive waste, EURATOM) or **SpacePix** (TAČR, ESC Aerospace).

In addition to the monetary donations, the faculty received from their partners for free use or as a gift expensive equipment such as Raman Spectrograph (**Institute of Biophysics**), Metallographic Microscope (**Institute of Plasma Physics**), EDS Spectrometer (**UJP Praha a.s.**), BSE Detector (**UJP Praha a.s.**), Ionization Chamber + HV Source (**UJP Praha a.s.**), Gamma-ray Probe with Scintillation Crystal (**Georadis s.r.o.**), Planmed Sophie Mammograph (**EUC Clinic Ústí nad Labem**), Nuclear Power Plant Simulator (**KHNP Central Research Institute**).

Finally, sponsorship of conferences organised by faculty is also a significant item, without which these events would have a much more limited impact and would not be accessible, for example, to students.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

Type of revenue	Revenue (in thousands CZK/EUR)				
	2019	2020	2021	2022	2023
Gift	321/13	267/11	192/8	205/8	763/30
Sponsor/ Donations		100/4		171/7	
The co-financing of the project	1940/77	759/30	1798/71	323/13	429/17
Total	2261/90	1126/44	1990/79	699/28	1192/47

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

The FNSPE has been actively involved in popularising research, development, and innovation, as well as communicating with the public. The faculty actively engages with media outlets to share research findings and innovations. This includes interviews, media appearances, press releases, and popularization articles. Researchers from the faculty regularly publish articles in popular science magazines and newspapers. These articles explain complex scientific concepts in an accessible manner, reaching a broad audience. The faculty maintains a dedicated website and active social media presence to share research updates, news, and events. These platforms allow for direct engagement with the public and provide a space for questions and discussions.

The faculty regularly organises public lectures on topics such as nuclear energy, radiation safety, and advanced materials. These lectures are aimed at both the general public and students, providing insights into the latest research and technological advancements:

Faculty Colloquia

This is a regular series of lectures attended by Czech and foreign experts informing attendants about the latest research findings. The Colloquium is designed for the general public, faculty academics and students, and guests and visitors outside the faculty.

University of the Third Age (U3V)

At FNSPE, U3V combines lectures in the history of physics and popular science lectures with visits to scientific places of work and laboratories and an offer for attendants to take part in experiments of their choice. In addition to the course programme, the course participants can also attend other FNSPE activities, like physics seminars, laboratory demonstrations, and others.

Young Minds

The Prague section of the European Physics Society (EPS), Young Minds associates students of FNSPE, the Faculty of Mathematics and Physics of Charles University, and other schools. Their objective is to popularize science among the young and arouse interest in science. Young Minds organize activities where students can present their research in an informal setting, but also events where students can meet experienced scientist quite informally.

The faculty intends to inform potential applicants about the study and the careers open to graduates at such traditional events as e.g., Education Fairs or Open House, and others. The faculty has established partnerships with local schools to introduce students to nuclear sciences through hands-on workshops and classroom visits. These programs aim to inspire the next generation of scientists and engineers. Faculty participates in annual open days and science fairs, where they set up

interactive exhibits and demonstrations. Together, these events attracted thousands of visitors, including families, students and educators. Notable events include (but are not limited to):

A Day at FNSPE

At FNSPE, there are many interesting experimental laboratories that can be visited by students from secondary schools. On agreement with the tutor, a bespoke programme may be prepared for each group of visitors.

The Night of Scientists

In October, during the Night of Scientists, one of the biggest scientific and popular events not only in the Czech Republic but also in Europe, the faculty opens its doors to those who want to see the GOLEM tokamak, PlasmaLab and many other facilities. On this occasion, popular science lectures are held, and amusing science-based games are organised.

Become a Medical Physicist for a Day

This event introduces the work of a radiological physicist or technician working in a hospital and about other possible jobs and careers for students of the Department of Dosimetry and Application of Ionizing Radiation. They attend lectures and try to operate an X-ray and a radionuclide, prepare a radiotherapy plan for oncological patients, and visit the Motol and Thomayer Hospitals.

Become a Lady Scientist for a Day

This event is designed especially for female students on the occasion of the International Women's and Girls' Day in Science. It is organized in cooperation with the Brookhaven National Laboratory (BNL-CZ) and CERN-CZ. Along with particle physics, the attendants will also get acquainted with other fields of study offered by FNSPE.

Become a Reactor Physicist for a Day

This event is designed for secondary school students aged 16 and older. They will be able to experience and carry out – in one day - some basic experiments on the VR-1 school training nuclear reactor and learn more about the operation of the fission reactor and its use - in power engineering and other uses in addition.

Become a Particle Physicist for a Day

This event is part of an International Master Class project that usually takes place in March. Secondary school students have a chance to work with data from the CERN laboratory and compare them online with students of other foreign universities and directly with CERN scientists.

Science Week at FNSPE

Science Week at FNSPE is a traditional semi-social event taking place towards the end of the academic year, during which the faculty's staff and students prepare about 50 miniprojects, visits to the departments and laboratories, and popular scientific lectures for about 180 attendants. The programme starts on Sunday with an icebreaker session followed by the Fort Břehyard game, during which students face various tasks in mathematics, chemistry, physics and look for logical solutions to problems. From Monday onwards, the attendants work on miniprojects required by laboratories, involving instruments, or measurements outside of the faculty. To have a clearer idea of what scientific work is really like, the participants have to summarise their research results in a paper and present them at the closing session.

These activities have significantly contributed to the popularisation of research, development, and innovation, as well as enhanced communication with the public. The faculty continues to explore new ways to engage with the community and share their scientific achievements.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

The most frequent recommendation in the last evaluation was to keep on track, which we have tried (and hopefully managed to do), and we hope that this is visible in the self-evaluation report especially in the sections Recognition by the research community, Research projects, Research results with existing or prospective impact on society and Activities in the field of popularization of R&D&I and communication with the public.

International visibility of the faculty's applied research results mentioned by the Panel in the last evaluation is (and will be) further enhanced by participation in prestigious international applied research collaborations under auspices of renowned institutions such as CERN's DRD projects. Results and outputs of these collaboration will become publicly accessible, without any intellectual property protection, increasing their accessibility to the broader international community.

The main criticism raised by the Panel in the last evaluation was related to the income from economic activities/technological outputs and the small contribution of the private (non-public) sector to the financing of the faculty's activities.

We have made efforts to address this difficult task and, apart from the COVID years, when the overall economy in the Czech Republic was in decline, we managed to increase the volume of contracts compared to the previous evaluation, which constitutes a non-negligible part of the faculty's income usable for financing its activities.

We have also succeeded in creating a fund for talented students from donor contributions (the fund with an initial capital of 10M CZK is currently approved at the faculty level and is in the process of being incorporated into university legislation). Besides donations from sponsors to finance prizes for the best master's/doctoral theses, fellowships for students, and the organization of student and/or scientific conferences, this fund represents an important instrument to enhance faculty excellence.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)
Centre of Advanced Applied Sciences (CAAS)	3.3	https://caas.cvut.cz/en
Strengthening and development of research at the Czech Technical University in Prague with the use of the VR-1	3.3	https://www.vyzkumne-infrastruktury.cz/en/energy/vr-1-training-reactor-for-research-activities/

Training Reactor research infrastructure for research activities		
Collaboration with CERN - CERN-CZ	3.3	https://www.vyzkumne-infrastruktury.cz/en/physic/research-infrastructure-for-experiments-at-cern/
Brookhaven National Laboratory – participation of the Czech Republic	3.3	https://www.vyzkumne-infrastruktury.cz/en/physic/bnl-cz/
SpacePix2: Advancing Space Radiation Monitoring with First In-Orbit Deployment	3.3	https://starfos.tacr.cz/en/projekty/TJ04000374
Research support for the safety assessment of a deep geological repository	3.3	https://surao.gov.cz/en/deep-geological-repository/
A-CINCH – Augmented Cooperation in Education and Training in Nuclear and Radiochemistry	3.3	https://cordis.europa.eu/project/id/945301 https://www.cinch-project.eu
New challenges for spectral theory: geometry, artificial materials and complex fields	3.3	https://nsa.fjfi.cvut.cz/david/EXPRO.html
ELLECTRA - Efficient Low-energy Electron Cancer Therapy with Terbium-161	3.3	https://electtra.cz/
Quantum secured communication in a critical infrastructure over lines with possible interferences	3.3	https://www.cybersecurityhub.cz/en/strategic-projects/czqci
Modernization of the Large Research Infrastructure VR-1 - Training Reactor for Research Activities	3.4	http://www.reaktor-vr1.cz/en/about-us/vr-2
SpacePix Radiation Monitor	3.4	https://indico.esa.int/event/233/attachments/3219/4238/The_SpacePix_radiation_monitor-Matej_Vaculciak.pdf https://wrmiss.org/workshops/twentyfifth/Jirsa.pdf
Method for isolation of Ac from mixture of Radium, Actinium and Thorium	3.4	https://patents.google.com/patent/WO2017157355A1/en
Method of preparation of zirconium oxide nanoparticles	3.4	https://doi.org/10.1007/s10967-022-08598-2

		https://doi.org/10.1021/acs.nanolett.4c00681
MMG Medical Tools, 4DFlowDataProcessing	3.4	https://geraldine.fjfi.cvut.cz/mmg-medical-tools/
List of results from the period under evaluation	3.4	https://v3s.cvut.cz/anonymous/searching

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: Faculty of Architecture, Czech Technical University in Prague

FORD: 6 - Humanities and the arts

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

The Faculty of Architecture of the Czech Technical University in Prague is the oldest and most prestigious institution providing education in the field of architecture in the Czech Republic. It is unique in that it combines three areas of study – Architecture and Urbanism, Landscape Architecture, and Design. It educates almost 40 % of the architects and landscape architects in the Czech Republic.

During their studies, students have the opportunity to collaborate with eminent architects and designers who lead studio teaching, as well as top theorists. And not only Czech experts, students can also study under the guidance of significant world personalities. The Faculty of Architecture has established a permanent studio for visiting professors. The first to hold this position was the Dutch architect and urban planner Winy Maas, after whom Jakob Dunkl, Gerd Erhardt, and Peter Sapp from the prestigious Viennese architectural office querkraft took over guidance of the studio. One of the landscape architecture studios has been led for a long time by the leading landscape architect and graduate of TU Dresden Till Rehwaldt, and the new visiting professor of landscape architecture is Valerio Morabito from the Italian Mediterranean University. The Faculty of Architecture also gives opportunities to young progressive architects, opening a very successful visiting studio for 'emerging architects'. The quality of our studios is evidenced by the excellent placements of students in national and international university project competitions and by the prestigious awards won by teachers for their projects from private practice.

The Faculty of Architecture has the best results among technical faculties in the Register of Artistic Outputs, which collects the results of creative artistic activity in the Czech Republic and is a tool for evaluating artistic activity at universities. The Faculty also provides theoretical knowledge to professionals and the general public. An example of this is the lecture series, in English, November Talks, which has been supported by the Sto Foundation since 2006 and takes place annually at six selected European schools of architecture, with speakers from among the world's leading architects. Another example is the regular lecture series Památky (Monuments), which the Faculty organises in cooperation with the Czech National Committee of ICOMOS, or the reVize Typologie conference, which focuses on current topics in the field of design, management, operation and research of the built environment.

The faculty has long cooperated with the public and private sectors. An example is the 1:1 lab, where students, together with teachers, bring their ideas to life with their own hands. This alternative to standard teaching has a tradition at the

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

world's leading architectural schools. Design-build projects implemented at our faculty regularly receive awards in prestigious architectural competitions – the Czech Architecture Awards of the Czech Chamber of Architects or the Grand Prix of the Association of Architects.

Grant cooperation with ministries, government agencies, cities, and municipalities reflects research activities, which are usually carried out under the guidance of associate professors and professors within the faculty institutes and include a number of intersecting thematic areas. A unique workplace at the Faculty of Architecture is the Research Centre for Industrial Heritage, which systematically maps industrial heritage-sites, monuments of technology and industry in the Czech Republic from the perspective of the history and theory of architecture, heritage-site conservation, and urban planning. Another example of a research workplace is the Department of Building Theory, which focuses on research into the environment for people with Parkinson's disease, barrier-free housing for people with disabilities, participatory and sustainable housing in cooperation with the Ministry of Labor and Social Affairs, or the creation of standards with the Czech Standardisation Agency. The Department of Theory and History of Architecture publishes a number of monographic and encyclopaedic publications on the history of architecture and on important architects. It also operates a thematic library, a teaching and research database, websites focused on Czech post-war architecture and architecture of the 1980s, as well as the website of the Czech section of DOCOMOMO International. It organises exhibitions, such as Le Corbusier+ in Models and Images, or exhibitions of haptic models intended for the blind.

As the faculty is home to more than 1,500 students and 180 employees, it is important to provide them with an open and respectful environment. The Ombudsman provides assistance in matters of study and work culture, ethics, and prevention of abuses of power. The FA CTU Equal Opportunities Commission operates in the area of equal opportunities and creating a fair environment. The CTU Centre for Information and Counselling Services offers professional advice and assistance for students with specific needs. Two-thirds of the students at the Faculty of Architecture are female. Our support for women is also reflected in the number of teachers – in total, the faculty teaching staff is 35 % female. The faculty also supports the career growth of women. Between 2019 and 2023, 7 (41 %) new female associate professors emerged from a total of 17 habilitations and 2 (40 %) female professors emerged from 5 professorships.

The faculty also performs well in international comparisons. Architecture education at CTU is ranked first in the Czech Republic in the Architecture and Built Environment category in the prestigious QS World University Rankings. It is also the best-rated field at the CTU in Prague. This result reflects the efforts of our teachers, researchers, and students and is a confirmation of the increasing quality of teaching and research at the Faculty of Architecture at CTU. We have a long-term commitment to the quality and international reputation of our faculty. It is important to us that our graduates can succeed in an international environment. We actively support foreign student mobility, which is the best at CTU, and we develop double-degree programs with leading European universities, such as Politecnico di Milano. The faculty is a long-term member of international associations EAAE, AESOP, DOCOMOMO, ECLAS, TICCIH and ICOMOS. Since 2020, the faculty has been part of the international EuroTeQ Engineering University project, which connects six leading European universities through virtual collaboration.

Dalibor Hlaváček, doc. Ing. arch. Ph.D.
Dean

Table 3.1.1 - Staffing per FTE²

Academic / Professional position	Total / Of which women					
	2019	2020	2021	2022	2023	Total
Professor	14.1/1.0	15.6/1.0	16.2/1.0	17.4/1.5	16.9/1.5	80.3/6.0
Associate Professor	21.8/4.7	24.7/5.7	22.7/5.7	26.0/8.0	24.1/8.2	119.1/32.1
Assistant Professor	83.1/32.6	79.8/32.3	78.7/32.7	80.0/32.5	91.3/37.2	413.0/167.2
Assistant	0/0	0/0	0/0	0/0	0/0	0/0

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

R&D Personnel ³	14.6/11.4	13.3/10.1	14.1/11.1	14.1/11.1	13.3/10.3	69.2/53.8
Researchers in other categories ⁴	6.1/2.7	6.1/2.6	5.5/2.3	7.0/2.2	9.5/1.4	34.1/11.2
Technical and economic staff ⁵	30.6/18.7	29.5/18.7	30.0/19.2	38.3/26.5	38.0/24.7	166.4/107.6
Scientific, research and development staff involved in teaching activities	26.0/6.9	25.5/6.4	22.0/6.4	22.0/6.4	21.0/6.4	116.5/32.3
Early career researchers ⁶	5.7/2.3	4.9/1.8	4.7/1.4	5.1/1.0	4.5/0.8	24.8/7.2
Total ⁷	170.3/71.0	168.9/70.2	167.1/71.8	182.7/81.7	193.1/83.2	882.1/377.8

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁸

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	1	0	4	1	8	0	5	0
Associate Professor	0	0	0	0	5	1	12	2	9	2	7	1
Assistant Professor	0	0	0	0	3	0	2	1	1	1	1	0
Assistant	0	0	0	0	0	0	0	0	0	0	0	0
R&D Personnel ⁹	0	0	0	0	6	4	4	2	4	4	4	4
Researchers in other categories ¹⁰	0	0	9	6	8	3	0	0	0	0	1	0

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

Technical and economic staff ¹¹	0	0	0	0	0	0	0	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	0	0	0	0	7	2	8	1	9	4	7	1
Early career researcher ¹²	0	0	9	6	0	0	0	0	0	0	0	0
Total ¹³	0	0	9	6	23	8	22	6	22	7	18	5

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁴

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	0	0	8	0	6	2	7	0
Associate Professor	0	0	1	1	6	1	12	3	12	5	9	0
Assistant Professor	0	0	0	0	3	0	1	1	0	0	0	0
Assistant	0	0	0	0	0	0	0	0	0	0	0	0
R&D Personnel ¹⁵	0	0	1	1	4	3	4	2	4	4	2	2
Researchers in other categories ¹⁶	1	0	5	2	7	2	1	0	0	0	1	0
Technical and economic staff ¹⁷	0	0	0	0	0	0	0	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	0	0	0	0	7	2	7	1	7	3	4	1
Early career researcher ¹⁸	1	0	5	2	0	0	0	0	0	0	0	0
Total ¹⁹	1	0	7	4	20	6	27	6	22	11	19	2

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students

Type of study	2019		2020		2021		2022		2023		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate	966	609	1006	629	977	616	1029	637	1063	663	5041	3154
Master's ²⁰	509	301	484	300	482	312	512	328	581	374	2568	1615
Doctoral	119	55	95	40	143	73	132	61	125	59	614	288
Lifelong Learning Courses	298	209	246	181	267	195	409	309	456	317	1676	1211
Total	1892	1174	1831	1150	1869	1196	2082	1335	2225	1413	9899	6268

Table 3.1.5 - Study programmes in Czech/English

Type of study programme	Total ²¹ / Of which professional study programmes											
	2019		2020		2021		2022		2023		Total	
Undergraduate	3/0	0	3/0	0	3/0	0	3/0	0	3/0	0	4/0	0
Master's	3/3	0	3/3	0	4/3	0	4/3	0	4/3	0	4/3	0
Doctoral	3/1	0	3/2	0	3/2	0	3/2	0	3/2	0	3/2	0
Lifelong Learning courses	0	0	0	0	0	0	0	0	0	0	0	0
Total	9/4	0	9/5	0	10/5	0	10/5	0	10/5	0	11/5	0

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
1. Natural Sciences	1.1 Mathematics		Zvolte položku.	4.94
	1.2 Computer and information sciences	1.61	Balanced basic and applied research	
	1.3 Physical sciences	0.35	Applied Research	
	1.4 Chemical sciences		Zvolte položku.	

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

	1.5 Earth and related environmental sciences	2.98	Balanced basic and applied research	
	1.6 Biological sciences		Zvolte položku.	
	1.7 Other natural sciences		Zvolte položku.	
2. Engineering and Technology	2.1 Civil engineering	34.22	Balanced basic and applied research	36.13
	2.2 Electrical engineering, Electronic engineering, Information engineering	0.90	Applied Research	
	2.3 Mechanical engineering	0.45	Applied Research	
	2.4 Chemical engineering		Zvolte položku.	
	2.5 Materials engineering	0.02	Applied Research	
	2.6 Medical engineering		Zvolte položku.	
	2.7 Environmental engineering	0.09	Balanced basic and applied research	
	2.8 Environmental biotechnology		Zvolte položku.	
	2.9 Industrial biotechnology		Zvolte položku.	
	2.10 Nanotechnology		Zvolte položku.	
	2.11 Other engineering and technologies	0.45	Balanced basic and applied research	
3. Medical and Health Sciences	3.1 Basic medicine		Zvolte položku.	
	3.2 Clinical medicine		Zvolte položku.	
	3.3 Health sciences		Zvolte položku.	
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries		Zvolte položku.	
	4.2 Animal and Dairy science		Zvolte položku.	
	4.3 Veterinary science		Zvolte položku.	
	4.4 Other agricultural sciences		Zvolte položku.	
5. Social Sciences	5.1 Psychology and cognitive sciences		Zvolte položku.	11.83
	5.2 Economics and Business	0.14	Applied Research	
	5.3 Education	0.40	Balanced basic and applied research	
	5.4 Sociology		Zvolte položku.	
	5.5 Law	0.43	Applied Research	
	5.6 Political science		Zvolte položku.	
	5.7 Social and economic geography	7.73	Basic Research	
	5.8 Media and communications		Zvolte položku.	
	5.9 Other social sciences	3.13	Basic Research	
6. Humanities and the Arts	6.1 History and Archaeology	0.07	Basic Research	47.10
	6.2 Languages and Literature		Zvolte položku.	
	6.3 Philosophy, Ethics and Religion		Zvolte položku.	

	6.4 Arts (arts, history of arts, performing arts, music)	34.82	Balanced basic and applied research	
	6.5 Other Humanities and the Arts	12.21	Basic Research	
	Total	100 %	-	100 %

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

The FA is one of the leading research institutions in the Czech Republic in the field of architecture, design and landscape architecture. The topics addressed by the FA are, to a large extent, linked to the staff composition and focus of the departments as well as to the nature of teaching architecture, design, and landscape.

The most prominent thematic areas include (ranked by weight of publication outputs in 2024) the history of architecture, theory and typology of architecture, industrial heritage, urbanism and spatial planning, building and construction, digital and model design, heritage-site conservation, landscape architecture, and design. Related scientific, grant, publication, and lecture activities are often linked to membership and activities in international organisations (e.g. EAAE, Docomomo International, TICCIH, ICOMOS, eCAADe, SFHST, AIA, IIID, Hungarian Academy of Sciences, etc. – see the appendix for more details). The FA also takes advantage of the interdisciplinary nature of the field and collaborates on scientific projects and outputs with various research institutions in the Czech Republic (e.g. with the Institute of History of the Czech Academy of Sciences, the Academy of Fine Arts, the Klokner Institute, The Prague Institute of Planning and Development, and the National Heritage Institute), or participates in activities organised by these or foreign organisations (e.g. the eCAADe conference, a workshop with a publication by the Heritage section within the EAAE, the V4 railway heritage within the Visegrad Fund, or the post-war architecture of the V4 countries within the Iconic Ruins project in cooperation with Czechinvest and Docomomo International).

A significant proportion of the FA's scientific and expert activities, often on the borderline between research and design, consists of cooperation with municipalities and public administration, ranging from territorial or strategic plans and their methodologies, through landscape architecture and the public space, examining the possibilities of buildings or complexes or plots of land, to the preparation of assignments (e.g. competitions), various evaluations, analyses, and surveys (especially departments of theory and history of architecture, architectural heritage conservation, building theory, urban design, landscape architecture, and spatial planning).

These long-term activities, domestic and international ties are also reflected in the staff representation of academics at the FA, the nature of the research teams' activities and, last but not least, the success in grant calls.

Some areas of the FA's activities are fittingly linked to external entities and production, for example activities related to 3D printing, recycling, the use of mycelium in construction (Department of Architectural Modelling) and design proposals in cooperation with leading multinational manufacturers, e.g. TON, RWE, Sapeli, Technistone, Galavito, Tesla, Meva, Meopta, Viadrus, Lasvit (Department of Design).

However, practicing architects also play an extraordinary role at the FA and their linking of creative activity and analysis and interpretation of this activity, both in terms of the theory and typology of architecture, as well as at the level of exceptional and renowned design-build projects in the Czech Republic (especially the completed footbridges and shelters in the Krkonoše National Park). These activities are reflected in the long-term results of the FA in the Register of Artistic Outputs of the Czech Republic, where the FA holds a dominant position in the field of architecture.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
Vladimír Šlapeta, Prof. Ing. arch. DrSc. Hon. FAIA	Jean Tschumi Prize 2023	International Union of Architects (UIA)
Vladimír Šlapeta, Prof. Ing. arch. DrSc. Hon. FAIA	Bene Merentibus (for his tireless, scientifically based popularisation of the work of Polish architects of the 20th century)	Chamber of Architects of the Republic of Poland
Benjamin Fragner, PhDr.	Ministry of Culture Award for contributions to the field of architecture (for initiating and long-term management of industrial heritage research and professional popularisation of its outputs)	Ministry of Culture of the Czech Republic
Václav Gírsa, Prof. Ing. arch. Akad. arch.	Jože Plečnik Award 2019 (for lifetime achievement in the field of monument preservation)	Association of Architects of the Czech Republic
Jan Stempel, Prof. Ing. arch.	Medal for Hungarian Architecture 2019	Association of Hungarian Architects
Štěpán Valouch, Ing. arch.	Nominated for the Mies van der Rohe Award 2021; Prize in the Renovation category, Grand Prix of Architects 2020; Main Prize, Czech Architecture Award (for the project Lasvit Company Headquarters, Nový Bor)	Mies van der Rohe Foundation; Architects' Association; Czech Chamber of Architects
Pavla Melková, prof. Ing. arch. Ph.D.; Miroslav Cikán, prof. Ing. arch.; Vojtěch Ertl, Ing. arch.	Nominated for the Mies van der Rohe Award 2021 / Prize for Architectural Design and Renovation, Grand Prix of Architects 2020 (for the Jan Palach Memorial project)	Mies van der Rohe Foundation; Architects' Association
Tomáš Hradečný, doc. Ing. arch.; Klára Hradečná, Ing. arch.	Award of the President of the Senate of the Parliament of the Czech Republic Miloš Vystrčil in the Czech Architecture Award 2023 competition (for the Memorial of the Three Resistance Movements project)	Czech Chamber of Architects
Tomáš Efler, doc. Ing. arch.; Václav Gírsa, prof. Ing. arch. akad. arch.	Prize in the Renovation category, Grand Prix of Architects 2022; Winner of the Patrimonium pro futuro competition 2022 (for the project Restoration of the gloriette in the Rose Garden of Děčín Castle)	Architects' Association; National Heritage Institute
Ondřej Císlar, doc. MgA. Ph.D.	Grand Prix of Architects 2019 (for the Bridge over the Dřetovice stream project)	Architects' Association

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of scientific journal, ISSN
Pavel Kalina, Prof. PhDr. Ph.D.	Acta Polytechnica (Web of Science), ISSN 1805–2363
Matúš Dulla, prof. Ing. arch. DrSc.	Architecture & Urbanism, Slovak Republic (WoS / Scopus), ISSN 0044-8680
Petr Vorlík, Prof. Ing. arch. Ph.D.	Architecture & Urbanism, Slovak Republic (WoS / Scopus), ISSN 0044-8680
Karel Maier, Prof. Ing. arch. CSc.	Architecture & Urbanism, Slovak Republic (WoS / Scopus), ISSN 0044-8680
Henry Achten, Prof. Dr. ir.	International Journal of Architectural Computing, ISSN 1478-0771
Jana Tichá, doc. PhDr. Ph.D.	Piranesi Magazine, Ljubljana, Slovenia, ISSN 1318-007X

Hubert Guzik, Doc. mgr Ph.D.	Sešit pro umění, teorii a příbuzné zóny (Scopus), ISSN 1802-8918
Karel Maier, Prof. Ing. arch. CSc.	Urbanismus a územní rozvoj, ISSN 1212-0855
Veronika Šindlerová, Doc. Ing. arch. Ph.D.	Urbanismus a územní rozvoj, ISSN 1212-0855
Jakub Vorel, Doc. Ing. arch. Ph.D.	Urbanismus a územní rozvoj, ISSN 1212-0855

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
Michal Kohout, Prof. Ing. arch.	Housing Estates, What's Next? Masters of Collective Housing	Universidad Politecnica of Madrid (UPM), Swiss Federal Institute of Technology (ETH); Postgradual Programme; Madrid	2019
Pavla Melková, Prof. Ing. arch. Ph.D.	How to Bring a Monument to Speech	Columbia University Graduate School of Architecture, Planning and Preservation; New York	2020
Michal Kohout, Prof. Ing. arch.	Housing Challenges in the 21st Century	EPOKA University; Workshop Bauhaus Open Studio – Rethinking Housing Space; Tirana	2020
Lukáš Beran, Mgr. Ph.D.	Carl Arnold Séquin-Bronner, the Common Denominator	TICCIH Textile Section expert meeting, The International Committee for the Conservation of the Industrial Heritage; Berlin	2020
Vít Řezáč, Ing. arch.	System of spatial planning in the Czech Republic	European Systems of Spatial Planning, the Croatian Chamber of Architects and Association of Croatian Urban Planners; Belgrade	2021
Martin Pospíšil, Prof. Dr. Ing., Ph.D.	Load-bearing Structures in Architecture	ESPI (École Supérieure des Professions Immobilières) Nantes, France	2022
Henri Hubertus Achten, prof. Dr.	But Is It Interactive? Thoughts on Interactive Architecture	Human Architecture Interaction Design Conference 2022, Beijing, China (online, keynote speaker)	2022
Henri Hubertus Achten, prof. Dr.	It is Digital, So It Must Be Research	DARE Conference; Bialystok (keynote speaker)	2023
Petr Vorlík, Prof. Ing. arch. Ph.D.	Public building as key	Dublin City Council; Generous Architectures, Late 20 th -century buildings in Dublin: 1970s, 1980s, 1990s + the circular economy; Dublin (online, keynote speaker)	2023
Ondřej Císlar, Doc. Ing. arch. Ph.D.		Ted at Polimi; Teams: Architectures; Politecnico di Milano, SAUIC	2023

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year
Ruairi Glynn	Bartlett School of Architecture, University College London	Animating Architecture	2019
Michel Desvigne	Harvard Graduate School of Design, Cambridge, Architectural Studio MDP	Transforming Landscapes	2019
Steven Holl	Columbia University New York, Steven Holl Architects	About air, light and greenspace in the (post)covid era,	2021
Momoyo Kaijima	Architectural Studio Bow Wow; Department of Architecture, ETH Zurich	Architectural Ethnography	2022
Ievgenia Gubkina	Center for Urban History of East Central Europe in Lviv, Modernistki	Kharkiv constructivism, Ukrainian heritage under Russian threat	2022
Winy Maas	MVRDV, The Why Factory (t?f), Faculty of Architecture, TU Delft	The Future City: What's Next	2022
Carlo Ratti	Massachusetts Institute of Technology, MIT, Cambridge	Senseable Cities	2022
Pier Paolo Tamburelli	Architectural Studio baukuh; Technical University of Vienna	On Books, On Buildings	2023
Oliver Lütjens a Thomas Padmanabhan	ETH Zurich	Teaching Together	2023
Dubravka Sekulić	Royal College of Art London	Really Useful (Spatial) Knowledge	2023

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the research project/programme call	Name of the contracting authority/guarantor of the project/programme call	Year
Jana Tichá, Doc. PhDr. Ph.D.	Nomination for the Czech Republic for the European Prize for Contemporary Architecture – Mies van der Rohe Award	Fundació Mies van der Rohe in Barcelona	from 2013
Petr Vorlík, Prof. Ing. arch. Ph.D.	VEGA 6; project appraisal	Scientific grant agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic and the Slovak Academy of Sciences	2019
Petr Vorlík, Prof. Ing. arch. Ph.D.	VEGA 6; project appraisal	Scientific grant agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic and the Slovak Academy of Sciences	2020

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the period of 2019–2023²³. This should be done from the full list in annex tables (Table 3.3.1–3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

1) NAKI II – Origin and attributes of historical towns of the Czech Republic (Ministry of Culture of the Czech Republic, DG16P02R025, Department of Urban Design FA CTU in Prague, ÚTAM AV ČR, principal investigator: Jan Jehlík, 2016–2020)

The main contribution of the work is the creation of an original method for examining monument values on an urban scale. In the field of mapping historic cities for the purposes of identifying and protecting the attributes of their values, a comprehensive methodology was prepared, which can be used as the basis for the development of other partial analytical methods and for the processing of stable databases for any historical city (see Table 3.4). In the area of location analysis of medieval historical cities, a unique procedure for creating geometric relationships was demonstrated, allowing for the definition of urban and economic contexts of the location plan. The core of this work is the definition of key concepts and the arrangement of phenomena, attributes, and relationships corresponding to the basic goals of caring for cultural values. An original comprehensive methodology was thus developed supporting the recognition of basic phenomena that reflect the cultural and historical values of the city as a whole. In the international context, it was possible to cooperate intensively with specialist workplaces in the Central European area during the project's resolution. A number of consultations were held with colleagues from academic institutions in Belgium, Spain, and Great Britain. The project was presented and discussed at a seminar of the International Scientific Committee for Historic Cities CIVVIH ICOMOS, and workshops were held with the participation of colleagues from Austria and Slovakia. The results are applicable in the spatial-planning process as part of spatial analysis and spatial-planning documents, spatial-planning documentation and for the development of heritage-management plans.

2) NAKI II – Architecture of the 1980s in the Czech Republic. Individuality, identity and parallel considerations against the background of political repression (Ministry of Culture of the Czech Republic, DG18P02OVV013, Department of Theory and History of Architecture FA CTU in Prague, principal investigator: Petr Vorlík, 2018–2022)

Czech architecture from the period 1945–1989 has received intense public attention in recent years. Dozens of publications, exhibitions and research projects have been created; however, the 1980s have long been overlooked and underestimated in this research 'ferment' due to the repressive political and social atmosphere of the time. The aim of the research project was to map developments in period architecture, the changes that the 1980s brought, and the inherited values. The core of the publication outputs consists of five books focusing on the phenomena of building typologies (*(a)typ*, 2019, rated 2 in module 1), unrealised visions (*nepostavená*, 2020), memories of selected personalities (*rozhovory*, 2020), a characteristic approach (*improvizace : improvisation*, 2021) and a holistic contextual interpretation of the period (*ambice : ambitions*, 2022, rated 1 in module 1). The books are complemented by an interactive database of buildings, personalities, and events, publicly accessible on the project website www.architektura80.cz (see Table 3.4). As part of the project, we also managed to publish a series of articles in prestigious professional journals, present the results at foreign conferences, publish three more books and a number of articles in the professional press beyond what was planned, and (thanks to media coverage) stimulate interest in this layer of cultural heritage among both the general professional and lay public. The topic has also aroused interest abroad, and the last two books (*improvizace : improvisation*, *ambice : ambitions*) were published bilingually and published for free download on the Docomomo International website.

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

3) NAKI II – Industrial Architecture: Commemoration of Industrial Heritage as a Technical-Architectural Work and as an Identity of a Place (Ministry of Culture of the Czech Republic, DG16P02H001, Research Centre for Industrial Heritage FA CTU in Prague, principal investigator: Lukáš Beran, 2016–2020)

The Research Centre for Industrial Heritage has long been developing a broad-based approach to the topic of industrial heritage in the long term, unique even in global terms, which, in addition to values specific to this area, also formulates and interprets general, cultural values, the understanding of which is necessary to find appropriate means for the new use of industrial buildings. The project directly followed up on the results of the previous VCPD NAKI project to use and further develop its online Industrial Topography database for synthesising and evaluating research, the result of which was, in addition to a specialised map (see Table 3.4), a pair of exhibitions with extensive bilingual critical catalogues and a number of other publication outputs, especially five thematically utterly unique book monographs. The project opened up new research topics and drew attention to often overlooked cultural values, the connections and meanings of industrial heritage buildings, while at the same time characterising their development potential and providing an irreplaceable overview of conservation and at the same time creative urban and architectural procedures for their new use. Through seminars and lectures, this topic was naturally reflected in the pedagogical activities of the Faculty of Architecture.

4) TAČR – Possibilities and limits of socially and environmentally sustainable participatory housing in the Czech Republic (TAČR Environment for Life, Department of Building Theory FA CTU in Prague, principal investigator for FA CTU in Prague: David Tichý, 2021–2023)

The Faculty of Social Studies of Masaryk University in Brno (principal investigator of the entire project Jan Blažek), the Institute of Sociology of the Academy of Sciences of the Czech Republic, the Faculty of Architecture of the Czech Technical University in Prague, the Faculty of Arts and Architecture of the Technical University in Liberec and Arnika Centre for Citizen Support jointly participated in the project.

The aim was to conceptualise participatory housing for the Czech Republic: to identify the main forms and propose systemic solutions for the development of social innovation in various contexts. During the project, the Symposium on Participatory Housing and the Conference on Participatory Housing were organised, among others. The research also included participation in the European Network for Housing Research conference in Barcelona and the IBA Research Lab summer school in Vienna, focused on the production of affordable housing. A series of research workshops with residents were carried out in each of the six Czech partner cities of the project. The needs and interests of housing actors in cities were identified, whether and in what form they are willing to adjust their current practices in providing and managing housing in favour of greater cooperation or sharing of various aspects of housing. The main results of the project are the Methodological Guide to Participatory Housing for Cities and Municipalities in the Czech Republic, the Participatory Housing Manual for Residents, Policy Paper – recommendations for state administration representatives, an online guide to methodological procedures for participatory housing and a project website intended for all potential actors and the public. participativnibydleni.cz/metodika-manual/

5) TAČR – Models for the valuation of public goods for spatial planning purposes (ÉTA 3, TL03000695, Department of Spatial Planning FA CTU in Prague, IPR Prague, Dataligence s.r.o., principal investigator: Jakub Vorel, 2020–2023)

The principal investigator was the Faculty of Architecture, Czech Technical University in Prague, co-investigators were the The Prague Institute of Planning and Development and Dataligence s.r.o. The project also involved Lukáš Makovský, working at the London Schools of Economics, UK and Henley Business School, University of Reading, UK.

The aim of the project was to create practical tools (valuation models) that would allow a) an estimate of the utility value of public goods, especially public amenities, public spaces and public infrastructure, which are not directly valued by the market, from data on the prices of market goods (here real estate) or from other data; b) an estimate of the impact of planned public and private projects on the price of residential and commercial real estate. Another aim of the project was to examine the possible uses of valuation models in the process of spatial planning and spatial decision-making and ex-ante assessment of the feasibility of development projects in the Prague metropolitan region, as well as in vocational education. Representatives of academia, the public, and private sectors participated in the three-year project.

The main results of the research are an open-source software application and an academic book. The val4plan software application provides a robust set of tools for implementing practical econometric analyses to verify the economic impacts of changes in the environment. The academic book 'Hedonické ceny veřejných statků', and its English mutation 'Hedonic Prices of Public Goods', describes the basic principles of parametric and non-parametric, classical and spatial regression methods used to derive hedonic prices, including quasi-experimental difference-in-differences models.

6) TAČR – Development potential of municipalities and regions (BETA, TITSMMR926, Department of Spatial Planning FA CTU in Prague, principal investigator: Jakub Vorel, 2021–2023)

The aim of the project was to develop a methodology and a software application that would enable the development potential of territorial districts of municipalities and administrative districts of municipalities with extended powers (SO ORP) to be assessed in a standardised and interactive manner. The project sponsor and the end user of its results was the Ministry of Regional Development of the Czech Republic. The first result of the project was a certified methodology for assessing development potential, which proposes a procedure for quick and easy comparison of development potential at the micro-regional and local level, namely administrative districts of municipalities with extended powers, municipalities and regional capitals and their hinterland. For this purpose, the methodology uses standardised indicators that, with

exceptions, are based on publicly available data and proposes procedures for assessing the development potential of the territory. The second result of the project is an interactive online application (see Table 3.4).

7) TAČR – Sustainable and affordable housing in strategic plans of settlements (ÉTA, TL01000143, Department of Building Theory FA CTU in Prague, MÚVS, principal investigator: Michal Kohout; investigators: David Tichý, Petr Štěpánek, Lucia Dobrucká, Veronika Peňázová, 2018–2019)

The aim of the project was to methodologically anchor the issue of housing as one of the pillars of strategic plans of settlements as well as smart cities concepts, and to describe the relationship between affordable housing and the competitiveness of settlements and regions, their economic and social sustainability, and the quality of life in them. Furthermore, the project sought to summarise the key determinants of sustainable and affordable housing in the 21st century, to describe and interpret relevant aspects with significant or hidden impacts on the sustainability and affordability of housing in cities and municipalities, and to codify these using indicators and to explore the possibilities of influencing them through strategic planning of cities and municipalities or other housing, policy and sustainable development policies. The project combines knowledge from the field of strategic planning and urban administration with knowledge of spatial planning processes, contemporary urban theory, and architectural and typological knowledge. The project contributed to the establishment of cooperation with experts from the Masaryk Institute of Advanced Studies, who supplemented the team with knowledge from the field of strategic planning and urban administration. The cooperation eventually resulted in other research projects as well as the introduction of a Lifelong Development program and current cooperation on the preparation of the Master's degree program in Planning and Development.

8) TAČR – Revitalisation of urban residential complexes of the housing estate type with an emphasis on solving their spatial layout and organisation of public space (TAČR Beta, TIRSMR916, Department of Building Theory FA CTU in Prague, principal investigator: Michal Kohout; investigators: Filip Tittl, Jitka Molnárová, 2020–2021)

The main objectives of the project consisted of: a) elaboration of analytical material on the general conditions for the preparation and implementation of the revitalisation of residential complexes and individual apartment buildings from the point of view of current legislative conditions, their systemic administration and resolution of property relations; b) elaboration of analytical material focused on the possibilities of applying innovative technologies and solutions in housing construction (new forms, revitalisation, increasing the typological diversity of the social and generic composition of housing, integration of other activities within or in connection with existing buildings, use, organisation and hierarchisation of external and internal living space, technical equipment of buildings, etc.), recommendations for a methodology; c) elaboration of a methodology for solving comprehensive projects for the revitalisation of housing complexes of the housing estate type and the revitalisation of their public spaces using the principle of universal design, including a list and description of individual types of modifications and measures (catalogue); d) preparation of a pilot project of a selected housing estate at the stage of documentation for a building permit using the results of previous stages of work, including practical solutions to the analysed barriers (e.g. fragmented ownership), evaluation, especially in terms of the effectiveness of the public support funds spent, preparation and organisation of a conference on the topic of the analysis and methodology of the pilot project. The project contributes to the promotion of socially and functionally diversified development corresponding to the concept of a city of short distances and a fair city.

9) TAČR – Searching for new methods to support the implementation of the universal design principle in housing investment support (TIRBMMR823, Department of Building Theory FA CTU in Prague, principal investigator: Irena Šestáková, 2019–2021)

The main objective of the research was to review the existing legislative requirements for the use of buildings without barriers and to prepare materials for their amendment. Special attention was paid to the evaluation and optimisation of the requirements for special-purpose apartments with an emphasis on the methodological implementation of the principles of universal design. The aim was also to create materials that could be used to compare the economic efficiency of different levels of barrier-free adaptations. This material is used to determine possible new subsidy titles to support the renovation of housing construction from the period 1948–1990. Three types of results were addressed within the project: a) methodology for applying the principles of universal design and lifelong living in housing construction; b) application of the methodology in the form of a housing typology according to the principles of universal design and lifelong housing, mapping the housing stock built in the years 1948–1990 in the Czech Republic, for which models of barrier-free adaptations were subsequently developed according to the standards defined by the methodology; c) proposals for amending Decree No. 398/2009 Coll., on general technical requirements ensuring barrier-free use of buildings according to the upcoming amendment of legislative requirements for barrier-free use of buildings and the adopted European standard EN 17210 – accessibility and usability of the built-up environment (Decree of the Ministry of the Interior No. 146/2024 Coll. on requirements for construction and binding standards ČSN 73 4001 Accessibility and barrier-free use). An essential part of the research was the comparison of regulations in the Czech Republic with selected foreign legislation of a similar nature.

10) NAKI II – Optimisation of monitoring and evaluation of information on heritage buildings (Ministry of Culture of the Czech Republic, investigator for FA: Martin Pospíšil, principal investigator: Klokner Institute CTU in Prague)

The protection of objects with cultural and historical value is currently an important task for architects, conservationists and civil engineers. With the increasing adverse effects emanating from the surrounding environment, the degradation

processes of building materials are increasing. Obtaining sufficient information about the condition of the structure, its evaluation and the planning of diagnostic procedures regarding the anticipated progress of degradation is a key part of preventive care for heritage sites. Therefore, the applied research project focused on optimising diagnostic procedures to increase the efficiency and quality of the processes of preventive heritage-site activities while minimising costs. The optimised procedures included visual inspections, structural engineering surveys, and long-term monitoring of structures with an emphasis on the use of non-destructive procedures. The main objective was to provide operational tools and data for monitoring of decision-making, in particular, brick and metal structures. New methodologies were developed to review the ČSN standards and functional samples. The project's partial objectives included: choosing a diagnostic procedure and setting priorities for intervention depending on the type of historical structure, its condition, and its heritage value; development of gentle diagnostic procedures; optimisation of diagnostic systems for the selection of appropriate methods, locations, and monitoring frequencies; data for decision-making on measures and conceptual design of repairs. The application of innovative procedures reduces the costs of diagnosing historic buildings and leads to significant economic benefits by preventing breakdowns. The results were verified on real structures and published in professional publications. The project target group included experts in the protection of monument buildings, designers, construction companies, responsible authorities and students of secondary schools and universities.

Table 3.3.1 Projects supported by public funds

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
Ministry of Culture of the Czech Republic/ NAKI II	Architecture of the 1980s in the Czech Republic. Individuality, identity and parallel considerations against the background of political repression (principal investigator: Petr Vorlík)	2869/113	3287/130	3356/133	3269/129	
Ministry of Culture of the Czech Republic/ NAKI III	Stavoprojekt 1948–1953. Collectivization of architectural designing and its imprint in the memory of Czech landscape and cities (principal investigator: Petr Vorlík)					5412/ 213
Ministry of Culture of the Czech Republic/ NAKI II	Industrial architecture. Monument of industrial heritage as a technical-architectural work and as an identity of the place (principal investigator: Lukáš Beran)	3779/149	4492/177			

²⁵ If the provider is from abroad, please indicate the provider's country of origin in brackets. For the determination of the country of origin of the provider, the place of residence of the provider is decisive.

²⁶ Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

Ministry of Culture of the Czech Republic/ NAKI III	Industrial Architecture in the Second Half of the 20th Century: Extension, Transformation, and Identity (principal investigator: Jan Zikmund)					3833/151
Ministry of Culture of the Czech Republic/ NAKI II	Origin and attributes of heritage values of historical towns of the Czech Republic (principal investigator: Jan Jehlík)	4287/169	4773/188			
Technology Agency of the Czech Republic / ETA, BETA	TIRBMMR823 Searching for new methods to support the implementation of the principle of universal design in housing investment support (principal investigator: Irena Šestáková)	482/19	1274/50	139/55		
Technology Agency of the Czech Republic /BETA	TL01000143 Sustainable and affordable housing in strategic plans of settlements (principal investigator: Michal Kohout)	1220/48				
Technology Agency of the Czech Republic /ETA	TL03000695 Models for public goods valuation for spatial planning purposes TACR ETA (principal investigator: Jakub Vorel)		415/16	1171/46	1180/46	868/34
Technology Agency of the Czech Republic /BETA	TIRSMMR916 Revitalisation of urban residential complexes of the housing estate type with an emphasis on solving their spatial layout and organisation of public space (principle investigator: Michal Kohout)		951/37	1802/71		
Technology Agency of the Czech Republic /BETA	TITSMMR926 Development potential of municipalities and regions TAČR Beta (principle			1599/63	2472/98	379/15

	investigator: Jakub Vorel)					
Ministry of Culture of the Czech Republic	Real Santini (principal investigator: Pavel Kalina)					70/27
Prague City Hall	Preparation of the book 'CONCRETE, BŘASY, BOLETICE. Prague on the Wave of Brutalism' (principal investigator: Klára Brůhová)	60/2				
ERASMUS_21	Landscape and Climate Change Adaptation in Education (doc. Ing. Klára Salzmann, Ph.D.), International project				3667/151	3640/151
KRNAP	Footpaths and MOUNTAIN SHELTERS in Krkonoše Mountains					1552/65
Libčice nad Vltavou, in cooperation with the city and with students of the Higher Vocational School and the Secondary Industrial School in Volyně	3 sittings – a tie between Libčice nad Vltavou and the village of Tursko (students of the Hlaváček–Čeněk studio)	400/16				
Prague-Nebošice district, in cooperation with the Faculty of Mechanical Engineering of the Czech Technical University, the RENEX company, Valenta ZT, Havlíček Carpentry and Tomáš Beran Locksmithing	Eye over Nebošice, an original observation platform and an unconventional swing (students of the Seho–Poláček studio)			655/27		
Total		13097/516	15192/598	8722/395	10588/424	15754/656
In the role of another participant						
	Project name	Support (in thousands CZK/EUR)				

Provider ²⁷		2019	2020	2021	2022	2023
Ministry of Culture of the Czech Republic/ NAKI II	Technologies and procedures for the protection of historic concrete bridges (FA investigator: Lukáš Beran, principal investigator Klokner Institute, CTU)		113/5	136/5	136/5	
Ministry of Culture of the Czech Republic/ NAKI II	Methods for ensuring the sustainability of steel bridge structures of industrial cultural heritage (FA investigator: Martin Pospíšil, principal investigator Klokner Institute CTU)	619/25	643/26	560/22	581/23	
Ministry of Culture of the Czech Republic/ NAKI II	Optimisation of monitoring and evaluation of information on historical buildings (FA investigator: Martin Pospíšil, principal investigator Klokner Institute, CTU)	625/25				
Ministry of Culture of the Czech Republic/ NAKI II	Development and research of materials, processes and technologies for the restoration, conservation and strengthening of historical masonry structures and surfaces and systems for the preventive protection of historical and listed buildings threatened by anthropogenic and natural risks (FA investigator: Martin Pospíšil, principal investigator FSV CTU)	65/3	63/3			
Technology Agency of the Czech Republic /Environment for Life	Possibilities and limits of socially and environmentally sustainable participatory			499/20	545/21	505/20

²⁷ Ibid.

	housing in the Czech Republic (principal investigator: David Tichý)					
Technology Agency of the Czech Republic	Development of large-format 3D printing from recycled plastics and its application in innovative eco-design (Prof. Dr. Henri Hubertus Achten, consortium with Lavaris, Plastenco)					364/14
Technology Agency of the Czech Republic	Development of Timber Bridge using remote control and monitoring (FA investigator: Dalibor Hlaváček; principal investigator: Czech University of Life Sciences Prague)					344/13
Norwegian funds	Revitalisation of the historic Liechtenstein brewery, restoration of the original technology and access to the unique brewing museum and archive in Kostelec nad Černými lesy (FA investigator: Benjamin Fragner, principal investigator National Brewing Museum o.p.s.)			70/3	70/3	
International Visegrad Fund	Railway Heritage for Sustainable Tourism Development (FA investigator: Benjamin Fragner, consortium Serbia, Hungary, Czech Republic, Poland, Slovakia)			43/2		
Total		1309/53	819/34	1308/52	1332/53	1213/47

Table 3.3.2 - Contract research activities

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023

²⁸ If the client is from abroad, indicate in brackets the country of origin of the client.

Klokner Institute, CTU	Hlávkův Bridge in Prague – architectural and historical research (principal investigator: Michael Rykl)	260/10				
Pet MAT	Cooperation and support for PET-MAT research and innovation	83/3				
Karlovarské minerální vody	Agreement on mutual cooperation and support for research and innovation	260/10	304/12			
Prague 10	Methodology for private sector participation in public expenditure	106/4	374/15			
National Theatre and the Association of Architectural Studios	The New Stage and restaurant building of the National Theatre in Prague – architectural and historical research (principal investigator: Petr Vorlík)		320/13			
Prague 6 district	Polyclinic Pod Marjánkou in Prague – expert assessment of reconstruction and completion (Department of Building Theory FA CTU in Prague)		306/12			
National Technical Museum	The last house of Adolf Loos		60/2			
Prague 10	Update of the method for the municipality		15/1	19/1		
The Prague Institute of Planning and Development	Elaboration of user and technical standards for the reconstruction of the Emauzy administrative complex		190/7	95/4	38/2	
The city of Neratovice and the OVA architectural studio	Neratovice Community Centre – inventory of architectural and interior elements (principal investigator: Miroslav Pavel)			119/5		
The Prague Institute of Planning and Development	New Hospital Prague-Letňany – expert assessment (Department of Building Theory FA CTU in Prague)			100/4		
The Prague Institute of Planning and Development	Bulovka Hospital in Prague – site-use analysis			250/10		
The Prague Institute of Planning and Development	Consultancy services for the preparation of the BIM reconstruction assignment of the Emauzy administrative complex			154/6		
Klokner Institute, CTU	Mánes Bridge in Prague – architectural and historical research (principal investigator: Michael Rykl)			100/4	50/2	
Pražská developerská společnost	Primary schools – manual for public building projects			411/16	280/11	
Pražská developerská společnost, the city of Sušice	Cooperation with cities, Kohout-Tichý studio				440/17	
The city of Jihlava, the city of Tábor	Cooperation with cities, Kohout-Tichý studio					440/17
Uniwersytet Wrocławski	Luxury, standard and poverty in the civilisation of the burghers of East Central Europa					40/2

EKOLA group, spol. s r.o.	Measurement of daylight for the office of the Administration of State Material Reserves with the influence of specific internal blinds (Daniela Bošová, Lenka Prokopová, Dagmar Richtrová)					20/1
Saint-Gobain Construction Products CZ a.s.	Ratiometric measurement of glazing transmittance (Daniela Bošová, Lenka Prokopová, Dagmar Richtrová)					99/4
NEBESYS a.s.	Ratiometric measurement of light transmission of a transparent roof system – 7 samples (Daniela Bošová, Lenka Prokopová, Dagmar Richtrová)					120/5
ADITEX, spol. s r.o.	Evaluation of data from laboratory measurements of the ADITIZOL BASIC material in a climatic chamber to verify the thermal insulation properties of the material (Adéla Vrbová, Lenka Prokopová)					12/1
Total		709/27	1569/62	1248/50	808/32	731/30

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁹, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

1) A methodology for the comprehensive identification and protection of attributes of heritage sites of historical cities and public spaces and the preservation of their authenticity (Jan Jehlík et al., 2020, certified methodology, see NAKI II MK CR, DG16P02R025, Department of Urban Design FA CTU in Prague).

A logically structured set of methods for the comprehensive analysis and evaluation of historical space from the perspective of development in the formation of the city, i.e. its organisation and methods of use and identification of the basic supporting landscape, urban and architectural phenomena, and prevailing activities, including their intangible manifestations. The results are applicable in the process of spatial planning as part of spatial analytical and spatial planning documents, spatial planning documentation, and for the development of plans for heritage-site care and for the assessment of specific projects. The use of the results leads to more erudite planning and decision-making in the field of heritage-site care and urban development. The methodology is a standard basis for teaching students and is further developed in dissertations. A methodology catalogue is continuously distributed within the relevant area of public administration. The certified methodology was used in the analytical part of the Territorial Study of the Prague Monument Reservation.

2) Methodology for applying the principles of universal design and lifelong living in housing construction (Irena Šestáková, Jan Tomandl, Michal Kohout, David Tichý, Erik Petrus, 2021, Applied methodology approved, see TAČR, TIRBMMR823, Department of Building Theory FA CTU in Prague)

The aim of the certified methodology was to create material that would provide support to public administration entities, designers and architects, the professional public, and defined groups of residents in implementing the principles of barrier-free and universal design in housing at the level of an apartment building and individual apartments. The methodology follows up, revising and developing, in particular a section of the then valid Decree of the Ministry of the Interior No.

²⁹ See Terms definition.

398/2009 Coll., on general technical requirements ensuring barrier-free use of buildings. Specifically, these are the sections relating to requirements for special purpose apartments and customisable apartments. In contrast to the aforementioned decree, the methodology mainly brings a division into several categories of accessibility of apartments, which will enable, for example, the ensuring of minimum standards in ordinary apartments, in social apartments, in homes for the elderly or in apartments in nursing homes. It will also simplify the possibility of future use and possible adaptations of apartments for people with limited mobility or orientation. Other standards develop the current requirements for special purpose apartments for people with limited mobility. In addition to technical and spatial requirements, the methodology also contains recommendations and guidance solutions. Different categories of apartment accessibility can also be observed in foreign legislation (Sweden, Germany). The newly defined accessibility standards were reflected in legislation in 2024, specifically in the Decree of the Ministry of the Interior No. 146/2024 Coll. On the requirements for construction and binding standards ČSN 73 4001 Accessibility and barrier-free use.

<https://mmr.gov.cz/cs/ministerstvo/bytova-politika/archiv-do-2024/publikace-a-analyzy/1/metodika>

3) Methodology for solving comprehensive projects for the regeneration of housing estate-type residential complexes (Michal Kohout, Jitka Molnářová, David Tichý, Filip Tittl, 2021, Applied methodology approved, see TAČR Beta, TIRSMR916, Department of Building Theory FA CTU in Prague)

The methodology represents a procedure for bringing current Czech housing estates, home to approximately 30 % of the population of the Czech Republic, closer to the requirements for contemporary housing. The methodology represents a set of measures improving the low adaptability of housing estates, the deficit of employment opportunities and higher-standard housing, the absence of private and shared outdoor areas, as well as the lack of personalisation of the public space, a non-intuitive transport service system and a lower number of parking spaces, and so on while maintaining their chief advantages, which can be considered, for example, the openness of the development, a large proportion of green areas, an economical density of development, the availability of basic civic amenities, etc. The ultimate purpose of the methodology is to create sustainable territorial units from housing estates with a high degree of resilience, functioning as fair and inclusive cities of short distances with a lively functional and social structure providing adequate housing for all people throughout the life cycle.

[https://mmr.gov.cz/cs/ministerstvo/bytova-politika/archiv-do-2024/publikace-a-analyzy/1/revitalizace-mestskych-obytnych-celku-sidlistn-\(1\)](https://mmr.gov.cz/cs/ministerstvo/bytova-politika/archiv-do-2024/publikace-a-analyzy/1/revitalizace-mestskych-obytnych-celku-sidlistn-(1))

4) Tabula Rasa / Děčín (Josef Šafařík, RUV-84873, OPVV-Centre for Advanced Applied Natural Sciences, CZ. 02.1.01/0.0/0.0/16-019/0000778, Department of Design FA CTU in Prague)

In 2021, a sculpture concept was created as a result of cooperation between the Faculty of Physics, the Faculty of Engineering and the Faculty of Physics of the Czech Technical University. The goal was to shape the synergy between these faculties and popularise science at the Faculty of Engineering. Inspiration came from a dialogue between artists and scientists during workshops. The design connected abstract and concrete representations and brought particle physics closer to the public.

The central theme of the project was physical interference, a principle of wave physics and optics, which describes the behaviour of waves when two or more sources meet. Constructive interference occurs when the amplitudes of the waves add up, and destructive interference occurs when they cancel each other out. In art, this principle is used to create optical effects, for example, through transparent materials or overlapping layers.

The Tabula Rasa sculpture is unique, thanks to technological experimentation, especially in glassmaking and interdisciplinary integration. Josef Šafařík explored new approaches here and also designed a multimedia interface that connects the work of art with scientific data from CERN. The sculpture is the first of its kind with a variable mirror surface that reacts to the movement of the observer. The interference pattern was precisely calculated for the given space and integrated into the interlayers of the glass composition, enhancing the visual effect and interaction with the viewer. The combination of illusion and physical principle allows for the creation of a hyperstructural event in which reality and fiction merge.

5) Bohemian Perfection (Marián Karel, RUV-77826, Department of Design FA CTU in Prague)

This first of the trio of exhibitions represented a combination of student design from the Department of Design FA CTU and top craftsmanship from several traditional fields. The exhibition was characterised by its large-scale concept, where over an area of more than 150 m² in the historic space of the Old Town Hall, traditional craftsmanship, contemporary design and the unique atmosphere of the place were brought together. The exhibition was conceived with an emphasis on minimalism and efficiency, using simple and affordable structures. It presented not only student designs and samples of craftsmanship from the participating companies, but also tools, materials, and forms illustrating the process of producing individual artefacts. The exhibition had a distinct educational character and offered visitors insight into traditional and contemporary approaches in the field of design and craftsmanship. Its great success was confirmed by the attendance of more than 4,000 visitors in just one month.

A significant benefit was also practical cooperation, which led to the testing of innovations in production processes, such as the valorisation of waste from the TON company's production, and to the realisation of some products that have since become a permanent part of the companies' production portfolio, such as Jasanky or Košíkářství Král.

6) Architecture of the Eighties (Petr Vorlík, Lucia Mlynčková, Jan Zikmund, Lenka Kužvartová, Jana Bukačová, Tereza Pokorná, 2022, Specialised Map with Expert Content, see NAKI II MK ČR, DG18P02OVV013, Department of Theory and History of Architecture FA CTU in Prague)

This specialised map was created as a synthetic, publicly available platform at www.architektura80.cz, which contains the results of a five-year research project. Professionally verified data are presented on three complementary levels – buildings, personalities, events – that support other publication outputs of the project (books, articles, proceedings texts). The map at the address forms an anchor point for professional institutions that deal with the topic of architecture of the seventies and eighties, such as the National Institute of Monuments, the Academy of Sciences, Charles University and the University of Applied Arts. However, public administration institutions are also key beneficiaries, especially in the areas of property management, heritage-site care, or spatial planning. The financial benefit cannot be quantified, as the core lies in the long-term social benefit, especially in the transformation of value frameworks and in making previously unknown, inaccessible, or incomprehensible information publicly available on a platform based on professional work. The theme naturally takes into account gender issues – the 1980s are precisely the period when women architects are more prominent in the field (see the book *rozhovory*) and when, within the framework of generational change and growing interest in regions and 'fringe topics', the role of the young and middle generation of creators is growing, shaping a new, more inclusive approach to the creation of public space and so-called humanised architecture. It was also in the 1980s that the first attempts at ecological solutions and sustainability were established in the field of architecture (see records in the database of buildings and chapters in the books *(a)typ, nepostavená, improvizace, ambice*).

www.architektura80.cz

7) Séquin & Knobel: A Map of Industrial Architecture (Lukáš Beran et al., 2022, Specialized Map with Expert Content, see NAKI II MK ČR, DG16P02H001, Research Centre for Industrial Heritage FA CTU in Prague)

A map presenting newly discovered global historical and cultural connections in the topographic structure. The content of the map was chosen as a case study of the activities of the specialised industrial building design office of Carl Arnold Séquin-Bronner, which has been collaborating with the firm Séquin & Knobel since 1895, when it teamed up with the architect Hillario Knobel. The findings from the office documents, stored in the archives of the Institute of History and Theory of Architecture (gta) at the ETH in Zurich, combined with the results of research into archival funds in the Czech Republic. Detailed literature searches and field research made it possible to capture approximately one hundred of its buildings in Switzerland, Germany, Austria, and the Czech Republic. The content of the online map, freely available on the website sequin-et-knobel.net, can be shared and co-created by today's users of these buildings, local experts or witnesses, and thus support the life of local communities. As a result, it presents a whole range of possibilities for new uses of typologically similar buildings – various models of sustainability.

<https://sequin-et-knobel.net/>

8) Potential for the development of municipalities and regions (principal investigator Jakub Vorel, 2023, online application, see TAČR BETA, TITSMMR926, Department of Spatial Planning FA CTU in Prague)

An interactive online application for automatic evaluation and display of the development potential of municipalities and regions, which allows individual target groups to find the current development potential of territorial units, including partial potentials in the monitored areas (e.g. environment, demography, public services, etc.) within the map display. The application is publicly available and represents an easily accessible tool that is understandable to all potential target groups of users. It consists of four user interfaces: evaluation of SO ORP, evaluation of municipalities, evaluation of regional cities and their surroundings, and evaluation in the map. The online application allows users to choose from a large number of indicators in various thematic areas and to choose territories with which they will compare their own areas, thus allowing users to compile individual comparisons, change and test these comparisons, and thus obtain richer information. The application draws data mainly in an automated manner (with a few exceptions) in real time and provides users with current comparisons based on standardised indicators of development potential. Automated drawing of data into the application system will allow in the future continuous monitoring of the development potential of individual territorial units in a time series.

9) 3D printing and filament from recycled plastic, use of plastic waste in architecture and design (Kateřina Sýsová et al, Department of Architectural Modelling FA CTU in Prague)

Research on the use of plastic waste in architecture and design has been ongoing since 2010. Starting with the establishment of the Experimental Studio supported by the publication of 150,000 PET bottles (2014) and installations pointing out the seriousness of the issue for the PETree company (2015) and PETAnděl (2016 and 2017), cooperation began with the largest PET bottle producer in the Czech Republic (Karlovy Vary mineral waters MATTONI). The PET brick (EP3101189) or bottle-brick was patented, designed to serve construction purposes after the contents were emptied (first presented in the Czech pavilion at the EXPO 2015 world exhibition in Milan). Other installations were then made from this brick (PETOTEM at the Blik Blik festival in Pilsen 2017, a stand for the CTU publishing house 2018, winners' podiums for the RUN CZECH 2018 event). With the development of 3D printing in the Czech Republic, research began to deal with recycled filament or printer cartridges made of PET material: PETsculpt (2017, Advent statue in Jindřichův Hradec), Parallel World of Angels (2018, 18 angel statues designed by sculptor Michal Trpák), Kaleidoscope (2019, statue for the International Construction Fair in Brno), 3dění (2022, Dačice sugar cube project with MAS Czech Canada), Plasteosaurus (2022, statue of a 6-meter dinosaur for the

National Museum in Prague) and 3D EXPO surprise (2023). All of these projects were connected with students of FA CTU in Prague, who modelled sculptures for 3D printing, trained volunteer printers of different ages and genders about the possibilities of circularity of materials, especially plastic. Recycled filament produced in the Czech Republic is still on the market today.

10) Bridges to the Krkonoše Mountains vol. 2, KRNP Administration (Dalibor Hlaváček, Martin Čeněk, Hana Seho et al., Department of Architectural Design II FA CTU in Prague)

The design-build projects of the Department of Architectural Design II, implemented in cooperation with the Krkonoše National Park Administration (KRNP), represent an important form of scientific and research activity focused on innovative designs and realisation of small architectural objects in extreme mountain conditions. The projects combine theoretical knowledge with practical experience and allow students to go through the entire process of the creation of a building to its realisation. Cooperation with the Krkonoše National Park Administration began in 2017, when the first set of footbridges was completed. Between 2019 and 2023, two main series of projects were created: sets of mountain shelters (2019) and footbridges (2023). Six shelters were installed at strategic locations where they can provide refuge for tourists. The architectural concepts were inspired by the local environment, climatic conditions, and the need for sustainability. The successful construction of the shelters was followed by a second set of footbridges, designed to meet demanding mountain conditions and aesthetically fit into the natural environment of the Krkonoše Mountains. The significance of the completed projects is confirmed not only by an award from the Public Investor's Action in the Krkonoše Prize for Architecture (2022) but also by the long-term contribution to the design-build educational concept. The students gained invaluable experience with the complex process of architectural creation, and the KRNP Administration received functional and aesthetically valuable buildings that enrich the tourist infrastructure of the Krkonoše Mountains. Cooperation between the academic sphere and the administration of this protected area shows the possibilities of linking education, research, and practical implementation in the public space.

<https://1-1lab.cz/en/>

Table 3.4.1 - Overview of research results in the period under evaluation

Type of result ³⁰	Year of application	Name
Applied methodology approved	2020	A methodology for the comprehensive identification and protection of attributes of heritage sites of historical cities and public spaces and the preservation of their authenticity (Jan Jehlík et al., see NAKI II MK CR, DG16P02R025, Department of Urban Design FA CTU in Prague).
Applied methodology approved	2021	Methodology for applying the principles of universal design and lifelong living in housing construction (Irena Šestáková, Jan Tomandl, Michal Kohout, David Tichý, Erik Petrus, see TAČR, TIRBMMR823, Department of Building Theory FA CTU in Prague)
Applied methodology approved	2021	Methodology for solving comprehensive projects for the regeneration of housing estate-type residential complexes (Michal Kohout, Jitka Molnářová, David Tichý, Filip Tittl, see TAČR Beta, TIRSMMR916, Department of Building Theory FA CTU in Prague)
Exhibition, artworks, prototypes	2021	Tabula Rasa / Děčín (Josef Šafařík, OPVV-Centre for Advanced Applied Natural Sciences, RUV-84873, CZ. 02.1.01/0.0/0.0/16-019/0000778, Department of Design FA CTU in Prague)
Exhibition, artwork	2022	Bohemian Perfection (Marián Karel, RUV-77826, Department of Design FA CTU in Prague)
Specialised Map with Expert Content	2022	Architecture of the Eighties (Petr Vorlík, Lucia Mlynčková, Jan Zikmund, Lenka Kužvartová, Jana Bukačová, Tereza Pokorná, see NAKI II MK ČR, DG18P02OVV013, Department of Theory and History of Architecture FA CTU in Prague)

³⁰ Specify the specific type of result. Add rows as needed.

Specialized Map with Expert Content	2022	Séquin & Knobel: A Map of Industrial Architecture (Lukáš Beran et al., see NAKI II MK ČR, DG16P02H001, Research Centre for Industrial Heritage FA CTU in Prague)
online application	2023	Development potential of municipalities and regions (principal investigator Jakub Vorel, see TAČR BETA, TITSMR926, Department of Spatial Planning FA CTU in Prague)
	2014–2023	3D printing and filament from recycled plastic, use of plastic waste in architecture and design (Kateřina Sýsová et al, Department of Architectural Modelling FA CTU in Prague)
Design-built project	2023	Bridges to the Krkonoše Mountains vol. 2, KRNP Administration (Dalibor Hlaváček, Martin Čeněk, Hana Seho et al., Department of Architectural Design II FA CTU in Prague)

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples). It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)³¹, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).³²

Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

Self-assessment:

With its interdisciplinary focus, the Faculty of Architecture covers a wide range of research areas – from predominant art, social sciences, history and theory, urbanism and spatial planning, public space management, building typology, to engineering. The most typical beneficiaries of research originating at the Faculty include: in the case of theory and typology, the professional public (practicing architects and designers), in the case of urbanism and territorial or spatial planning and landscape, public administration (municipal and city management, politicians), in the case of history and heritage-site management, professional institutions and property owners or managers (especially the National Heritage Institute, public administration, the Academy of Sciences, other universities), in the case of engineering or experimental design (e.g. digital, 3D printing, new materials) construction companies and manufacturers, in the case of design, manufacturers.

It follows from the above that only a small part of the activities can be realistically commercialised, as most of the research has rather long-term social impacts on the value system, planning of the built-up environment and, last but not least, on the humanisation of the public space, architecture or design and their shift towards sustainability. Most of the above-

³¹ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

³² If the commercialisation of R&D&I results is carried out in this way.

mentioned application outputs are thus of the nature of completely non-commercialisable soft social-scientific or artistic tools (e.g. methodologies, professional maps) or only not very profitable expert activities (building-historical surveys, assessments, analyses). A certain exception is the FA's closest activities on the borderline of research and design, with greater (e.g. general plans, spatial plans) or lesser impacts (individual building designs) on society for whose full and financially beneficial implementation in a university environment, however, there are no adequate administrative conditions in the Czech Republic (the university as a contributory organisation) and quite a few of these activities are rather created in the private studios of academic staff working at the FA. It should be added that, in the field of design, the FA is clearly the dominant institution in the Czech Republic (see results in the Register of Artistic Outputs of the Czech Republic). One specific area is cooperation with design manufacturers and design-build projects, both areas are highly developed at the FA, the financial benefit of which is, however, primarily the opportunity to offer students cooperation on specific products, in specific production conditions, with the result in the form of a 1:1 prototype. The cultivation of the public space (e.g. the implemented footbridges and shelters in the Krkonoše National Park) and the testing of ecological or inclusive solutions (e.g. mycelium as a building material, structures made of recycled PET bottles, barrier-free and humanised design products) are also of fundamental benefit to these activities.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

Type of revenue	Revenue (in thousands CZK/EUR)				
	2019	2020	2021	2022	2023
Donations	220/8	50/2	310/12	7/0,3	20/1
Total	220/8	50/2	310/12	7/0,3	20/1

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

In recent years, FA has significantly increased the popularisation of its activities in the public sphere. The FA website has a Science and Research in the FA section dedicated to basic information about research, containing basic information about selected projects and publications with links to a complete list of activities registered in the V3S CTU system. The professional public is also informed of current lectures, publications, conferences, exhibitions or creative activities, etc. in news on the FA website, through e-mail newsletters, on social networks and in press releases to the media. National and specialised professional media are consistently invited to book launches and other events, and it is not infrequent on such an occasion to report on the events at the FA and its research activities, projects and partial outputs of these projects (see PR monitoring as an annex). This presentation emphasises the 'FA brand', comprehensibility, and attractiveness for the general public but at the same time, scientific and social benefits are always highlighted.

Projects with overlaps with design practice always deserve special attention from the public, especially exhibitions of student projects and design-build projects.

FA academic staff often receive media invites to express themselves in connection with their expertise arising from long-term research on current issues and topics of architecture. They are also often invited by various societies and associations to give lectures to the general professional and lay public (e.g. Days of Architecture, CAMP, Klub Za Starou Prahu, Plac Jablonec na Nisou, VIPER, Jaroslav Fragner Gallery).

Larger research projects and workplaces also have their own websites (e.g. vcpd.fa.cvut.cz, architektura80.cz).

An essential popularisation tool is also the faculty bulletin Alfa, which in recent years has been providing more information on monothematic issues about selected activities and topics at the Faculty. There is also the faculty yearbook, published and distributed in both Czech and English versions.

Between 2019 and 2023, teachers and students were significantly represented in the media, with a total of nearly **600 mentions** in a wide range of professional or news media and popularisation portals. Of these, the public media, including Czech Television and Czech Radio, brought **47 mentions**. The most represented were thematically focused media in the fields of architecture, design and education, as well as national and regional news platforms. This is evidenced by the media's interest in the academic and research activities of the FA and the visibility of the faculty's teachers and students in the public debate.

1) Iconic Ruins? Ještěd versus Transgas – Petr Vorlík – 5. 12. 2019

Presentation of post-war architecture of the V4 countries, lectures, discussions and an exhibition opening at the Czech Center in Berlin.

2) 8+1 Unit Housing – Michal Kohout – 2019

Lecture on the occasion of the opening of an exhibition, Universiteti Metropolitan Tirana.

3) Architecture in the crosshairs. Are we taking revenge on buildings from the 1960s to the 1980s during communism? Conversations with architectural historian Petr Vorlík – March 25, 2020

Interview on research into post-war architecture and an on-going exhibition at the National Gallery.

<https://plus.rozhlas.cz/architektura-je-bud-dobra-nebo-spatna-neumime-ocenit-realnou-hodnotu-staveb-8170487>

4) 'No one knocks down a Baroque facade, but a mosaic from the 1970s? No problem.' says architectural historian – Veronika Vicherková, Petr Vorlík – 2. 2. 2021

Interview on the occasion of the publication of the book Architecture on the Red List / It is Normal not to Demolish.

<https://wave.rozhlas.cz/barokni-fasadu-nikdo-neotluce-ale-mozaiku-ze-70-let-klidne-rika-historicka-8417708>

5) The eighties, underestimated heritage of ideological shifts – Petr Vorlík – 22.–23.10. 2022.

Lecture and presentation of the Iconic Ruins exhibition at the Third Future Present Architecture Biennale in Tbilisi.

6) The Circle – How does architecture influence film and film influence architecture? – Petr Hájek – 11. 1. 2022

The Czech architect and professor at FA CTU Petr Hájek is one of the innovative architects of the present day and each of his designs provokes discussions within the field and also among the wider public. He invites the famous director of popular Czech films Jan Hřebejk to a dialogue in the Circle.

<https://www.radio1.cz/kruh-jak-ovlivnuje-architektura-film-a-film-architekturu/>

7) Old factories are witnesses to a disappearing era. Where can they still be seen and visited? – Lukáš Beran, Benjamin Fragner and Jan Zikmund – 4. 5. 2022

Lukáš Beran, Benjamin Fragner and Jan Zikmund from the Research Centre for Industrial Heritage are investigating old industrial buildings – breweries, chimneys, lime kilns and transformer stations. What is interesting about them? And why should we not demolish them, but instead reuse them?

<https://wave.rozhlas.cz/stare-tovarny-jsou-svedci-zanikajici-doby-kde-je-jeste-videt-a-navstivit-8738449>

8) Tires, bumpers and concrete. Students transformed waste into design objects – Reborn Design – 8. 6. 2022

A sink made of recycled concrete, a play element made of waste plastic and car seat belts, or a variable storage system made of rubber. These are the winning items of the first year of the Reborn Design challenge for students.

<https://www.newstream.cz/zpravy-z-firem/jak-by-mohl-vypadat-druhy-zivot-plastoveho-narazniku-nebo-bezpecnostniho-automobiloveho-pasu>

9) Zoo Architect – Pavel Ullmann – December 17, 2022

Pavel Ullmann is an architect and university lecturer who specializes in zoos. He has been designing zoos for over 25 years and has published a book about his experiences with the often exciting process of creating environments for animals, The Elephant in Architecture. In 2004, he traveled to New Jersey as a Humphrey fellow at Rutgers State University.

<https://vedavyzkum.cz/z-domova/komise-j-williamsa-fulbrighta/pavel-ullmann-architekt-zoologickych-zahrad>

10) Ambition: Architecture of the Eighties – 2. 3. 2023

The launch of the final book of the architektura80.cz project, combined with a meeting of the professional public, a moderated discussion, and a screening of period short films from the Czech Television archive. With the participation of the media.

<https://www.stavbaweb.cz/ambice-architektura-osmdesatych-let-26846/clanek.html>;

<https://www.earch.cz/revue/clanek/nenaplne-ambice-kniha-sleduje-unik-z-projekcni-kazdodennosti-80-let>;

<https://ct24.ceskatelevize.cz/kultura/3573151-unik-do-soukromi-i-touha-po-kreativite-v-architekture-konce-80-let-se-vycerpaly>

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

1) Report 2020: The international exchange and the involvement of foreign specialist is promising but could be more intensive.

In 2022, the FA established the Academic Competition for the Support of Artistic, Creative, and Publishing Activities, and subsequently in 2023, the Mobility Fund. The aim of both systems is to initiate and support relevant scientific and creative outputs and projects, with an emphasis on their professional parameters and international dimension. In the Academic Competition, it is possible to apply for support for professional publications, with preference for bilingual, foreign-language and internationally relevant outputs, for support for translations and foreign-language proofreading, for support for the presentation of creative activities and for holding events that go beyond the pedagogical process. The Mobility Fund supports travel abroad and income mobility, including participation in foreign conferences, holding lectures and activities of foreign personalities at the FA, etc. Another form of such an initiation is a reward for extraordinary results from the Future Fund.

The FA has also initiated a Visiting Professor Institute (Winy Maas, Queercraft) and is working on hosting international events (Workshop Conservation / Demolition Heritage section EAAE in 2019; EAAE Annual Conference + General Assembly in 2021) and lectures by foreign guests (November Talks, Ukrainian researchers, etc.). The FA has also prepared a Double Degree program with Politecnico Milano.

The aim of strengthening international cooperation and overlaps is also reflected in the revitalisation of doctoral studies, consisting, among other things, in the establishment of the FA Doctoral Study Regulations (obligation to participate in an international conference, monthly foreign internships and publication activities). The number of doctoral students from abroad is also gradually increasing. In 2022–2023, two postdocs from abroad worked at the FA as researchers.

An integral part of the internationalisation effort is also the visibility of the FA in the international space (FA yearbooks in English) and visibility within the QS Ranking (in 2023, after a six-year break, it returned to the top 240 architecture schools in the world and in 2024 moved up to the 151–200th place).

2) Report 2020: There is some important research of high benefit concerning 3.6. which should be continued and deepened. The argumentation of the faculty concerning 3.5 is not quite plausible. There are of course areas of research, which could be carried by the members of the faculty and which lead to results that can be applied in practice. The faculty should take measures to look for common areas of interest with building industry, as other schools of architecture do.

In recent years, the FA has been striving to highlight cooperation with external entities, a typical example being the growing research by design projects – in particular cooperation with the Krkonoše National Park (see implemented shelters and footbridges), with the city of Libčice nad Vltavou and with students of the Higher Vocational School and the Secondary Industrial School in Volyně (seats), with Nebušice (Okó viewpoint), with Mníšek pod Brdy (refreshment stand at a pilgrimage site). Expert activities (methodologies in connection with spatial planning, building-historical surveys for public institutions or architectural offices) and creative cooperation with municipalities playing a significant role, especially in the area of examining the possibilities of the public space and public buildings (as part of teaching design studios and the activities of the Department of Landscape Architecture). Practicing architects working at the school also offer a significant connection with praxis, and this level of cooperation has been further strengthened in recent years thanks to generational change.

Cooperation with production, or rather testing of production possibilities and limits, is a typical activity of Department of Architectural Modelling (e.g. Lavaris, Plastenco) and Department of Design (e.g. TON, RWE, Sapeli, Technistone, Galavito, Tesla, Meva, Meopta, Viadrus, Lasvit). In recent years, cooperation with other universities has also been strengthened (workshop CZ2 Visions for the Future of the Czech Republic led by Winny Maas (MVRDV) at FA together with Archip and TU Delft and TUL Liberec, VUT Brno etc.; or workshop Architecture Ethnography led by Momoyo Kaijima (Bow Wow) at FA together with ETH) and the work of our teachers at other universities and their activities (Ondřej Císlar and double degree with Politecnico Milano; invited lecturers of Department of Theory and History of Architecture at the High-tech conference at ETH Zurich; invited lecturer and guest lecturer of Department of Building Theory at EPOCA University in Tirana).

3) Report 2020: Whilst it is good to see important research being carried out, looking at the breadth of subjects covered by the school, there seem to be parts of the faculty which are research inactive. It would be good for a raft of measures to be put in place for all staff to be encouraged to carry out research to a high standard.

By introducing and setting up support funds, such as the aforementioned Academic Competition or the Mobility Fund, the FA strives not only to strengthen publishing and creative activities and internationalisation, but also to increase cooperation

across (more experienced and still rather less active) departments and with external entities (support is usually linked to other sources of funding). The above-mentioned reform of doctoral studies has also gone in the same direction (the Doctoral Study Regulations, the ongoing revitalisation of subjects, revision of the Student Scientific Conference or publication and presentation activities, formulation of FA priorities when awarding subsidies within the framework of the CTU Student Grant Competition or IP projects of the Ministry of Education, Youth and Sports). In 2024, the FA also underwent a relocation that had been prepared for several years, during which the relocation and more efficient use of FA premises created more suitable conditions for cooperation between thematically close institutes; shared doctoral rooms were created, workshops were retrofitted, etc.

Another method of initiating greater involvement in research was the long-awaited reform of the methodology for distributing funds within the FA, which now places greater emphasis on 'full-fledged' scientific outputs, international cooperation and publication activities, on quality coefficients resulting from active grants, etc.

An integral part of this process is the gradual generational change that the FA has been undergoing in recent years hand-in-glove with the effort to improve working conditions and build an inclusive environment (an ombudsman, an Equal Opportunities Commission, wellbeing and work-life balance surveys, baby-changing counters, inclusive language in all forms of communication, including FA regulations).

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)
FA CTU: Visuals, Data, and Achievements	3.1; 3.2; 3.3; 3.4; 3.5	www.fa.cvut.cz/vyzkum-a-spoluprace/fa-ctu-self-evaluation-report-2025-annex.pdf
Methodological Guide to Participatory Housing for Cities and Municipalities in the Czech Republic	3.3	participativnibydeni.cz/metodika-manual/
Methodology for applying the principles of universal design and lifelong living in housing construction	3.4	https://mmr.gov.cz/cs/ministerstvo/bytova-politika/archiv-do-2024/publikace-a-analyzy/1/metodika
Methodology for solving comprehensive projects for the regeneration of housing estate-type residential complexes	3.4	https://mmr.gov.cz/cs/ministerstvo/bytova-politika/archiv-do-2024/publikace-a-analyzy/1/revitalizace-mestських-obytnych-celku-sidlistn-(1)
Specialised map Architecture of the Eighties	3.4	www.architektura80.cz
Design-build projects of the Department of Architectural Design II	3.4	https://1-1lab.cz/en/
Popularization – media	3.6	https://plus.rozhlas.cz/architektura-je-bud-dobra-nebo-spatna-neumime-ocenit-realnou-hodnotu-staveb-8170487
Popularization – media	3.6	https://wave.rozhlas.cz/barokni-fasadu-nikdo-neotluce-ale-mozaiku-ze-70-let-klidne-rika-historicka-8417708
Popularization – media	3.6	https://www.radio1.cz/kruh-jak-ovlivnuje-architektura-film-a-film-architekturu/
Popularization – media	3.6	https://wave.rozhlas.cz/stare-tovarny-istou-svedci-zanikajici-doby-kde-je-jeste-videt-a-navstivit-8738449
Popularization – media	3.6	https://www.newstream.cz/zpravy-z-firem/jak-by-mohl-vypadat-druhy-zivot-plastoveho-narazniku-nebo-bezpecnostniho-automobiloveho-pasu
Popularization – media	3.6	https://vedavyzkum.cz/z-domova/komise-j-williamsa-fulbrighta/pavel-ullmann-architekt-zoologickych-zahrad
Popularization – media	3.6	https://www.stavbaweb.cz/ambice-architektura-osmdesatych-let-26846/clanek.html ; https://www.earch.cz/revue/clanek/nenaplnene-ambice-kniha-sleduje-unik-z-projekcni-kazdodennosti-80-let ;

		https://ct24.ceskatelevize.cz/kultura/3573151-unik-do-soukromi-i-touha-po-kreativite-v-architekture-konce-80-let-se-vycerpaly

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: Faculty of Transportation Sciences

FORD: 2 - Engineering and technology

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

The evaluated unit is committed to advancing research and education in transportation sciences, with a strong emphasis on industry collaboration and the practical application of research findings. Its mission is to bridge applied research and experimental development in transportation engineering, logistics, and mobility, preparing qualified professionals to tackle modern challenges in the field. The unit focuses on making meaningful contributions to industry-driven innovation and sustainable mobility solutions. A core aspect of its research strategy is close cooperation with industrial partners, ensuring that its work remains relevant and addresses real-world needs. Through projects in transportation planning, optimization, and aviation, the unit collaborates with key organizations to bring research findings directly into practice. These partnerships help develop innovative solutions that enhance the efficiency, safety, and sustainability of transportation systems.

Beyond national collaborations, the unit actively participates in European research projects on mobility and intelligent transport systems. By engaging in initiatives such as Horizon Europe and EIT Urban Mobility, it works alongside international universities and research institutions, fostering scientific cooperation, knowledge exchange, and the development of next-generation mobility solutions. Its long-term goals include strengthening interdisciplinary collaboration, expanding international research involvement, and securing funding for projects with a high practical impact. A key priority is the development of further doctoral education and the attraction of talented researchers to advance knowledge in transport automation, digitalization, and smart mobility solutions. Research activities are primarily focused on applied research and experimental development. Applied research addresses practical transportation challenges, such as AI-driven transport management, multimodal optimization, and safety improvements. Experimental

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

development involves pilot projects, technology validation, and industry-supported initiatives, ensuring that innovative solutions can transition smoothly from research to real-world applications. Although fundamental research is not a primary focus, it is pursued selectively when necessary to support applied and experimental projects.

Collaboration with industrial partners plays a crucial role in ensuring that research findings are directly applicable. The unit works with stakeholders in various transportation sectors, including railway automation, public transport, aviation, road infrastructure, smart transport systems, the automotive industry, and technology-driven mobility solutions. Notable partnerships include collaborations with AŽD Praha, SUDOP Praha, PUDIS, and Dopravní podnik hl. m. Prahy (Prague Public Transport Company) on railway automation, smart signaling systems, and urban transit optimization. In aviation, it works with Řízení letového provozu ČR (Czech Air Navigation Services, ANS ČR) and Letiště Praha (Prague Airport) on air traffic management, operational efficiency, and aviation safety. Research with Ředitelství silnic a dálnic ČR (Czech Road and Motorway Directorate), ELTODO dopravní systémy, and OLTIS Group focuses on road infrastructure improvements and intelligent transport systems. In the automotive sector, partnerships with Škoda Auto and Škoda Transportation support developments in vehicle automation, electrification, and safety technologies. Additional collaboration with TÜV SÜD Czech and Telematix Software contributes to progress in transport safety certification and intelligent mobility software solutions. While these examples highlight the unit's strong industry engagement, research, development, and innovation activities extend beyond these collaborations.

In alignment with these research efforts, the unit is structured to ensure efficient management of pedagogical, scientific, and administrative activities. As part of the Faculty of Transportation Sciences at CTU in Prague, its organizational framework supports both academic and industrial collaboration. The faculty operates under a hierarchical structure led by the Dean, who represents the faculty in external relations and holds overall responsibility for its academic and research endeavors. The Dean is supported by a team of Vice-Deans, each overseeing specific operational domains. Financial and administrative affairs are managed by the Faculty Secretary, who oversees budgeting, resource allocation, and internal administration.

Strategic decision-making is further supported by several advisory bodies. The Scientific Council serves as the highest authority determining the direction and content of the faculty's educational, scientific, research, and development activities. It is chaired by the Dean. The Dean's Collegium, composed of Dean, Vice-Deans, heads of departments, Faculty Secretary, and representatives of the Academic Senate, serves as a key consultative forum for faculty governance. The Industrial Council, comprising over 20 prominent figures from the transportation sector, provides guidance on aligning educational programs with industry needs and fostering partnerships with key stakeholders. Additionally, the Professorial Board plays a vital role in shaping academic and research directions, reinforcing the faculty's commitment to excellence in transportation sciences.

At the operational level, the faculty is organized into departments and an institute, each responsible for specific domains of transportation research and education. The departments are led by department heads appointed through a competitive selection process, ensuring effective leadership in both academic and applied research initiatives. These departments cover a wide range of specializations, including applied mathematics, transportation engineering, applied informatics, language and social sciences, vehicle engineering, smart cities and regions, mechanics and materials, transport telematics, and aviation. The Institute of Forensic Expertise in Transport further extends the faculty's capabilities by providing expert analysis and assessments in transportation-related legal and technical matters.

From the perspective of the education provided, FTS offers a comprehensive portfolio of study programs at the bachelor's, master's, and doctoral levels. At the bachelor's level, programs such as

Technology and Transportation Systems, Aircraft Maintenance Technology, and Professional Pilot combine theoretical foundations with practical training, equipping graduates with skills applicable across various transportation sectors. The Aircraft Maintenance Technology program prepares students for obtaining an Aircraft Maintenance License (AML), while the Professional Pilot program includes EASA-recognized ATPL(A) flight training.

Master's degree programs build upon undergraduate studies and offer advanced expertise in transportation systems and technologies. Programs such as Transportation Systems and Technology, Intelligent Transportation Systems, Logistics and Transport Process Management, and Air Transport Operations and Management are designed to develop specialists in modern transport infrastructure, mobility planning, and aviation management. Additionally, the faculty offers dual-degree Master's programs in collaboration with international universities, including Linköping University in Sweden (Intelligent Transport Systems) and the University of Texas at El Paso (Smart Cities).

Doctoral studies at the faculty focus on scientific research under the guidance of experienced supervisors, contributing to advancements in transportation systems, logistics, air transport management, intelligent transport systems and SmartCities. Doctoral candidates are regarded full-time researchers and may receive industry scholarships to support their research projects.

Table 3.1.1 - Staffing per FTE²

Academic/ Professional position	Total / Of which women					
	2019	2020	2021	2022	2023	Total
Professor	9.1 / 1.3	8.1 / 1.3	7.9 / 1.3	7.5 / 1.3	7.2 / 1.3	39.6 / 6.5
Associate Professor	30.9 / 6.4	30.4 / 6.4	31.8 / 6.4	34.2 / 6.4	33.5 / 6.4	160.8 / 32.0
Assistant Professor	69.0 / 19.9	66.8 / 18.7	62.1 / 18.4	59.9 / 18.9	58.6 / 19.2	316.3 / 95.0
Assistant	8.2 / 3.8	10.2 / 4.1	10.3 / 4.6	10.3 / 4.6	11.2 / 5.5	50.2 / 22.4
R&D Personnel ³	54.3 / 28.3	84.4 / 39.2	87.0 / 39.5	89.7 / 40.5	83.6 / 36.3	398.9 / 183.6
Researchers in other categories ⁴	10.9 / 2.4	13.9 / 3.8	14.3 / 3.8	15.3 / 3.8	13.1 / 3.3	67.5 / 16.9
Technical and economic staff ⁵	32.7 / 26.5	53.2 / 29.5	61.0 / 36.9	52.0 / 35.1	53.6 / 34.9	252.4 / 162.8
Scientific, research and development staff involved in teaching activities	126.8 / 33.8	124.4 / 33.1	119.9 / 32.8	119.2 / 32.8	116.4 / 32.6	606.6 / 165.2

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

Early career researchers ⁶	47.3 / 11.2	43.6 / 8.8	39.5 / 8.5	33.6 / 7.5	25.8 / 5.0	189.7 / 41.0
Total ⁷	215.0 / 88.4	267.0 / 102.8	274.3 / 110.7	268.8 / 110.4	260.7 / 106.7	1285.7 / 519.0

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁸

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	3	1	1	0	2	0	10	1
Associate Professor	0	0	4	0	20	4	1	0	6	3	10	1
Assistant Professor	3	1	45	10	33	8	9	5	5	3	4	1
Assistant	5	2	2	1	6	1	1	1	0	0	0	0
R&D Personnel ⁹	20	6	14	5	28	16	9	6	4	3	0	0
Researchers in other categories ¹⁰	8	4	4	1	4	0	0	0	2	0	3	0
Technical and economic staff ¹¹	1	1	0	0	1	0	0	0	0	0	1	0
Scientific, research and development staff involved in teaching activities	17	5	53	12	64	14	12	6	13	6	24	3
Early career researcher ¹²	16	7	55	12	0	0	0	0	0	0	0	0
Total ¹³	37	14	69	17	95	30	21	12	19	9	28	3

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁴

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	2	0	2	1	1	0	7	1
Associate Professor	0	0	3	0	19	3	6	1	4	2	11	2
Assistant Professor	0	0	20	3	34	9	17	7	5	4	4	1
Assistant	0	0	5	3	8	1	2	2	0	0	0	0
R&D Personnel ¹⁵	31	10	35	13	26	10	10	7	8	3	2	1
Researchers in other categories ¹⁶	3	1	8	4	5	1	1	0	2	0	3	0
Technical and economic staff ¹⁷	0	0	0	0	0	0	0	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	3	1	37	9	65	13	27	11	11	6	22	4
Early career researcher ¹⁸	3	1	36	10	0	0	0	0	0	0	0	0
Total ¹⁹	34	11	71	23	94	24	38	18	20	9	27	5

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students

Type of study	2019		2020		2021		2022		2023		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate	839	175	796	162	697	125	618	109	605	119	3555	690
Master's ²⁰	283	102	297	82	300	86	295	72	250	52	1425	394

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

Doctoral	120	36	124	38	134	36	121	33	106	25	605	168
Lifelong Learning Courses	260	196	272	164	264	180	386	268	490	339	1672	1147
Total	1502	509	1489	446	1395	427	1420	482	1451	535	7257	2399

Table 3.1.5 - Study programmes in Czech/English

Type of study programme	Total ²¹ / Of which professional study programmes											
	2019		2020		2021		2022		2023		Total	
Undergraduate	2/1	0/0	3/1	0/0	6/2	0/0	7/1	0/0	7/1	0/0	25/6	0/0
Master's	2/1	0/0	8/3	0/0	8/2	0/0	10/2	0/0	10/2	0/0	38/10	0/0
Doctoral	5/0	0/0	12/4	0/0	13/1	0/0	15/2	0/0	14/2	0/0	59/9	0/0
Lifelong Learning courses	8/1	0/0	12/2	0/0	10/2	0/0	17/2	0/0	17/2	1/0	64/9	1/0
Total	2/1	0/0	3/1	0/0	6/2	0/0	7/1	0/0	7/1	0/0	25/6	0/0

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
1. Natural Sciences	1.1 Mathematics	3.96	Balanced basic and applied research	19.52
	1.2 Computer and information sciences	9.63	Applied Research	
	1.3 Physical sciences	0.00	-	
	1.4 Chemical sciences	0.00	-	
	1.5 Earth and related environmental sciences	1.84	Applied Research	
	1.6 Biological sciences	0.19	Applied Research	
	1.7 Other natural sciences	3.90	Applied Research	
2. Engineering and Technology	2.1 Civil engineering	36.01	Applied Research	69.80
	2.2 Electrical engineering. Electronic engineering. Information engineering	3.23	Applied Research	
	2.3 Mechanical engineering	8.65	Applied Research	
	2.4 Chemical engineering	0.00	-	
	2.5 Materials engineering	6.35	Applied Research	
	2.6 Medical engineering	0.01	Applied Research	
	2.7 Environmental engineering	2.27	Applied Research	
	2.8 Environmental biotechnology	0.00	-	

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

	2.9 Industrial biotechnology	0.00	-	
	2.10 Nanotechnology	0.00	-	
	2.11 Other engineering and technologies	13.28	Applied Research	
3. Medical and Health Sciences	3.1 Basic medicine	0.05	Applied Research	0.55
	3.2 Clinical medicine	0.01	Applied Research	
	3.3 Health sciences	0.49	Applied Research	
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries	0.34	Applied Research	0.34
	4.2 Animal and Dairy science	0.00	-	
	4.3 Veterinary science	0.00	-	
	4.4 Other agricultural sciences	0.00	-	
5. Social Sciences	5.1 Psychology and cognitive sciences	2.08	Applied Research	8.27
	5.2 Economics and Business	3.96	Applied Research	
	5.3 Education	0.13	Applied Research	
	5.4 Sociology	0.13	Applied Research	
	5.5 Law	0.85	Applied Research	
	5.6 Political science	0.00	-	
	5.7 Social and economic geography	1.12	Applied Research	
	5.8 Media and communications	0.00	-	
	5.9 Other social sciences	0.00	-	
6. Humanities and the Arts	6.1 History and Archaeology	0.66	Basic Research	1.52
	6.2 Languages and Literature	0.09	Applied Research	
	6.3 Philosophy, Ethics and Religion	0.66	Applied Research	
	6.4 Arts (arts, history of arts, performing arts, music)	0.00	-	
	6.5 Other Humanities and the Arts	0.11	Applied Research	
Total		100 %	-	100 %

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

Between 2019 and 2023, the evaluated unit has actively contributed to the international research community through its involvement in high-quality research, participation in professional organizations, editorial activities, invited lectures, and engagement in national and European

research evaluations. Faculty members have been recognized with several awards for their contributions to research and development, reflecting the relevance and impact of their work in transportation science, mobility solutions, and related fields. Examples of these include the Josef Hlávka Award, which acknowledges excellence in research among young scientists, and the Smart Cities Personality Award, which highlights contributions to innovative urban mobility solutions. Further recognitions, such as the Czech Road Society Award for the Best Dissertation and institutional distinctions like the Dean's Award of the Faculty of Transportation Sciences, underscore the achievements of faculty members in both research and education.

The unit's academic staff has contributed to the international research community through participation in editorial boards of high-impact journals. Faculty members have been engaged in the International Journal of Transportation Science and Technology, Neural Network World, and the Journal of Competitiveness, among others. Their roles in these journals involve evaluating submissions, shaping research agendas, and supporting the dissemination of findings in areas such as intelligent transportation systems, applied artificial intelligence, and infrastructure resilience. This engagement reflects the unit's commitment to maintaining high academic standards and fostering collaboration within the broader scientific community.

The evaluated unit has also remained active in professional societies, holding elected positions in organizations such as the European Platform of Transport Sciences and the Czech Association of Scientific and Technical Societies. Through these roles, faculty members have contributed to shaping research policies, promoting interdisciplinary collaboration, and influencing the strategic direction of research in transportation and mobility. These memberships provide opportunities to engage with international experts, exchange knowledge, and contribute to discussions on the future of transportation technologies.

An important aspect of the international engagement of the unit has been the delivery of invited lectures at leading institutions and scientific conferences. Faculty members have presented research on topics such as automated mobility, space-based navigation systems, and human factors in aviation at institutions including The University of Texas at Austin, Taiwan Tech (NTUST), and the University of Zagreb Faculty of Transport and Traffic Sciences. Additionally, invited lectures at the European Space Agency (ESA SWESNET) have focused on the impact of space weather on aviation navigation, while contributions at EUROCONTROL have addressed vestibular illusions and their effects on flight safety. These invited presentations demonstrate the role of faculty in the sharing of knowledge and contributing to global discussions on transportation challenges and technological advancements.

Beyond delivering lectures, the unit has also hosted international researchers, strengthening academic exchange. Notable guests have included researchers specializing in aerodynamics, deep learning in transport applications, and airline management approaches, who have provided valuable insights through guest lectures and collaborative research efforts. These exchanges have enriched the academic environment of the unit and fostered new research directions.

The faculty has also played an active role in evaluating research proposals and funding applications at the national and European levels. Members have participated as reviewers for Horizon 2020 and Horizon Europe projects, providing expert assessments of proposals in areas such as sustainable urban mobility, railway digitalization using drones, and intelligent traffic management systems. Additionally, the unit has contributed to evaluations conducted by the Czech Science Foundation (GAČR) and the European Research Council (ERC). Faculty members have been involved in the Monitoring Committee of the Operational Programme Transport under the Ministry of Transport of

the Czech Republic, and in the Evaluation Panel for Research, Development, and Innovation (VVI) Results (EP4) under the 17+ methodology. These contributions highlight the faculty's engagement in shaping research, funding decisions and supporting scientific progress at a broader level.

In addition to research activities, the unit has been involved in organizing and contributing to international academic events. A key example is the Smart Cities Symposium Prague (SCSP), which has provided a platform for researchers, industry experts, and policymakers to discuss developments in urban mobility and smart infrastructure. The faculty has also contributed to the European Transport Congress, further reinforcing its role in European research networks. Through collaborations with institutions such as The University of Texas at El Paso, Technical University of Berlin, and Technical University of Dresden, the unit has expanded its international research partnerships and facilitated student and faculty exchange programs.

Overall, the evaluated unit has demonstrated a strong commitment to high-quality research, international collaboration, and academic leadership. Through its engagement in prestigious awards, editorial activities, professional society memberships, invited lectures, research evaluations, and academic event organization, the faculty continues to contribute meaningfully to the global research landscape. While there is always room for further development, the unit remains dedicated to advancing scientific knowledge, fostering interdisciplinary collaboration, and supporting innovation in transportation science and mobility solutions.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
Adam Orlický, Ing., PhD.	Josef Hlávka Award	Josef, Marie, and Zdeňka Hlávka Foundation
Přemysl Toman, Ing.	Stanislav Hanzl Award	CTU Stanislav Hanzl Endowment Fund
Jiří Brož, Ing., MSc., Ph.D.	Stanislav Hanzl Award	CTU Stanislav Hanzl Endowment Fund
Jiří Brož, Ing., MSc., Ph.D.	Prof. Ing. Mirko Novák, DrSc. Award	Czech Technical University
Jiří Brož, Ing., MSc., Ph.D.	Czech Road Society Award for the Best Dissertation	Czech Road Society
Emil Pelikán, prof. Ing., CSc.	Dean's Award of the Faculty of Transportation Sciences	CTU Faculty of Transportation Sciences
Miroslav Svítek, prof., Dr., Ing., dr. h. c.	Smart Cities Personality	Ministry of Regional Development of the Czech Republic
Miroslav Svítek, prof., Dr., Ing., dr. h. c.	K. D. Gangloff Medal	Czech Association of Scientific and Technical Societies
Miroslav Svítek, prof., Dr., Ing., dr. h. c. Tomáš Horák, doc., Ing., Ph.D. Ondřej Přibyl, prof., Ing. Ph.D.	International Academic Collaboration Award	The University of Texas at El Paso, USA
Ondřej Jiroušek, prof. Ing., Ph.D.	Medal from Institute of Theoretical and Applied Mechanics for scientific development of the Institute	Institute of Theoretical and Applied Mechanics of the Czech Academy of Sciences

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of scientific journal, ISSN
Martina Bečvářová, prof., RNDr., Ph.D.	Antiquitates Mathematicae ISSN: 1898-5203 (print), 2353-8813 (online)
Martina Bečvářová, prof., RNDr., Ph.D.	Quarterly Journal of the History of Science and Technology ISSN: 0023-589X (print), 2657-4020 (online)
Jan Přikryl, Dr.	Neural Network World ISSN: 1210-0552 (print), 2336-4335 (online)
Petr Bouchner, doc., Ing., Ph.D.	Neural Network World ISSN: 1210-0552 (print), 2336-4335 (online)
Petr Bouchner, doc. Ing., Ph.D.	Advances in Transportation Studies ISSN: 1824-5463
Tomáš Horák, doc., Ing., Ph.D.	International Journal of Transportation Science and Technology ISSN: 2046-0449
Miroslav Svítek, prof., Dr., Ing., dr. h. c.	Journal of Competitiveness, ISSN: 1804-171X (Print), 1804-1728 (online)
Jakub Kraus, doc. Ing., Ph.D.	Scientific Journal of Safety and Logistics ISSN 2995-7443
Jakub Kraus, doc. Ing., Ph.D.	Journal of Airline Operations and Aviation Management ISSN: 2949-7698
Ondřej Jiroušek, prof., Ing., Ph.D.	Frontiers in Built Environment: Transportation and Transit System ISSN: 2297-3362

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
Ondřej Přibyl, prof., Ing., Ph.D.	Automated vehicles in an urban environment	The University of Texas at Austin	2019
Ondřej Přibyl, prof. Ing. Ph.D.	Cooperative environment – CCAM in cities	Taiwan Tech (NTUST)	2023
Vladimír Socha, doc. Ing., Ph.D. Lenka Hanáková, Ing., Ph.D.	Vestibular in-flight illusions	EUROCONTROL	2023
Jakub Hospodka, doc. Ing., Ph.D.	Impact of Space Weather on Aviation Navigation	ESA SWESNET Space Weather Service Network Development and Pre-Operation	2022
Ondřej Jiroušek, prof., Ing., Ph.D.	Dynamical Compressive Properties of SLS-printed Auxetic Lattices – SHPB experiments and FE Modelling	Advanced Computational Engineering and Experimenting (ACEX2020)	2020
Ondřej Jiroušek, prof., Ing., Ph.D.	Impact resistance of structural panel with polymeric auxetic core against rigid penetration	Advanced Computational Engineering and Experimenting (ACEX2022)	2022
Andrej Lališ, doc. Ing., Ph.D.	Safety Management for Air Navigation Service Provider	Azeraeronavigatsiya (AZANS)	2019

Miroslav Svítek, prof., Dr., Ing., dr. h. c.	Smart Cities and Public Health	Cornell University, USA	2020
Miroslav Svítek, prof., Dr., Ing., dr. h. c.	Fundamentals of Smart Cities (teaching of a master's course)	The University of Texas at El Paso	2019, 2020, 2022, 2023
Roman Štěrbá, doc., Dr., Ing., MBA	Integrated public transport system serving communities outside of urban areas in Mid-Bohemia	European Parliament	2020

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year
Milada C. Smastuen, prof., MSc.	Oslo Metropolitan University	Design and analysis of Questionnaires	2019
Luis Velazquez-Araque, PhD	University of Guayaquil	Aerodynamics of vehicles	2023
Sara El hamdani, Dr.	USMBA - Université Sidi Mohamed Ben Abdellah	HMI and Simulation	2021
Peter Veit, prof.	TU Graz	Predictive Maintenance Workshop Smart Via Vindobona	2023
Robert O. Walton, prof., Ph.D., FRAeS	Embry-Riddle Aeronautical University	Airline management approaches	2023
Robert O. Walton, prof., Ph.D., FRAeS	Embry-Riddle Aeronautical University	Ranking of Airlines	2022
Martin Wittmer, Prof. Dr.-Ing.	HTW Dresden – University of Applied Sciences, Faculty Mechanical Engineering	Moderne Möglichkeiten von PKW und LKW-Bremsprüfungen	2023
K. C. Park, prof.	University Colorado Boulder	Method of localized Lagrange multipliers and its recent applications	2019
Fuh-Gwo Yuan, prof.	North Carolina State University	Use of deep learning in complex materials design for engineering applications	2023
Univ. prof. Zoltán Major	Johannes Kepler University Linz	Dynamic testing of laminate composites	2023

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the research project/programme call	Name of the contracting authority/guarantor of the project/programme call	year
Stanislav Novotný, doc., Ing., Ph.D.	Member of the Monitoring Committee of the Operational Programme Transport	Ministry of Transport of the Czech Republic	2021–2023

Petr Bouchner, doc., Ing., Ph.D.	Committee for Scientific Activities of the Coordination Council of the Minister of Transport for Space Activities	Ministry of Transport of the Czech Republic	2019–2023
Petr Bouchner, doc., Ing., Ph.D.	Evaluation Panel for Research, Development, and Innovation (VVI) Results, EP4, according to the 17+ methodology	Government Council for Research, Development, and Innovation	2019–2023
Tomáš, Tichý, doc. Ing. Ph.D., MBA	ETA, SIGMA, EPSILON, TRANSPORT 2020, TREND, IMPACT, OPSEC	Technology Agency of the Czech Republic	2019–2023
Miroslav Svítek, prof., Dr., Ing., dr. h. c.	Member of the Evaluation Panel, Connecting and Coordinating European Research and Technology Development with Japan	European Interest Group	2023
Miroslav Svítek, prof., Dr., Ing., dr. h. c.	Railway digitalisation using drones	European commission, EUSPA, H2020-SPACE-EGNSS-2020	2021–2024
Jakub Kraus, doc. Ing., Ph.D.	TREND, Transport 2020+, Transport 2030	Technology Agency of the Czech Republic	2019–2023
Jakub Hospodka, doc. Ing., Ph.D.	TREND, Transport 2020+, Transport 2030, Environment for Life, SIGMA	Technology Agency of the Czech Republic	2019–2023
Denisa Mocková, doc. Ing., Ph.D.	ETA, SIGMA, Transport 2020+, EPSILON	Technology Agency of the Czech Republic	2020–2023
Ondřej Jiroušek, prof., Ing., Ph.D.	Horizon 2020 – Future and Emerging Technologies (FET)	European commission	2021

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the period of 2019–2023²³. This should be done from the full list in annex tables (Table 3.3.1–3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

New Mobility Data and Solutions Toolkit (nuMIDAS)

<https://cordis.europa.eu/project/id/101007153>

The nuMIDAS project addresses the rapid evolution of urban mobility ecosystems, where emerging services, new actors, and advanced technologies are reshaping transportation. The project responds

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

to the growing adoption of shared mobility, the Mobility-as-a-Service (MaaS) paradigm integrating planning, booking, and payment into a unified system, and the increasing role of connected and autonomous vehicles. Simultaneously, the expansion of these mobility solutions is accompanied by the generation, collection, and storage of vast amounts of data. Effective analysis of these data is crucial for evaluating the functionality of various transportation solutions, understanding human mobility needs, and assessing socio-economic impacts and associated risks.

A key challenge remains the successful integration of these emerging mobility technologies into municipal decision-making processes. The nuMIDAS project, funded under the Horizon 2020 programme, aims to bridge this gap by developing a modular toolkit designed to support transportation decision-making. The project consortium includes partners from Belgium, Italy, the Netherlands, Greece, and Spain, along with researchers from the Faculty of Transportation Sciences at the Czech Technical University in Prague, specifically from the Department of Applied Mathematics and the Department of Logistics and Transport Management.

The primary outcome of nuMIDAS is a flexible and expandable software toolkit tailored for use by policymakers, urban planners, and mobility stakeholders. Initially developed for four pilot cities—Milan, Leuven, Barcelona, and Thessaloniki—the toolkit is designed to adapt to other urban environments and be scalable through the addition of further modules to address new mobility challenges. The project thus contributes to the enhanced data-driven governance of mobility systems, enabling cities to make informed decisions that foster sustainable, efficient, and resilient transportation networks.

Universal Driving Simulator for Public Transit Drivers

<https://starfos.tacr.cz/en/projekty/UH0841>

The Universal Driving Simulator for Public Transit Drivers project aimed to develop an advanced interactive metro simulator to modernize the training and qualification process for train operators at Dopravní podnik hlavního města Prahy, a.s. (DPP). The primary objective of the developed system was to optimize training, enhance its quality, and reduce costs while preparing operators for both standard and emergency situations.

The excellence of the project lies in its customized design tailored specifically to the needs of DPP while maintaining a technological standard on par with the best global solutions in the field. The resulting simulator represents a fully integrated training system, featuring:

- A full-scale replica of the 81-71M metro train cabin mounted on a motion platform to provide realistic physical feedback.
- A climate-controlled enclosed cockpit to create an immersive environment.
- An instructor workstation, allowing trainers to communicate with operators via radio and monitor their performance.
- A comprehensive software suite capable of simulating train operations and track conditions, specifically modeled online V.A of the Prague metro.

The project was conceived and executed entirely at the Faculty of Transportation Sciences. External collaboration was maintained with DPP to ensure that the simulator met real-world operational requirements.

The project significantly expanded the knowledge and technical capabilities of the research team, particularly in the domains of rail vehicle dynamics, railway infrastructure, and simulation

technologies. The development of the simulator required an inherently interdisciplinary approach, integrating expertise in transport systems, software development, hardware design, and simulation engineering. The final solution successfully replicates the functionalities of real-world metro operations at a level suitable for professional operator training, ensuring an effective and cost-efficient training framework for public transit drivers.

Engineering Applications of Microworld Physics

https://starfos.tacr.cz/en/projekty/EF16_019%2F0000766

The Engineering Applications of Microworld Physics project advanced imaging techniques in material research, particularly in the study of metal foams and auxetic structures. A key technological achievement was the development of a unique experimental setup at DynLab (Faculty of Transportation Sciences, CTU), which integrates a dynamic loading device (Hopkinson bar) with a flash X-ray source for high-speed imaging of impact events. This system enables precise observation of dynamic material behavior under extreme conditions, enhancing research in impact mechanics and material characterization.

The project resulted in 11 articles published in impact-factor journals, the successful completion of three Ph.D. dissertations, and the habilitation of one researcher. It also provided support for multiple master's theses, with several graduates continuing into doctoral studies. The project's high research standards and technological innovation attracted a foreign postdoctoral researcher and facilitated long-term collaboration with Prof. Fuh-Gwo Yuan (North Carolina State University, NCSU). This collaboration led to a bilateral project submitted and contributed to securing follow-up funding, including a GA ČR JuniorStar grant.

The Faculty of Transportation Sciences played a key role in the development of experimental methods and led the design and implementation of the high-speed imaging system. The project strengthened the faculty's expertise in experimental mechanics, enriched PhD education, and reinforced international collaborations.

The interdisciplinary nature of the project integrated experimental mechanics, material science, and imaging technologies, leading to breakthroughs in impact mechanics. Collaboration extended beyond CTU, involving institutions such as IEAP, FBME, CIIRC, FEE UWB, NRPI, and ITAM AS CR. The project positioned the Faculty of Transportation Sciences as a leader in advanced experimental mechanics, fostering future research innovations and technological applications.

Progressive numerical and experimental modelling of innovative sandwich panels with cellular core

<https://starfos.tacr.cz/en/projekty/GA19-23675S>

The Progressive Numerical and Experimental Modelling of Innovative Sandwich Panels with Cellular Core project advanced the development and validation of energy-absorbing structural panels incorporating polymeric cellular cores with nanocrystalline metal coatings. A significant outcome was the optimization of sandwich structures with auxetic cores, supported by an extensive experimental campaign that included the analysis of strain-rate-sensitive fillings. The research provided valuable insights into the deformation behavior of these structures under impact conditions, improving their potential applications in high-performance energy-absorbing systems.

The project yielded seven publications in impact-factor journals, nine presentations at international conferences, and contributed to the successful defense of three Ph.D. dissertations and several master's theses. As a basic research project funded by the Czech Science Foundation (GAČR), it

combined dynamic material testing, numerical modeling of impact events, and experimental-numerical studies. The integration of Hopkinson bar experiments, impact simulations, and computed tomography-derived numerical models resulted in a comprehensive understanding of the mechanical response of sandwich composites.

The Faculty of Transportation Sciences (FTS), CTU, played a central role in the project as the sole recipient and led all research activities, including experimental methodologies, numerical simulations, and structural optimization. The project strengthened the faculty's expertise in heterogeneous materials, particularly auxetic structures, metal foams, and sandwich composites. It also contributed to laboratory development, international collaborations, and expanding knowledge of impact-resistant materials.

The research successfully bridged dynamic material testing, computational mechanics, and material science, reinforcing the interdisciplinary nature of impact-resistant structure research. The project fostered strong international collaborations, particularly with Helmut-Schmidt University Hamburg and the University of Maribor, solidifying European partnerships in the field of heterogeneous materials and structural mechanics.

High velocity impact dynamics with fast and flash X-ray radiography

<https://starfos.tacr.cz/en/projekty/GM22-18033M>

The project made significant advancements in experimental research on high-velocity impact dynamics, particularly through the use of flash X-ray imaging. A key achievement was the construction and commissioning of a unique experimental setup at DynLab (Faculty of Transportation Sciences, CTU), enabling real-time X-ray imaging of high-speed dynamic events. This setup has been instrumental in studying ballistic protection materials, aerospace composites, and metamaterials under extreme loading conditions. The research findings were disseminated through five publications in high-impact journals and ten presentations at international conferences.

Beyond technological advancements, the project had a major academic impact, fostering a team of young researchers and contributing to the successful completion of one Ph.D. dissertation, with three additional dissertations expected to be defended in 2025. The principal investigator also completed and submitted their habilitation thesis, further solidifying the project's role in academic development.

The excellence of the project was recognized through its selection for the prestigious JuniorStar grant from GAČR, awarded to only 16 projects in the Czech Republic that year, underscoring the outstanding potential of early-career researchers. The funding enabled the development of state-of-the-art experimental techniques to study materials filled with dilatant fluids, where the integration of X-ray imaging with dynamic testing provided critical insights into deformation behaviors. These findings are crucial for improving numerical models and optimizing impact-resistant material design.

The project significantly strengthened the Faculty of Transportation Sciences' leadership in experimental mechanics and high-speed imaging techniques. It also fostered international research collaboration, particularly with the groups of Prof. Sousa (University of Aveiro, Portugal) and Dr. Máca (TU Dresden, Germany), reinforcing global partnerships and expanding research networking opportunities.

Research of the GNSS signal interference in the domain of air transport

<https://starfos.tacr.cz/en/projekty/CK01000183>

The project delivered two fundamental advancements in the detection of GNSS interference across any operational range. The first is a Methodology for Detecting Unlawful GNSS Signal Interference Using ADS-B Data, while the second is a Model for Multi-Source Fusion of GNSS Interference Information.

The detection methodology introduces a novel approach that allows the identification of GNSS interference even in cases where aircraft continue to broadcast their GNSS-derived positions via ADS-B. By analyzing quality parameters within ADS-B messages, the system can detect anomalies indicative of signal interference, thereby providing an innovative layer of resilience against GNSS spoofing and jamming threats.

The multi-source fusion model serves as a key component for scaling the detection system, as it enables the integration of any available GNSS interference data into a unified assessment framework. By merging multiple sources of information, the system ensures enhanced reliability and coverage, making it adaptable for large-scale deployment.

Both developments are currently in the implementation phase. The methodology has been integrated into a GNSS interference visualization tool, available for operational use, while the fusion model is deployed on a CTU server, progressively integrating various interference detectors.

The project is considered highly innovative, as it pioneers a breakthrough approach to detecting GNSS interference from ADS-B messages, even when aircraft continue transmitting position data. The fusion tool significantly enhances detection robustness, enabling widespread deployment across vast geographical areas, thus ensuring better protection for GNSS-reliant users.

The project aligns with the scientific excellence strategy in GNSS applications for transportation. The Faculty of Transportation Sciences was the lead institution, overseeing the research, development, and implementation of the project's core technologies. This project was carried out in cooperation with the GNSS Centre of Excellence.

The Development of Innovative Method for Detection of Crimes Within Road Transportation System Using Electronic Accident Data

<https://starfos.tacr.cz/en/projekty/VI20172020108>

The project aimed to enhance forensic investigations of road accidents by developing a certified methodology for analyzing electronic accident data. This methodology enables more effective identification of criminal activities related to traffic incidents, improving investigative accuracy and efficiency.

A key innovation was the integration of forensic methods with advanced data analytics, significantly enhancing fraud detection and the identification of unauthorized interventions in vehicle onboard systems. The project fostered interdisciplinary collaboration between transportation engineering, computer science, and forensic science, ensuring a comprehensive and applicable solution.

The research was conducted in collaboration with Faculty of Transportation Sciences, Police Academy of the Czech Republic, Pardubice University and Institute of Forensic Engineering, University of Žilina (Slovakia). These institutions worked closely with law enforcement agencies and government bodies, ensuring the practical application of the project outcomes. The results contribute to road safety by enabling more accurate detection of fraudulent activities related to traffic accidents, strengthening legal enforcement and forensic analysis capabilities.

Digitalization of integrated aviation safety oversight

<https://starfos.tacr.cz/en/projekty/CK01000073>

The project focused on advancing operational safety processes within aviation oversight authorities through the development of two key components: a Methodology for Applying the STAMP Model in Aviation Oversight and a Prototype Tool Supporting the Implementation of the STAMP Safety Model. The methodology introduces new insights that enable a systemic approach to aviation safety while allowing for detailed assessments of individual organizations.

The project is recognized for its excellence in exploring the application of the STAMP (Systems-Theoretic Accident Model and Processes) model in aviation oversight, where both a high-level systemic perspective and a detailed organizational view are essential. The results hold significant potential for further enhancing aviation operational safety.

The project aligns with scientific excellence in aviation safety and facilitated collaboration with Sapienza University of Rome and academic engagement with MIT.

The research was primarily conducted by Faculty of Transportation Sciences as the lead institution, with Faculty of Electrical Engineering also contributing to the project's outcomes.

Urban Smart Parking

<https://www.eiturbanmobility.eu/projects/urbansmartpark/>

The UrbanSmartPark project addressed the growing demand for urban mobility and parking solutions in response to technological advancements in transportation. With the rise of shared vehicles, robotic taxis, and electric cars, traditional parking models—where users pay solely for the duration of their stay—are becoming less efficient, creating opportunities for innovative solutions.

The project focused on two primary objectives. The first was the design of new parking services and business models for on-street parking, actively involving customers. This phase included extensive market research and customer studies to ensure the successful implementation of these services. The second objective was the development and pilot testing of automated vehicles for autonomous parking in urban areas. This innovation opens new possibilities for related services, such as repositioning shared and electric vehicles, package delivery, and maintenance during parking. Automating these processes will reduce operational costs and enhance urban mobility efficiency.

The strength of the project lies in the expertise and collaboration of its partner organizations. Research institutions such as NFF and Fraunhofer contributed knowledge in intelligent parking systems and data management, cities provided real-world testing environments, and industrial partners like Škoda and Siemens played a key role in technological innovation and practical implementation.

Urban Mobile Charging

<https://www.eiturbanmobility.eu/projects/urban-mobile-charging-umc/>

The availability of charging infrastructure is and will remain a critical challenge for both cities and electric vehicle users. By 2030, Europe is expected to have 33 million electric vehicle owners requiring efficient charging solutions. The UMC project aimed to develop commercially viable and innovative charging options tailored to urban environments.

The project introduced the "NIMBEE" service concept, providing on-demand, mobile renewable charging in three cities. This solution ensures that drivers have access to charging whenever needed while minimizing the use of public space and urban infrastructure. The service was implemented through a "charging-as-a-service" model, supported by a mobile application that simplifies the charging process for users. A battery-powered charging unit is delivered directly to the vehicle, and its recharging is optimized based on real-time electricity pricing in the distribution network.

The project successfully addressed key challenges for the large-scale adoption of this service, focusing on seamless urban deployment, improved infrastructure planning, and the use of advanced intelligence to optimize charging efficiency and logistics management.

Table 3.3.1 Projects supported by public funds

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
GA ČR	High velocity impact dynamics with fast and flash X-ray radiography (2022–2026) https://starfos.tacr.cz/en/projekty/GM22-18033M	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	5267 kCZK / 210694 €	3051 kCZK / 122020 €
GA ČR	Progressive numerical and experimental modelling of innovative sandwich panels with cellular core (2019–2021) https://starfos.tacr.cz/en/projekty/GA19-23675S	1912 kCZK / 76480 €	1965 kCZK / 78600 €	1915 kCZK / 76600 €	0 kCZK / 0 €	0 kCZK / 0 €
Capital City of Prague	GLOMODO - Global traffic model of the City of Prague (2018–2020) https://starfos.tacr.cz/en/projekty/UH0370	917 kCZK / 36664 €	500 kCZK / 19988 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Capital City of Prague	Universal driving simulator for public transit drivers (2019–2022) https://starfos.tacr.cz/en/projekty/UH0841	3759 kCZK / 150366 €	5820 kCZK / 232785 €	5368 kCZK / 214709 €	4880 kCZK / 195203 €	0 kCZK / 0 €
GA ČR	The underestimated role of Pilsen Premonstratensians in mathematics and nature sciences (2021–2024) https://starfos.tacr.cz/en/projekty/GA21-08835S	0 kCZK / 0 €	0 kCZK / 0 €	1010 kCZK / 40407 €	1069 kCZK / 42767 €	1051 kCZK / 42052 €
EEA and Norway Grants	Academic Development through bilateral peer-learning activities on mission-oriented innovation for Climate Neutral and Smart Cities (2021–2023) https://eeagrants.org/archive/2014-2021/projects/CZ-EDUCATION-0064	0 kCZK / 0 €	0 kCZK / 0 €	68 kCZK / 2739 €	1028 kCZK / 41100 €	1420 kCZK / 56817 €
Erasmus+	RESICITIES - Building resilience through education for Sustainable, Collaborative and Smart Cities (2020–2023) https://app.cristin.no/projects/show.jsf?id=2526861 https://www.resicities.eu/	0 kCZK / 0 €	0 kCZK / 0 €	2029 kCZK / 81154 €	1261 kCZK / 50450 €	3274 kCZK / 130969 €
Min. of Edu., Youth and Sports	Ontology engineering utilization in reliability and quality knowledge management systems in the aviation (2019–2022)	1080 kCZK / 43200 €	1828 kCZK / 73120 €	1828 kCZK / 73120 €	0 kCZK / 0 €	0 kCZK / 0 €

²⁵ If the provider is from abroad, please indicate the provider's country of origin in brackets. For the determination of the country of origin of the provider, the place of residence of the provider is decisive.

²⁶ Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

	https://starfos.tacr.cz/en/projekty/LTACH19032					
Min. of Edu., Youth and Sports	SimulUK - Simulační prostředí v Ústeckém kraji (2023-2028)	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	546 kCZK / 21856 €
Min. of Edu., Youth and Sports	Establishment and development of experimental facilities of CTU in Prague FTS (2017–2023) https://starfos.tacr.cz/en/projekty/EF16_017%2F0002589	1636 kCZK / 65445 €	5913 kCZK / 236537 €	4356 kCZK / 174247 €	2901 kCZK / 116029 €	1129 kCZK / 45169 €
Min. of Edu., Youth and Sports	The establishment of doctoral study program Smart Cities and development of research-focused study program at CTU FTS (2017–2023) https://starfos.tacr.cz/en/projekty/EF16_018%2F0002565	849 kCZK / 33976 €	90 kCZK / 3611 €	55 kCZK / 2204 €	40 kCZK / 1600 €	200 kCZK / 7984 €
Min. of Inter.	Aviation resilience against spoofed GNSS and ADS-B signals (2023–2025) https://starfos.tacr.cz/en/projekty/VK01030071	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	2127 kCZK / 85086 €
Min. of Inter.	System For Evaluating Security Aspects of Mass Social Events in Relation to Selected Security Incidents (2022–2023) https://starfos.tacr.cz/en/projekty/VB01000041	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1579 kCZK / 63148 €	1600 kCZK / 63996 €
Min. of Inter.	The Development of Innovative Method for Detection of Crimes Within Road Transportation System Using Electronic Accident Data (2017–2020) https://starfos.tacr.cz/en/projekty/VI20172020108	2817 kCZK / 112679 €	479 kCZK / 19145 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Min. of Reg. Dev. / ESF	Improving the Quality of Technical Education to Meet Labor Market Needs in the Ústí Region (2019-2022) https://www.risy.cz/cs/vyhledavace/projekty-eu?code=CZ.02.2.69%2F0.0%2F0.0%2F18_058%2F0010196&villageld=3020&nuts=43	498 kCZK / 19907 €	565 kCZK / 22615 €	635 kCZK / 25389 €	1071 kCZK / 42836 €	0 kCZK / 0 €
Min. of Reg. Dev. / ESF	Infrastructure and laboratory equipment of FD ČVUT (2017-2023) https://www.risy.cz/cs/vyhledavace/projekty-eu?code=CZ.02.2.67%2F0.0%2F0.0%2F16_016%2F0002482	6882 kCZK / 275283 €	12072 kCZK / 482867 €	5004 kCZK / 200150 €	2474 kCZK / 98979 €	7599 kCZK / 303966 €
TA ČR	Advanced cyber security methods in tunnel systems as a part of critical transport infrastructure (2023–2025) https://starfos.tacr.cz/en/projekty/CK04000082	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	4178 kCZK / 167112 €
TA ČR	Design of U-space implementation for the Czech Republic (2020–2023) https://starfos.tacr.cz/en/projekty/CK01000185	0 kCZK / 0 €	3458 kCZK / 138330 €	4918 kCZK / 196724 €	3542 kCZK / 141697 €	1753 kCZK / 70116 €
TA ČR	Development of a train expert system responsible for autonomous train behaviour (2020–2022) https://starfos.tacr.cz/en/projekty/CK01000111	0 kCZK / 0 €	3817 kCZK / 152663 €	4228 kCZK / 169133 €	4869 kCZK / 194745 €	0 kCZK / 0 €
TA ČR	Digital Twin for Transportation - Evropská street (2021–2024) https://starfos.tacr.cz/en/projekty/CK02000118	0 kCZK / 0 €	0 kCZK / 0 €	3136 kCZK / 125424 €	5708 kCZK / 228327 €	6729 kCZK / 269147 €
TA ČR	Digitalization of AFIS and Radio aerodrome service provision (2022–2023) https://starfos.tacr.cz/en/projekty/CK03000054	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	4224 kCZK / 168960 €	4320 kCZK / 172793 €

TA ČR	Digitalization of integrated aviation safety oversight (2020–2023) https://starfos.tacr.cz/en/projekty/CK01000073	0 kCZK / 0 €	1450 kCZK / 58002 €	1 803 kCZK / 72103 €	1 731 kCZK / 69221 €	286 kCZK / 11457 €
TA ČR	Efficient Operational Concept for Rapid Services (2020–2023) https://starfos.tacr.cz/en/projekty/CK01000004	0 kCZK / 0 €	716 kCZK / 28640 €	1234 kCZK / 49360 €	1074 kCZK / 42960 €	806 kCZK / 32220 €
TA ČR	Evaluating the behaviour of automated vehicles in terms of compliance with ethical and legal principles in mixed traffic (2023–2025) https://starfos.tacr.cz/en/projekty/CK04000150	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	3321 kCZK / 132842 €
TA ČR	Improving effectiveness of aircraft maintenance planning and execution (2020–2023) https://starfos.tacr.cz/en/projekty/CK01000204	0 kCZK / 0 €	2052 kCZK / 82084 €	2613 kCZK / 104536 €	2516 kCZK / 100620 €	417 kCZK / 16670 €
TA ČR	Increasing the resilience and safety of railway infrastructure and minimizing impacts on other transport infrastructure sectors (2020–2023) https://starfos.tacr.cz/en/projekty/CK01000015	0 kCZK / 0 €	2125 kCZK / 85018 €	3720 kCZK / 148814 €	3924 kCZK / 156951 €	1779 kCZK / 71150 €
TA ČR	Innovative way of HEMS navigation using GNSS, Point in Space procedures and Low Level Routes in the Czech Republic (2020–2023) https://starfos.tacr.cz/en/projekty/CK01000031	0 kCZK / 0 €	1274 kCZK / 50971 €	1497 kCZK / 59886 €	1497 kCZK / 59886 €	247 kCZK / 9864 €
TA ČR	Integration of vestibular illusion simulators into ab-initio training (2021–2024) https://starfos.tacr.cz/en/projekty/CK02000321	0 kCZK / 0 €	0 kCZK / 0 €	1634 kCZK / 65364 €	2372 kCZK / 94881 €	2166 kCZK / 86652 €
TA ČR	Methodology of systematic introduction and operation of railway vehicle simulators for train drivers in the Czech Republic (2020–2022) https://starfos.tacr.cz/en/projekty/CK01000132	0 kCZK / 0 €	1188 kCZK / 47533 €	2761 kCZK / 110428 €	2365 kCZK / 94612 €	0 kCZK / 0 €
TA ČR	Predictive diagnostics of ITS technological equipment using AI approaches (2023–2025) https://starfos.tacr.cz/en/projekty/CK04000109	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	4690 kCZK / 187595 €
TA ČR	Protection of non-personal data and databases in autonomous systems (2021–2022) https://starfos.tacr.cz/en/projekty/CK02000188	0 kCZK / 0 €	0 kCZK / 0 €	4187 kCZK / 167482 €	4643 kCZK / 185718 €	0 kCZK / 0 €
TA ČR	Research of the GNSS signal interference in the domain of air transport (2020–2023) https://starfos.tacr.cz/en/projekty/CK01000183	0 kCZK / 0 €	1950 kCZK / 77985 €	3017 kCZK / 120698 €	2711 kCZK / 108459 €	447 kCZK / 17877 €
TA ČR	Research on the operational aspects of the intelligent end of the train (2023–2024) https://starfos.tacr.cz/en/projekty/CK04000156	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	4211 kCZK / 168426 €
TA ČR	Research on the operational aspects of the intelligent end of the train (2023–2024) https://starfos.tacr.cz/en/projekty/CK04000156	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	4061 kCZK / 162440 €
TA ČR	System for support of complex network time coordination of connections in public transport (2023–2025) https://starfos.tacr.cz/en/projekty/CK04000098	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1021 kCZK / 40835 €

TA ČR	System for Supporting Network Time Coordination of Connections at Interchange Nodes (2020–2022) https://starfos.tacr.cz/en/projekty/CK01000043	0 kCZK / 0 €	584 kCZK / 23351 €	765 kCZK / 30582 €	720 kCZK / 28790 €	0 kCZK / 0 €
TA ČR	Prediction of traffic excesses using neural networks (2018–2019) https://starfos.tacr.cz/en/projekty/TJ01000183	1898 kCZK / 75907 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	Proposal of standard scenarios for the safe operation of unmanned systems (2019–2021) https://starfos.tacr.cz/en/projekty/TJ02000048	313 kCZK / 12538 €	522 kCZK / 20861 €	230 kCZK / 9208 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	Psychophysiological condition of pilots and its influence on carrying out the final phase of landing on an airport (2019–2021) https://starfos.tacr.cz/en/projekty/TJ02000334	1032 kCZK / 41263 €	1583 kCZK / 63322 €	667 kCZK / 26669 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	Research of Intelligent Components for Safety Data Collection and Processing Systems (2017–2019) https://starfos.tacr.cz/en/projekty/TJ01000377	1716 kCZK / 68621 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	Research of Quantitative Methods for Safety Studies Risk Analysis and Evaluation (2017–2019) https://starfos.tacr.cz/en/projekty/TJ01000252	830 kCZK / 33211 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	Synergy in Railway Public Transport Line Planning – Improvement of Efficiency of Spatial Public Railway Transport Service (2017–2019) https://starfos.tacr.cz/en/projekty/TJ01000162	858 kCZK / 34339 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	Human Dimension of Sustainable Urban and Regional Mobility Plans. (2019–2020) https://starfos.tacr.cz/en/projekty/TL02000400	2453 kCZK / 98100 €	2534 kCZK / 101340 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	Law protection of traffic-data databases in autonomous driving systems (2021–2023) https://starfos.tacr.cz/en/projekty/TL05000681	0 kCZK / 0 €	0 kCZK / 0 €	1499 kCZK / 59947 €	2827 kCZK / 113078 €	1668 kCZK / 66705 €
TA ČR	Privacy and personal data protection in autonomous driving systems (2020–2022) https://starfos.tacr.cz/en/projekty/TL03000691	0 kCZK / 0 €	1085 kCZK / 43400 €	1880 kCZK / 75200 €	1075 kCZK / 43000 €	0 kCZK / 0 €
TA ČR	Value of Air Transport in Czech Republic (2018–2021) https://starfos.tacr.cz/en/projekty/TL01000421	933 kCZK / 37331 €	889 kCZK / 35560 €	220 kCZK / 8782 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	Clean mobility and its prospect in trucking (2019–2022) https://starfos.tacr.cz/en/projekty/TK02010106	843 kCZK / 33701 €	1794 kCZK / 71760 €	2028 kCZK / 81121 €	1137 kCZK / 45461 €	0 kCZK / 0 €
TA ČR	Dynamic charging (2023–2025) https://starfos.tacr.cz/en/projekty/TK05010044	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1978 kCZK / 79118 €
TA ČR	Analysis of possible adaptation of Czech legislation necessary for entry of vehicles of SAE 3 level and higher into operation (2021–2022) https://starfos.tacr.cz/en/projekty/TIRAMD108	0 kCZK / 0 €	0 kCZK / 0 €	177 kCZK / 7098 €	1575 kCZK / 63011 €	0 kCZK / 0 €

TA ČR	Data usability from BIM models for the development of National Infrastructure for Spatial Information (2022–2024) https://starfos.tacr.cz/en/projekty/TITSMV112	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	287 kCZK / 11499 €	2816 kCZK / 112649 €
TA ČR	Unification and standardization of ARFF training in the Czech Republic, including verification of the qualification level (2019–2023) https://starfos.tacr.cz/en/projekty/TIRAMD905	334 kCZK / 13363 €	563 kCZK / 22537 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Total		31559 kCZK / 126237 €	56816 kCZK / 2272626 €	64482 kCZK / 2579277 €	70367 kCZK / 2814681 €	68890 kCZK / 2755582 €
In the role of another participant						
Provider ²⁷	Project name	Support (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
EEA and Norway Grants	Building bilateral research network towards resilient, smart and sustainable cities and regions (2020–2022) https://bf.sfzp.cz/building-bilateral-research-network-towards-resilient-smart-and-sustainable-cities-and-regions/	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	146 kCZK / 5824 €	179 kCZK / 7167 €
GA ČR	The impact of WWI on the formation and transformation of the scientific life of the mathematical community (2018–2021) https://starfos.tacr.cz/en/projekty/GA18-00449S	1480 kCZK / 59200 €	1362 kCZK / 54480 €	53 kCZK / 2124 €	0 kCZK / 0 €	0 kCZK / 0 €
Erasmus+	STAFFER - Skill Training Alliance For the Future European Rail Systém (2021–2024) https://www.railstaffer.eu/about-staffer/	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	493 kCZK / 19707 €	710 kCZK / 28402 €
European Commission	Automated solutions for sustainable and circular construction and demolition waste management (2022-2026) https://cordis.europa.eu/project/id/101058580	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	170 kCZK / 6800 €	429 kCZK / 17172 €
European Commission	LOD-RoadTran18: Improvement of NAPs through the exploitation of traffic LOD DATEX II (2019–2022) https://cef.uv.es/lodroadtran18/index.php/en/	118 kCZK / 4720 €	428 kCZK / 17120 €	322 kCZK / 12880 €	607 kCZK / 24280 €	25 kCZK / 1000 €
European Commission	C-ROADS Czech Republic (2016–2021) https://www.its-knihovna.cz/en/knihovna/projekty/archiv-projektu/c-roads/about-project	3 618 kCZK / 144720 €	4 138 kCZK / 165520 €	502 kCZK / 20080 €	-1210 Kč / -48400 €	0 kCZK / 0 €
European Commission	Programme Support Action (PSA) for the maintenance, adaptation and further development of a European ITS Framework Architecture for Intelligent Transport Services (ITS). (2017-2021) https://frame-next.eu/	611 kCZK / 24442 €	787 kCZK / 31481 €	1 802 kCZK / 72063 €	0 kCZK / 0 €	0 kCZK / 0 €
European Commission	Managing Automated Vehicles Enhances Network (2016–2019) https://cordis.europa.eu/project/id/690727	1282 kCZK / 51285 €	35 kCZK / 1403 €	53 kCZK / 2123 €	151 kCZK / 6035 €	0 kCZK / 0 €
European Commission	New Mobility Data and Solutions Toolkit (2021–2023) https://cordis.europa.eu/project/id/101007153	0 kCZK / 0 €	0 kCZK / 0 €	1 692 kCZK / 67667 €	1 667 kCZK / 66674 €	575 kCZK / 22991 €

²⁷ Ibid.

European Commission	Smart freight TranspOrt and logistics Research Methodologies (2021–2023) https://cordis.europa.eu/project/id/101006700	0 kCZK / 0 €	0 kCZK / 0 €	1486 kCZK / 59432 €	1993 kCZK / 79711 €	1257 kCZK / 50262 €
European Commission	Understand the Dimensions of Organised Crime and Terrorist Networks for Developing Effective and Efficient Security Solutions for First-line-practitioners and Professionals (2016–2019) https://cordis.europa.eu/project/id/700688	2102 kCZK / 84081 €	156 kCZK / 6257 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
European Commission	The Integrator-centric approach for realising innovative energy efficient buildings in connected sustainable green neighbourhoods (2022-2026) https://cordis.europa.eu/project/id/101037075	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	715 kCZK / 28612 €	2648 kCZK / 105936 €
European Commission	Co-creating people-centric sustainable neighbourhoods through urban regeneration (2023–2027) https://cordis.europa.eu/project/id/101123546	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	216 kCZK / 8659 €
European Commission	The European Living Lab on Designing Sustainable Urban Mobility Towards Climate Neutral Cities (2023–2026) https://cordis.europa.eu/project/id/101103772	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	861 kCZK / 34434 €
European Commission	Judicial Strategy Against all Forms of Violent Extremism in Prison (2018-2020) https://www.developmentaid.org/organizations/awards/view/123713/judicial-strategy-against-all-forms-of-violent-extremism-in-prison	240 kCZK / 9581 €	687 kCZK / 27483 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
European Commission	Strategic Assessment for LAW and Police Cooperation (2018-2021) https://satlawproject.eu/	386 kCZK / 15456 €	382 kCZK / 15280 €	359 kCZK / 14351 €	0 kCZK / 0 €	0 kCZK / 0 €
European Commission	Judicial And Police Cooperation Preventing Radicalization Towards Terrorism (2019-2021) https://jpcoopsproject.eu/	522 kCZK / 20892 €	549 kCZK / 21958 €	396 kCZK / 15833 €	247 kCZK / 9883 €	0 kCZK / 0 €
EIT – Urban Mobility	MaaS components assessment and system planning for cooperative value creation (2020–2020) https://www.eiturbanmobility.eu/projects/maas-components-assessment-and-system-planning-for-cooperative-value-creation/	0 kCZK / 0 €	2 975 kCZK / 119012 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
EIT – Urban Mobility	PowerManagement: A smart and efficient electrical vehicle charging platform (2022-2023) https://www.eiturbanmobility.eu/projects/powermanagement/	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	599 kCZK / 23975 €	620 kCZK / 24780 €
EIT – Urban Mobility	eUltimate (2021-2022) https://www.eiturbanmobility.eu/projects/eultimate/	0 kCZK / 0 €	0 kCZK / 0 €	1658 kCZK / 66320 €	768 kCZK / 30720 €	0 kCZK / 0 €
EIT – Urban Mobility	Urban Mobile Charging (2022-2023) https://www.eiturbanmobility.eu/projects/urban-mobile-charging-umc/	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1719 kCZK / 68742 €	1086 kCZK / 43426 €
EIT – Urban Mobility	Urban Smart Parking (2020-2021) https://www.eiturbanmobility.eu/projects/urbansmartpark/	0 kCZK / 0 €	868 kCZK / 34737 €	868 kCZK / 34737 €	0 kCZK / 0 €	0 kCZK / 0 €
ERDF	HydroRACE4schools – Races of Saxon and Czech Schools "Exploring the World of Electromobility with Hydrogen" (2017–2021)	1325 kCZK / 52998 €	486 kCZK / 19452 €	3 kCZK / 132 €	480 kCZK / 19192 €	0 kCZK / 0 €

	https://hydro-race.eu/tiki-index.php?page=HomePage_DE&no_bl=y					
ERDF	The Use of Modern Visualization and Simulation Techniques in Transportation Systems (2016–2019) https://www.sn-cz2020.eu/de/projekte/gefoerderte_projekte/Simulations-uns_Visualisierungswerkzeuge.html	2739 kCZK / 109575 €	2028 kCZK / 81132 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Min. of Edu., Youth and Sports	Development of infrastructure facilities for PhD programmes at CTU (2023–2027) https://starfos.tacr.cz/en/projekty/EH22_012%2F0006347#project-main	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	670 kCZK / 26794 €
Min. of Edu., Youth and Sports	Engineering applications of microworld physics (2018–2022) https://starfos.tacr.cz/en/projekty/EF16_019%2F0000766	9173 kCZK / 366937 €	1588 kCZK / 63535 €	2567 kCZK / 102693 €	2695 kCZK / 107795 €	0 kCZK / 0 €
Min. of Edu., Youth and Sports	Mobility CTU - STA (2020–2023) https://starfos.tacr.cz/en/projekty/EF18_053%2F0016980	0 kCZK / 0 €	0 kCZK / 0 €	250 kCZK / 9980 €	1539 kCZK / 61576 €	623 kCZK / 24910 €
Min. of Edu., Youth and Sports	Smart City - Smart Region - Smart Community (2018–2023) https://starfos.tacr.cz/en/projekty/EF17_048%2F0007435	2477 kCZK / 99067 €	1887 kCZK / 75491 €	2145 kCZK / 85795 €	2 551 kCZK / 102047 €	0 kCZK / 0 €
Min. of Ind. and Trade	Verification of the prototype production of the protective deformation block (2021–2023) https://starfos.tacr.cz/en/projekty/EG21_374%2F0026841	0 kCZK / 0 €	0 kCZK / 0 €	335 kCZK / 13414 €	1358 kCZK / 54333 €	747 kCZK / 29866 €
Min. of Ind. and Trade	The Experimental Development for Production in The Company SPEL, a.s. (2015–2020) https://starfos.tacr.cz/en/projekty/EG15_019%2F0004329	6826 kCZK / 273040 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Min. of Ind. and Trade	Implementation of Industry 4.0 principles during production and repairs of constructional layers of surface transportation (2017–2019) https://starfos.tacr.cz/en/projekty/FV20356	720 kCZK / 28788 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Min. of Ind. and Trade	Operational methods of monitoring, prediction of service life of bridges and guarantee of safety bridges (2017–2020) https://starfos.tacr.cz/en/projekty/FV20585	499 kCZK / 19967 €	509 kCZK / 20367 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Min. of Inter.	STRENGTH 2023: Strengthening the resilience of critical land transport infrastructure entities (2023–2025) https://starfos.tacr.cz/en/projekty/VK01030014	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	617 kCZK / 24685 €
Min. of Inter.	ISOLATOR - Detection of defects in insulators of energy transmission systems (2019–2022) https://starfos.tacr.cz/en/projekty/VI20192022170	729 kCZK / 29157 €	2822 kCZK / 112895 €	2886 kCZK / 115448 €	2951 kCZK / 118048 €	0 kCZK / 0 €
Min. of Inter.	Electronic speed limitation of vehicles in emergency and crisis situations triggered by security forces (2021–2026) https://starfos.tacr.cz/en/projekty/VJ01010066	0 kCZK / 0 €	0 kCZK / 0 €	3104 kCZK / 124160 €	4504 kCZK / 180160 €	3503 kCZK / 140108 €
Min. of Inter.	Strategic infrastructure protective system detecting illegal acts intentionally affecting GNSS signals (2017–2021) https://starfos.tacr.cz/en/projekty/VI20172019090	844 kCZK / 33775 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €

Min. of Reg. Dev. / ESF	Institutional support of the Czech Technical University in Prague (2017-2023) https://www.risy.cz/cs/vyhledavace/projekty-eu?code=CZ.02.2.69%2F0.0%2F0.0%2F16_015%2F0002382	2 790 kCZK / 111596 €	1 160 kCZK / 46418 €	411 kCZK / 16434 €	478 kCZK / 19130 €	1009 kCZK / 40356 €
Min. of Reg. Dev. / ESF	International Mobility of Researchers at CTU (2018-2022) https://www.risy.cz/cs/vyhledavace/projekty-eu?code=CZ.02.2.69%2F0.0%2F0.0%2F16_027%2F0008465	674 kCZK / 26944 €	89 kCZK / 3577 €	712 kCZK / 28463 €	137 kCZK / 5486 €	0 kCZK / 0 €
Min. of Reg. Dev. / ESF	Project CTU ESF II. (2019-023) https://www.risy.cz/cs/vyhledavace/projekty-eu?name=Projekt+%C4%8CVUT+ESF+II.	0 kCZK / 0 €	1 007 kCZK / 40263 €	1309 kCZK / 52341 €	1 657 kCZK / 66279 €	33 kCZK / 1312 €
TA ČR	National Hydrogen Mobility Center (2023–2028) https://starfos.tacr.cz/en/projekty/TN02000007	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1986 kCZK / 79431 €
TA ČR	5G application in V2X sensor networks (2023–2025) https://starfos.tacr.cz/en/projekty/FW08010039	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1055 kCZK / 42187 €
TA ČR	Automated management center for minibuses as autonomous MoD (2023–2025) https://starfos.tacr.cz/en/projekty/FW06010535	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	2948 kCZK / 117900 €
TA ČR	Cyber risk management system in industrial networks (2021–2023) https://starfos.tacr.cz/en/projekty/FW03010458	0 kCZK / 0 €	0 kCZK / 0 €	1123 kCZK / 44924 €	1238 kCZK / 49536 €	1443 kCZK / 57703 €
TA ČR	IoT device for electronic conspicuity of manned aviation in U-space (2022–2024) https://starfos.tacr.cz/en/projekty/FW04020025	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	589 kCZK / 23553 €	589 kCZK / 23553 €
TA ČR	New generation of software tools to support System-Theoretic Process Analysis (STPA) method (2023–2025) https://starfos.tacr.cz/en/projekty/FW09020092	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	95 kCZK / 3815 €
TA ČR	Cyber SECURITY for coopERative connecteD automatEd mobility using V2X (2023–2025) https://starfos.tacr.cz/en/projekty/TM04000040	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	2 000 kCZK / 80000 €
TA ČR	Multidimensional detection and automated response using artificial intelligence (2022–2024) https://starfos.tacr.cz/en/projekty/TM03000055	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1597 kCZK / 63874 €	1726 kCZK / 69050 €
TA ČR	National Centre of Competence in Cybersecurity 2019–2022) https://starfos.tacr.cz/en/projekty/TN01000077	0 kCZK / 0 €	1098 kCZK / 43909 €	512 kCZK / 20478 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	A system to support commercial operation of unmanned aerial vehicles in shared airspace of the Czech Republic (2020–2022) https://starfos.tacr.cz/en/projekty/CK01000210	0 kCZK / 0 €	1070 kCZK / 42781 €	1221 kCZK / 48854 €	1 449 kCZK / 57963 €	0 kCZK / 0 €
TA ČR	Aviation protection against low-energy lasers (2022–2025) https://starfos.tacr.cz/en/projekty/CK03000036	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	578 kCZK / 23136 €	425 kCZK / 16983 €
TA ČR	Data quality tools for ensuring system reliability of transport information centres (2023–2024)	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1200 kCZK / 48000 €

	https://starfos.tacr.cz/en/projekty/CK04000189					
TA ČR	Dynamic digital street model for the usage of autonomous mobility in Pilsen (2022–2024) https://starfos.tacr.cz/en/projekty/CK03000179	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1543 kCZK / 61724 €	1723 kCZK / 68900 €
TA ČR	Dynamic Opto-Acoustic Method for Noise Emission Evaluating of the Railway Track (2022–2024) https://starfos.tacr.cz/en/projekty/CK03000099	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1 673 kCZK / 66904 €	1 997 kCZK / 79889 €
TA ČR	Increasing of tunnel safety using continuous accurate vehicle location (2023–2025) https://starfos.tacr.cz/en/projekty/CK04000088	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	980 kCZK / 39200 €
TA ČR	InovaFOND (2016-2019) https://starfos.tacr.cz/en/projekty/TG02010033	660 kCZK / 26400 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	Intelligent system for analysis and prediction of public transport (2020–2022) https://starfos.tacr.cz/en/projekty/CK01000165	0 kCZK / 0 €	699 kCZK / 27976 €	947 kCZK / 37872 €	1004 kCZK / 40148 €	139 kCZK / 5550 €
TA ČR	Modern tools and methods to increase security of air transport at international airports in Czech Republic (2021–2024) https://starfos.tacr.cz/en/projekty/CK02000005	0 kCZK / 0 €	0 kCZK / 0 €	883 kCZK / 35325 €	1055 kCZK / 42210 €	1055 kCZK / 42210 €
TA ČR	Research of alternative methods of position determination and its integrity with GNSS for drivers using C-ITS (2020–2022) https://starfos.tacr.cz/en/projekty/CK01000163	0 kCZK / 0 €	1000 kCZK / 40000 €	1238 kCZK / 49500 €	1723 kCZK / 68900 €	128 kCZK / 5100 €
TA ČR	Research of information modelling in public space with a focus on infrastructure (2022–2024) https://starfos.tacr.cz/en/projekty/CK03000089	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1 278 kCZK / 51106 €	1 347 kCZK / 53869 €
TA ČR	Traffic controll system of new generation (SENDER) (2023–2025) https://starfos.tacr.cz/en/projekty/CK04000027	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1 188 kCZK / 47500 €
TA ČR	Application of nonparametric methods (DEA, FDH) to analyze and to compare the efficiency of municipalities (2018–2021) https://starfos.tacr.cz/en/projekty/TL01000463	212 kCZK / 8486 €	212 kCZK / 8486 €	9 kCZK / 362 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	Standards for the performance of expert activities in assessing the course and causes of traffic accidents (2021–2023) https://starfos.tacr.cz/en/projekty/TL05000028	0 kCZK / 0 €	0 kCZK / 0 €	320 kCZK / 12790 €	808 kCZK / 32318 €	607 kCZK / 24262 €
TA ČR	Integrated Quality Measurement System (InQMS) (2018–2019) https://starfos.tacr.cz/en/projekty/TH03010503	158 kCZK / 6336 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	Preparation of transport infrastructure action elements (2017–2019) https://starfos.tacr.cz/en/projekty/TH02010886	709 kCZK / 28352 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	Using of new authentication and security procedures for ITS (2017–2020) https://starfos.tacr.cz/en/projekty/TH03010297	258 kCZK / 10327 €	82 kCZK / 3298 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €

TA ČR	Advanced RGB LED display panels for transport applications (2017–2020) https://starfos.tacr.cz/en/projekty/TH02010771	350 kCZK / 14000 €	80 kCZK / 3200 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	Reliability Diagnostics of Technological Equipment (2019–2021) https://starfos.tacr.cz/en/projekty/TH04010481	200 kCZK / 7992 €	335 kCZK / 13392 €	340 kCZK / 13608 €	0 kCZK / 0 €	0 kCZK / 0 €
TA ČR	National Competence Center - Cybernetics and Artificial Intelligence (2018–2022) https://starfos.tacr.cz/en/projekty/TN01000024	1766 kCZK / 70648 €	1766 kCZK / 70648 €	767 kCZK / 30677 €	330 kCZK / 13192 €	0 kCZK / 0 €
TA ČR	GNSS signal interference detector for integrated safety means in road transport (2021–2024) https://starfos.tacr.cz/en/projekty/CK02000127	0 kCZK / 0 €	0 kCZK / 0 €	307 kCZK / 12272 €	514 kCZK / 20551 €	275 kCZK / 11004 €
TA ČR	Josef Bozek National Center of Competence for Surface Vehicles (2018–2022) https://starfos.tacr.cz/en/projekty/TN01000026	1964 kCZK / 78546 €	1842 kCZK / 73672 €	1606 kCZK / 64236 €	688 kCZK / 27529 €	1411 kCZK / 56431 €
TA ČR	Research and development of a high load bearing deformation block and its production process in order to increase the traffic safety (2019–2021) https://starfos.tacr.cz/en/projekty/TH04010066	770 kCZK / 30782 €	770 kCZK / 30782 €	770 kCZK / 30782 €	0 kCZK / 0 €	0 kCZK / 0 €
Total		46202 kCZK / 1848090 €	32900 kCZK / 1316002 €	32953 kCZK / 1318149 €	42481 kCZK / 1699254 €	40119 kCZK / 1604797 €

Table 3.3.2 - Contract research activities

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
Administration of the Krkonoše National Park	Proposal of measures to improve transport in KRNP	0 kCZK / 0 €	931 kCZK / 37240 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Administration of the Krkonoše National Park	Pilot testing of selected technologies for improving transport in KRNP	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	279 kCZK / 11160 €	kCZK / 0 €
AERO Vodochody	Development of software for collecting and evaluating operational data	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1237 kCZK / 49480 €
AMBIS	Development of the WebDear web application	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	295 kCZK / 11800 €	0 kCZK / 0 €
AŽD	Analytical work related to modifying the laboratory for measuring eurobales with an interface to LEU	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	124 kCZK / 4960 €
AŽD	Testing and certification of products	320 kCZK / 12800 €	1628 kCZK / 65120 €	1681 kCZK / 67240 €	1509 kCZK / 60360 €	2056 kCZK / 82240 €
BUSINESS SYSTEMS, a.s.	Simulation of crisis management solutions, penetration tests, and stress tests	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	2196 kCZK / 87840 €

²⁸ If the client is from abroad, indicate in brackets the country of origin of the client.

CALLIDITAS S.R.O.	Technical solution for traffic safety	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	242 kCZK / 9680 €	0 kCZK / 0 €
CDV	Catalog of testing areas for autonomous vehicles	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1210 kCZK / 48400 €	0 kCZK / 0 €
Central Bohemian Region	Expert opinion on the proposed repair of reported defects in a transportation structure	0 kCZK / 0 €	176 kCZK / 7040 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Central Bohemian Region	Study of the potential of route "012 Pečky – Kouřim"	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	539 kCZK / 21560 €	0 kCZK / 0 €
Central Bohemian Region	Transport study of a dedicated bus lane – Zdiby	0 kCZK / 0 €	282 kCZK / 11280 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
City of České Budějovice	Development of a public transport strategy	0 kCZK / 0 €	2016 kCZK / 80640 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
City of Dobříš	Transport assessment	0 kCZK / 0 €	229 kCZK / 9160 €	143 kCZK / 5720 €	0 kCZK / 0 €	0 kCZK / 0 €
City of Frýdek-Místek	Transport assessment	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	261 kCZK / 10440 €	304 kCZK / 12160 €
City of Horoměřice	Parking analysis	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	167 kCZK / 6680 €
City of Hradec Králové	Development of a public transport strategy	0 kCZK / 0 €	0 kCZK / 0 €	342 kCZK / 13680 €	0 kCZK / 0 €	0 kCZK / 0 €
City of Hradec Králové	Technical supervision – telematics solutions	0 kCZK / 0 €	0 kCZK / 0 €	1349 kCZK / 53960 €	0 kCZK / 0 €	0 kCZK / 0 €
City of Jihlava	Strategy for the development of transport telematics in Jihlava	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	kCZK / 0 €	478 kCZK / 19120 €
City of Kutná Hora	Transport assessment	1825 kCZK / 73000 €	153 kCZK / 6120 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
City of Liberec	Safety inspection of public roads on a selected section of Švermova Street in Liberec	183 kCZK / 7320 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	178 kCZK / 7120 €
City of Milovice	Transport assessment	0 kCZK / 0 €	0 kCZK / 0 €	433 kCZK / 17320 €	516 kCZK / 20640 €	0 kCZK / 0 €
City of Most	SWOT analysis – comparing the use of buses with alternative propulsion within public transport in Most and Litvínov	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	411 kCZK / 16440 €
City of Most	Consulting services	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	497 kCZK / 19880 €
City of NYMBURK	Safety inspection of public roads	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	176 kCZK / 7040 €	0 kCZK / 0 €
City of NYMBURK	Transport engineering assessment "Residential Zone Nymburk – Nové Zelko"	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	178 kCZK / 7120 €
City of Prague	Transport assessment	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	488 kCZK / 19520 €
City of Prague	Transport assessment – cycling transport	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	163 kCZK / 6520 €	163 kCZK / 6520 €

City of Prague	Feasibility study – Barrandov Bridge	0 kCZK / 0 €	2074 kCZK / 82960 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
City of Prague	Preparation of an evaluation report on the modification of the transport solution for MÚK Pelc – Tyrolka for construction project No. 0079 MO Špejchar – Pelc/Tyrolka	0 kCZK / 0 €	0 kCZK / 0 €	175 kCZK / 7000 €	0 kCZK / 0 €	0 kCZK / 0 €
City of ŘÍČANY	Intersection assessment	0 kCZK / 0 €	0 kCZK / 0 €	kCZK / 0 €	212 kCZK / 8480 €	0 kCZK / 0 €
City of SLANY	General accessibility of the city of Slaný	0 kCZK / 0 €	0 kCZK / 0 €	279 kCZK / 11160 €	0 kCZK / 0 €	0 kCZK / 0 €
City of SLANY	Development strategy for cycling transport in the city of Slaný	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	174 kCZK / 6960 €
City of TABOR	Assessment of road traffic safety on two selected routes in relation to servicing the southern part of Tábor	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	118 kCZK / 4720 €	0 kCZK / 0 €
City of Uherské Hradiště	Transport assessment and transport model	728 kCZK / 29120 €	0 kCZK / 0 €	852 kCZK / 34080 €	557 kCZK / 22280 €	679 kCZK / 27160 €
City of Vysoké Mýto	Safety assessment	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	242 kCZK / 9680 €
CTP INVEST, SPOL. S	Expert study evaluating the potential of a location for the construction of a logistics center – automotive	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	242 kCZK / 9680 €	0 kCZK / 0 €
ČD, a.s	Preparation of studies and expert reports	159 kCZK / 6360 €	0 kCZK / 0 €	481 kCZK / 19240 €	520 kCZK / 20800 €	0 kCZK / 0 €
Čepro	Optimization of railway transportation	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	543 kCZK / 21720 €
České Švýcarsko National Park	Analysis of transport sustainability issues in České Švýcarsko National Park	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	387 kCZK / 15480 €
Different contracting authorities	Transport surveys	4881 kCZK / 195240 €	5677 kCZK / 227080 €	7880 kCZK / 315200 €	5676 kCZK / 227040 €	9726 kCZK / 389040 €
Different contracting authorities	Expert evaluations	253 kCZK / 10120 €	179 kCZK / 7160 €	431 kCZK / 17240 €	510 kCZK / 20400 €	647 kCZK / 25880 €
Dobřichovice	Development of a transport strategy	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	467 kCZK / 18680 €	0 kCZK / 0 €
DOPRAVNÍ PODNIK HL.	Safety assessment of operating the metro without a train protection system and with a single-person train crew	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	182 kCZK / 7280 €
EFEX, S.R.O.	Fusion of positional data in indoor localization	272 kCZK / 10880 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	kCZK / 0 €
EUROPEAN DIGITAL IND	Assessment of the impact of the LMS system on the safety devices of the Prague metro – track circuits and train protection systems	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	138 kCZK / 5520 €
INSTITUT PLANOVANI	Transport survey and simulation – Černý Most	0 kCZK / 0 €	0 kCZK / 0 €	123 kCZK / 4920 €	0 kCZK / 0 €	0 kCZK / 0 €
IOT.WATER A.S.	Design and implementation of energy consumption measurement for a battery metering device utilizing the NB-IOT transmission network	0 kCZK / 0 €	0 kCZK / 0 €	147 kCZK / 5880 €	0 kCZK / 0 €	0 kCZK / 0 €
ITS Group	Study and proposal of a solution for implementing smart technologies at railway stations and stops	0 kCZK / 0 €	0 kCZK / 0 €	446 kCZK / 17840 €	0 kCZK / 0 €	0 kCZK / 0 €

JIHOMORAVSKÝ KRAJ	Study of a new railway electric unit for the South Moravian Region	0 kCZK / 0 €	0 kCZK / 0 €	148 kCZK / 5920 €	0 kCZK / 0 €	0 kCZK / 0 €
KAUFLAND ČESKÁ REPUB	Measurement of traffic flow on Pivovarská Street in Domažlice	127 kCZK / 5080 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
KPMG CZ	Feasibility study for the "U-SMART ZONE" project	786 kCZK / 31440 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
KRAJ VYSOČINA	Development and implementation of an educational course "Autonomous Vehicles" for students and teachers of technical secondary schools in the Vysočina Region	224 kCZK / 8960 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
KRAJSKÁ SPRÁVA SILNI	Safety inspection of road infrastructure at road corridor III/27814 in the village of Dlouhý Most in the Liberec Region	0 kCZK / 0 €	182 kCZK / 7280 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
KZC, S.R.O.	Development of a mobile and web application	0 kCZK / 0 €	0 kCZK / 0 €	576 kCZK / 23040 €	0 kCZK / 0 €	0 kCZK / 0 €
LEUBE Beton	Crash tests – certification	0 kCZK / 0 €	0 kCZK / 0 €	346 kCZK / 13840 €	0 kCZK / 0 €	0 kCZK / 0 €
Ministry of the interior of Slovakia	Analysis of possible economic impacts and safety risks of separating aircraft from the Air Unit of MV SR into the Transport Wing "Kuchyňa" of MO SR	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	191 kCZK / 7640 €	0 kCZK / 0 €
ODIS	Establishment of standards for vehicles and services in trains for tendering regional railway transport in the Moravian-Silesian Region	305 kCZK / 12200 €	0 kCZK / 0 €	250 kCZK / 10000 €	0 kCZK / 0 €	0 kCZK / 0 €
ODIS	Cooperation agreement for ensuring regional railway transport in the Moravian-Silesian Region within the Ostravsko operating fleet	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	185 kCZK / 7400 €	0 kCZK / 0 €
PRAGOLET S.R.O.	Modifications to simulation software based on test results with virtual and augmented reality	0 kCZK / 0 €	227 kCZK / 9080 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Prague 6 City District	Analysis of road traffic safety at locations selected by the elementary school in Prague 6	0 kCZK / 0 €	467 kCZK / 18680 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
PRODEAL, S.R.O.	Expert support for MUCBox – Early Stage and Pre-production Stage	0 kCZK / 0 €	480 kCZK / 19200 €	584 kCZK / 23360 €	0 kCZK / 0 €	0 kCZK / 0 €
REASUNTA TECHNOLOGY	Living Lab project "Chytrá Evropská"	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	145 kCZK / 5800 €
Regional administration and maintenance of roads	Road safety inspections and audits	2115 kCZK / 84600 €	0 kCZK / 0 €	638 kCZK / 25520 €	861 kCZK / 34440 €	672 kCZK / 26880 €
Regional administration and maintenance of roads	Transport assessment – trolleybuses	0 kCZK / 0 €	0 kCZK / 0 €	215 kCZK / 8600 €	kCZK / 0 €	kCZK / 0 €
Road and Motorway Directorate of the Czech Republic	Safety inspections and audits	3464 kCZK / 138560 €	7468 kCZK / 298720 €	11002 kCZK / 440080 €	8165 kCZK / 326600 €	9458 kCZK / 378320 €
Road and Motorway Directorate of the Czech Republic	Assessment of the occupancy of parking areas on motorways	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	724 kCZK / 28960 €
Road and Motorway Directorate of the Czech Republic	Research on driver behavior	283 kCZK / 11320 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Road and Motorway Directorate of the Czech Republic	Preparation of telematics projects	0 kCZK / 0 €	0 kCZK / 0 €	235 kCZK / 9400 €	0 kCZK / 0 €	0 kCZK / 0 €
Road and Motorway Directorate of the Czech Republic	Mapping of services and data in the field of FCD	403 kCZK / 16120 €	398 kCZK / 15920 €	1359 kCZK / 54360 €	0 kCZK / 0 €	0 kCZK / 0 €

Road and Motorway Directorate of the Czech Republic	Project management for URSA	612 kCZK / 24480 €	152 kCZK / 6080 €	502 kCZK / 20080 €	0 kCZK / 0 €	0 kCZK / 0 €
Road and Motorway Directorate of the Czech Republic	Revision of regulations for tunnels	0 kCZK / 0 €	159 kCZK / 6360 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Road and Motorway Directorate of the Czech Republic	Sampling of telematics devices and systems	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1258 kCZK / 50320 €
Road and Motorway Directorate of the Czech Republic	Analysis of solutions for transitioning vehicles to alternative powertrains	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	300 kCZK / 12000 €	0 kCZK / 0 €
ROPID	Transport study	258 kCZK / 10320 €	0 kCZK / 0 €	204 kCZK / 8160 €	0 kCZK / 0 €	0 kCZK / 0 €
SATRA, SPOL. S R.O.	Development of a knowledge model for tunnel technology	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	130 kCZK / 5200 €	0 kCZK / 0 €
SILMOS s.r.o.	Management activities in technical committees	131 kCZK / 5240 €	153 kCZK / 6120 €	153 kCZK / 6120 €	170 kCZK / 6800 €	182 kCZK / 7280 €
SMARTPLAN S.R.O.	Study of the "in-motion weighing" system in the Republic of Moldova	0 kCZK / 0 €	0 kCZK / 0 €	270 kCZK / 10800 €	0 kCZK / 0 €	0 kCZK / 0 €
SOFO ADVISORY S.R.O.	Aviation VR simulator for AUPRT training – concept validation	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	363 kCZK / 14520 €	0 kCZK / 0 €
Správa železnic (Railway administration)	Preparation of a study – Smart Railway Stations	0 kCZK / 0 €	458 kCZK / 18320 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Správa železnic (Railway administration)	Study of safety issues	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	2381 kCZK / 95240 €	0 kCZK / 0 €
STARMON S.R.O.	Study "Utilization of Passenger Counting Technologies for Railway Infrastructure Management"	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	167 kCZK / 6680 €	0 kCZK / 0 €
STRIX Chomutov a.s.	Crash tests – certification	359 kCZK / 14360 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
STUDIO ACHT, SPOL. S	Evaluation of the transport solution for Benešovská Street – Děčín	0 kCZK / 0 €	0 kCZK / 0 €	547 kCZK / 21880 €	0 kCZK / 0 €	0 kCZK / 0 €
SWAN A.S.	Provision of AirTracker technology	0 kCZK / 0 €	0 kCZK / 0 €	374 kCZK / 14960 €	0 kCZK / 0 €	0 kCZK / 0 €
ŠKODA Auto	Development of innovative systems for interactive HMI simulations	485 kCZK / 19400 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
ŠKODA Auto	Transport research	1941 kCZK / 77640 €	469 kCZK / 18760 €	2095 kCZK / 83800 €	4728 kCZK / 189120 €	6463 kCZK / 258520 €
ŠKODA DIGITAL S.R.O.	Safety assessment of the TDD and VCU software on the 20Ev vehicle	423 kCZK / 16920 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
ŠKODA Transportation	Product testing and modifications	2983 kCZK / 119320 €	1346 kCZK / 53840 €	385 kCZK / 15400 €	813 kCZK / 32520 €	0 kCZK / 0 €
Technical Road Administration (of Prague)	Transport study	0 kCZK / 0 €	547 kCZK / 21880 €	699 kCZK / 27960 €	0 kCZK / 0 €	0 kCZK / 0 €
TECHNOLOGICKA PLATFO Líšeň	Safety map for the modernization of road transport regarding traffic safety	0 kCZK / 0 €	0 kCZK / 0 €	207 kCZK / 8280 €	0 kCZK / 0 €	0 kCZK / 0 €

The Government Office of the Czech Republic	Smart Cities study	204 kCZK / 8160 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
The Morava River Basin	Logistical study for material transportation – Vlára, Vodní dílo Vlachovice	0 kCZK / 0 €	0 kCZK / 0 €	346 kCZK / 13840 €	0 kCZK / 0 €	0 kCZK / 0 €
TOUCH AS GMBH	Two Safety Risk Management training courses	899 kCZK / 35960 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
US PLAN S.R.O.	Assessment of transport capacity in the area of the planned new construction on S. K. Neumann Street in Jihlava	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	129 kCZK / 5160 €	0 kCZK / 0 €
Ústí nad Labem Region	Expert study "Development of the Industry 4.0 Ecosystem in the Ústí Region"	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	303 kCZK / 12120 €	0 kCZK / 0 €
Ústí nad Labem Region	Development of a public transport strategy	0 kCZK / 0 €	218 kCZK / 8720 €	0 kCZK / 0 €	144 kCZK / 5760 €	0 kCZK / 0 €
Valeo	Annotation laboratory	0 kCZK / 0 €	17815 kCZK / 712600 €	15722 kCZK / 628880 €	14002 kCZK / 560080 €	18273 kCZK / 730920 €
Vršanská uhelná, a.s.	Side slopes VRŠ – software modification	0 kCZK / 0 €	kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	514 kCZK / 20560 €
Vršanská uhelná, a.s.	Safety assessment	0 kCZK / 0 €	182 kCZK / 7280 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Yunex	Unified traffic management system (MAS)	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	1029 kCZK / 41160 €
Yunex	Study of MAS – documentation	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €	387 kCZK / 15480 €
Total		24623 kCZK / 984920 €	44066 kCZK / 1762640 €	51619 kCZK / 2064760 €	46524 kCZK / 1860960 €	60300 kCZK / 2412000 €

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁹, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

Most of the applied results achieved by the faculty are outputs of projects involving an application guarantor. This means that, in a narrower sense, the realization of these results is contingent upon their applicability to at least one partner. In cases where the partner is a company, the results are typically utilized within the company itself, often in the form of software or technical solutions. However, in many instances, the application guarantor is a government institution, such as the

²⁹ See Terms definition.

Ministry of Transport or the Civil Aviation Authority, where the results are directly employed by these bodies—whether for issuing recommendations, shaping legal regulations, or similar purposes. In this way, methodologies and similar evidence-based outputs, derived from research activities, are most implemented. Below, we present ten examples of applied results or results with potential for application.

The full list of results is available as an online annex; see *A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3* (at the end of the document).

Device for expanding and overturning vehicles

Utility Model

The device was developed in collaboration with four universities to enhance the reliability of crash tests. During eccentric frontal, side, or other specific types of traffic accidents, vehicle rollovers may occur, posing a significant risk to occupants. Therefore, it is essential to consider this phenomenon in vehicle passive safety testing.

The device enables the test vehicle to accelerate to the required speed using a towing vehicle. The towing mechanism is then disconnected, and the vehicle's direction is altered, leading to rollover when combined with an appropriately designed road surface profile or obstacle. Compared to existing solutions, this system is technically simpler and allows testing beyond specialized test tracks, including on public roads and parking areas. Installation requires only minimal modifications to the road surface for the placement of the ejector plate.

The primary purpose of the device is to simulate accident scenarios such as collisions or rollovers and to verify passive safety features. It is primarily intended for scientific research and offers opportunities for collaboration with other research institutions. The device was developed within the project VI20172020108 – Development of an Innovative Method for Detecting Traffic Crimes Using Electronic Accident Data (2017–2020, MV0/VI) (see [link](#)).

The system has been used by the University of Žilina as part of the European project ENABLE-S3 (Grant ID: 692455) and in crash tests conducted in cooperation with the Institute of Forensic Engineering at Brno University of Technology, focusing on assessing vehicle deformation behavior and dynamic crash parameters.

Localization infrastructure for tunnels on road networks

Certified Methodology

The certified methodology for vehicle localization infrastructure in road tunnels provides a structured approach for selecting, designing, planning, and implementing BLE (Bluetooth Low Energy) and C-ITS (Cooperative Intelligent Transport Systems) technologies. Its purpose is to ensure precise vehicle localization in enclosed spaces by defining where and how localization technology should be integrated into road infrastructure. The methodology serves tunnel administrators, infrastructure designers, and commercial entities, offering technical guidance on the deployment of localization systems to ensure accuracy and reliability in challenging environments such as tunnels.

The methodology has direct legislative and regulatory implications. It has been identified as a reference document for potential updates to technical conditions TP 98 and TP 154, issued by the Ministry of Transport of the Czech Republic (MD ČR), and may also contribute to the revision of ČSN 73 7507, the national standard for tunnel design on road infrastructure.

The methodology has already been applied in practice in several key areas:

- Deployment of Beacons in all tunnels in Prague (2021–2023), demonstrating commercial viability and practical cooperation between academia and industry, not only in research but also in commercial implementation.
- Integration into the new TP 154 (Operations, Maintenance, and Management of Road Tunnels), which was approved by the Ministry of Transport in March 2024.
- Incorporation into the updated TP 98 (Technological Equipment for Road Tunnels), currently undergoing approval at the Ministry of Transport.
- Anticipated use in the revision of ČSN 73 7507, which is currently in the preparatory phase.

This result was achieved through the project *Research of Alternative Methods of Position Determination and Its Integrity with GNSS for Drivers Using C-ITS*, which was carried out by the Faculty of Transportation Sciences in collaboration with two commercial partners (see: [link](#)). The methodology received official certification from the Ministry of Transport in May 2023, reinforcing its regulatory relevance and practical applicability.

Methodology for evaluating the operational and economic benefits of air transport for the Czech Republic **Certified Methodology**

The Methodology provides a structured approach to evaluating the economic performance and strategic value of the aviation sector. Developed as part of the project "Value of Air Transport in the Czech Republic" (see [project details](#)), the methodology is currently utilized by the Ministry of Transport, which served as the application guarantor of the project. Each year, a report based on this methodology is compiled for the Ministry of Transport, ensuring a standardized assessment of air transport's contribution to the national economy.

The methodology is based on scientific research and internationally recognized evaluation frameworks, including those of ICAO, IATA, FAA, and ATAG. It establishes a systematic process for generating comprehensive reports that quantify the direct and indirect economic impacts of air transport, including airports, airlines, and the aerospace industry, across key areas such as employment, tourism, and business activity.

By defining primary and secondary effects alongside production groups and analytical clusters, the methodology allows for quantification of air transport's economic impact using standard economic indicators. These indicators are derived from data provided by the Czech Statistical Office (ČSÚ) and CzechTourism, ensuring accuracy and consistency. Furthermore, the methodology includes a framework for evaluating airport connectivity within the Czech Republic.

A key feature is its compatibility with ICAO's proposed Satellite Account for Aviation, ensuring alignment with future international economic assessment standards. It also estimates the gross value added by aviation to the Czech economy and analyzes its relationship with tourism.

By applying this methodology annually, the Czech Republic achieves cost savings of approximately 200,000 CZK, demonstrating its practical benefits for policy-making and strategic planning in the aviation sector.

Aircraft Maintenance Planner & Aircraft Maintenance Dashboard **Software**

The Aircraft Maintenance Planner and the Aircraft Maintenance Dashboard are two complementary outputs developed within the research project conducted by the Faculty of Transportation Sciences

and Czech Airlines Technics in collaboration with the Faculty of Electrical Engineering at CTU. These results were created as part of the Technology Agency of the Czech Republic's 1.VS DOPRAVA 2020+ grant (see [link](#)), with the goal of improving efficiency in aircraft maintenance planning and execution. The systems are currently in use at Czech Airlines Technics, supporting operational processes and decision-making.

The Aircraft Maintenance Planner is a knowledge-based system that streamlines maintenance scheduling by integrating manual expertise with automated data imports from internal systems. It processes CSV files over SFTP, ensuring data integrity through validation, version monitoring, and structured user management. The backend is built on Java (Spring Boot, REST API) with Docker orchestration, while Ontotext GraphDB stores structured maintenance data.

The Aircraft Maintenance Dashboard, complementing the Planner, provides real-time monitoring and visualization of maintenance progress. It is designed for line technicians and management, offering an interactive interface for daily operations and an analytics dashboard for supervisory decision-making. The system operates as a secure web client-server application, utilizing Java (Spring, JOPA), Ontotext GraphDB, and OAuth 2.0 authentication, and is deployed on Apache Tomcat v.9.

By integrating advanced knowledge management and predictive analysis, these systems enhance planning accuracy, reduce inefficiencies, and support data-driven decision-making. Their deployment at Czech Airlines Technics demonstrates their practical application in improving maintenance effectiveness and operational oversight within aviation maintenance operations.

CTU Lions EVO 3.0 Electric

Functional Sample

The CTU Lions EVO 3.0 Electric is a fully functional electric racing motorcycle developed by the CTU Lions team at the Czech Technical University in Prague (CTU) under the Faculty of Transportation Sciences (technical specifications can be found in the supporting documents accompanying this report). Designed to compete in the MotoStudent international competition, the motorcycle adheres to the Moto3 category standards within MotoGP and incorporates several innovative technical solutions.

The development process spanned two years and followed industry-standard engineering methodologies, including CAD modeling, structural analysis, and simulation-based optimization. The motorcycle features a newly developed battery storage system, a liquid-cooled controller and motor, and a customized frame tailored for competitive racing. Testing included comprehensive functional and stress tests, culminating in its participation in the MotoGP circuit at Motorland Aragón, Spain, under the supervision of the Fédération Internationale de Motocyclisme (FIM).

The project was developed with the input of professional racer Radek Lamich, ensuring real-world performance adjustments in chassis geometry, suspension tuning, and race ergonomics. The motorcycle's design incorporates unique innovations, including an adjustable front fork angle, a high-performance lithium-polymer battery pack, and a custom frame design optimizing stability and aerodynamics.

Its successful performance in the MotoStudent competition demonstrated its competitiveness among 47 international teams from 17 countries, securing 7th place overall and 8th place in innovation and economic analysis.

The technology developed has attracted industry interest, with Jawa Moto spol. s.r.o. expressing interest in adopting certain design elements for future electric motorcycle production. Additionally, Force Energy s.r.o. has recognized the potential of the battery storage system. The selected

components from the project are now serving as the foundation for a hydrogen-powered motorcycle development under the TAČR DELTA 2 program (see [link](#)).

The CTU Lions EVO 3.0 Electric represents a significant advancement in electric racing technology, demonstrating both academic and commercial viability.

FTA/FMEA tool

Software

The developed software tool enhances safety and reliability analysis in the aviation industry by automating key processes in Fault-Tree Analysis (FTA) and Failure Modes and Effects Analysis (FMEA). The tool integrates a Java-based backend with a React-based frontend, enabling efficient execution, visualization, and conversion of safety analyses. Its automation capabilities distinguish it from existing solutions, improving data consistency, completeness, and compatibility with established software infrastructures. By streamlining complex safety assessments, the tool provides a more practical and error-resistant approach to reliability evaluation in aircraft systems.

Developed in cooperation with China Aero-Polytechnology Establishment (CAPE) and released in 2022, the tool has gained industry recognition for its innovative approach. At the final stages of development, Aero Vodochody Aerospace (AVA), a Czech military aircraft manufacturer, acknowledged its potential and expressed interest in its adoption. This interest materialized into a contractual research agreement between AVA and CTU in Prague in 2023 (see: [contract link](#)). The agreement outlines the first steps toward implementation at AVA by 2024.

Currently, the tool plays a role in enhancing the safety and reliability of L-39 and L-39 NG aircraft, providing an advanced analytical framework for evaluating potential system failures. Its integration into AVA's workflow represents a shift towards more automated, accurate, and structured safety evaluations. The software's application demonstrates its ability to reduce human error, optimize analysis processes, and support regulatory compliance in aircraft certification and maintenance.

This software was developed as part of the project "Ontology Engineering Utilization in Reliability and Quality Knowledge Management Systems in Aviation" (see: [link](#)) in collaboration with the Faculty of Electrical Engineering at CTU in Prague.

Methodology for detecting illegal GNSS signal interference using the ADS-B system

Certified Methodology

The developed methodology provides a systematic approach to detect GNSS interference using ADS-B data, addressing operational challenges related to the increasing occurrence of jamming and spoofing. This methodology was developed as part of project VK01030071 (see: [link](#)). The methodology has been evaluated by key aviation and cybersecurity entities in Czech Republic, which have recognized its potential for practical application. Letters of Intent confirm that Air Navigation Services of the Czech Republic, the Czech Ministry of Transport, the Air Accidents Investigation Institute, and the National Cyber and Information Security Agency consider the methodology as a viable tool for monitoring and mitigating GNSS interference in airspace operations (see the supporting documents accompanying this report).

For Air Navigation Services of Czech Republic, the methodology offers an additional means of monitoring GNSS signal integrity in real time, supporting decision-making within air traffic management (ATM) systems. By detecting anomalies in ADS-B quality parameters such as NACp and NIC, it can contribute to the early identification of degraded navigation accuracy.

The Ministry of Transport of the Czech Republic has identified the methodology as relevant in the assessment of GNSS interference risks and its impact on aviation safety. As European regulations

require ADS-B compliance, the ability to evaluate potential GNSS disruptions supports regulatory oversight and policy development.

The Air Accidents Investigation Institute has acknowledged the methodology's potential for analyzing incidents where GNSS interference may have played a role. Its ability to detect position degradation from ADS-B data enhances post-incident analysis and supports flight safety recommendations.

Additionally, NÚKIB has recognized the methodology's applicability in detecting unauthorized GNSS interference. The ability to identify interference patterns contributes to broader cybersecurity efforts related to aviation infrastructure.

By leveraging existing ADS-B data, the methodology provides a cost-effective solution for multiple stakeholders, enhancing resilience against GNSS signal disruptions without requiring additional infrastructure investment.

Synergy in railway line planning. Optimization of public rail transport service areas

Certified Methodology

The developed methodology for public railway service contractors aims to identify potential synergies between different hierarchical levels of service to facilitate the planning of an efficient network based on the principles of an integral timetable (ITJŘ). The methodology considers the proportionality of service to expected transport demand and vehicle deployment efficiency. It provides a structured approach to achieving operational coordination among different service levels, ensuring better use of available infrastructure and resources.

This methodology was developed primarily for the Ministry of Transport's Public Transport Department as the contracting authority for long-distance train services, with secondary application to regional rail service contractors. It is a key output of the research project [TJ01000162](#), funded by TA CR, which focused on enhancing railway network efficiency through improved service planning. The methodology has been practically applied by three regional transport coordinators: the Ústí Region, Jikord s.r.o., and the Zlín Region's public transport coordinator. These applications have demonstrated its effectiveness in improving train service synchronization, reducing travel times, and optimizing rolling stock usage.

A key feature of the methodology is its emphasis on vertical (long-distance and regional coordination) and horizontal (cross-regional coordination) synergies. It enables service providers to optimize train frequencies by integrating services into consistent intervals (half-hourly or hourly), balancing accessibility and efficiency. Additionally, the methodology supports strategic decision-making for new railway stops to enhance service coverage without compromising overall efficiency.

The methodology provides a universally applicable tool for transport planners, offering a data-driven approach to balancing service availability and resource constraints. It has also supported subsequent research, including the project [CK01000004](#) on high-speed rail operations. This comprehensive framework represents a novel, internationally applicable solution for railway service planning, which contributes to improved network integration and enhanced public transport effectiveness.

Methodology for using the theory of STAMP safety model by the Civil Aviation Authorities

Certified Methodology

The certified methodology for aviation safety oversight and audit development was created as part of the "Digitalization of Integrated Aviation Safety Oversight" project ([see project details](#)). It

introduces innovative procedures for collecting, processing, and analyzing safety data at the regulatory level and provides a systematic framework for generating audit questions based on the System-Theoretic Accident Model and Processes (STAMP). This approach represents a paradigm shift in aviation safety, moving from traditional accident causality models that focus on human error and technical failures to a holistic perspective on complex socio-technical systems.

The methodology enhances the capabilities of aviation authorities by improving their ability to identify and proactively manage safety risks based on actual safety performance rather than compliance alone. It supports digitalization and modernization efforts in aviation safety oversight, increasing efficiency, integration, and the ability to address safety issues before they escalate. Given the growing complexity of aviation operations, traditional certification and oversight processes are increasingly insufficient in detecting emerging risks. By identifying a broader range of safety concerns earlier, this methodology enables more targeted and effective preventive measures.

The methodology has been validated in real-world regulatory processes by the Czech Civil Aviation Authority and has been distributed to multiple aviation authorities in the Czech Republic and abroad. It has been recognized as a potential long-term solution for improving aviation safety oversight over the next 5–10 years, with gradual implementation under consideration. Additionally, Brazil's National Civil Aviation Agency (ANAC) has identified it as a valuable tool for evaluating internal safety oversight processes within the framework of Brazil's national aviation safety program.

Beyond its regulatory impact, the methodology also advances scientific knowledge by integrating state-of-the-art safety research into practical applications, paving the way for future innovations in aviation safety oversight.

Train expert system for autonomous operation

Utility Model

The Train Expert System for Autonomous Train Operation is an advanced decision-making system designed to replace key elements of the decision-making process of a train driver by evaluating defined inputs. This system was developed as part of the project "Development of a Train Expert System for Autonomous Train Behaviour" ([see project details](#)) and was registered as a utility model (PUV 2022-40156, registration number 36609) in 2022.

The system processes information from various onboard sensors (such as obstacle detection, fire detection, and system status monitoring) and evaluates them against railway operational rules. It then issues commands to train subsystems, ensuring that all safety and operational conditions for autonomous train movement are met. The decision-making algorithms also consider human factors, including the psychosomatic characteristics of train operators, enhancing the reliability and safety of autonomous operations.

The development of the system involved system analysis, data collection, input-output specification, interface definition, system architecture design, software implementation, and mathematical analysis using advanced simulation tools. The core functionality of the system ensures safe train movement, including automated checks for departure, travel, and stopping conditions using a network of sensors and interfaces integrated into modern railway vehicles.

This system has been identified as a perspective solution for implementation, and its practical application has been confirmed by AŽD Praha s.r.o., the project's application guarantor. The company is set to launch official autonomous passenger train operations that use this system on April 5, 2025. This milestone marks a significant step forward in railway automation, demonstrating

the system's practical applicability and commercial potential for the future of autonomous rail transport.

Table 3.4.1 - Overview of research results in the period under evaluation

Type of result ³⁰	Year of application	Name
ASW - Software	2022	FTA/FMEA tool
ASW - Software	2023	Aircraft maintenance planner & Aircraft maintenance dashboard
FVZ - Functional Sample	2023	CTU Lions EVO 3.0 Electric
UPM - Certified Methodology	2019	Synergy in railway line planning. Optimization of public rail transport service areas.
UPM - Certified Methodology	2023	Localization infrastructure for tunnels on road networks
UPM - Certified Methodology	2023	Methodology for using the theory of STAMP safety model by the Civil Aviation Authorities
UPM - Certified Methodology	2023	Methodology for detecting illegal GNSS signal interference using the ADS-B system
UPM - Certified Methodology	2021	Methodology for evaluating the operational and economic benefits of air transport for the Czech Republic
UZV - Utility Model	2022	Train expert system for autonomous operation
UZV - Utility Model	2020	Device for expanding and overturning vehicles

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)³¹, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).³²

Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

³⁰ Specify the specific type of result. Add rows as needed.

³¹ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

³² If the commercialisation of R&D&I results is carried out in this way.

Self-assessment:

The Faculty's primary strategy to transfer research into practice is based on close cooperation with industry partners and public administration institutions, where the results of applied research are directly utilized or implemented. Typically, the applied outcomes are generated through projects financed by public grants or governmental funding. Due to this funding structure, further commercialization of these results is often challenging, since outcomes developed through publicly funded projects are generally intended for immediate practical application by specific partners rather than for subsequent commercial exploitation.

Specifically, our applied research can be categorized as follows:

- Directly Applied Solutions: Results are predominantly tailored to meet specific requirements of collaborating industry or institutional partners, often with implementation costs covered by public or grant funding. Consequently, these results are directly integrated into partners' processes or services without additional commercial transactions. This structure naturally limits further commercialization opportunities.
- Solutions with Societal Impact: A significant portion of outputs involves methodologies, guidelines, and strategic recommendations for cities, regions, and state-level organizations, addressing complex transport, mobility, and infrastructure challenges. Examples include developing solutions for transport service planning in cities and regions, strategies to optimize transport networks, and frameworks supporting policy formation and legislative processes.

In the area of contract research, the solutions provided by the faculty are custom-developed (tailor-made) and often protected by contractual agreements or NDAs. Although these outputs have intrinsic value for the collaborating partner, they are not typically suitable for further commercial dissemination due to their specificity and legal restrictions.

Nevertheless, we recognize the potential to enhance commercialization activities in the future through mechanisms such as licensing agreements, joint ventures, or spin-off initiatives, provided that appropriate adjustments are made to existing project funding structures and intellectual property strategies. The university has adopted a Commercialization and Fundraising Strategy, which the faculty leadership is actively working to establish at the faculty level, for example, by creating a dedicated Faculty Industry Advisory Board, where current industry challenges and opportunities for cooperation are regularly discussed. This represents an ongoing process through which the faculty is aiming to broaden its activities, particularly in relation to the commercialization of its own research outcomes.

Therefore, for the period 2019–2023, the faculty's funding from non-public, non-grant sources was primarily generated from contractual collaborations rather than direct commercialization or licensing revenue.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

Type of revenue	Revenue (in thousands CZK/EUR)				
	2019	2020	2021	2022	2023
Donations	0 kCZK / 0 €	250 kCZK / 10000 €	370 kCZK / 14800 €	300 kCZK / 12000 €	250 kCZK / 10000 €

Sold License (Software) - SNOG Admin CLI/REST	0 kCZK / 0 €	50 kCZK / 2000 €	0 kCZK / 0 €	0 kCZK / 0 €	0 kCZK / 0 €
Total	0 kCZK / 0 €	300 kCZK / 12000 €	370 kCZK / 14800 €	300 kCZK / 12000 €	250 kCZK / 10000 €

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

Between 2019 and 2023, the Faculty of Transportation Sciences actively engaged in the popularisation of research, development, and innovation through a combination of public events, online communication, and collaboration with media and industry partners.

One of the faculty's key initiatives is its participation in public science festivals, particularly the *Night of Scientists* and *ScienceFest*. During these events, the faculty presents its research to the public through interactive exhibits, live demonstrations, and popular science lectures. These festivals attract a broad audience, including students, families, and professionals, offering hands-on experiences in areas such as intelligent transportation systems, aviation engineering, and traffic safety innovations. In addition, the faculty organises and participates in open days and educational fairs, including the *Gaudeamus* fairs in Prague, Brno, and Bratislava, where prospective students and the general public can engage with faculty researchers. Besides receiving information about study programs, visitors can learn about ongoing scientific projects and research efforts.

A significant focus of the faculty's communication strategy in recent years has been the continuous use of social media and digital platforms. The faculty has strengthened its public outreach by expanding its communication team, which ensures regular dissemination of research updates, project results, and success stories through Facebook, Instagram, LinkedIn, and faculty web portals. These platforms not only inform but also facilitate interaction, allowing the public to engage with scientists and ask questions about ongoing research. Targeted online campaigns have increased public awareness of the practical applications of transportation research and innovation. By 2023, the Faculty of Transportation Sciences strengthened its presence on social media to enhance awareness among students, the professional community, and industry partners. Key activities included increasing interaction with followers, expanding visual content, and joining the new social network Threads.

The most significant year-over-year growth was recorded on Instagram, where the number of followers increased by 25% (from 1,181 to 1,482), and the average monthly reach tripled to 98,251 (+200%). On X (formerly Twitter), the faculty enhanced interactions with industry partners, leading to a 36% increase in followers. On Threads, the faculty quickly gained 241 followers after the platform became available in Europe. Facebook maintained stable viewership. Faculty had to leave TikTok for regulatory reasons, but its strategy on other platforms ensured overall growth in audience reach and increased engagement.

Beyond social media, the faculty regularly produces promotional and educational materials, including electronic newsletters, video content, and printed brochures, which are distributed at conferences, fairs, and public exhibitions. Annual reports also serve as a structured means of summarising key scientific achievements and research outputs for both academic and non-academic audiences. In this context, the visual and informational aspects of these reports were significantly improved.

In addition to these outreach activities, the faculty plays an active role in the international academic community by organising major scientific conferences, including the Smart Cities Symposium Prague and New Trends in Civil Aviation. These conferences provide a platform for leading experts, researchers, and industry representatives to discuss advancements in smart city solutions, sustainable mobility, and emerging trends in civil aviation.

Furthermore, the faculty collaborates with industry and government institutions to publicise R&D&I outcomes. Many of these partners integrate faculty research into their public communication efforts, particularly in areas such as smart city initiatives, transportation safety, and sustainable mobility.

To illustrate the impact and diversity of these activities, the faculty presents the following ten exemplary events:

Night of Scientists (2019–2023)

The Night of Scientists is a nationwide science popularization event that annually opens the doors of research institutions to the general public. As one of the most significant and widely publicized outreach events in the Czech Republic, it attracts a diverse audience and serves as a key platform for presenting scientific achievements in an engaging and accessible manner.

The Faculty of Transportation Sciences actively participates in this event each year by organizing interactive exhibitions and hands-on demonstrations designed to effectively communicate scientific and research findings to a broad audience. Faculty research teams engage directly with the public and present their work in an educational and approachable format.

A standard part of the faculty's contributions includes car, train and flight simulators, transportation safety tests, the faculty's Traffic Control Hall, interactive workshops, demonstrations of the latest technological solutions in the context of UAV applications, and many others. These activities not only showcase cutting-edge research but also provide visitors with a unique opportunity to experience scientific principles firsthand.

Due to pandemic restrictions, the event was conducted primarily online in 2020 and 2021. The faculty adapted by producing educational videos and virtual laboratory tours, enabling the public to explore ongoing research in transportation engineering and smart mobility remotely.

VědaFest (ScienceFest) (2019–2023)

VědaFest is one of the largest outdoor science popularization events in the Czech Republic, held annually at Vítězné náměstí in Prague. The Faculty of Transportation Sciences at CTU has been a regular participant, contributing an interactive exhibition where visitors can engage with transportation simulators, test their traffic knowledge, and explore modern transport technologies. The faculty's involvement reflects its commitment to making research accessible to the public, with a strong focus on inspiring younger generations to explore transportation engineering.

Over the years, the faculty has expanded its presentations at the event. In 2019, it focused on interactive education through mobile laboratories and traffic knowledge testing. In 2020, due to

pandemic restrictions, the event moved online, and the faculty provided digital interactive content. In 2021, under the theme *"Digital World,"* it prepared an online video and hosted a physical booth featuring an interactive vehicle simulator. In 2022, the exhibition introduced intelligent transport solutions and showcased research in smart mobility. In 2023, the faculty presented *"Transport Yourself to the Transport Faculty,"* offering a hands-on experience with a vehicle simulator, traffic tests, and insights into the CTU Lions student racing team.

Through VědaFest, the faculty continues to promote transportation research and innovation, strengthening its connection with the public.

Gaudeamus (2019–2023)

Gaudeamus is one of the most significant European fairs for post-secondary and lifelong education, where students seek comprehensive information about their future studies. The Faculty of Transportation Sciences at CTU actively participates, contributing to the university's outreach through interactive exhibits, presentations, and direct communication with prospective students. The faculty's presence, coordinated within the broader CTU exhibition, plays a key role in promoting its study programs and research activities while inspiring interest in transportation engineering.

Since 2019, the faculty has continuously refined its approach to student engagement. It maintained a dedicated booth at the Prague fair and, in 2021, adapted to an online format due to pandemic restrictions, delivering live-streamed lectures. At Gaudeamus Brno 2021, the faculty's Air Traffic Control Simulator gained significant attention, contributing to CTU's first-place award for best exhibition.

In 2022 and 2023, the faculty expanded its presence at both Prague and Brno events, offering interactive communication, faculty-led presentations, and showcasing the CTU Lions student racing team. With attendance exceeding 28,000 students and 550 educators in 2023, Gaudeamus remains a key platform for attracting prospective students and strengthening the faculty's visibility in transportation research and education.

Open Day at the Faculty of Transportation Sciences (2019–2023)

The Open Day at the Faculty of Transportation Sciences serves as a key platform for promoting both academic programs and R&D&I. Through interactive demonstrations, guided tours, and expert-led presentations, prospective students and public gain insights into cutting-edge transportation research and its real-world applications.

Since 2019, Open Days have evolved to enhance outreach efforts. In response to the COVID-19 pandemic, the faculty adapted the event to an online format in 2020 and 2021, featuring live-streamed lectures, virtual lab tours, and interactive Q&A sessions with researchers and students. This digital transition broadened accessibility and reinforced the faculty's commitment to knowledge dissemination in transportation sciences.

Recent in-person Open Days in 2022 and 2023 have placed greater emphasis on R&D&I by integrating faculty research outputs into the visitor experience. Attendees explored cutting-edge laboratories such as Smart Cities, MobiLab, or Air Traffic Control Simulation, engaging directly with researchers and innovative projects. Hands-on demonstrations of vehicle and flight simulators further highlighted the faculty's role in technological advancements. With over 400 visitors per event, Open Day remains a vital instrument for inspiring future students and strengthening the faculty's visibility in transportation research and innovation.

Runway Park – Prague airport (2020)

Runway Park was a unique two-month project organized by Václav Havel Airport Prague, in which the Faculty of Transportation Sciences, CTU, played a key role in presenting not only aviation but also broader aspects of transportation and technology to the general public. The faculty's interactive exhibition, located on the former Runway 22, provided visitors with the opportunity to experience a flight simulator, learn primarily about the research and activities of the Department of Air Transport, but also engage with presentations showcasing other faculty initiatives, such as electric motorcycles developed by the student team CTU Lions.

Held during the summer months, the event offered the public a rare opportunity to explore aviation research and flight simulation in a real-world airport setting. The faculty's contributions also included demonstrations of ongoing research projects in flight safety, air traffic management, and airport operations.

This initiative significantly contributed to the popularization of aviation research, particularly among young people with an interest in aeronautics, while also fostering collaboration between the faculty and key stakeholders in the aviation industry.

Smart Cities Symposium Prague and New Trends in Civil Aviation Conferences (2019–2023)

The Smart Cities Symposium Prague is a well-established annual symposium focused on smart cities and sustainable mobility, organized by the faculty. Over the past decade, it has fostered a strong interdisciplinary network of professionals and researchers working on various aspects of urban resilience, intelligent transportation, and sustainable development.

Similarly, the New Trends in Civil Aviation Conference is a recognized international forum dedicated to fostering collaboration between researchers, practitioners, and industry experts in both civil and military aviation. Organized biennially, its primary mission is to facilitate interactions among various communities of interest, providing a platform for discussions on emerging challenges, technological advancements, methodologies, applications, case studies, and best practices in the aviation sector.

Both conferences are IEEE-indexed, with proceedings included in citation databases such as Scopus and Web of Science. While primarily oriented towards the presentation and exchange of domain-specific knowledge, these events also attract industrial partners and students, serving as platforms for communicating scientific research results to a broader audience, including the public.

World Road Congress (2023)

In 2023, the Faculty of Transportation Sciences at CTU took part in the World Road Congress, one of the most significant global events in the field of transportation engineering.

The faculty was represented within the Czech and Slovak Pavilion, where it showcased research in intelligent transportation systems, transport planning, and road infrastructure safety. A dedicated section of the event was aimed at high school and university students, offering them the opportunity to engage in interactive presentations and simulations.

The congress provided a valuable platform for international knowledge exchange and allowed the faculty to strengthen its ties with industry professionals and experts in the field.

CTU Lions Racing Team (2019–2023)

The CTU Lions Racing Team is a student-led motorsport team from the Faculty of Transportation Sciences at the Czech Technical University in Prague (CTU). Specializing in the development and construction of electric racing motorcycles, the team competes in the prestigious MotoStudent competition, an international event that challenges students to design, build, and race innovative electric motorcycles. Through this experience, students integrate theoretical knowledge with hands-on engineering practice, gaining expertise in electromobility, vehicle design, and modern transportation technologies.

CTU Lions actively participates in science popularization events to showcase their achievements and inspire new generations of students. The team regularly presents its innovations at major public exhibitions offering interactive demonstrations and engaging discussions about the future of electric mobility. Additionally, the team contributes to open days at the Faculty of Transportation Sciences, racing exhibitions, and the Night of Scientists, making cutting-edge technology accessible to the public.

By competing in Spain's MotorLand Aragón alongside 50+ university teams worldwide, CTU Lions not only represent CTU internationally but also foster collaboration and knowledge exchange in the rapidly evolving field of electric motorsports. Their efforts enhance the faculty's reputation, encourage innovation, and attract students to careers in sustainable transportation engineering.

Negrelli Viaduct Day (2019)

Negrelli Viaduct Day took place on September 28, 2019, as part of the popularization activities of the Faculty of Transportation Sciences at CTU. The event was organized in collaboration with the Ministry of Transport of the Czech Republic and was structured as an open day at the historic Negrelli Viaduct in Prague.

The faculty showcased its study programs and research, with a special focus on its involvement in the C-Roads project, which is dedicated to the implementation of Intelligent Transport Systems (ITS) and cooperative technologies in real-world traffic. This innovative platform enables the testing of vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication, significantly contributing to safer and more efficient transportation systems.

The event attracted around 7,000 visitors, including students, transportation professionals, and the general public. The Faculty of Transportation Sciences, in collaboration with the Ministry of Transport, provided interactive demonstrations and information materials, highlighting modern transportation technologies and their real-world applications. The event successfully raised awareness about smart mobility solutions and the role of academic research in shaping the future of transportation.

Guest Speaker Series – "Křeslo pro hosta" (2022–2023)

In 2022, the CTU Faculty of Transportation Sciences launched the "Křeslo pro hosta" (Guest Speaker Series), a discussion-driven event designed to explore key transportation trends, innovations, and ongoing research projects. The primary objective of the series is to provide students and the academic community with direct engagement opportunities with leading professionals, policymakers, and researchers in the transportation sector. Through open discussions and expert insight, the event fosters knowledge exchange on the latest developments in mobility, transport infrastructure, and smart transportation solutions.

The inaugural event took place on November 10, 2022, with Professor Ing. Petr Moos, CSc., a prominent transportation expert, founder of the Faculty of Transportation Sciences, and former

Minister of Transport. The discussion focused on the history of the faculty, the evolution of transportation in the Czech Republic, and emerging challenges in transport engineering.

In 2023, the series continued with a significant session on October 19, featuring Mgr. Martin Kupka, the Minister of Transport of the Czech Republic. The event, held at the CIIRC and CTU Rectorate, attracted more than 180 participants, including students, academics, and industry professionals. Discussions centered on the future of transportation policy, strategic infrastructure projects, and potential collaborations between academia and the public sector.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

Based on the current self-evaluation report of the Faculty of Transportation Sciences (FTS), we respond to the comments from the previous evaluation period as follows:

Regarding the general characteristics and societal benefits of our research, evaluators recognized our faculty's research focus as compelling and up to date. However, they highlighted relatively lower financial support compared to other faculties at CTU. To address this issue, FTS has actively undertaken steps to improve the situation, particularly through increased participation in significant European projects such as Horizon Europe and EIT Urban Mobility. These initiatives contribute to financial stabilization and ensure long-term research sustainability.

In the area of applied research, evaluators emphasized the need for inter-faculty collaboration. FTS responded to this recommendation by initiating projects such as "Digital Twin for Transportation" and "Advanced Cyber Security Methods in Tunnel Systems," involving cooperation with other CTU faculties (e.g., FEE, FME). We intend to further expand interfaculty collaboration to strengthen our interdisciplinary approach.

Regarding the comments on the number of smaller projects, FTS emphasizes that these projects allow flexible responses to the immediate needs of industry partners and public administration. Nonetheless, we recognize the necessity to optimize administrative processes associated with managing smaller-budget projects and aim to enhance their efficiency.

Concerning revenues from contract research, evaluators noted a relatively low share of income from non-public sources. FTS acknowledges this issue and refers to Section 3.5, which provides a detailed discussion on this topic. Given the faculty's primary focus on applied research and collaboration with industry and public institutions.

Evaluators raised concerns regarding the classification of certain applied results under contract research. FTS clarifies that all listed applied results demonstrate clear practical significance and directly contribute to addressing societal challenges in transportation.

In terms of cooperation with the non-academic sector, we acknowledge evaluators' suggestions regarding the need for stronger strategic initiatives. FTS has already implemented concrete

measures in this area, significantly enhancing our representation and influence through participation of our staff in key national and international organizations and expert groups. Examples include significant positions held by our employees in the Czech Association of Scientific and Technical Societies and the executive board of FEANI (Assoc. Prof. Daniel Hanus), Strategic Forum for Unmanned Systems and Inter-Ministerial Commission for UAS (Assoc. Prof. Jakub Kraus), Chairmanship of the Board of Directors at Správa železnic (Assoc. Prof. Pavel Hruběš), membership in CEACM and Czech Society for Mechanics (Assoc. Prof. Radek Kolman), presidency of Czech Smart City Cluster and membership in the Prague City Council's Smart Cities Development Commission (Prof. Miroslav Svítek), presidency of the Czech Association for Autonomous and Cooperative Mobility (CzeCCAM) (Prof. Ondřej Přibyl), leadership of the International Union of Railways – Statistic Platform (Assoc. Prof. Roman Štěrbá), representation in the Inter-Ministerial Navigation Commission (Dr. Stanislav Pleninger), and chairmanship of the Scientific Council of the National Technological Platform for Railway Infrastructure Interoperability (Prof. Ondřej Jiroušek). These activities clearly illustrate FTS's capability to directly influence strategic decision-making in transportation.

Regarding international recognition, the faculty recognizes the need to increase both the number and significance of international awards. Faculty staff have consistently published in reputable journals and regularly attended international conferences. Nevertheless, we have recently introduced measures actively encouraging staff to present their research outcomes through participation in prestigious international competitions and awards, and we regularly inform our staff about opportunities for nominations.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)
Invited Lectures.zip (Supporting documentation for examples of invited lectures)	3.2	https://intranet.fd.cvut.cz/evaluace-2025 Login: evaluace Password: Dopravka--Evaluace25
Projects and Contracts.zip (A more detailed overview of projects (including links) and a separate listing of contracts are provided in a tabular format extracted from the internal economic system of FTS.)	3.3	
Results.zip (Supporting materials for the 10 significant application results mentioned, along with an overview of all outputs recorded in the information system for result documentation at ČVUT for the years 2019–2023)	3.4	

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: Faculty of Biomedical Engineering

FORD: 2 - Engineering and technology

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

Mission of the Faculty of Biomedical Engineering

The Faculty of Biomedical Engineering (FBME) at CTU is a significant center of interdisciplinary education, science, research, development, innovation and creative activity. It has respected results at the national and international level. It focuses on promising fields of the future, technical, natural science, health, management and security, which are associated with high societal demand, especially in non-medical health professions, but also components of the integrated rescue system. With a significant interdisciplinary approach in areas such as biomedical engineering, technology, informatics, cybernetics, healthcare, crisis management and population protection, it contributes to solving current challenges and societal problems for the benefit of an increased quality of life and population protection.

Vision of FBME

The FBME of CTU will continue to be a respected centre of interdisciplinary education, science, research, development, innovation and creative activity, whose significant results will be disseminated by our students and graduates, as well as by academic staff concentrated in scientific teams, both nationally and internationally. It will focus on promising future fields with added value of technical development, which are linked to high societal demand. The faculty wants to be a respected and reliable partner in addressing current challenges and societal problems in the region, as well as in the national and international context.

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

Organisational structure of FBME

The academic bodies of FBME are the Dean, the Academic Senate (AS), the Scientific Council, the Disciplinary Committee, and the Secretary. The AS is the self-governing representative body of FBME. The AS approves, among other things, the strategic documents of FBME, internal regulations and the budget, decides on the proposal for the appointment of the Dean, and expresses its opinion on proposals for study programmes implemented at the faculty. The Dean is the supreme representative of FBME and the representative in relation to other bodies. The Scientific Council expresses its opinion mainly on matters submitted to it by the Dean. The Disciplinary Committee hears disciplinary offences of students and proceeds in accordance with the Disciplinary Regulations for Students of CTU, which are given by the internal regulations of FBME. The Secretary heads the Dean's Office and manages the management and internal administration of FBME within the scope set by the Dean's measure. The Ethics Committee oversees the preservation of ethical principles of research and creative activities carried out at FBME, cooperates in the unification of national and regional approaches with international ethical standards containing ethical principles and applies these standards to its practical activities.

The faculty has five separate departments and a dean's office. The departments are

1. Department of Biomedical Informatics,
2. Department of Biomedical Technology,
3. Department of Health Care and Population Protection,
4. Department of Information and Communication Technologies in Medicine,
5. Department of Natural Sciences.

FBME currently has a total of 14 research teams whose focus covers a large part of the areas of biomedical engineering:

1. Bio-Electromagnetism,
2. Bioreactors for tissue and organ replacements,
3. Biotelemetry systems,
4. Brain Team FBME,
5. Cardiac Electrophysiology team,
6. Health technology assessment for medical devices,
7. Health technology for space applications,
8. Interaction of XUV radiation with biological objects,
9. Nanocomposite and nanocrystalline materials for implantology and biomedicine,
10. New trends in disaster medicine,
11. Non-conventional Ventilatory Team (NVT),
12. Rehabilitation process quantification,
13. Team of Biomechanics and Assistive Technology,
14. Telemedicine and diabetes.

Size of the Faculty

The numbers of FBME staff, students and study programs for the monitored period are summarized in Tables 3.1.1-3.1.5.

Staffing

Between 2019 and 2023, the number of faculty staff (full FTE) ranged from 160 to 180 persons. Based on the recommendation of the international evaluation panel to support employees in habilitation and appointment procedures, the faculty has introduced a new incentive system that is oriented towards the results required from candidates in the respective procedures. In the reporting period, a total of 12 staff members were habilitated (all in the age range 30-50 years) and 2 were appointed full professors (in the age of 40 and 41).

Number of students

The total number of faculty students in bachelor's, master's and doctoral studies increased from approximately 1,500 to 2,000 between 2019 and 2023.

Number of study programs implemented

In total, the faculty runs 8 bachelor's, 6 master's and 3 doctoral study programs.

Bachelor's degree study programs (3 years)

- Biomedical Technology (in Czech and English)
- Optics and Optometry
- Informatics and cybernetics in healthcare
- Physiotherapy
- Radiological assisting
- Laboratory diagnostics in healthcare
- Paramedics
- Public safety and security

Master's degree study programs (2 years)

- Biomedical and Clinical Engineering (in Czech and English)
- System Integration of Processes in Healthcare
- Biomedical and Clinical Informatics
- Civil Emergency Planning
- Applied Physiotherapy
- Biomedical Laboratory Methods

Doctoral study programs (4 years)

- Biomedical Engineering (in Czech and English)
- Civil Emergency Preparedness
- Assistive Technology (in Czech and English)

We Are Unique in the World

- **in developing equipment for artificial pulmonary ventilation.** We are one of the world's top workplaces in this field, which is working on optimizing the high-frequency pulmonary ventilation used in neonatology and for adults. This team is behind the rapid development of the lung ventilator CoroVent during the COVID-19 pandemic.
- **in having our applications-oriented facility in Prague Albertov,** which links the innovative potential of the university environment with professional commercial implementations. The potential of the facility is focused on projects linking technology, medicine, health care services and social services together with elements of safety, security and rescue teams.
- **in developing microwave-based diagnostics and therapy.** A well-established team in the European community is working on EC projects such as H2020, MSCA, COST Actions, Interreg CE and prestigious national projects from the Czech Science Foundation. The

team founded the first spin-off at CTU in 2023 according to the new CTU concept and its first product is aimed at electroporation research, especially for cardiology.

Table 3.1.1 - Staffing per FTE²

Academic/ Professional position	Total / Of which women					
	2019	2020	2021	2022	2023	Total
Professor	8,5/0,8	8,8/1,0	10,4/1,0	10,4/1,0	9,6/0,8	47,6/4,4
Associate Professor	14,7/2,7	16,6/3,5	16,1/3,9	21,2/4,1	20,9/4,1	89,3/18,3
Assistant Professor	52,4/24,1	49,0/21,9	47,8/20,8	45,3/23,2	46,4/23,4	240,8/113,4
Assistant	35,3/16,8	35,6/15,5	38,9/17,4	38,4/17,5	36,1/17,0	184,1/84,0
R&D Personnel ³	8,8/3,9	20,5/11,1	20,3/11,1	15,8/7,9	12,2/5,4	77,5/39,4
Researchers in other categories ⁴	9,7/1,3	14,1/4,6	15,3/5,5	13,2/2,6	15,2/3,7	67,5/17,7
Technical and economic staff ⁵	31,3/23,6	31,5/22,9	31,3/23,0	28,7/21,3	31,1/24,1	153,8/114,8
Scientific, research and development staff involved in teaching activities	69,2/21,6	72,7/23,2	72,4/22,8	70,4/22,5	67,0/22,0	351,6/112,0
Early career researchers ⁶	41,9/11,9	46,0/16,6	42,3/16,3	34,1/11,4	33,4/11,7	197,5/67,7
Total ⁷	160,5/73,1	176,0/80,3	179,9/82,6	172,8/77,5	171,2/78,4	860,5/391,8

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁸

Academic/ professional position	Under 29 years	30-39 years old	40-49 years old	50-59 years old	60-69 years old	70 years and older

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	1	0	0	0	4	1	6	2
Associate Professor	0	0	2	0	4	0	3	1	7	1	5	1
Assistant Professor	2	1	24	7	12	4	2	2	4	2	0	0
Assistant	6	2	16	7	5	1	2	0	2	0	0	0
R&D Personnel ⁹	7	6	9	3	3	1	4	3	3	1	2	0
Researchers in other categories ¹⁰	8	1	5	1	11	7	0	0	3	0	0	0
Technical and economic staff ¹¹	0	0	1	0	1	0	0	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	11	5	43	15	23	5	7	3	17	4	12	3
Early career researcher ¹²	16	4	47	15	0	0	0	0	0	0	0	0
Total ¹³	23	10	57	18	37	13	11	6	23	5	13	3

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁴

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	2	0	1	0	2	1	5	1
Associate Professor	0	0	4	1	5	0	5	0	4	1	5	1
Assistant Professor	0	0	12	6	13	3	4	3	3	1	0	0
Assistant	4	3	13	2	8	4	2	0	0	0	1	0
R&D Personnel ¹⁵	9	4	7	3	4	2	1	0	0	0	2	0

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

Researchers in other categories ¹⁶	7	3	18	3	8	1	3	1	2	0	1	0
Technical and economic staff ¹⁷	0	0	0	0	0	0	1	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	6	4	31	10	29	8	12	3	9	3	12	2
Early career researcher ¹⁸	11	6	47	12	0	0	0	0	0	0	0	0
Total ¹⁹	20	10	54	15	40	10	17	4	11	3	14	2

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students

Type of study	2019		2020		2021		2022		2023		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate	972	650	1062	688	1276	803	1198	751	1200	767	5708	3659
Master's ²⁰	383	211	394	202	479	285	427	256	440	261	2123	1215
Doctoral	130	50	151	65	158	63	154	63	172	77	765	318
Lifelong Learning Courses	13	10	53	42	181	98	282	193	246	180	775	523
Total	1498	921	1660	997	2094	1249	2061	1263	2058	1285	9371	5715

Table 3.1.5 - Study programmes in Czech/English

Type of study programme	Total ²¹ / Of which professional study programmes											
	2019		2020		2021		2022		2023		Total	
Undergraduate	6/1	2/0	11/2	4/0	15/2	4/0	15/2	4/0	15/2	4/0	62/9	18/0
Master's	10/2	3/0	12/3	4/0	12/2	4/0	9/2	4/0	8/1	5/0	51/10	20/0
Doctoral	9/0	0/0	10/0	0/0	11/1	0/0	12/2	0/0	10/2	0/0	52/5	0/0
Lifelong Learning courses	1/0	0/0	11/0	2/0	9/0	1/0	9/0	0/0	9/0	1/0	39/0	4/0
Total	26/3	5/0	44/5	10/0	47/5	9/0	45/6	8/0	42/5	10/0	204/24	42/0

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
1. Natural Sciences	1.1 Mathematics	0,00%	Zvolte položku.	16,95
	1.2 Computer and information sciences	5,79%	Balanced basic and applied research	
	1.3 Physical sciences	3,02%	Balanced basic and applied research	
	1.4 Chemical sciences	1,18%	Balanced basic and applied research	
	1.5 Earth and related environmental sciences	1,37%	Balanced basic and applied research	
	1.6 Biological sciences	4,60%	Balanced basic and applied research	
	1.7 Other natural sciences	0,99%	Balanced basic and applied research	
2. Engineering and Technology	2.1 Civil engineering	0,08%	Balanced basic and applied research	46,37
	2.2 Electrical engineering, Electronic engineering, Information engineering	6,38%	Balanced basic and applied research	
	2.3 Mechanical engineering	1,57%	Balanced basic and applied research	
	2.4 Chemical engineering	0,00%	Zvolte položku.	
	2.5 Materials engineering	1,21%	Balanced basic and applied research	
	2.6 Medical engineering	31,28%	Balanced basic and applied research	
	2.7 Environmental engineering	0,00%	Zvolte položku.	
	2.8 Environmental biotechnology	1,09%	Balanced basic and applied research	
	2.9 Industrial biotechnology	0,00%	Zvolte položku.	
	2.10 Nanotechnology	2,40%	Balanced basic and applied research	
	2.11 Other engineering and technologies	2,44%	Balanced basic and applied research	

3. Medical and Health Sciences	3.1 Basic medicine	2,21%	Balanced basic and applied research	28,06
	3.2 Clinical medicine	14,41%	Balanced basic and applied research	
	3.3 Health sciences	11,44%	Balanced basic and applied research	
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries	0,00%	Balanced basic and applied research	0,00
	4.2 Animal and Dairy science	0,00%	Balanced basic and applied research	
	4.3 Veterinary science	0,00%	Zvolte položku.	
	4.4 Other agricultural sciences	0,00%	Zvolte položku.	
5. Social Sciences	5.1 Psychology and cognitive sciences	1,63%	Zvolte položku.	8,29
	5.2 Economics and Business	0,07%	Zvolte položku.	
	5.3 Education	1,57%	Zvolte položku.	
	5.4 Sociology	0,27%	Balanced basic and applied research	
	5.5 Law	1,77%	Balanced basic and applied research	
	5.6 Political science	1,61%	Balanced basic and applied research	
	5.7 Social and economic geography	0,01%	Balanced basic and applied research	
	5.8 Media and communications	0,16%	Balanced basic and applied research	
	5.9 Other social sciences	1,20%	Balanced basic and applied research	
6. Humanities and the Arts	6.1 History and Archaeology	0,00%	Balanced basic and applied research	0,25
	6.2 Languages and Literature	0,00%	Balanced basic and applied research	
	6.3 Philosophy, Ethics and Religion	0,00%	Balanced basic and applied research	
	6.4 Arts (arts, history of arts, performing arts, music)	0,00%	Zvolte položku.	
	6.5 Other Humanities and the Arts	0,25%	Zvolte položku.	
Total		100,00 %	-	100,00 %

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

Selected individual examples are presented in Tables 3.2.1-3.2.5.

Prestigious R&D&I awards are regularly won not only by the faculty staff members but also by its students. In the overview of the 10 most important ones in Table 3.2.1, the results of both groups were purposely listed. It is worth to mention awards of Prof. Karel Roubik related to the rapid development of a lung ventilator during the global pandemic COVID-19.

Regarding the participation of the academic staff in the editorial boards of international scientific journals, it is evident from Table 3.2.2 that the staff of the faculty participate in the activities of high-quality scientific journals of prestigious publishers such as Springer (4x), Elsevier (1x) and IET (1x). In addition, the faculty self publishes a peer-reviewed journal Clinician and Technology (ISSN: 0301-5491) indexed in the SCOPUS database. It is also worth mentioning the involvement of our employees in the review process of peer-reviewed journals with an impact factor. According to the internal database of CTU (V3S), our employees elaborated more than 625 reviews in the monitored period.

Table 3.2.3 shows a selection of the 10 most important invited talks given by our employees at international conferences and workshops.

Table 3.2.4 lists the 10 most important lectures by foreign experts at the faculty. During the given period, faculty staff organized several international conferences with significant foreign participation. One such conference was the Photonics and Electromagnetics Research Symposium (PIERS) in 2023 in Prague, with the participation of around 1,200 people from approximately 80 different countries. Students and faculty staff had free admission to the conference. Also, every year, faculty staff participated in the organization of the Nanocon conference held in Brno, which is typically attended by 200 to 300 experts, including Nobel laureates, from around 30 countries.

The 10 most significant involvements of faculty staff in the evaluation of national and international project calls are listed in Table 3.2.5. It is worth mentioning the evaluation of projects for Swiss and Slovak agencies. Among the national agencies, the membership of our employees in the Czech Science Foundation and Czech Health Research Council panels can be highlighted. These two agencies are among the most prestigious agencies funding basic research and applied health research in the Czech Republic, respectively.

Furthermore, the faculty is a member of the European Alliance for Medical and Biological Engineering and Sciences (EAMBES) and a member of the Association of University Educators of Non-Medical Health Professions in the Czech Republic. This membership enables us to participate fully in the activities of this Association, to get acquainted with the knowledge accumulated in other medical and

health facilities in the Czech Republic, where study programs focused on health issues are also accredited, and to participate in changes resulting from the amendment to the Higher Education Act.

FBME academic staff are elected members of committees of national and international professional societies. The faculty records a total of 23 such memberships. Among the professional societies whose committees include FBME staff are e.g.:

- Czech Medical Association of J. E. Purkyně
 - o The Czech Society of Biomedical Engineering and Medical Informatics, FBME is represented by the President, Assoc. Prof. Ing. Jiří Hozman, Ph.D., the Scientific Secretary, Assoc. Prof. Ing. Lenka Lhotská, CSc., and three members of the Committee, Assoc. Prof. Ing. Martin Rožánek, Ph.D. and prof. Ing. Karel Roubík, Ph.D. and Assoc. Prof. MUDr. Jan Bruthans, Ph.D., MBA,
 - o Society for Radiobiology and Crisis Planning, FBME is represented by the Vice-chairman, prof. MUDr. Leoš Navrátil, CSc. and one member of the committee, Mgr. Renata Havráňková, Ph.D,
- Engineering in Medicine and Biology Chapter of the Czechoslovakia Section of IEEE, where FBME is represented by the President, prof. Ing. David Vrba, Ph.D., and one member of the Committee, Assoc. Prof. Ondřej Fišer, Ph.D.,
- International Academy of Laser in Medicine and Surgery – one member of the committee, prof. MUDr. Leoš Navrátil, CSc., MBA, dr.h.c.,
- IMEKO International Measurement Confederation – two members of the committee, prof. Ing. Peter Kneppo, DrSc., Dr.H.C., prof. Ing. Karel Roubík, Ph.D.,
- International Union for Physical and Engineering Sciences in Medicine – one member of the committee, Assoc. Prof. Ing. Lenka Lhotská, CSc.,
- European Association for Education in Electrical and Information Engineering – one member of the committee, Assoc. Prof. Ing. Lenka Lhotská, CSc.,
- European Federation of Medical Informatics – one member of the committee, Assoc. Prof. Ing. Lenka Lhotská, CSc.,
- International Federation for Medical and Biological Engineering– one member of the committee, Assoc. Prof. Ing. Lenka Lhotská, CSc.,
- Slovak Society for Biomedical Engineering and Medical Informatics – one member of the committee, prof. Ing. Peter Kneppo, DrSc.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
Ing. Ondřej Fišer, Ph.D.	Best dissertation thesis	Engineering in Medicine and Biology, Chapter of CS IEEE, 2019.
Mgr. Anna Kmecová	Winner startup - RescueRoom	Social Impact Award Slovakia 2019/ https://slovakia.socialimpactaward.net/Slovakia.
Assoc. Prof. RNDr. Pavla Bojarova, Ph.D.,	The best review article	2019 Award of the Institute of Microbiology of the Academy of Sciences of the Czech Republic.
prof. Ing. Karel Roubík, Ph.D.	Innovators 20 (20 best innovators of the Czech Republic in 2020)	Hospodářské noviny (a well-known economic national daily newspaper published in the Czech Republic, www.hn.cz) and server CzechCrunch, Czech Republic.

prof. Ing. Karel Roubík, Ph.D.	2nd prize of "Hack the Crisis" with financial price for further research of 2 000 000 CZK for design of CoroVent.	CzechInvest and Ministry of industry and trade. 2020. Czech Republic.
Ing. Hana Mózerová	Best Master's Thesis	IEEE MTT-S International Microwave Biomedical Conference (IEEE IMBioC) held December in 14 - 17, 2020 in Toulouse, France.
Prof. RNDr. Evžen Amler, CSc.	Honorary recognition of the Minister of Health for medical research and development for the year 2020	2021, Ministry of Health of the Czech Republic.
Ing. Ondřej Klempíř, Ph.D.	Josef Hlávka Award	Foundation "Endowment of Josef, Marie and Zdeňka Hlávka", for outstanding creative thinking, Czech Republic.
prof. Dr.-Ing. Jan Vrba, M.Sc.	Session Organizer Award	The Electromagnetic Academy. Awarded for organization of Special Session at Photonics and Electromagnetics Research Symposium, PIERS 2023. Prague, Czech Republic.
Bc. Ksenia Kulaková	Best Poster Award in a common category to bachelor's, master's and doctoral students	Society of Women Engineers (SWE), WE Local Conference 2023, Barcelona, Spain.

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of scientific journal, ISSN
doc. Ing. Lenka Lhotská, CSc.	Engineering Applications of Artificial Intelligence, Elsevier Science, ISSN 0952-1976, IF = 7.5.
doc. Ing. Lenka Lhotská, CSc.	Transactions on large-scale data- and knowledge-centered systems, Springer. ISSN 1869-1994.
doc. Ing. Lenka Lhotská, CSc.	Health and Technology, Springer. ISSN 2190-7188, IF = 7.5.
prof. MUDr. Leoš Navrátil, CSc., MBA, dr.h.c.	Acta medica, Faculty of Medicine in Hradec Kralove of Charles University, ISSN 1211-4286.
doc. MUDr. Ján Lešták, CSc. MBA	Biomedical papers, Medical Faculty of the University Palacký, ISSN 1213-8118, IF = 0.7.
prof. Ing. Peter Kneppo, DrSc., Dr. H. C.	American Journal of Biomedical Science & Research, BiomedGrid LLC, ISSN 2642-1747.
doc. MUDr. Jan Bruthans, Ph.D., MBA	Journal of Medical Systems, Springer Nature, ISSN 0148-5598, IF = 3.5.
Ing. Petra Hospodková, Ph.D., MBA	Technology and Health Care, IOS Press, ISSN 0928-7329, IF = 1.4.
doc. RNDr. Pavla Bojarová, Ph.D.	Folia Microbiologica, Springer. ISSN 0015-5632, IF = 2.4.
prof. Ing. et Ing. Fabian Khateb, Ph.D. et Ph.D.	IET Circuits, Devices & Systems, The Institution of Engineering and Technology (IET). ISSN 1751-858X, IF = 1.0.

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
Ing. Yulia Efremova, Ph.D.	Effects of laser on reparation of damages in gamma-irradiated mice	Laser Florence 2019, Laser biomodulation from scientific research to clinical practice, Italy.	2019
prof. MUDr. Leoš Navrátil, CSc.	The use of hplt in the methodical approach to the treatment of vertebrogenic disorders in patients in outpatient rehabilitation care	Laser Florence 2019, Laser Rehabilitation, Italy.	2019
Ing. Václava Piorecká, Ph.D.	Extraction and evaluation of EEG covariates and their influence on GLM model	2021 International Symposium on Biomedical Engineering and Computational Biology, Nanchang, August 13 - 15, 2021, China.	2021
prof. Ing. Karel Roubík, Ph.D.	Opportunities in Technical Sciences in the Central Bohemia Region	Imperial College London with the Central Bohemian Innovation Center. Online workshop that has the aim of presenting research conducted in Central Bohemia Region. Great Britain.	2021
Assoc. Prof. Pavla Bojarová, Ph.D.	Glyconanomaterials and galectins in biomedicine. Invited plenary lecture IL1.	15BSS - 15th Bratislava Symposium on Saccharides, 20.6.-24.6.2022, Smolenice, Slovakia.	2022
prof. Ing. Anton Fojtík, CSc.	Nanotechnology and inter-disciplinary branch of Science	II. Scientific and Practical Conference. Invited speaker, opening lecture. Bukovinian Sate Medical University, Chernivtsi, Ukraine.	2022
Ing. Petra Hospodková, Ph.D., MBA	Overcoming the Challenges of Physical Inactivity: Do We Know the Solutions	Soochow University Sports Science Research Forum, Soochow University, China.	2023
Ing. Ondřej Klempíř, Ph.D.	1. Acquire the information on the current available open-source brain image database 2. Understand how to properly use or collect open brain image data ethically and legally 3. Adopt value-added strategies and infrastructure to achieve data sustainability	Human Brain Mapping Annual Meeting, Montreal, Canada.	2023
doc. Ing. Lenka Lhotská, CSc.	Ethics and Regulation of Artificial Intelligence	DigiHealthDays 2023, Deggendorf Institute of Technology, Germany.	2023
prof. Ing. Anton Fojtík, CSc.	NANO for Biomedical. Laser for NANO	III. Scientific and Practical Conference. Invited speaker, opening lecture. Bukovinian Sate Medical University, Chernivtsi, Ukraine.	2023

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year
Prof. Paul Stauffer (H-index = 40)	Director of Dept. of thermal oncology at Thomas Jefferson University Hospital in Philadelphia, USA	Applications of Electromagnetic Energy In Thermal Therapy for Cancer	2019
Prof. Jacob Peleg (H-index = 11)	Head of the Disaster Medicine Department at Tel Aviv University (TAU) School of Public Health	Optimizing Medical Response to Large-scale Disasters	2019
Prof. Gunnar Hartvigsen (H-index = 20)	Department of Computer Science, Faculty of Science and Technology, University of Tromsø – The Arctic University of Norway	The digital health revolution started almost 50 years ago in Northern Norway	2019
Prof. Dr. rer. nat. Knut Möller (H-index = 26)	Furtwangen University, Faculty III: Health, Medical & Life Sciences, Germany	Mechanical lung ventilation and clinical studies	2021
Assoc. Prof. Paolo Maccarni, Ph.D. (H-index = 18)	Department of Electrical Engineering at Duke University and Duke University Medical Center, Durham, USA	Optimization of thermal medicine using the latest technical tools: from multiphysical parametric modeling to photothermally enhanced immunotherapy	2021
Prof. Dr. rer. nat. Knut Möller (H-index = 26)	Furtwangen University, Faculty III: Health, Medical & Life Sciences, Germany	Electrical impedance tomography and its usage on patients with COVID-19	2021
prof. RNDr. Emil Kormuth, MSc., Ph.D. (H-index = 5)	Mangosuthu University of Technology, South Africa	Biomedical Science - Radiation Biology	2022
Assoc. Prof. Bor Kos, Ph.D. (H-index = 26)	Laboratory of Biocybernetics, Faculty of Electrical Engineering, University of Ljubljana	Five lectures and exercises at FBME CTU – Electroporation from cell to body level	2022
Dario Rodrigues, Ph.D. (H-index = 21)	University of Maryland School of Medicine, Baltimore, Maryland, USA	Electromagnetics-based hyperthermia therapy for treatment of brain cancer	2022
Prof. Gunnar Hartvigsen (H-index = 20)	Department of Computer Science, Faculty of Science and Technology, University of Tromsø – The Arctic University of Norway	Technology for (self-management of) diabetes	2023

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the research project/programme call	Name of the contracting authority/guarantor of the project/programme call	Year
Assoc. Prof. Jan Muzik	Excellent research, Pre-application research	Operational Program Research Development and Education, Ministry of Education, Youth and Sports (Czech Republic)	2016-2020

Assoc. Prof. Jan Muzik	Application, Potential, Digital enterprise	Operational Program Entrepreneurship and Innovation for Competitiveness, Ministry of Industry and Trade (Czech Republic)	2019-2022
prof. Dr.-Ing. Jan Vrba, M.Sc.	Standard grant projects, Lead Agency grant projects, POSTDOC projects	Czech Science Foundation, Panellist and since 2023 Vice-Chairman of the Electrical and Electronic Engineering Panel - P102	2020-2023
prof. Ing. Peter Kneppo, DrSc.	Design solution and biomechanical analysis of personalized instruments for arthroscopic applications/ standard science project	VEGA - Scientific Grant Agency Ministry of Education, Research, Development and Youth of the Slovak Republic and the Slovak Academy of Sciences	2021
doc. Ing. Lenka Lhotská, CSc.	Standard grant projects, POSTDOC projects	Czech Health Research Council, Panellist in Biomedical Technologies Panel - P08	2021-2023
doc. Ing. Lenka Lhotská, CSc.	Interdisciplinary and collaborative projects	Swiss National Science Foundation, Panellist and Referee	2022-2023
prof. Ing. Peter Kneppo, DrSc.	Surface modification of 3D printed titanium spinal implants to improve functional properties/standard science project	VEGA - Scientific Grant Agency Ministry of Education, Research, Development and Youth of the Slovak Republic and the Slovak Academy of Sciences	2023
Doc. Ing. Karel Hána, Ph.D.	Technological incubation	CzechInvest	From 2023
prof. Ing. Peter Kneppo, DrSc.	Bioprinting of spheroids from chorionic and adipose mesenchymal stem cells as building blocks in tissue bioengineering of cartilage and bone tissue.	VEGA - Scientific Grant Agency Ministry of Education, Research, Development and Youth of the Slovak Republic and the Slovak Academy of Sciences	2023
Doc. Ing. Karel Hána, Ph.D.	The Country for the Future	Ministry of Industry and Trade, Czech Republic	From 2023

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the period of 2019–2023²³. This should be done from the full list in annex tables (Table 3.3.1-3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

In the period 2019-2023, the faculty staff was solving a total of 62 projects with a total volume of funds equal to 304 mil. CZK / 11.98 mil. EUR. In the previous evaluation period, the amount of FBME funding received for research projects was 3.88 mil. EUR.

Most of the FBME projects, both in terms of the amount of funds and the number of projects, were supported by national providers.

In the Czech Republic, the excellent basic research and excellent applied medical research is supported by the Czech Science Foundation and the Czech Health Research Council, respectively. The success rate of acceptance of project proposals is usually around 15% only. The FBME is proud of the fact that a total of 6 Czech Science Foundation projects and 8 Czech Health Research Council projects were solved in the reporting period. The total amount of funds obtained from Czech Science Foundation and Czech Health Research Council, in the given period, amounted to 13.7 mil. CZK / 542 thous. EUR and 13.2 mil. CZK / 523 thous. EUR, respectively.

Applied research projects with a higher emphasis on rapid application in practice and positive impact on society were most often obtained from the Technology Agency of the Czech Republic and relevant ministries and government institutions. Without a doubt, these projects bring the highest number of resources to the faculty due to the high costs of prototype implementation and sub-projects. The total amount of funds obtained in this category of projects amounted as follows

Funding provider	Support (in mil. CZK)	Support (in mil. EUR)
Technology Agency of CR	54.966	2.168
Ministry of Education, Youth and Sports CR	8.823	0.348
Ministry of Interior of CR	49.328	1.946
Ministry of Industry and Trade of CR	45.727	1.804
Prague Municip	59.991	2.367

In connection with the projects implemented at the faculty, it is important to mention that the faculty staff were also very successful in obtaining and solving several development projects. Thanks to this

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

important initiative and great effort, the faculty has high-quality and modern equipment, which is necessary for current and future excellent research of our staff and Ph.D. students. The total amount of funds obtained in this category of projects amounted to 51.4 mil CZK / 2.03 mil. EUR.

FBME was also involved in several international projects supported by the European Commission. Specifically

- H2020, Fast track to Innovation, Left atrial appendage electrical Isolation via bio-photonics optical confirmation to treat persistent atrial fibrillation, 2019-2022, this project is one of the 10 selected projects, which are described in more detail below,
- H2020, Marie Skłodowska-Curie Actions, ElectroMagnetic imaging for a novel genERation of medicAL Devices, 2018-2022, the project supported 14 PhD students, FBME was in the role of a participant, which provided mandatory internships for the students, <http://www.msca-emerald.eu/>.
- ERASMUS+, Innovative Teaching Education in Mathematics, 2018–2022, the project was concerned with the development of new effective teaching methods in mathematics, <https://item.uni-pr.edu/>
- COST Action (CA17115 - European network for advancing Electromagnetic hyperthermic medical technologies, 2018-2023), <http://www.cost.eu/actions/CA17115/>
- Euramet (Affordable low-field MRI reference system, 2023-2025), <https://www.euramet.org/>.

In the 2019–2023 period, the FBME implemented contract research projects with a total volume of 10804 thous. CZK / 423 216 EUR, mainly in research and construction of new biomedical devices, development of diagnostic algorithms and introduction of new methods of telemedicine into clinical practice. In the previous period, the total amount of funds raised for contract research was approximately 462 thousand EUR. This is a decrease of approximately 9%.

The list of contract research is given in Table 3.3.2. The table does not include contract research under NDA and small contracts up to 50 thousand CZK for clarity. The total amount of contracts under NDA and small contracts was 1533 thous. CZK/60038 EUR and 118 thous. CZK/4690 EUR, respectively.

The 10 most significant Research projects solved during the monitored period:

1) Technology for eHealth on CTU (Prague the capital, UH0834, 2019-2021, 25 319 thous. CZK / 998 777 EUR, Assoc. Prof. Ing. Karel Hána, Ph.D.)

The project focused on supporting the transfer of technologies and knowledge from CTU to the field of social and healthcare services in the capital city of Prague. The goal was to assess the feasibility and commercial potential of the following innovative concepts for improving public services.

The first concept was “Telemedicine System for Pediatric Diabetes Treatment”. This concept was aimed at a technological platform for children with type 1 diabetes, with its key component being a mobile diabetes diary application. The app enables the recording of blood glucose levels, insulin doses, carbohydrate intake, and physical activity, with data automatically synchronized across devices used by the patient, parents, and teachers. An integral part of the system is an interactive Furby toy, which helps children better understand their glucose levels.

The objective of the second concept “Enhanced Home Care for Seniors” was to improve existing technologies for remote senior care, particularly in medication management. The system provides advanced medication reminders and offers 24/7 continuous assistance, reducing the burden on

families and caregivers. The technology is designed to help individuals with reduced self-sufficiency manage daily medication-related tasks.

Both technologies were tested for user-friendliness and efficiency and subsequently commercially implemented at the Institut zdravotně sociálních služeb, z.ú. The results are validated technologies that enhance the quality of healthcare and social services provided.

2) Modular multisensory clothing for risk management, health protection and safety of IRS members using artificial intelligence methods (Ministry of the Interior of Czech Republic, VJ02010031, 2022-2025, 12 440 thous. CZK / 49 072 EUR, Assoc. Prof. Ing. Pavel Smrčka Ph.D.)

The project team is multidisciplinary: principal investigator, Czech Technical University in Prague - Faculty of Biomedical Engineering is responsible for the coordination of the project, and for the design and implementation of the subsystem for monitoring health parameters and for the aggregation/analysis of results. The second participant, University of West Bohemia - Faculty of Electrical Engineering works on special flexible connecting structures that can be embedded in clothing, as well as on the development of sensors for hazardous substances in the environment. The third participant, National Institute for Nuclear, Chemical and Biological Protection is responsible for the implementation of system tests in the climate chamber under conditions close to operational deployment. The last participant, Technical University of Liberec - Faculty of Textile Engineering, is responsible for the selection and testing of suitable underwear for the installation of sensors. Main result of the project will be solution of the multisensory monitoring system that will allow monitoring the physiological state of the wearer using methods of artificial intelligence based on adaptive individualized evaluation of parameters such as body temperature, heart rate, breathing activity, physical activity, etc. (inner layer of the garment) and monitoring of the wearer's chemical, thermal etc. burden by evaluating parameters such as temperature under clothing, humidity under clothing and measuring the concentration of selected CBRN substances (outer layer of garment). The system will be designed to reduce risk, protect the health and safety of members of the IRS in real time and will also enable wireless remote monitoring of wearers at the commander's station during routine and CBRN incidents in difficult to access terrain to improve the commander's decision-making process.

3) Therapeutic rehabilitation robot controlled by brain signals (Technology Agency of the Czech Republic, FW03010025, 2021-2025, 11 652 thous. CZK / 459 645 EUR, Assoc. Prof. PhDr. Ing. Jaroslav Průcha Ph.D. et Ph.D.)

The project is focused on the development of a therapeutic neurorehabilitation robot capable of being controlled by the patient's mental intention to perform the desired movement, or rather by the patient's concentration on performing the required movement task, which will significantly increase the efficiency of re-education, "re-learning" the movement of a paretic or plegic limb with the help of a robot whose activity will be directly controlled by signals from the brain. The project applies to the results of practically focused research on the BCI (Brain Computer Interface) method associated with the application of neural networks and artificial intelligence to control a rehabilitation robot. As part of the project, the BCI approach was researched with these goals in several neurorehabilitation robots and an active robot providing treatment for upper limb movement disorders was chosen as the target solution, for which a unique kinematic mechanism, active drives, a sensory network with position and moment sensors of forces and movement scenes, implemented both on a monitor and in virtual reality glasses, were developed. The capture of EEG recordings from relevant electrodes and their processing, including the use of a

neural network, the created classifier and AI training, was solved. The project is close to successful completion.

FBME CTU is in the position of another key participant in the solution. The main recipient of the subsidy was Foton s.r.o. FBME created 2 functional samples, 1 prototype and one utility and one industrial design. Commercialization of the developed solutions is already being ensured in cooperation with Ing. Jan Urban, Ph.D., LL.M., Head of the Technology Transfer Department of the CTU Rectorate, as well as with investors, without whose participation it is not possible to secure the financial resources necessary for the certification process according to the requirements of the MDR Directive.

- 4) Temporal context in the task of analyzing a long-term non-stationary multidimensional signal focuses on the development of semiautomatic and automatic methods for improving EEG data processing** (Czech Science Foundation, GA17-20480S, 2017-2021, 6 144 thous. CZK / 242366 EUR, Assoc. Prof. Ing. Vladimír Krajča CSc.). Key outcomes include enhanced techniques for detecting sleep spindles and artifacts removal from EEG signals. The results have practical applications in both medical and bioinformatics fields, particularly in improving the accuracy of sleep disorder diagnostics and EEG-based analysis tools.

The results achieved have been published in major scientific journals and proceedings, including 11 articles in WoS (Web of Science), 3 articles in Scopus and 20 articles in proceedings.

The project initiated an interdisciplinary collaboration linking informatics, medical engineering, and bioinformatics, which resulted in long-term collaboration on sleep research and the transfer of sleep monitoring technologies for use by the wider public. The work also paved the way for advanced diagnostic tools that could have clinical applications in sleep medicine.

Additionally, the project supported the integration of machine learning techniques with EEG data analysis, which represents a critical step toward more automated and accurate health monitoring systems.

- 5) Development of metamaterial applicators for the regional hyperthermia system and evaluation of the accuracy of treatment planning algorithms** (Ministry of Education, Youth and Sports, LTC19031, 2019-2022, 4 990 thous. CZK / 196 844 EUR, Prof. Dr.-Ing. Jan Vrba, M.Sc.)

The aim of this project was to develop a complete functional laboratory prototype of a hyperthermic regional system enabling hyperthermic heating in the pelvic area and abdominal cavity, consisting of: 1. a technically advanced and clinically usable prototype of a regional hyperthermic system with metamaterial antenna elements including a system for controlling the amplitudes and phases of individual channels, monitoring incident and reflected powers and measuring temperature, 2. software for planning hyperthermic treatment, 3. tools for quantitative verification of the functionality of regional systems. The results are 5 publications in impacted journals, 3 conference papers, one chapter in a book, a synchronous RF signal generator with amplitude and phase adjustment, modules for measuring amplitudes and phases of signals entering the antenna elements and metamaterial antenna elements.

Furthermore, a universal tool for creating hyperthermia treatment planning, enabling easy and reproducible creation of simulation models was developed. This tool allows the

automatic generation of complete simulation models for regional hyperthermia treatment planning. It is currently being implemented in the clinical planning process at the University Hospital Hyperthermic Department of the Erasmus MC Cancer Institute, Rotterdam, The Netherlands.

6) Functionalized nanofibers as a cover of colorectal anastomosis (Ministry of Health, NV16-29680A, 2016-2019, 4394 thous. CZK / 173333EUR, Prof. RNDr. Evžen Amler CSc.)

The project is a natural continuation of previous projects awarded by the Award of Ministry of Health for best research results. The main result of the Project was description and optimization of fractionalized nanofibers for injectable systems. This has opened a door for laparoscopic surgery and solves the problem of aseptic inflammation evoked by a larger nanofiber membrane that had been used for intestine cover after colonoectomy. The main contribution of FBME has been production of functionalized nanofibers for regenerative medicine and nanotheragnostics. Results led to several completed PhD. theses and also deepening of the international cooperation, namely with University of Naples, Milano and Sassari, as well as of the cooperation on the national level (2nd Faculty of Medicine, Charles University at Prague, Veterinary and Pharmaceutical University, Brno).

The Project has led to dozen publications in impact journals and to continuation of the research on the Czech as well as international level. The main implication for the years 2019-2023 was pavement of the way towards modern nanotheragnostics and personalized medicine. There were also performed first steps towards technological transfer of obtained results on the market level. Unfortunately, there is an obvious lack of enthusiastic donors and/or investors on the Czech market. Consequently, alternative steps have been taken which, however, hinders and slows down the technological transfer.

7) Multiphysical Study of Superposition of Electromagnetic Waves in Human Head Model to Verify the Feasibility of Microwave Hyperthermia of Brain Tumors (Czech Science Foundation, GA21-00579S, 2021-2023, 4 621 thous. CZK/ 182 288 EUR, Prof. Ing. David Vrba, Ph.D.)

Microwave hyperthermia is a cancer therapy. State-of-the-art microwave hyperthermia systems are based on active phased antenna arrays and use the superposition of electromagnetic waves to increase the temperature in the treated area. Given the clinically proven benefits of hyperthermia in combination with standard therapies for various tumor locations and the recent development of 3D non-invasive temperature measurements using MRI systems, the hyperthermia community believes that the time has come to apply regional microwave hyperthermia to brain tumor patients as well. Because brain tissue is very sensitive to elevated temperature, conformal heating of the treated area, as well as accurate non-invasive 3D temperature monitoring, are key to effective and safe microwave hyperthermia for brain tumors.

This interdisciplinary research project has provided new insights into the feasibility of superposition of electromagnetic fields in the human brain region, its limitations as well as the quality of the achievable temperature distributions. The project considered different parameters such as operating frequency, number of antenna elements, geometry, position and polarization of the antennas, as well as patient variations, variations in tissue material parameters, and others. The results are 8 publications in impacted journals, and one chapter in a technical book. The results are being developed and improved with the aim developing a regional microwave hyperthermia for brain region.

8) New materials for cardiovascular surgery based on modified decellularized tissues (Ministry of health, NV18-02-00422, 2018-2022, 3 038 thous. CZK / 119 842 EUR, prof. Ing. Peter Kneppo DrSc., dr. h. c.)

Interdisciplinary project realized by 4 partners: IKEM– tissue harvesting and implantation into animal model, FBME CVUT – decellularization and cultivation technology developments, preparation of implantable matrices, FGU AV CR – cellular biology and substrate modification, PrimeCell Bioscience a.s. – technology traslation.

A novel and efficient methodology for decellularization of biological matrices for vascular tissue engineering was developed, specifically of planar matrices (pericardium) for vascular patches and tubular matrices (porcine arteries) for small- and medium-diameter vascular replacements. For the decellularization of both planar and tubular matrices, new bioreactors have been developed in the framework of this project. Techniques for further modification of the decellularized matrices were also developed - firstly, their reinforcement by cross-linking, and secondly, their functionalization with fibrin with heparin to reduce the thrombogenicity of the surface, and with growth factors (VEGF, FGF-2) to increase their attractiveness for cell colonization. For matrix recellularization, both already differentiated endothelial cells and mesenchymal stem cells derived from adipose tissue (ASC) or Wharton's jelly of the umbilical cord (WJSC) were used. The matrices were recellularized not only in a classical static culture system, but also in dynamic systems - bioreactors newly constructed in the framework of this project. Recellularized matrices, in particular vascular patches, were tested in a large animal model - the laboratory pig. The results showed that the presence of stem cells, particularly WJSCs, facilitated the acceptance of the implant by the host organism, mainly by reducing the inflammatory response and neointimal hyperplasia compared to commercially available synthetic or biological cell-free vascular patches. Results consist of 6 papers published in journals with impact factor, 1 utility model, 5 functional samples, 2 software, 2 bachelor and 2 diploma theses, part of 2 dissertation thesis and 1 habilitation.

9) Bioartificial cardiovascular patches and vessels from porcine collagen reinforced with nano/microfibers using stem cells and dynamic culture (Ministry of health, NV19-02-00068, 2019-2023, 2 626 thous. CZK / 103 590 EUR, Assoc. Prof. Ing. Roman Matějka Ph.D.)

Interdisciplinary project realized by 4 partners: IKEM – tissue harvesting and implantation into animal model, FBME CVUT – 3D bioprinting optimization, preparation of collagen based implantable substrates, cultivation in bioreactors, USMH AV CR – isolation of collagen from porcine skin and its modification towards castable/printable bioink, FGU AV CR – cellular biology and substrate modification. In this project standardized protocol for the preparation of highly concentrated porcine collagen hydrogels (up to 50 mg/ml) including optimal sterilization procedure for further processing. These gels were then transformed into castable and then printable collagen bioinks with incorporated cell culture. To obtain these a unique mixing system was developed utilizing controlled mixing of multiple bioink compounds with precise adjustments of pH and maintaining maximum cell viability and bioink printability. These gels were then printed on decellularized and modified tissue scaffolds and cultured in dynamic bioreactor systems. To promote cell differentiation was supported either by adding growth factors into cell culture medium (TGFB and BMP4), or by controlled release of platelet lysate components from PVA nanofibers. Endothelialization was supported by the release of VEGF or FGF2 from microparticles. We developed nanoparticles releasing VEGF, FGF2, CXCL12 or TGFB, as well. Prepared planar and tubular

substrates were then implanted into large animal model (pig) and observed for 1 and 3 months. Implanted replacements remained uniformly patent, endothelialized, and covered by an adequate layer of neointimal hyperplasia. Results consist of 8 papers published in journals with IF, 2 utility model, 6 functional samples, 1 software, 2 bachelor and 3 diploma theses, part of 2 dissertation thesis and 1 habilitation.

10) Left atrial appendage electrical Isolation via bio-photonic optical confirmation to treat

persistent atrial fibrillation (EU H2020, Fast track to innovation, Grant agreement ID: 831117, 2019-2020, 2 025 thous. CZK / 79 905 EUR, Prof. Dr.-Ing. Jan Vrba, M.Sc.)

An international consortium of companies (AuriGen Medical, Ireland, Medibane LTD, Israel, Teleflex Medical Europe Limited, Ireland) and universities (National University of Ireland, Czech Technical University) was awarded a grant in the amount of more than five million EUR (three million EUR subsidy, the Czech Republic's share was 80 thousand EUR) to complete the development of a system that will reduce the risk of stroke and heart failure in patients with irregular heart activity caused by atrial fibrillation.

The Irish company AuriGen Medical has designed a concept and developed a unique prototype of a minimally invasive cardiac implant that permanently electrically and mechanically isolates the auricle of the so-called left atrium in a single procedure. This is a very common site for blood clot formation in patients with chronic atrial fibrillation, which can cause stroke or heart failure. This affects approximately more than 10 million patients in the EU and the US.

The aim of the grant was to complete the development of this system with subsequent implementation into practice and thus minimize the formation of blood clots and thus fatal damage to the patient's brain and heart.

The main task of the FBME team was to contribute to the design of the electrical part of the system. Specifically, the design of the applicator was improved in terms of shape, dimensions and number of electrodes using numerical calculations. Realistic models of the left atrial appendages and surrounding structures were considered in the modeling. This made it possible to predict the shape of the ablated zone and the risk of phrenic nerve damage. Within the duration of the project the new applicator was tested on animal models. Company AuriGen Medical recently announced the first-in-human procedure of their related product Zenith.

Table 3.3.1 Projects supported by public funds

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
Ministry of interior	VK01020078 - Smart system for wearable protective equipment enabling telemonitoring and planning of police and military					9830/387771

²⁵ If the provider is from abroad, please indicate the provider's country of origin in brackets. For the determination of the country of origin of the provider, the place of residence of the provider is decisive.

²⁶ Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

	interventions (2023-2026)					
Ministry of health	NV16-29680A - Functionalized nanofibres for external coating of colorectal anastomoses (2016-2019)	2460/97041				
Ministry of health	NV16-28784A - Affection of the locomotive apparatus degenerative diseases symptoms by means of high-induction magnetic stimulation (2016-2019)	1553/56016				
Czech Science Foundation	GJ17-00477Y - Physical nature of interactions of EM fields generated by MTM structures with human body and study of their prospective use in medicine (2017-2020)	1377/54320				
Czech Science Foundation	GA17-20480S - Temporal context in analysis of long-term non-stationary multidimensional signal (2017-2021)	1642/64773				
Prague the capital	UH0834 - Technology for eHealth on CTU (2019-2021)	14608/576252	8179/322643	2532/99882		
Ministry of interior	VI20192022117 - Detection of Radicalisation in the context of population and soft targets protection from violent incidents (2019-2022)	1094/43156	1571/61972	1745/68836	1945/76726	
Technology Agency of the Czech Republic	TJ02000092 - Inertial system for pig walking measurement and analysis (2019-2021)	1316/51913	1263/49822	381/15030		
Ministry of Education,	LTC19031 - Development of	816/32185	1531/60394	1572/62012	1071/42249	

Youth and Sports	metamaterial applicators for the regional hyperthermia system and evaluation of the accuracy of treatment planning algorithms (2019-2022)					
Ministry of Education, Youth and Sports	LTAIZ19008 - Enhancing Robotic Physiotherapeutic Treatments using Machine Learning (2019-2022)	661/26075	1278/50414	1168/46075	726/28639	
Czech Science Foundation	GA20-28980S - Electrically-read quantum diamond sensors for nuclear magnetic resonance and chemical sensing (2020-2022)		1289/50848	1591/62761	1855/73176	
Technology Agency of the Czech Republic	TJ04000176 - Simulation of real force effects during shooting on a shooting simulator and influence on shooting accuracy (2020-2022)		553/21815	1715/67653	597/23550	
Czech Science Foundation	GA21-00579S - Multiphysical Study of Superposition of Electromagnetic Waves in Human Head Model to Verify the Feasibility of Microwave Hyperthermia of Brain Tumors (2021-2023)			1535/60552	1543/60868	1543/60868
Technology Agency of the Czech Republic	TL05000480 - Improving the quality of life in homes for the elderly during a state of emergency (2021-2023)			805/31755	1419/ 55976	1458/57515
Ministry of interior	VJ02010031 - Modular multisensory professional clothing for risk management, health protection				9445/372584	10305/406509

	and safety of IRS members using artificial intelligence methods (2022-2025)					
Ministry of Education, Youth and Sports	EF16_018/0002360 -Assistive Technology for Sustainable Development and Active Life of Seniors and Handicapped Persons (2017-2022)	1299/51243	877/34596	728/28718	1/39	
Prague the capital	NeuroTechnology to Improve Quality of Life and Prevention of Cyberbullying in the Society 4.0 (2019–2021)	10303/406430	11240/443393	6557/258659		
Ministry of Education, Youth and Sports	Modernization and adaptation of laboratories in the field of assistive technologies (2017–2022)	1840/72584	1230/48521	1230/48521	1229/48481	
Ministry of Education, Youth and Sports	Biomedical engineering for knowledge based economy (2017–2023)	2545/100394	1300/51282	1300/51282	1037/40907	
Ministry of Education, Youth and Sports	Instrumentation and computer aided processes in medicine (2017–2022)	5020/198028	225/8876	1/39	1/39	
Ministry of Education, Youth and Sports	Modernization of Laboratories for Biomedical Engineering (2017–2023)	16150/637081	5500/216963	5500/216963	4348/171519	
Total		<u>69775/275246</u> <u>5</u>	<u>38632/152394</u> <u>5</u>	<u>30079/118654</u> <u>8</u>	<u>25650/101183</u> <u>4</u>	<u>23136/912663</u>
In the role of another participant						
Provider	Project name	Support (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
Ministry of health	NV18-02-00422 - New materials for cardiovascular surgery based on modified decellularized tissues(2018-2022)	874/34477	836/32978	679/26785	91/3590	

Ministry of health	NV19-02-00068 - Bioartificial cardiovascular patches and vessels from porcine collagen reinforced with nano/microfibers using stem cells and dynamic culture (2019-2023)	474/18698	708/27929	739/29152	705/27811	
Ministry of interior	VK01010037 - Methodology of fast non-contact and non-destructive detection of gunshot residue (2023-2025)					2602/102643
Ministry of interior	VK01020181 - Research, development and streamlining of advanced measurement and warning terminal elements for population protection (2023-2025)					3195/126036
Ministry of interior	VK01020196 - Innovative system of virtual reality and simulated model cases of security character facilitating training and treatment of police officers in risky situations (2023-2025)					2560/100986
Technology Agency of the Czech Republic	FW06010087 - Devices for advanced medical administration of drugs by transdermal route mediated by multifrequency focused ultrasound (2023-2027)					1809/71361
Technology Agency of the Czech Republic	FW06010271 - MIHRIL II - progressive ballistic armor for defense forces (2023-2025)					1354 / 53412

Technology Agency of the Czech Republic	TM04000062 - Development of the platform for maintaining and monitoring the physical conditions in isolated, confined and extreme environments(2023-2025)					1311/51716
Ministry of interior	VI20152020019 - Research on critical information structures of the state, focusing on a unified system of warning and informing the population (2015-2020)	2368/93412	1968/77633			
Ministry of health	NV16-28119A - Analysis of movement disorders for the study of extrapyramidal diseases mechanisms using motion capture camera systems (2016-2019)	892/35187				
Ministry of industry and trade	FV20422 - Development of nanofibrous scaffolds ensuring application of cellular products, including physical stimulation effect, with the intended purpose of the treatment of chronic wounds(2017-2020)	1850/72978	1215/47929			
Ministry of industry and trade	EG16_084/0009888 - Complex software and hardware system for heartbeat monitoring (2017-2020)	1437/56686	458/18067			
Ministry of industry and trade	FV30393 - Therapeutic ultrasound fully new parameters (2018-2022)	1700/67061	1650/65089	2490/98225	2490/98225	

Czech Science Foundation	GA17-15319S - Diamond based microelectrode arrays for dual mode neural recording (2017-2019)	1355/53452				
Technology Agency of the Czech Republic	TJ02000036 - Back behind the Wheel - Diagnostic and rehabilitation tool for people after brain injury (2019-2021)	1274/50256	1269/48008	227/8955		
Ministry of industry and trade	FV40295 -Inteligent robotic devices for effective limb movement disorders home rehabilitation utilizing of the neuroplasticity and the feedback (2019-2022)	875/34517	1750/69034	1750/69034	1750/69034	
Ministry of industry and trade	FV40187 - New methods of preparing highly sophisticated wound dressings optimisation and validation for use primarily in healthcare (2019-2022)	610/24063	720/28402	609/24024	345/13609	
Ministry of industry and trade	FV40189 - Innovative cartridges for manipulation and activation of functionalized nanofibrous wound covers in healthcare(2019-2022)	930/36686	1077/42485	1098/43314	324/12781	
Ministry of industry and trade	EG17_176/0015688 - Systems of database (2018-2022)			2302/90809	1053/41538	
Prague the capital	UH0365 - Concept Prague - Personal health systems (2018-2020)	5666/223511	906/35740			
Technology Agency of the Czech Republic	FW01010106 - Development of new generation medical devices by		3038/119842	3116/122919	3116/122919	2205/86982

	means of the translational medicine and physical interventions principle (2020-2024)					
Ministry of health	NU20-04-00327 - Disorders of gait, postural stability and cognition in Parkinson's disease: presymptomatic detection and targeted rehabilitation (2020-2024)		618/24379	922/36371	922/36371	922/36371
Technology Agency of the Czech Republic	FW01010463 - MIHRIL (Multi Impact Hybrid Layers) - protection against street threats (2020-2022)		1075/42406	1142/45049	1188/46864	
Technology Agency of the Czech Republic	FW01010218 -Fast detectors for harsh operating conditions(2020-2023)		481/18974	481/18974	481/18974	481/18974
Technology Agency of the Czech Republic	TL03000611 - Intelligent Senior Care System (2020-2023)		481/8974	1021/40276	914/36055	205/8087
Ministry of industry and trade	EG19_262/0020005 - Fascia lubrication and regeneration by hyaluronan (2020-2023)			667/26312	796/31400	1422/56095
Ministry of interior	VH20202021051 - The working safety improvement of workers at the risk of exposition to CBRN materials (2020-2021)		299/11795	401/15819		
Technology Agency of the Czech Republic	FW03010025 - Therapeutic rehabilitation robot controlled by brain signals (2021-2025)			2295/90533	2351/92742	2351/92742
Technology Agency of the Czech Republic	FW03010094 - New generation modular equipment for the production of innovative medical devices and			762/30059	575/22682	551/21736

	protective tools (2021-2023)					
Ministry of industry and trade	EG20_321/0024565 - Telerehabilitation system for the support of patients in distance care (2021-2024)				584/23037	2628/103669
Technology Agency of the Czech Republic	FW03010194 - Development of a System for Monitoring and Evaluation of Selected Risk Factors of Physical Workload in the Context of Industry 4.0. (2021-2024)			482/19014	602/23748	593/23393
Technology Agency of the Czech Republic	FW04020071 - Smart Mobility for children with disabilities - therapeutics, lifestyle and leisure (2022-2024)				1659/55464	1675/68146
Ministry of industry and trade	EG21_374/0026959 - Healthy diet - Healthy pregnancy (2022-2023)					1268/50020
Ministry of industry and trade	EG21_374/0026762 - Integrated spa information system with support for eHealth and telemedicine processes (2022-2024)				6695/264103	
Ministry of industry and trade	EG20_321/0024518 - Development of a robotic workplace for packaging goods (2021-2023)					1265/49901
European Commission	Left Atrial Appendage Electrical Isolation via Bio-photonics Optical Confirmation to Treat Persistent Atrial Fibrillation, Horizon 2020, Fast Track to Innovation (FTI), LAA-START, 831117 (2019-2022)	1006/39687	502/19815	350/13820	167/6583	

Ministry of industry and trade	Extension of telemedicine technology for care of patients with diabetes mellitus (2020-2022)		285/11236	1060/41832	574/22642	
Ministry of Labour and Social Affairs	Using social innovations with the help of assistive technologies in the Zlín Region		4395/173387			
Total		<u>15645/617160</u>	<u>22773/898343</u>	<u>22593/891243</u>	<u>27129/1070178</u>	<u>28196/111226</u> 8

Table 3.3.2 - Contract research activities

Client ²⁷	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
Applied Sunrise Technologies PLC (Czech Republic)	Long-term telemedical monitoring of patients with chronic and civilization diseases in their natural environment		68/2684			
CEEOR, LLC (Czech Republic)	Web portal for displaying and continuously updating cardiovascular risks by region of the Czech Republic. Methodology for analyzing direct and indirect costs in Myasthenia Gravis disease. Proposal for the structure of the Cost of Disease model of HPV disease in the entire spectrum of the adult population					83/3260
Mebster, LLC	Integration and testing of a rotary encoder into the medial hip joint			290/11440		
Medicalc software, LLC (Czech Republic)	Development and implementation of clinical data import	95/3742				
Numerus game, LLC (Czech Republic)	Algorithms for processing measured data to determine			490/19329		

²⁷ If the client is from abroad, indicate in brackets the country of origin of the client.

	activity parameters and psychological state of the subject Creation of procedures for processing data from monitoring systems					
Samsung Electronics (Czech Republic)	Measuring functionalities with Samsung Galaxy Watch 2, 3 and 5 smartwatches (ECG, blood pressure - 2021, blood saturation - 2023)			72/2840		84/3314
Škoda Auto, PLC (Czech Republic)	Possibilities of safety monitoring and automatic evaluation of the health status of the driver and passengers (2022) Project Smartwatch connection with glycemia ind. (2023)	3272/129066	1889/74522	177/6994	1013/39968	981/38687
AuriGen Medical Limited (Ireland)	Expert consultations – optimization of electrode system			144/5669	138/5439	
General University Hospital in Prague (Všeobecná fakultní nemocnice), (Czech Republic)	Expert assessment for the acquisition of tomotherapy	96/3787		124/4874	132/5212	300/11834
Institute for Clinical and Experimental Medicine (IKEM) (Czech Republic)	Preparation of implantable tissues					54/2130
Total		3463/136595	1957/77206	1297/51146	1283/50619	1502/59225

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁸, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its

²⁸ See Terms definition.

commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

1) Lung ventilator CoroVent

During the COVID-19 pandemic, many research teams around the world attempted to develop a lung ventilator in response to their shortage. However, the research team from FBME CTU was one of the few in the world to develop such a ventilator and deploy it in regular clinical operation, mainly thanks to its unique solution, which is protected by a Czech patent from the Industrial Property Office [1] and described in detail in the prestigious international scientific journal Scientific Reports [2]. In record time, CoroVent was also approved by the US Food and Drug Administration [3] and subsequently by the Ministry of Health of the Czech Republic for emergency use in hospitals. At the end of 2020, CoroVent was used for the first time in the Ústí nad Labem Hospital [4]. In the winter of 2020 and spring of 2021, emergency lung ventilators were distributed to 27 Czech hospitals. The clinical usability and correctness of the lung ventilator design were confirmed by an analysis of medical data from patients ventilated with CoroVent. The huge interest of the population in CoroVent was underlined by a public collection, during which 12.5 million CZK were collected in just 18 hours on the website [donio.cz/CoroVent.cz](https://www.donio.cz/CoroVent.cz) [6]. The CoroVent lung ventilator has also received several significant awards, such as second place at the prestigious hackathon "HACK THE CRISIS CZECH REPUBLIC" [7,8], or the award of the head of the development team, Prof. Roubík, among the top 20 innovators of 2020 in the Czech Republic [<https://archiv.hn.cz/c1-66876020-20-nejlepsich-inovatoru-roku-2020-nejen-cupr-s-prusou-zabodoval-i-prvok-mikroelektrarna-ci-it-gympl>].

[1] Czech Patent No. 309212. Registered on 25.05.2022. [2] ROUBÍK, Karel, et al. Novel design of inspiratory flow generation and gas mixing for critical care ventilators suitable for rapid production and mass casualty incidents. Scientific Reports, 2023, 13.1: 7153. [3] Czech lung ventilator developed during the coronavirus pandemic has received certification from the US government agency FDA <https://www.mpo.cz/cz/rozcestnik/pro-media/tiskove-zpravy/cesky-plicni-ventilator-vyvinuty-behem-pandemie-koronaviru-ziskal-certifikaci-od-americke-vladni-agentury-fda--256517/> [online]. [cited 2023-05-10]. [4] Doctors of the Regional Health Service were the first in the Czech Republic to use the CoroVent lung ventilator <https://www.kzcr.eu/cz/kz/o-spolecnosti/tiskove-zpravy/41/#ca10654> [online]. [cited 2023-05-10]. [6] CoroVent. Donio. <https://www.donio.cz/CoroVent> [online]. [cit. 2023-05-10]. [7] Hack the Crisis knows its winners, it has helped more than a hundred projects in total. The new Crisis Response Hub will follow it. <https://www.mpo.cz/cz/rozcestnik/pro-media/tiskove-zpravy/hack-the-crisis-zna-sve-viteze--celkem-pomohl-vice-nej-stovce-projektu--navaze-na-nej-novy-crisis-response-hub--255350/> [online]. [cit. 2023-05-10]. [8] COROVENT LUNG VENTILATOR PLACED 2ND IN THE HACKATHON HACK THE CRISIS CZECH REPUBLIC. <https://aktualne.cvut.cz/stalo-se/20200624-plicni-ventilator-corovent-se-umistil-na-2-miste-na-hackathonu-hack-the-crisis> [online]. [feeling. 2023-05-10].

2) Intelligent Sensor Subsystem for Sensing Selected Biological Quantities, Integrable into the First Layer of Clothing, Functional Sample, 2023 (main result of the project VJ02010031)

Proposed functional sample includes intelligent sensor nodes for sensing biological variables (heart rate, cardiac arrhythmia, movement and breathing activity, multi-point sensing of skin temperature

and relative humidity and temperature under clothing), integrated into the first layer of clothing and connected using a flexible system. The solution also includes adaptive algorithms for calculating diagnostic symptoms. The first layer of clothing is designed with optimal properties to transport liquid and gaseous moisture and heat away from the wearer's skin. The functional sample of the sensor subsystem for sensing selected biological quantities is designed so that its parameters correspond to the medical quality of sensing biological signals and enable the direct application of advanced data segmentation methods from built-in wearable biological sensors in real time at the level of sensor nodes.

Functional sample can be directly used by all components of the Integrated Rescue System during training and intervention (firefighters, police officers, paramedics), but also in other areas such as sports medicine, where top sportsmen also need monitoring physiological functions. An example of the real contemporary deployment of one application variant of the proposed functional sample is the monitoring of soldiers during training (in cooperation with the company CASRI).

The solution is gender neutral and the inner layer of the garment with built-in sensors can be customized according to the individual needs of the IRS member. The system will allow individualized real-time monitoring the effect of long-term physical and mental stress in combination with exposure to harmful substances from the environment - this aspect is related to the increase of health safety of IRS members at work, thereby potentially reducing the costs of subsequent medical care and therefore the presented solution has a positive long-term impact on sustainability.

3) Techniques for the classification of long-term PSG and EEG signals (main result of the project, GA17-20480S).

The project focused on developing methods that integrate temporal context into active learning approaches to improve predictive performance and reduce labeling costs. The main objective was accomplished, with several methodologies designed, implemented, and tested on real, long-term data, particularly in the fields of polysomnographic (PSG) and electroencephalographic (EEG) signal analysis. The project led to the creation of semi-automatic techniques for the classification of long-term signals, which provide faster, and more objective evaluations of PSG data compared to traditional manual scoring by certified experts.

The proposed active learning approach is particularly beneficial for healthcare providers, including sleep clinics, where the efficiency of signal analysis is critical. By reducing the reliance on manual scoring, the method allows healthcare institutions to process large volumes of data more quickly and at a lower cost. The technique's robustness to noise and artifacts enhances the accuracy of diagnoses, particularly in sleep disorders. These advances could also lead to improvements in personalized healthcare, as the method can adapt to different types of EEG signals without needing specific electrode configurations or training data, making it broadly applicable across varied medical contexts.

The project's results are relevant for a wide range of users, including medical professionals, researchers, and healthcare technology providers. They have the potential to significantly impact the efficiency and accessibility of sleep disorder diagnostics, with measurable economic benefits, such as reducing labor costs and increasing diagnostic throughput.

Regarding gender considerations, the project does not mention gender-related factors in its results, but the method applies to all patients regardless of gender.

As for sustainability, the methods developed promote greater efficiency and resource utilization, contributing to more sustainable healthcare practices by reducing unnecessary manual effort and the environmental footprint associated with traditional diagnostic methods.

4) Compact system for automated decellularization of tissues (main result of the project, NV18-02-00422)

To ensure the homogeneity of the decellularization process, we have constructed a compact system that allows automated control of the decellularization process, including cyclic exchange of decellularization reagents and rinse water, while minimizing the negative impact on the tissue. The system includes special chambers for tissue attachment. In this way, 3 generations of the system have been successively designed during the project. The first experimental generation used two peristaltic pumps and a set of clamp valves. This solution required specific hoses and couplings which were complicated in relation to the regulatory conditions and therefore the concept was abandoned. In the second generation, we replaced the pinch valves with infusion three-way valves, or an assembly of these valves, and the overall concept was modified for use with disposable infusion material - tubing, couplings, reagents and water in bags, etc. In the third generation, the entire system was simplified to use with only one peristaltic pump and a five-element three-way valve assembly allowing the use of up to 4 different reagents. The latest generation is also optimised in terms of design for potential use in cleanrooms and production (disposable consumables, optimised ergonomics in terms of cleaning and handling). The system control is implemented via a microcomputer and allows programming of individual process cycles, number of repetitions and duration. The system also includes special chambers to accommodate planar and tubular tissue, which are optimized in terms of process efficiency - minimizing tissue damage from handling, minimal reagent volume, and in terms of materials used for potential production applications - biocompatible resins. The design solution is included in two functional samples (FVZ NV18-0200422-3, FVZ NV18-0200422-5) and published (10.3390/App10165473). The system was also modified for further usage – cleaning of amniotic membrane – as contract research (BioHealing s.r.o.)

5) TonaPulse

TonaPulse is a generator of intense and short electrical pulses developed by Tonegena s.r.o., a spin-off of CTU, in 2023 for in-vitro electroporation studies. This device allows us to adjust the electroporation pulse parameters (amplitude, width, number of pulses in the pulse train and time between pulses and pulse trains) over a wide range to test different electroporation protocols for different cell types. The system can be extended with a switch matrix and electrode system (both also from TonaGena) so that protocols can be tested directly in standardized 96-well plates. This then greatly simplifies the evaluation of experiments. The system is currently being tested at the University Hospital Královské Vinohrady. The subject of the studies is transfection of cardiomyocytes. The system is currently certified and will be launched on the market in 2025. The solution is intended for in-vitro studies and thus gender neutral.

6) Optimized procedure for producing high concentration, bio-printable cell laden collagen bioinks (result of a research project NV19-02-00068)

Collagen provides an advantage, as it is the most common extracellular matrix present in all kinds of tissues and is, therefore, very natural for cells and the organism. Hydrogels with highly concentrated collagen make it possible to create 3D structures without additional additives to crosslink the polymer, which could negatively affect cell proliferation and viability. The method is based on two successive neutralizations of the prepared hydrogel using the bicarbonate buffering mechanisms of the 2x enhanced culture medium and pH adjustment by adding NaOH. To ensure these results a unique

multicomponent mixing system was created. The bioink preparation process is automated, including colorimetric pH detection and adjustment in sterile conditions. Results were published in 3 Q1 impacted papers and are used with ongoing research project. This custom mixing system together with 3D bioprinted with custom extruders and special fixtures for tissue samples is prepared for translation into commercial products.

7) A prototype of the modular production line (result of a research project FW03010094)

The prototype of the modular production line has been integrated into the producer's (main investigator's) operations, primarily for the manufacturing of medical devices, and is also being offered in customized modifications to other producers with compatible production profiles. The acquired know-how from developing sample medical devices has already been utilized in the recipient's own production too, with preparations in place for technology licensing—either as a comprehensive system (including production technology) or through the manufacture and sale of tailored production equipment in collaboration with both project participants. Additionally, the research partner (co-investigator) involved in the project applies the developed expertise to new research projects and educational activities, where knowledge of advanced processing techniques related to nanotechnology implementation and personalized care concepts are highly relevant.

The societal impact of these innovation spans both economic and non-economic domains. Hard-to-heal wounds, particularly infected and chronic wounds, represent a major socio-economic burden, and solutions that accelerate healing provide significant benefits for healthcare systems and patients alike. With an aging population and a rising prevalence of chronic conditions, there is an increasing need for advanced, personalized wound care technologies that improve treatment efficacy and cost-effectiveness from the perspectives of healthcare providers and reimbursement systems. A key demonstrable output in this regard is the “Wound dressing in a functionalization cartridge”, a core component of a long-term system for personalized wound care.

The gender dimension is inherently embedded in the personalization concept, as it ensures that individual patient factors—including biological, physiological, and sex-based differences—are systematically considered in medical treatment, leading to more accessible and effective care. The project also contributes to sustainability by optimizing production technologies, leading to more efficient and cost-effective manufacturing processes for medical devices, ultimately reducing material waste and resource consumption.

8) Universal software tool for creating hyperthermia treatment planning (result of a research project LTC19031)

A universal tool has been developed for hyperthermia treatment planning that allows easy and reproducible creation of simulation models. These consist of 3D patient models created by segmenting a series of CT scans and then an applicator model. This tool allows the automatic generation of complete simulation models for planning regional hyperthermia treatment. In the proposed treatment planning tool, we have programmed all clinically available regional microwave systems worldwide, as well as the possibility of automatic regional applicator placement, which is performed so that the treatment target is in the middle of the applicator model. Furthermore, this tool allows for placement of the applicator in the desired position during treatment using two control distances in the longitudinal (craniocaudal) and horizontal (frontal) directions and rotation in the sagittal plane. This tool is from 2020 implemented in the clinical planning process at the University Hospital Hyperthermia Unit, Erasmus MC Cancer Institute, Rotterdam, The Netherlands. The solution is gender neutral.

9) Improving the success and safety of left atrial appendage catheterization by creating patient-specific 3D heart models

Since 2021, members of the Bioelectromagnetism team have been collaborating with physicians at the Cardiology Clinic of the University Hospital of Královské Vinohrady (FNKV) and the Karlovy Vary Regional Hospital to improve the success and safety of left atrial appendage catheterization closure. This type of procedure is indicated for patients suffering from atrial fibrillation with an increased risk of thrombus formation, in whom anticoagulation therapy fails due to a high risk of internal bleeding. These patients are thus at significant risk of stroke. The most common site of possible thrombus formation is the left atrial appendage, from where the thrombus travels directly to the brain. Closing the left atrial appendage prevents thrombus formation and reduces the risk of stroke. Before the actual cardiac procedure, physical models of the patient's heart are prepared at FBMI. Specifically, computer models are created from CT scans of the patient's heart and then the model is produced using 3D printing. Doctors use this model as a basis for planning the procedure.

Thanks to the possibility of "in vitro" simulation, the course of the procedure is individualized with respect to the anatomical conditions of the patient's heart, which is important not only for the efficiency but also for the safety of the procedure.

By 2023, 70 patients have been operated on in this way. The success rate of the procedure increased from 70% to 99% and the duration was halved.

This result can be classified as an indirect result of research, development and creative activity with a documented societal impact. The Bioelectromagnetism team uses segmentation procedures in other research activities and has experience with the treatment of fibrillation from a H2020 project. The solution is gender neutral.

Table 3.4.1 - Overview of research results in the period under evaluation

Type of result ²⁹	Year of application	Name
Software	2020	Universal software tool for creating hyperthermia treatment planning (a result of a research project LTC19031), in use at University Hospital Hyperthermia Unit, Erasmus MC Cancer Institute, Rotterdam, The Netherlands.
Set of advanced techniques for processing of biosignals	2021	Advanced techniques for the classification of long-term PSG and EEG signals (main result of the project, GA17-20480S).
Indirect results of research, development and creative activities with documented societal impact	2021	Improving the success and safety of left atrial appendage catheterization by creating patient-specific 3D heart models. By 2023, 70 patients have been operated on in this way. The success rate of the procedure increased from 70% to 99% and the duration was halved.
CZ patent	2022	CoroVent, a lung ventilator, Czech Patent No. 309212, in the winter of 2020 and spring of 2021, emergency lung ventilators were distributed to 27 Czech hospitals.
Functional Sample	2022	System for automated decellularization of tissues (main result of the project, NV18-02-00422). The system was also modified for further usage – cleaning of amniotic membrane – as contract research (BioHealing s.r.o.).

²⁹ Specify the specific type of result. Add rows as needed.

Functional Sample	2023	Intelligent Sensor Subsystem for Sensing Selected Biological Quantities, Integrable into the First Layer of Clothing (main result of the project VJ02010031). The current deployment of one variant of the application of the proposed functional sample is the monitoring of soldiers during training (in collaboration with CASRI).
Prototype	2023	A prototype of the modular production line (result of a research project FW03010094)
Procedure	2023	Optimized procedure for producing high concentration, bio-printable cell laden collagen bioinks (result of a research project NV19-02-00068)
Prototype	2025	TonaPulse, an electrical pulse generator for in-vitro electroporation studies equipped with an electrode plate. Developed by CTU spin-off Tonegena s.r.o. First prototype developed in 2023, from that was used for different clinical studies at the University Hospital Královské Vinohrady. In 2025 is being certified and is going to be launched on the market.
Spin-off	2023	Foundation of spin-off Tonagena s.r.o a Czech Technical University spin-off company focused on development of novel solutions for electroporation, radar sensing and microwave hyperthermia. A prototype electroporation device TonaPulse for in vitro studies is currently being certified.

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)³⁰, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).³¹

Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

Self-assessment:

Most typical users of FBME results

The most typical users of FBME results are hospitals, universities and private companies. The faculty is actively seeking opportunities for cooperation. Before 2022, it advertised its competencies on the public portal <https://www.cvut.cz/en/database-of-ctu-offers-experts-and-devices-dnep>. Since 2022, it is possible to find a relevant academic partner by entering keywords at <https://results.cvut.cz/>.

FBME regularly organizes conferences and excursions with the participation of companies and institutions, where participants can get to know the research teams and their laboratories and the opportunities for collaboration (e.g. State Institute for Drug Control, ...).

It concludes memoranda of cooperation with companies and institutions (e.g. with GUBI Group, a. s., Medirecord CZ, s.r.o. in 2020, Krajská zdravotní, a. s. in 2021, Středočeské vodárny by Veolia) and organizes meetings between faculty members and representatives of hospitals and companies, where collaboration is offered. In the monitoring period, such meetings were, for example, with representatives from Klaudian Hospital in 2022 and from APAG in 2023.

Brief description of the commercialisation methods

Until 2023, the commercialization of research results at FBME was mainly initiated by the originators themselves and supported by the faculty. In October 2023, a meeting was organized with representatives of the CTU department for technology transfer and fundraising, specifically with its head, Mr. JUDr. Ing. Jan Urban, Ph.D., LL.M. The meeting included consultations in the areas of electroporation, non-contact glycemic sensing, stroke detection, automatic systems for oxygen dosing, fast thermal humidifier, magnetic resonance imaging (speeding up, simplification, lower cost), 3D printing applications in medicine, including substitutes, specialized devices for tissue engineering, tissue incubators.

³⁰ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

³¹ If the commercialisation of R&D&I results is carried out in this way.

The results of the above-mentioned consultations then led to selected activities. The most significant result was the establishment of TONAGENA s.r.o. as a prerequisite for the creation of the first ever spin-off company at CTU with a commercial share of CTU according to the new framework of the Department for Technology Transfer and Fundraising.

Currently, as mentioned earlier, two other spin-offs from FBME are being established.

Transfer of results and the commercialization of R&D&I results is documented with selected results described in Table 3.4.1. The most important five examples are the Czech patent for the invention CoroVent, System for automated decellularization of tissues, Sensor Subsystem for Sensing Selected Biological Quantities, development of the TonaPulse electroporator and the establishment of the spin-off Tonagen.

Funds received during the period of 2019–2023 from non-public, non-grant sources

The amount of funding received from non-public, non-grant sources is shown for each year in Table 4.5.1. During the monitoring period, these funds were made up entirely of donations. With the establishment of the Tonagena spin-off and the two other spin-offs currently being established, we hope to see an increase in these funds in the form of spin-off revenues and licenses sold in the future period.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

Type of revenue	Revenue (in thousands CZK/EUR)				
	2019	2020	2021	2022	2023
Donations	<u>50/1950</u>	<u>1505/56020</u>	<u>854/33180</u>	<u>493/20340</u>	<u>1080/45740</u>
Spin-off revenues	0/0	0/0	0/0	0/0	0/0
Licenses sold	0/0	0/0	0/0	0/0	0/0
Total	<u>50/1950</u>	<u>1505/56020</u>	<u>854/33180</u>	<u>493/20340</u>	<u>1080/45740</u>

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

Popularization of R&D&I and communication with the public by FBME can be divided into two main groups.

- 1) Annual participation of the faculty in important popular science events organized in the Czech Republic,
- 2) Appearances of FBME experts in various Czech media programs, presenting the results of their research or commenting on new or future trends and technologies.

Ad 1) Popular science events in which FBMI participated or organized in 2019-2023

The Faculty of Biomedical Engineering regularly participated in many popular science events such as:

- **FESTIVAL OF SCIENCE** (FESTIVAL VĚDY renamed VědaFest in subsequent years) - the largest open-air popular science festival in the Czech Republic. For pupils, secondary school students and the general public. The event is organized by the Youth and Young People of the City of Prague, CTU and University of chemistry and technology Prague.
- **FESTIVAL ABC** - (only in 2019) - fun science for children of all ages.
- **RESEARCHERS' NIGHT** (NOC VĚDCŮ) - an event bringing to life in one evening hundreds of scientific buildings that one can't just walk into. In the Czech Republic, the event has been held since 2015 and is represented by Czech universities, scientific institutes, observatories and other institutions.
- **SCIENCE FAIR** (VELETRH VĚDY) - is the largest popular educational event in the Czech Republic, organized by the Academy of Sciences of the Czech Republic since 2015. The fair offers visitors the most interesting from the world of natural, technical, humanities and social disciplines. It is visited annually by about 50 000 visitors.

Thousands of visitors annually attend these popular science events.

At the FBMI, the Halda Association, in cooperation with the **FBMI SCIENCE CAFÉ**, organized a series of informal discussions with scientists.

In addition, we held an **OPEN DAY at FBME** twice a year, where those interested could find out information about the studies, see the laboratories and short experiments. There were about 600 visitors per year.

We regularly organise excursions and one or two-hour scientific experiments for high school students and excursions for primary school pupils. Hundreds of pupils and students take part in these excursions and experiments every year.

In 2020, we filmed a series of spots about FBME's science teams.

Ad 2) Appearances of FBME experts in various Czech media programmes

Between 2019 and 2023, FBME experts have been invited to appear on programmes on Czech Television and Czech Radio. Interviews with them were printed in the Czech press such as Hospodářské noviny, Vesmír, Chemické listy, Paraple Magazine, Senior Fitness, Technicall, Pražská technika and others.

Below are 10 of the most important examples of Popularization of R&D&I and communication with the public.

- 1) **FESTIVAL OF SCIENCE** – 2019, 2021, 2022, 2023
- 2) **RESEARCHERS' NIGHT** – 2019, 2021, 2022, 2023
- 3) **SCIENCE FAIR** – 2022, 2023
- 4) **Science café** at FBME – 2019, 2020, 2022, 2023
- 5) **OPEN DAY** at FBME – 2019-2023
- 6) Příhoda, A., With the ease of an astronaut (S lehkostí astronauta), Innovation at universities, **Hospodářské noviny (Economic newspaper)**. 2020-01-29.
- 7) Böhm, P., Instrumentation in emergency medicine (Přístrojová technika v urgentní medicíně), Káva o čtvrté, **Český rozhlas (Czech Radio)**. 2019-01-22.
- 8) Matějka, R., Tissue engineering (Tkáňové inženýrství) - pořad ČT Sama Doma, **Česká Televize (Czech TV)**: 2022-03-29.
- 9) Piorecký, M., Pink sound for better memory (Růžovým zvukem k lepší paměti), **Vesmír**. 2022, 101 614-616. ISSN 1214-4029.
- 10) Michálek, J.; Podešva, J., Polymer implants in human medicine (Polymerní implantáty v humánní medicíně), **Chemické listy**. 2021, 115(6), 289-290. ISSN 0009-2770.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

In Module M3, the Evaluation Panel (IEP) rated FBME as "very good" in six categories and "excellent" in five. Thus, the overall rating of our faculty was at the upper end of the "very good" rating. The FBME management has implemented the MEP recommendations to the maximum extent possible and has taken steps to improve the working conditions of its staff and to support their R&D activities so that future evaluations will also be as good as possible.

The MEP recommendations can be summarised in the following points:

- A. Increase publications in prestigious international scientific journals and intensify scientific activities in international journals,
- B. increase activity in cardiovascular research,
- C. focus on fewer topics such as cardiovascular system, lung, sensors and telemedicine,
- D. to expand its activities to other research topics and to recruit new staff for this purpose,
- E. encourage the creation of spin-off companies,
- F. intensify FBME research cooperation in the EU,
- G. intensify collaboration with other faculties of CTU in the field of non-Newtonian fluids and advanced turbulent flow modelling for cardiovascular modelling.

Ad A: A motivation system has been prepared and implemented at FBME, which allows to reward faculty staff for their research and development activities in a simple and transparent way, for the preparation of manuscripts printed in prestigious scientific journals. Please note that the number of articles in journals with impact factor (Web of Science) increased from 224 to 465 compared to the previous evaluation period. At the same time, the share of prestigious publications in journals from the 1st and 2nd quartiles (Web of Science, IF) has increased from 46.9% to 70.1%. In addition, the system also supports e.g. membership on the editorial boards of prestigious journals and international professional societies. In addition, it introduces rewards for other achievements that are assessed in the habilitation and appointment procedures. Therefore, we believe that it helps in meeting the conditions for upgrading the qualifications of our staff. As mentioned in the first part of this report, 12 associate professors were habilitated and 2 professors were appointed during the monitoring period. In the period 2014-2018, 5 FBME employees were habilitated only. Furthermore, the faculty management has introduced a special incentive system for PhD students to improve their financial situation, accelerate their publication activity and thus increase the success rate of PhD completion.

Ad B: The cardiovascular system is currently the focus of three research teams at FBME: the "Bioreactors for tissue and organ replacement" team, the "Bio-electromagnetism" team and the "Cardiac Electrophysiology team". The first mentioned team mainly in terms of tissue substitutes for cardiac surgery, the latter in terms of design of electrodes and device for electroporation and blood

flow modelling in the heart, and the third in terms of cardiac activity mapping using multichannel ECG.

In the framework of the LAA-Start Horizon 2020 project (2019-2020), the "Bio-electromagnetism" team, in collaboration with the Irish company AuriGen Medical, has been involved in the design of the ablation part of an innovative implant for electrical and mechanical isolation (by RF ablation and electroporation) of the left atrial appendage, which is the site of frequent blood thrombi causing heart failure and strokes.

Another collaboration in the field of cardiovascular system was established with the University Hospital Královské Vinohrady. The collaboration is currently developing in planning mechanical left atrial appendage (LAA) isolation using patient-specific heart models. More than 70 patients have already been successfully operated after planning the procedure using models of their own heart. With model-based planning, the success rate of the procedures has increased from the original 70% to almost 100%.

Together with colleagues from the Faculty of Engineering, the Bio-electromagnetism team is working on numerical simulations of blood flow in the heart and LAA. Based on the results of the simulations, the risk of blood thrombus formation can be assessed in the future.

Ad C: FBME currently has a total of 15 research teams with very attractive and smart specialisations. The scope of research is determined by the expertise of the individual staff members. It would only be possible to change or expand the research focus of the faculty by employing additional experts in the relevant field.

Ad D: Recruitment of additional experts is a matter of available funding and may be relatively slow. However, the faculty continuously adds staff according to the current needs. This is supported by the implementation of a staffing strategy at CTU based on the principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. CTU in 2019 received the prestigious "HR Excellence in Research Award" from the European Commission.

Ad E: The faculty management supported the establishment of spin-off companies. As already mentioned, the Department of Technology Transfer and Fundraising of the CTU created in 2023 a new framework for the establishment of spin-off companies with the financial participation of the CTU. The FBME also had a certain share in the preparation of this framework. The first company that was established according to this new concept was company Tonagena from FBME. The last details of the framework were thus set when the company Tonagena was founded. Please note, that two other spin-off companies of FBME are currently being established. It is also worth mentioning that Tonagena's main activity is the design, manufacture and sale of electroporation equipment for in vitro studies. It is currently used to study the effect of electroporation parameters on cardiomyocyte electroporation and transfection.

Ad F: Faculty employees were informed about COST projects and encouraged to participate more in these projects. The management considers this activity to be essential for presenting results to the European professional community, gaining international contacts and cooperating with European workplaces. Finally, participation in COST projects provides an ideal opportunity for submitting joint Horizon 2020/Horizon Europe projects with project partners. In 2023 and 2024 FBME employees participated in preparation of a new COST Action EM-based medical technologies to advance the technology and accelerate their translation (EMBRACE), which has been evaluated since 10/2024. In 2022 and 2023, an international project proposal was prepared and accepted for funding from the Interreg Cetrál Europe call <https://www.interreg-central.eu/projects/medwaveimage/>. It started in 7/2024.

Ad G: Faculty management supports the cooperation of its employees with colleagues from other CTU faculties. In addition to the above-mentioned cooperation with colleagues from the Faculty of

Mechanical Engineering on modeling of blood flow in human heart, cooperation with the industrial design studios of the Faculty of Architecture began in 2023. Students in 2024 and 2025 are working on their final theses on the design of medical devices.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)
Information about the R&D etc. of the Faculty (on the University Website)	3.1	Information about the R&D etc. of the Faculty (on the University Website)
Faculty Website (en)	3.1	https://www.fbmi.cvut.cz/en
Annual reports 2019 - 2023 (in Czech)	3.1	Annual reports 2019 - 2023 (in Czech)
Scientific teams at FBME	3.1	https://www.fbmi.cvut.cz/en/research/teams
	3.1	
PRESTIGIOUS R&D&I AWARDS GRANTED DURING THE EVALUATION PERIOD		
Best dissertation thesis	3.2.1	https://www.fbmi.cvut.cz/index.php/cs/verejnost/fotogalerie/uspech-studentu-v-soutezi-ieee-embs
Winner startup - RescueRoom	3.2.1	https://slovakia.socialimpactaward.net/alumni-projekty/ https://youtu.be/zGtJwg3BuqM
Innovators 20 (20 best innovators of the Czech Republic in 2020)	3.2.1	https://archiv.hn.cz/c1-66876020-20-nejlepsich-inovatoru-roku-2020-nejen-cupr-s-prusou-zabodoval-i-prvok-mikroelektrarna-ci-it-gyml
2nd prize of "Hack the Crisis" with financial price for further research of 2 000 000 CZK for design of CoroVent.	3.2.1	https://czechinvest.gov.cz/en/For-Startups/Other-activities/Hack-the-Crisis-Czech-Republic
Best Master's Thesis	3.2.1	https://www.fbmi.cvut.cz/cs/verejnost/fotogalerie/nejlepsi-na-konferenci-ieee-mtt-s
Josef Hlávka Award	3.2.1	https://www.fbmi.cvut.cz/cs/verejnost/fotogalerie/ceny-josefa-hlavky-predany

Session Organizer Award	3.2.1	https://piers.org/awards/soa.html
Best Poster Award	3.2.1	https://www.fbmi.cvut.cz/en/public/news/gallery/best-student-poster
SELECTED RESEARCH PROJECTS		
Technology for eHealth on CTU	3.3	https://starfos.tacr.cz/en/projekty/UH0834
Modular multisensory clothing for risk management, health protection and safety of IRS members using artificial intelligence methods	3.3	https://starfos.tacr.cz/en/projekty/VJ02010031
Therapeutic rehabilitation robot controlled by brain signals	3.3	https://starfos.tacr.cz/en/projekty/FW03010025
Temporal context in the task of analyzing a long-term non-stationary multidimensional signal focuses on the development of semiautomatic and automatic methods for improving EEG data processing	3.3	https://starfos.tacr.cz/en/projekty/GA17-20480S
Development of metamaterial applicators for the regional hyperthermia system and evaluation of the accuracy of	3.3	https://starfos.tacr.cz/en/projekty/LTC19031

treatment planning algorithms		
Functionalized nanofibers as a cover of colorectal anastomosis	3.3	https://starfos.tacr.cz/en/projekty/NV16-29680A
Multiphysical Study of Superposition of Electromagnetic Waves in Human Head Model to Verify the Feasibility of Microwave Hyperthermia of Brain Tumors	3.3	https://starfos.tacr.cz/en/projekty/GA21-00579S
New materials for cardiovascular surgery based on modified decellularized tissues	3.3	https://starfos.tacr.cz/en/projekty/NV18-02-00422
Bioartificial cardiovascular patches and vessels from porcine collagen reinforced with nano/microfibers using stem cells and dynamic culture	3.3	https://starfos.tacr.cz/en/projekty/NV19-02-00068
Left atrial appendage electrical Isolation via bio-photonics optical confirmation to treat persistent atrial fibrillation	3.3	https://cordis.europa.eu/project/id/831117
POPULARIZATION OF VAVAI		

Science Café Kladno (web pages, in Czech)	3.6	https://www.sciencecafe.cz/kladno/
With the ease of an astronaut	3.6	https://archiv.hn.cz/c1-66711400-s-lehkosti-astronauta
Instrumentation in emergency medicine	3.6	https://dvojka.rozhlas.cz/pristrojova-technika-v-urgentni-medicine-7733751
Tissue engineering	3.6	https://www.ceskatelevize.cz/porady/1148499747-sama-doma/222562220600050/cast/902905/
Pink sound for better memory	3.6	https://vesmir.cz/cz/casopis/archiv-casopisu/2022/cislo-10/ruzovym-zvukem-k-lepsi-pameti.html
Polymer implants in human medicine	3.6	http://www.chemicke-listy.cz/ojs3/index.php/chemicke-listy/article/view/3855

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: Faculty of Information Technology

FORD: 2 - Engineering and technology

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

Faculty of Information Technology (FIT) of Czech Technical University in Prague (CTU) is a faculty established in 2009. The FIT's R&D&I focus covers all domains of Informatics: it ranges from theoretical computer science through software engineering, machine learning, computer security to hardware design. The faculty has a main study program, called Informatics, for all levels of university education, both in Czech and English. The number of bachelor-level students is steadily over 1500, master-level over 400, and PhD over 50, with a steady growing trend, reaching our full capacity. More study programs are planned now: master level Quantum computing (in cooperation with other faculties) and splitting of the master program into Informatics and Applied informatics. A steady growth of the faculty can be seen in most of the indicators: number of academic staff, number of projects and contract research, number of publications, etc. While in the first years after the foundation of FIT, most of the staff focused on teaching, the focus is now fully shifted towards the other domains as well and the faculty obtains more and more external funding through projects, contract research, partnership program etc. Besides the not so long history, an important characteristic of faculty staff is the never-ending competition with industry: It is challenging to attain and maintain a stable core of employees, mainly in applied domains (such as software engineering and machine learning).

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

Table 3.1.1 - Staffing per FTE²

Academic/ Professional position	Total / Of which women					
	2019	2020	2021	2022	2023	Total
Professor	4,2 / 0	4,2 / 0	5,2 / 0	7,1 / 1	7,1 / 1	27,6 / 2
Associate Professor	16,5 / 3	17,5 / 3	16,5 / 3	16 / 2	14,9 / 2,1	81,2 / 13,1
Assistant Professor	57,3 / 8,6	58,5 / 10,8	59,2 / 10,8	59,1 / 11,8	59,3 / 11,8	293,4 / 53,6
Assistant	7,4 / 1	8,4 / 1,5	9,7 / 1,5	10 / 1,5	10 / 1,5	45,4 / 7
R&D Personnel ³	24,5 / 14,8	26,8 / 16,5	29,8 / 17,5	31,6 / 17,2	33,8 / 16	146,4 / 81,9
Researchers in other categories ⁴	16,1 / 2,2	16,9 / 2,2	19,7 / 2,2	29,2 / 3,9	23,9 / 1,7	105,8 / 12,2
Technical and economic staff ⁵	24,2 / 13,9	25,3 / 12,6	24,6 / 11,6	26,6 / 11,6	28,6 / 10,6	129,1 / 60,1
Scientific, research and development staff involved in teaching activities	77,8 / 10,8	81,9 / 13,5	85,2 / 14,5	87,3 / 15,5	86,6 / 15,6	418,8 / 69,9
Early career researchers ⁶	55,6 / 7,2	59,6 / 9,2	59,1 / 9,2	61,3 / 10,9	57,7 / 8,7	293,2 / 45,2
Total ⁷	150,2 / 43,5	157,6 / 46,6	164,7 / 46,6	179,6 / 49	177,6 / 44,7	828,9 / 229,9

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁸

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	1	0	0	0	3	0	2	0

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

Associate Professor	0	0	1	0	8	0	1	1	5	2	2	0
Assistant Professor	3	0	36	5	16	3	2	0	1	0	0	0
Assistant	5	1	2	0	1	0	1	0	0	0	0	0
R&D Personnel ⁹	7	2	8	2	3	3	7	6	3	3	0	0
Researchers in other categories ¹⁰	9	1	19	2	1	0	4	0	0	0	0	0
Technical and economic staff ¹¹	0	0	2	0	0	0	0	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	9	2	40	5	26	3	4	1	9	2	4	0
Early career researcher ¹²	17	2	58	7	0	0	0	0	0	0	0	0
Total ¹³	24	4	68	9	30	6	15	7	12	5	4	0

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁴

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	1	0	1	0	5	1	1	0
Associate Professor	0	0	1	0	8	0	2	0	2	2	4	1
Assistant Professor	0	0	31	6	28	6	4	1	1	0	0	0
Assistant	1	0	11	2	1	0	0	0	1	0	0	0
R&D Personnel ¹⁵	13	1	12	4	8	5	7	4	4	4	0	0

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

Researchers in other categories ¹⁶	19	3	17	0	1	0	2	0	0	0	0	0
Technical and economic staff ¹⁷	7	0	2	0	2	0	2	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	1	0	44	9	39	6	7	1	9	3	5	1
Early career researcher ¹⁸	20	3	60	8	0	0	0	0	0	0	0	0
Total ¹⁹	40	4	74	12	49	11	18	5	13	7	5	1

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students

Type of study	2019		2020		2021		2022		2023		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate	1 683	226	1 800	255	1 763	243	1 940	271	1 880	268	9 066	1 263
Master's ²⁰	412	42	418	46	465	48	501	58	505	63	2 301	257
Doctoral	52	5	63	6	65	6	60	6	66	5	306	28
Lifelong Learning Courses	42	13	48	16	33	16	48	28	65	33	236	106
Total	2 189	286	2 329	323	2 326	313	2 549	363	2 516	369	11 909	1 654

Table 3.1.5 - Study programmes in Czech/English

Type of study programme	Total ²¹ / Of which professional study programmes											
	2019		2020		2021		2022		2023		Total	
Undergraduate	1/1	0/0	1/1	0/0	1/1	0/0	1/1	0/0	1/1	0/0	5/5	0/0
Master's	1/1	0/0	1/1	0/0	1/1	0/0	1/1	0/0	1/1	0/0	5/5	0/0
Doctoral	1/1	0/0	1/1	0/0	1/1	0/0	1/1	0/0	1/1	0/0	5/5	0/0
Lifelong Learning courses	4/0	0/0	4/0	0/0	3/0	0/0	4/0	0/0	7/0	1/0	22/0	1/0

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

Total	9/3	0/0	8/3	0/0	6/3	0/0	7/3	0/0	10/3	1/0	37/0	1/0

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
1. Natural Sciences	1.1 Mathematics	9,63%	Basic Research	81,40%
	1.2 Computer and information sciences	69,30%	Balanced basic and applied research	
	1.3 Physical sciences	1,74%	Basic Research	
	1.4 Chemical sciences	0,48%	Basic Research	
	1.5 Earth and related environmental sciences	0,00%	Zvolte položku.	
	1.6 Biological sciences	0,08%	Basic Research	
	1.7 Other natural sciences	0,17%	Balanced basic and applied research	
2. Engineering and Technology	2.1 Civil engineering	1,28%	Basic Research	14,91%
	2.2 Electrical engineering, Electronic engineering, Information engineering	12,85%	Balanced basic and applied research	
	2.3 Mechanical engineering	0,00%	Zvolte položku.	
	2.4 Chemical engineering	0,00%	Zvolte položku.	
	2.5 Materials engineering	0,00%	Zvolte položku.	
	2.6 Medical engineering	0,78%	Applied Research	
	2.7 Environmental engineering	0,00%	Zvolte položku.	
	2.8 Environmental biotechnology	0,00%	Zvolte položku.	
	2.9 Industrial biotechnology	0,00%	Zvolte položku.	
	2.10 Nanotechnology	0,00%	Zvolte položku.	
	2.11 Other engineering and technologies	0,00%	Zvolte položku.	
3. Medical and Health Sciences	3.1 Basic medicine	0,00%	Zvolte položku.	1,54%
	3.2 Clinical medicine	1,07%	Applied Research	
	3.3 Health sciences	0,47%	Applied Research	
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries	0,00%	Zvolte položku.	0,00%
	4.2 Animal and Dairy science	0,00%	Zvolte položku.	
	4.3 Veterinary science	0,00%	Zvolte položku.	
	4.4 Other agricultural sciences	0,00%	Zvolte položku.	
5. Social Sciences	5.1 Psychology and cognitive sciences	0,00%	Zvolte položku.	1,76%
	5.2 Economics and Business	0,80%	Applied Research	
	5.3 Education	0,00%	Zvolte položku.	
	5.4 Sociology	0,00%	Zvolte položku.	

	5.5 Law	0,45%	Applied Research	
	5.6 Political science	0,00%	Zvolte položku.	
	5.7 Social and economic geography	0,00%	Zvolte položku.	
	5.8 Media and communications	0,51%	Applied Research	
	5.9 Other social sciences	0,00%	Zvolte položku.	
6. Humanities and the Arts	6.1 History and Archaeology	0,15%	Applied Research	0,41%
	6.2 Languages and Literature	0,26%	Applied Research	
	6.3 Philosophy, Ethics and Religion	0,00%	Zvolte položku.	
	6.4 Arts (arts, history of arts, performing arts, music)	0,00%	Zvolte položku.	
	6.5 Other Humanities and the Arts	0,00%	Zvolte položku.	
Total		100 %	-	100 %

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

Considering the selected indicators, the recognition by the research community of FIT is slow but steadily growing. We lack larger involvement in evaluation of programme calls. As the main focus of the faculty is Informatics, a relevant indicator is also membership in prestigious international conferences. We list here examples of program committee memberships from the period of 2019-2023 with CORE ranking in square braces:

- doc. RNDr. Dušan Knop Ph.D.: AAAI 2020-2023 [A*], ECAI 2023 [A*], IJCAI 2020-2023 [A*]
- prof. RNDr. Pavel Surynek Ph.D.: AAAI 2019-2020 [A*], IJCAI 2019-2022 [A*], SoCS 2022 [B] (chair of doctoral consortium)
- Ing. Šimon Schierreich: ECAI 2023 [A*]
- doc. Ing. Petr Fišer Ph.D.: DAC 2020-2022 [A], DATE 2020-2023 [B]
- Ing. Milan Dojčinovski Ph.D.: ESWC 2022 [A (Core2021)], ACM CIKM 2022 [A]
- Ing. Petra Pavlíčková Ph.D.: CaiSE 2021 [A]
- RNDr. Jakub Klímek Ph.D.: ISWC 2019 [A]
- Dr.-Ing. Martin Novotný: DATE 2022-2023 [B]

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
Ing. Jan Říha, Ing. Jakub Klemsa and Dr.-Ing. Martin Novotný	BEST STUDENT Paper	2019 8th Mediterranean Conference on Embedded Computing (MECO)
prof. RNDr. Pavel Surynek, Ph.D.	ICAPS Influential Paper Award 2020	ICAPS
Pierre Donat-Bouillud, Ph.D.	Seal of Excellence (Horizon 2020)	European Commission
Ing. Karel Hynek, Ph.D., doc. Ing. Tomáš Čejka, Ph.D.	BEST paper award	IEEE Annual Information Technology, Electronics and Mobile Communication Conference 2020
doc. RNDr. Dušan Knop, Ph.D.	AAAI-21 Outstanding Program Committee Member	Association for the Advancement of Artificial Intelligence
Ing. Marek Sušický	Civic Tech Open 2021 - Best application in category of Health	Nadace OSF
Bc. Jiří Pihrt, Bc. Rudolf Raevskiy, Mgr. Petr Šimánek and Ing. Matej Choma	NeurIPS 2022 - Winner of Weather4cast challenge	NeurIPS
Ing. Ondřej Podsztavek	NeurIPS 2022 - Winner of Ariel Machine Learning Data Challenge	NeurIPS

Ing. Petr Kasalický	KDD 2023 - Best Student Paper Award	ACM KDD (Knowledge Discovery and Data Mining)
Ing. Jaroslav Pešek, Ing. Dominik Soukup, doc. Ing. Tomáš Čejka, Ph.D.	BEST paper award	IEEE Annual Computing and Communication Workshop and Conference (CCWC) 2023

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of scientific journal, ISSN
doc. Ing. Jan Janoušek, Ph.D.	COMSIS - Computer Science and Information Systems, 1820-0214
doc. Ing. Petr Fišer, Ph.D.	Microprocessors and Microsystems, 0141-9331
doc. Ing. Petr Fišer, Ph.D.	Elektronika ir Elektrotechnika, 1392-1215
doc. Ing. Robert Pergl, Ph.D.	The Enterprise Engineering Series, 1867-8920
Dr.-Ing. Martin Novotný	Microprocessors and Microsystems, 0141-9331
prof. Ing. Hana Kubátová, CSc.	Microprocessors and Microsystems, 0141-9331
prof. Ing. Viktor Fischer, CSc.	Journal of Cryptography Engineering, 2190-8516
doc. Ing. Robert Pergl, Ph.D.	The Enterprise Engineering Series, 1867-8920
prof. Ing. Michal Haindl, DrSc.	Kybernetika, 0023-5954

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
prof. Ing. Hana Kubátová, CSc.	Dependability Problems in Interconnected World	2019 8th Mediterranean Conference on Embedded Computing (MECO)	2019
doc. Ing. Robert Pergl, Ph.D.	The Two Pillars	11th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management	2019
prof. RNDr. Pavel Surynek, Ph.D.	SAT-based Multi-Agent Path Finding	IJCAI 2019 Workshop on Multi-Agent Path Finding	2019
Ing. Josef Pavlíček, Ph.D.	Business Process Models (BPMN and DEMO Notation) - Usability Study	EOMAS 2019: 15th International Workshop on Enterprise and Organizational Modelling and Simulation	2019
Ing. Marek Suchánek, Ph.D. et Ph.D.	Towards Evolvable Ontology-Driven Development with Normalized Systems	15th International Conference on Evaluation of Novel Approaches to Software Engineering	2021
Mgr. Eva Pernecká, Ph.D.	Functionals on Lipschitz spaces and measures	Lancaster: International Workshop on Operator Theory and its Applications. A	2021

		special session: Operator ideals and operators on Banach spaces	
doc. RNDr. Dušan Knop, Ph.D.	High-Multiplicity Fair Allocation: Integer Programming Theory in Application	Leiden: Advanced Optimization for Social Choice, Lorentz Center.	2022
Mgr. Eva Pernecká, Ph.D.	Integral representation of functionals on Lipschitz spaces	Lille: Functional Analysis in Lille. A conference in honor of Gilles Godefroy	2022
doc. Ing. Robert Pergl, Ph.D.	Minimum metadata for FAIR Semantic artefacts	Oslo: Second Global Workshop - OntoCommons addressing the challenges of the Industry 5.0 transition, OntoCommons	2023
Dr. techn. Ing. Jan Legerský	Flexibility of frameworks using edge colorings	Schloss Weinberg, Kefermarkt: Conference on Geometry: Theory and Applications (CGTA 2023)	2023

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year
Darius Blasband	Raincode	Grow your own language: The YAFL story	2021
Professor Joan Daemen	Radboud University in Nijmegen	Permutation-based cryptography	2022
Professor Lejla Batina	Radboud University in Nijmegen	Deep Learning and Physical Attacks on Embedded Systems: How Deep can we go?	2022
Dipl.-Inf. Roman Pipek	Imining GmbH München	O teorii informace, neurovědě a digitální demenci	2023
Professor Travis Gagie	Faculty of Computer Science of Dalhousie University	Pangenomic FM-indexes	2023

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the project/programme call	Name of the authority/guarantor of the project/programme call	Year
prof. Ing. Pavel Tvrdík, CSc.	Standard grants	Czech Science Foundation (GA ČR)	2019 - 2021

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the period of 2019–2023²³. This should be done from the full list in annex tables (Table 3.3.1–3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

Contract research with Meteopress: The company Meteopress was a significant partner of FIT CTU due to its long-term collaboration in the field of short-term weather prediction, particularly precipitation. Together with the Data Science Laboratory, Meteopress contributed to several key projects focused on innovations in radar rainfall forecasting and storm movement modelling using mathematical modelling and artificial intelligence methods.

The collaboration was most intensive between 2019 and 2022, during which three large research projects were carried out. The results of these projects contributed to advancements in predictive models that can improve the accuracy and reliability of meteorological forecasts. This research attracted the attention of the professional community and even reached the finals of the prestigious [AI Awards](#), demonstrating its high quality and relevance.

Thanks to this collaboration, researchers at FIT CTU gained access to real meteorological data and expert knowledge of Meteopress, enabling the more efficient development and testing of new approaches to weather forecasting. At the same time, faculty students and academic staff had the opportunity to participate in practical applications of their research, strengthening their professional competencies, and bridging the gap between academia and industry.

Overall, Meteopress was not only a significant partner for FIT CTU in applied research but also a key ally in promoting innovations in meteorology and utilizing artificial intelligence to enhance predictive models. This collaboration contributed to the advancement of the field and demonstrated how the connection between academia and industry can lead to practical and technologically advanced solutions.

Contract research with Škoda Auto: Škoda Auto stands as a strategic partner within the automotive industry, a cornerstone sector of the Czech economy. Our joint endeavours are centered around cutting-edge projects such as vehicle aerodynamics modelling, automated testing of intelligent sensors, and, more recently, the development of digital twin models for cars and production systems.

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

These initiatives are designed to integrate advanced artificial intelligence methods, with the most significant contributions coming from the Data Science Laboratory and the Department of Digital Design. This long-standing partnership plays an important role for the faculty and transferring its knowledge within the automotive sector.

Contract research with DataMole: DataMole has been a prestigious Gold Partner of the Faculty since its inception. The company's roots trace back to the Data Science Laboratory at FIT, and the collaboration has remained strong ever since. DataMole's engagement with the Faculty is centered around the application of artificial intelligence and smart sensor technologies in agriculture, with notable impact primarily outside of the Czech Republic. DataMole continues to leverage the Faculty's knowledge and expertise, recognizing us as a key strategic partner in driving their business forward.

Contract research with CESNET: FIT maintains a dynamic and ongoing partnership with the CESNET association, focusing primarily on three FIT laboratories: Hardware Workshop and Laboratory, Network Visualization Laboratory, and Network Traffic Monitoring Laboratory. This collaborative effort is driven by continuous exploration in the development of hardware, software, and web technologies, as well as enhancing tools for the creation and analysis of real-world traffic datasets. A key initiative includes designing a prototype knowledge database that extends the capabilities of the NERD Reputation Database (a database of known malicious network entities, <https://github.com/CESNET/NERD>). CESNET has thus emerged as one of our most active and valued collaborators, contributing significantly to cutting-edge research and innovation.

Project Evolving Language Ecosystems: the project contributed to advances in the concept of gradual typing which is a software engineering concept where a program can be extended with type annotations after it has been completed. This idea corresponds to the notion of evolving software from prototyping to robustness. The novel contribution was a study of the performance impact of various approaches to gradual typing, which revealed that many existing approaches are too costly to adopt in practice. The second major area of advances is in the concept of speculative compilation which is an approach that allows programs to evolve at run-time, that is, speculative compilation allows the addition of new code and the change of existing code while retaining peak performance. Another contribution of the project is within the Julia language semantics and is explaining the design of the language and laying the groundwork for evolving the Julia ecosystem. It also explained how the subtype relation worked, and uncovered that it is not decidable, and formalized the two notions of type stability and world age, both of which are unique to the Julia language.

Project Big Code: The project aimed to study massive codebases on the Internet. The four most significant achievements of the project are: 1) CodeDJ - an infrastructure for querying repositories composed of a persistent datastore, constantly updated with data acquired from GitHub, and an in-memory database with a Rust query interface. CodeDJ supports reproducibility, historical queries are answered deterministically using past states of the datastore; thus, researchers can reproduce published results. To illustrate the benefits of CodeDJ, biases in the data of a published study were identified and, by repeating the analysis with new data, it was demonstrated that the study's conclusions were sensitive to the choice of projects. 2) Formally Verified Speculation - a model just-in-time compiler with an intermediate representation that lists the synchronization points used for deoptimization and the assumptions made by the compiler's speculation. It was accompanied by a demonstration how one could use the verified optimization to obtain significant speed ups in an end-to-end setting. 3) Impact of Programming Languages on Code Quality - a reanalysis of a 2014 study claiming to have uncovered a statistically significant association between eleven programming languages and software defects and the relation between bugs and languages. Several serious flaws in the original study was uncovered which is considered important, as many subsequent works have

cited the 2014 result. 4) Genthat - a tool non-invasively recording execution traces of R programs and extracting unit tests from those traces.

Project Flow-based Encrypted Traffic Analysis: The project researches new methods of effective protection against cyber threats that misuse secured communication for cyber-attacks against servers and computers in the environment of high-speed networks. The project investigated machine learning methods suitable for determining the characteristics of the encrypted network flows and associated risks base on available data. The goal was to design a system using a hardware-accelerated traffic monitor and a software prototype for high-speed detection of security incidents. Further, a plug-in to the IBM Security QRadar EDR system for incident analysis was developed. The project outcomes also include reference data sets of network traffic and a system for their collection and annotation. The project was coordinated by the CESNET organization and with Brno University of Technology as another beneficiary.

Project Dowry Towns of the Queens of Bohemia: The project focused on so-called royal dowry towns (9 towns in the Czech Republic), which are a special category among Czech historical towns in many perspectives. The main objective of the project was to present this Czech historical phenomenon to the general public through the tools of historical geography and advanced computer graphics. The main outputs of the project are a dedicated mobile application and a web portal that served as a specialized historical guide to the dowry towns and their urban landscape and specialized (reconstruction) maps of the entire regional enclave and the towns themselves. The outputs also include 3D visualization in the so-called expanded virtual reality, incl. 3D reconstruction of already destroyed urban complexes. The project was coordinated by University of Hradec Králové and another participant was the Institute of history of Czech Academy of Sciences. FIT oversaw the technical outcome related to graphics, e.g., 3D visualization of the monuments.

Project Connect and align ELIXIR Nodes to deliver sustainable FAIR life-science data management services: The project aimed to enhance and align ELIXIR, European life sciences infrastructure, nodes to provide sustainable and FAIR-compliant (Findable, Accessible, Interoperable, and Reusable) life-science data management services. By fostering collaboration and developing essential resources, the project results empower researchers with tools and best practices for efficient data management. CTU played an active role in several key work packages, contributing to training, toolkit development, and SARS-CoV-2 data tracking solutions. CTU contributed to the development of user documentation and training materials for the Data Stewardship Wizard (DSW). We also delivered training sessions focused on data management planning using DSW, equipping researchers with the knowledge and tools necessary for effective data stewardship. We contributed to the development and enrichment of RDMkit (<https://rdmkit.elixir-europe.org>), a comprehensive resource for the best practices in research data management. Our key contributions included Bi-directional integration between DSW and RDMkit. CTU developed a proof-of-concept solution for the FAIRification of Czech COVID-19 data from COG CZ, leveraging FAIR Data Point technology. This work aimed to transition COVID-19 data from a human-readable format, as presented on the <https://virus.img.cas.cz> website, to a machine-actionable format that adheres to the FAIR principles. This approach demonstrated how structured data management could facilitate machine access and automation, ensuring greater usability and integration within broader scientific research frameworks. The project was coordinated by the European Molecular Biology Laboratory, Heidelberg, Germany, with a total of 58 participants: <https://cordis.europa.eu/project/id/871075>.

Project Development and testing of algorithms for predictive behavioral analysis of persons crossing the EU's external borders: The objectives of the project were to create a system for early detection of persons crossing the external borders of the EU and the Czech Republic. The project

outcomes include the description of the analysis of the available data and their applicability for behavioural analysis of persons, a detailed description of the algorithms examined and an evaluation of their quality and scalability. It covers also ensembles (combinations) of the selected algorithms. A web application was created, which is the main software output presenting the results of the algorithms and enabling the user's own exploratory analysis.

Table 3.3.1 Projects supported by public funds

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
Czech science foundation	logicMOVE: Logic Reasoning in Motion Planning for Multiple Robotic Agents				870 / 34 320	961 / 37 909
Czech science foundation	The structure of free Banach spaces and of their second duals				1 143 / 45 089	1 143 / 45 089
Czech science foundation	New Frontiers in Computational Social Choice				1 557 / 61 420	2 114 / 83 393
Czech science foundation	Local-global problems over number fields				446 / 17 594	1 338 / 52 781
Czech science foundation	Paradoxical flexibility of frameworks				67 / 2 643	835 / 32 939
Ministry of education youth and sports	International Mobility of Researchers MSCA-F-I at CTU in Prague					1 178 / 46 469
Czech science foundation	Rigorous Engineering of Data Analysis Pipelines (RiGiD)					10 090 / 398 028
Technology Agency of the Czech Republic	Development of a communication assistant using artificial intelligence and					2 678 / 105 641

²⁵ If the provider is from abroad, please indicate the provider's country of origin in brackets. For the determination of the country of origin of the provider, the place of residence of the provider is decisive.

²⁶ Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

	the created knowledge base in the field of industrial property					
Ministry of education youth and sports	Research Center for Informatics	9 337 / 368 323	11 366 / 448 363	13 004 / 512 978	11 401 / 449 744	6 647 / 262 209
Ministry of education youth and sports	Center for advanced applied sciences	492 / 19 408	474 / 18 698	461 / 18 185	435 / 17 160	184 / 7 258
CESNET, z.s.p.o.	Videostream Hunter			487 / 19 211	198 / 7 811	
Ministry of education youth and sports	International Mobility of Researchers in CTU	627 / 24 734			879 / 34 675	
Ministry of education youth and sports	Big Code: Scalable Analysis of Massive Code Bases	7 247 / 285 878	9 564 / 377 278	9 917 / 391 203	10 662 / 420 592	
Ministry of education youth and sports	Mobility CTU - STA				2 156 / 85 049	315 / 12 426
European Commission	Evolving Language Ecosystems	9 123 / 359 882	9 601 / 378 738	8 166 / 322 130	4 502 / 177 594	
Ministry of the interior of the Czech Republic	Development and testing of algorithms for predictive behavioral analysis of persons crossing the EU's external borders	1 558 / 61 460				
Czech science foundation	Tight Parameterized Results for Directed Connectivity Problems	540 / 21 302				
Czech science foundation	Superintegrable systems in magnetic fields in three spatial dimensions	452 / 17 830				
Czech science foundation	Selected topics in non-linear functional analysis and approximation theory	2 200 / 86 785	2 038 / 80 394			

Czech science foundation	Efficient String Matching for Bioinformatics	994 / 39 211	999 / 39 408			
Czech science foundation	Intelligent Algorithms for Generalized Variants of Multi-Agent Path Finding	1 097 / 43 274	842 / 33 215	754 / 29 744		
Total		33 926 / 1 338 304	34 884 / 1 376 095	32 789 / 1 293 452	34 316 / 1 353 688	27 483 / 1 084 142
In the role of another participant						
Provider ²⁷	Project name	Support (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
Ministry of the interior of the Czech Republic	Tools for AI-enhanced Security Verification of Cryptographic Devices				2 939 / 115 937	2 961 / 116 805
Ministry of the interior of the Czech Republic	Flow-based Encrypted Traffic Analysis				2 966 / 117 002	3 377 / 133 215
Ministry of culture czech republic	Most – a city that did not disappear					651 / 25 680
Czech science foundation	Advancing the frontiers of first-principle modeling of atomic nuclei				218 / 8 600	738 / 29 112
European Commission	DigiQ					26 / 1 026
Czech science foundation	Selected questions of discrete and computational geometry					525 / 20 710
Technology Agency of the Czech Republic	Creation of advanced risk analysis and a software tool for the purpose of identification of risk subjects on their entrance to the VAT system		1 023 / 40 355	2 455 / 96 844	2 455 / 96 844	1 432 / 56 489

²⁷ Ibid.

Technology Agency of the Czech Republic	Development of equipment for automatic evaluation of defect indications, magnetic powder method and fluorescent penetration method			2 912 / 114 872	2 912 / 114 872	2 912 / 114 872
Technology Agency of the Czech Republic	Analysis of thematic clusters from the field of current cultural and social categories and their application to literary works of Czech 19th and 20th century			621 / 24 497	828 / 32 663	828 / 32 663
Technology Agency of the Czech Republic	Plant biomass in sustainable landscape: Learning platform on photosynthesis of terrestrial and aquatic plants to know the plant role in the landscape			339 / 13 373	678 / 26 746	679 / 26 785
Ministry of culture czech republic	Dowry Towns of the Queens of Bohemia (A living part of historical consciousness and its support of the instruments of historical geography, virtual reality and cyberspace)	678 / 26 746	683 / 26 943	772 / 30 454	683 / 26 943	
Czech science foundation	Combinatorics on words formalization		602 / 23 748	656 / 25 878	656 / 25 878	
Technology Agency of the Czech Republic	Software for evaluation of age with use of pelvis in Retrospective Anthropology,		421 / 16 607	463 / 18 264	505 / 19 921	

	Archeology and Forensic Sciences					
Ministry of education youth and sports	Czech National Infrastructure for Biological Data		3 241 / 127 850	3 001 / 118 383	2 942 / 116 055	
European Commission	Connect and align ELIXIR Nodes to deliver sustainable FAIR life-science data management services'			708 / 27 929	530 / 20 907	
Czech science foundation	Governance support tools for dynamic aspects of Big Data environments	1 771 / 69 862				
Czech science foundation	Fusion-Based Knowledge Discovery in Human Activity Data	1 112 / 43 866	1 112 / 43 866			
Total		3 561 / 140 473	7 082 / 279 369	11 927 / 470 493	18 312 / 722 367	14 129 / 557 357

Table 3.3.2 - Contract research activities

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				2023
		2019	2020	2021	2022	
1st Cloud Republic a.s.	Software tool for checking in changes to tasks between scientific departments, report on the validation of the software tool in collaboration with the Hydrolanaut research laboratory			599 / 23 627		
ACREA CR, spol. s r.o.	Text data analysis - entity extraction. SW realised as an independent functional module based on the "state of the art" BERT technology					2 077 / 81 949
AGC Flat Glass Czech a.s.	Detection of matted glass defects	344 / 13 556				
CESNET, z. s. p. o.	Code development for Internet of Things (IoT) sensor	10 / 403				
CESNET, z. s. p. o.	Expert cooperation focused on implementation, debugging and testing work on systems developed by CENET's interest group as well as hardware development, software development and web technologies.	875 / 34 534	1 049 / 41 394	1 213 / 47 845	1 058 / 41 722	913 / 36 000
CLOUDAPER s.r.o.	Analysis, design and implementation of software solutions for intelligent document content			234 / 9 243		

²⁸ If the client is from abroad, indicate in brackets the country of origin of the client.

	analysis using advanced artificial intelligence methods, conceptual modelling, software engineering and technologies available to the contractor.					
Cogniware, s.r.o.	Image classification in the project Creation of an image classification tool.					74 / 2 924
CompuGroup Medical Česká republika s.r.o.	UX analysis of SW for doctors within the project UX testing of SW for doctors, the purpose is to evaluate the time efficiency of the tested SW for doctors.		101 / 3 970			
DataMole, s.r.o.	Dairy Barn Simulaton, Behavior analysis of dairy cattle, Predictive maintenance of sensoric devices, Computational Infrastructure	1 268 / 50 013	1 227 / 48 390	726 / 28 639	430 / 16 973	297 / 11 732
EDAG Engineering CZ, s.r.o.	Research and development of methods to innovate the field of using machine learning methods to improve computational networks.					720 / 28 400
GoodAI Research s.r.o.	Research and development of methods in the field of multi-agent systems optimization.		496 / 19 570			
IMAGE CZ, a.s.	Development of a web application that will enable the client to keep more detailed records of orders and facilitate work in buying, selling and managing media campaigns using data sources and third-party software.		597 / 23 541			
INRIA Domaine de Voluceau [France]	Creation of type inference of dynamically typed languages and its use. Extension of information on method parameters. Refining the list of method call points and method implementations.					146 / 5 764
Institut mikroelektronických aplikací, a.s.	Creation of a hand gesture classification algorithm based on classical image processing methods.		121 / 4 773			
Jihočeský vědeckotechnický park, a.s.	A software tool for data stream classification.	242 / 9 546				
LearnerOn SE	Advanced innovative data structures in support of lifelong learning. Creation of an ontological model of the application domain, data models and analysis of suitable technologies for their implementation.			499 / 19 665		
Lesíkář a.s.	Resilience of TSAES and TS3DES tachographic sensors to differential sampling analysis	351 / 13 842				
Manta Tools, s.r.o.	Tools for governance of dynamic aspects of Big Data environment.	128 / 5 066	195 / 7 696	78 / 3 085	142 / 5 612	165 / 6 521
MarketUp s.r.o.	Centralized media plan as a browser executable application, connected to a cloud database and definition of its interface for communication with other systems.			580 / 22 883		
Meteopress, spol. s r.o.	Research and development of methods to innovate the field of radar rainfall forecasting.			1 356 / 53 491		
Meteopress, spol. s r.o.	Research and subsequent development, implementation and validation of advanced methods for modelling and predicting the movement of storms and precipitation using a		1 195 / 47 159			

	combination of mathematical modelling and artificial intelligence methods.					
Monster Worldwide CZ s.r.o.	Development of research methods in the field of multiagent systems.					296 / 11 694
Národní úřad pro kybernetickou a informační bezpečnost (National Cyber and Information Security Agency of the Czech Republic)	Secure use of OpenSource libraries.					182 / 7 160
Národní úřad pro kybernetickou a informační bezpečnost (National Cyber and Information Security Agency of the Czech Republic)	Possibilities and security aspects of remote exchange of a part of firmware in a cryptographic resource.				593 / 23 389	
NetRex s.r.o.	SW for video analysis of customer behaviour before entering a retail branch.			599 / 23 627		
Obec Dolní Břežany	Extension of the virtual exposition on the territory of the national cultural monument Závist - modern forms of extension of the infrastructure for CR - stage 2: mobile and internet application.					384 / 15 149
Oxford University Press	Consultancy Services			380 / 14 977		
Parker-Hannifin Česká republika s.r.o.	Optimization of the vision system of the PVA facility on the SRR5 line.			36 / 1 432		
PAS Procesní Automatizace s.r.o.	Automatic system for detection of leaks from pipelines.					803 / 31 657
Poster Media Network s.r.o.	SW solution BOSS 4.0, extension of the advertising space management module to include equipment/advertising space operation and registration.			601 / 23 713		
PRAGOEDUCA s.r.o.	Innovation and development of the knowledge portal - analysis of the status, design and implementation of a new version of the portal in order to achieve a better user experience.			261 / 10 310		
PROKOP & BROŽ s.r.o.	Design and prototype implementation of a specialised information system for the management of a specific custom production - luxury watch manufacturing.			304 / 11 981		
PROZETA Broadcasters s.r.o.	Detection algorithms for motion tracking - creation of a proof-of-concept modular information system that can be connected to the company's smart cameras, capable of automated image processing using other data provided by the cameras.		604 / 23 818			

Remmark, a.s.	Data platform for marketing communication.			3 825 / 150 888		
Saint-Gobain Construction Products CZ a.s.	Process data correlation - AI analysis.			399 / 15 751		
Saint-Gobain Construction Products CZ a.s.	Artificial intelligence project for dome furnace ČA1.		448 / 17 661			
Second Foundation s.r.o.	Research and development in the field of optimization of multiagent systems.					339 / 13 365
ŠKODA AUTO a.s.	Beta Phase of the AeroInterferences.	1 137 / 44 868				
ŠKODA AUTO a.s.	Fluctuation analysis.	424 / 16 706				
ŠKODA AUTO a.s.	Requirements for processing of AE optimization	1 461 / 57 636				
ŠKODA AUTO a.s.	Finding Aero-Interferences - Working out of PoC	1 554 / 61 311				
ŠKODA AUTO a.s.	AI optimization of CCX settings - Implementation for SK 326/0 PA		301 / 11 885			
ŠKODA AUTO a.s.	Modification of AI/ML wheel model for MP - Whole car parameters		301 / 11 885			
ŠKODA AUTO a.s.	Tire properties for AI		254 / 10 024			
ŠKODA AUTO a.s.	HPC Digital Twin - Completion		1 283 / 50 596			
ŠKODA AUTO a.s.	2020 EBW 006 "AI optimization of CFD solver setup		1 800 / 71 001			
ŠKODA AUTO a.s.	HPC digital twin - environment modelling		145 / 5 728			
ŠKODA AUTO a.s.	HPC digital twin - data and base model		145 / 5 728			
ŠKODA AUTO a.s.	HACKFIT 2020		61 / 2 387			
ŠKODA AUTO a.s.	076-2021 Implementation AI 076-2021			1 832 / 72 285		
ŠKODA AUTO a.s.	061-2021; Extension AI Model			303 / 11 933		
ŠKODA AUTO a.s.	Completion of MGV, modification of AI model (048-2021; Extension of MGV with AI)			303 / 11 933		
ŠKODA AUTO a.s.	AI in the EPA for the inlet to the aggregate			206 / 8 114		
ŠKODA AUTO a.s.	Feasibility study for SkodaLab				336 / 13 258	
ŠKODA AUTO a.s.	Artificial Intelligence 26753991/611				290 / 11 456	
ŠKODA AUTO a.s.	FIM phase 1				1258 / 49 641	
ŠKODA AUTO a.s.	WAI development for ELROQ				290 /	

					11 456	
ŠKODA AUTO a.s.	AI in EPA Phase 2				271 / 10 692	
ŠKODA AUTO a.s.	Validation set analysis.					375 / 14 797
ŠKODA AUTO a.s.	Icing Prediction.					223 / 8 783
ŠKODA AUTO a.s.	WAI model development and tools					290 / 11 456
University of Bergen [Norway]	Cooperation with FIT		451 / 17 799			
Ústav organické chemie a biochemie AV ČR, v.v.i.	Implementation study for the ELIXIR allhands project	34 / 1 327				
Valeo Autoklimatizace k.s.	Research and development of methods for innovation in the field of IT projects		68 / 2 683			
Vzdělávací a diagnostické centrum, s.r.o.	Application of artificial intelligence and image analytics for the educational product iSophi SMART 3.0.			603 / 23 770		
Vzdělávací a diagnostické centrum, s.r.o.	IT system iMAT Portal for the creation of diagnostic materials.			599 / 23 627		
Vzdělávací a diagnostické centrum, s.r.o.	Design and implementation of appropriate software tests for the iSophi IT system.		253 / 9 966			
WDF s.r.o.	Research and development in the area of conversational intelligence with design of chatbot framework solution.			73 / 2 878		
WDF s.r.o.	Device localization based on WiFi signal.					148 / 5 847
Total		7 828 / 308 809	11 095 / 437 653	15 608 / 615 698	4 669 / 184 198	7 433 / 293 199

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁹, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

²⁹ See Terms definition.

Self-assessment:

Software Data Stewardship Wizard:

The Data Stewardship Wizard (DSW) software has been developed to streamline and enhance data stewardship practices. Effective data stewardship is essential to ensure the quality, accessibility, and long-term usability of research data. The importance of structured Data Management Plans has been widely recognized by major funding agencies and institutions. DSW was started as part of the ELIXIR CZ infrastructure services provided by CTU. Over time, it has evolved into a widely recognized and adopted tool for data management. A major milestone in its development was its adoption by the entire European ELIXIR infrastructure, which led DSW to be awarded the ELIXIR Recommended Interoperability Service status. DSW has acquired a strong global user base within the three user groups: researchers, data stewards, and funders and evaluators. The cloud-based service operated by ELIXIR currently has approximately 6,500 registered users. Additional users rely on on-premises installations, as DSW is open-source. While the exact number of these users cannot be counted, numerous institutional installations exist worldwide. Another key indicator of DSW's success is its commercial uptake. Several companies have developed commercial versions based on the open-source framework, demonstrating its value beyond academia and research. This commercial interest contributes to its sustainability, continuous improvement, and long-term innovation. DSW also plays a crucial role in national and international initiatives: 1) EOSC CZ (National Repository Platform) (2024-2028): DSW is a key component of this national project aligned with the European Open Science Cloud goals. It helps to ensure that research data are managed in accordance with FAIR principles and supports the national research infrastructure in providing sustainable and transparent data stewardship; 2) Horizon Europe project OSTrails: DSW is actively contributing to this Horizon Europe project, which focuses on improving data stewardship practices across disciplines, further reinforcing its role in fostering best practices in research data management. The homepage of DSW is <https://ds-wizard.org>. The software is one of the outcomes of the project Czech National Infrastructure for Biological Data.

Software ipfixprobe:

The ipfixprobe software is an open-source tool for network traffic monitoring, available at <https://github.com/CESNET/ipfixprobe>. A server with ipfixprobe and a network interface can be used to analyze and aggregate IP packets into IP flows that represent network conversations. The ipfixprobe software is optimized for high speeds at the magnitude of hundreds of gigabits per second. Additionally, it can be used with smaller embedded devices such as a router with OpenWrt system, especially Turris routers by CZ.NIC – a large association operating the domain name registry for the .cz domain. It has been used for creating many useful and popular datasets for traffic analysis and research in machine learning applied for network monitoring and security. Users of ipfixprobe are primarily from academic institutions and government offices. This technology is deployed to monitor peering lines of CESNET, the Czech national research and education network. It is also used in ROWANET, part of the backhaul of the network in the Czech Republic. There are instances in universities in Munich, Dresden and Brno.

Software MassSpecBlocks:

The MassSpecBlocks software tool is relevant for laboratories focused on metabolomics experiments (i.e., the analysis of small molecules) which are equipped with mass spectrometers. However, it can also be used by other researchers working in bioinformatics/cheminformatics who are interested in the compositions of small molecules from various building blocks. Currently, the tool is used at the

Laboratory of Molecular Structure Characterization at the Institute of Microbiology of the Czech Academy of Sciences, to study the structures of nonribosomal peptides, polyketides, and siderophores that may serve as potential markers of infectious diseases caused by bacteria and fungi. At this moment (March 2025), the tool (<https://ms.biomed.cas.cz/msb>) has about 30 registered users.

Software for automatic evaluation of defects:

The device for detecting and evaluating defects using magnetic powder (MPI) and fluorescent penetrant (FPI) methods represents the final stage of automation in Industry 4.0. Quality control of metal products is a crucial step in their entire manufacturing process. Each method (MPI or FPI) enhances defect indications in metal products through a combination of chemical processes (such as an appropriate solution, developer, etc.) and physical processes (such as part magnetization, fluorescence, etc.). The inspected product passes through the production line, undergoes the mentioned chemical and physical processes, and is ultimately evaluated in terms of quality. Defect detection and classification are still the most commonly performed by quality control workers.

Manual inspection takes place in a darkened room using UV lamps, where quality control workers examine each product in a three-shift operation, visually inspecting the defect indications highlighted through chemical and physical processes. The worker must identify the indication and then assess its severity. Due to the required precision and overall success rate, the majority of workers are women.

The result is a fully automated production line (consisting of HW and SW), where previously manual tasks have been completely replaced by machines, primarily in the area of visual inspection. A robot equipped with a camera and UV light replaces the worker handling the product (HW), while an algorithm based on image processing and artificial intelligence methods replaces the objective part of defect indication detection and severity assessment (SW).

The positive impact on society is mainly in eliminating manual inspection, thereby improving working conditions for quality control personnel—especially considering that most of them are women. Another positive outcome is the creation of an objective, robust, and scalable technology for quality control of critical metal products—components that are now present almost everywhere.

The software is one of the outcomes of the project Development of equipment for automatic evaluation of defect indications, magnetic powder method and fluorescent penetration method.

Software System for semi-automatic creation of datasets:

The System for Semi-Automatic Dataset Creation is built on the Python-based software called Traffic Capture Infrastructure (TCI), which enables centralized control of the traffic capture process through monitoring probes. The infrastructure consists of a hive component, running on a central server or within a virtual machine, and monitoring probes equipped with drones that receive capture requirements from hive. Its primary goal is to provide real-world network traffic data samples for research purposes. By enabling researchers to move beyond synthetic, lab-generated datasets—whose real-world relevance is often questionable—the system facilitates significant advancements in computer networking research. To date, it has been used to generate at least eight distinct datasets, which have collectively recorded over 2,000 unique downloads from researchers worldwide (the most downloaded are these zenodo.org/records/5956044, zenodo.org/records/3906526, zenodo.org/records/4911551).

Additionally, the CESNET association leverages this system to semi-automatically capture ongoing

network attacks for forensic analysis and investigation, helping the security teams to quickly identify threats and protect the national e-infrastructure and its critical resources more efficiently. The presentation about this system was accepted at an annual Cisco Live! event in Amsterdam, where a huge community listens to emerging technologies related to Cisco, such as TCI deployable in Cisco products as a docker container.

The flexibility of the TCI system's deployment, spanning small personal networks to high-speed provider networks, is highly beneficial for real-world deployments. This simplifies the collection process of network traffic datasets and brings an ecosystem of additional modules for dataset quality evaluation. It also brings awareness and best practices for building datasets. The software is one of the outcomes of the project Flow-based Encrypted Traffic Analysis.

Software The collection of classification modules detecting security threats:

The collection of classification modules represents a technological breakthrough in encrypted traffic analysis that quickly found its users from the security community. These modules have been deployed within the national e-infrastructure managed by the CESNET association, protecting over half a million users and computational resources. For example, the crypto-miner detector protects Metacentrum—a distributed super-computational grid—against resource misuse. Furthermore, the National Center for Cyber Operations of Ministry of Defense has integrated this technology to protect critical state infrastructure. The software is one of the outcomes of the project Flow-based Encrypted Traffic Analysis.

3D time travel through Hradec Králové (Virtual reality application):

A virtual reality application that displays expert historical reconstructions of buildings that no longer exist in the city of Hradec Králové. The historical reconstructions of buildings were created based on archival, historical and building-historical research using the tools of historical geography. The application works with 3D models of these buildings and is implemented using Unreal 4D engine. The application is used in the Museum of East Bohemia in Hradec Králové in an attractive journey through time. It is one of the outcomes of the project Dowry Towns of the Queens of Bohemia (A living part of historical consciousness and its support of the instruments of historical geography, virtual reality and cyberspace).

Table 3.4.1 - Overview of research results in the period under evaluation

Type of result ³⁰	Year of application	Name
Software	2021	Software tool for IPFIX flows export (ipfixprobe)
Software	2021	Data Stewardship Wizard
Software	2021	MassSpecBlocks
Software	2022	Device for automatic evaluation of defect indications by the magnetic powder method and the fluorescent penetration method
Software	2022	3D time travel through Hradec Králové (Virtual reality application)
Software	2022	System for semi-automatic creation of datasets
Software	2022	The collection of classification modules detecting security threats

³⁰ Specify the specific type of result. Add rows as needed.

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)³¹, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).³²

Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

Self-assessment:

At FIT CTU, responsibilities related to technology transfer and communication with the commercial sector have been assigned to a dedicated position – the Vice-Dean for Industry Collaboration, under whom a fully established office operates.

The Office for Cooperation with Industry represents a well-established system dedicated to this agenda. Its primary focus is on developing and maintaining strategic partnerships with the commercial sector, increasing the conversion rate from sponsors to long-term partners, identifying and engaging potential partners, facilitating communication, pinpointing faculty areas suitable for contract research, supporting technology transfer, building and maintaining an experienced and high-quality office team, and raising awareness of its activities within the faculty.

Currently, the most common form of transferring research results into practice is through the implementation of contract research for commercial companies. Here, we can identify two primary types of users – (1) companies already collaborating with the faculty (Partners) and (2) newly incoming commercial firms [see the examples below]. The Department for Cooperation with Industry is responsible for communicating with both types and setting up their collaboration.

The office maps the expertise, specializations, and capacities of internal faculty resources, including specialized laboratories, research groups, and individual offices and staff. This allows it to maintain

³¹ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

³² If the commercialisation of R&D&I results is carried out in this way.

the most comprehensive overview of faculty capabilities and to identify the best match between industry needs and the faculty's expertise.

Additionally, the office is responsible for identifying new industry partners. It continuously monitors the current network of partnering companies and seeks out new potential partners, typically in the IT or banking sector (3) or manufacturing industries (4). This enables the office to proactively respond and represent the entire faculty in negotiating potential contract research projects. Manufacturing companies are of particular interest, as their growing need for data-driven production management and quality enhancement through automated output control presents significant opportunities for collaboration.

Through continuous communication with industry partners, the office encourages them to submit real-world research challenges, engage in joint research projects, and support PhD students via the Industrial PhD framework. Research projects and PhD student support also provide ideal knowledge-transfer opportunities, including collaborations with state enterprises or even national security agencies (5).

The office is also responsible for presenting industry partners and their opportunities, needs, and offerings to faculty students. A key initiative in this area is the annual career fair, a full-day event where students and industry representatives meet in person and establish connections. As of 2023, this event has been a well-established activity for nine years and is highly popular among students. Due to high demand, participation in the fair is exclusively reserved for official faculty Partners.

This strong mutual awareness between students and industry partners enables knowledge transfer through academic projects and final theses. The office actively facilitates this process, ensuring that student work can have a direct impact on industry.

5 examples of most typical users of our results follow.

(1) Partner Company

The most common user of research results transferred into practice is a Partner company. This is primarily because Partners maintain ongoing communication with the faculty, allowing the faculty to be well acquainted with their focus and needs while actively negotiating collaboration and responding reactively to their requirements. The most frequent forms of collaboration include participation in joint grant projects under the Technology Agency of the Czech Republic (TA CR) or the Ministry of Industry and Trade (MPO), research projects funded by the Czech Science Foundation (GA CR), support for PhD students and their research, commercialization of academic projects, and fulfilling specific demands for contract research.

(2) New Company

Another user of research results transferred into practice is a commercial company that has not yet collaborated with the faculty. These are typically technology firms seeking expertise in artificial intelligence, data science, statistics, cybersecurity, or image analysis. Such companies most often engage in contract research, commercialization of academic projects, or, in rare cases, participation in joint technological or research projects.

(3) Banking Sector

Due to the nature of its business, the banking sector is another typical user of research results. Contract research projects in this area usually involve expertise in time series analysis, value prediction, anomaly detection, classification of suspicious data, and statistical modelling. Banks primarily seek collaboration in the form of contract research or commercialization of academic projects.

(4) Manufacturing Enterprises

With increasing demands for quality assurance, manufacturing enterprises are another key user of research results. The faculty data science and image processing laboratories are ideal partners for the most common requests in contract research, which include production process monitoring, predictive maintenance, data storage optimization, and automated visual inspection. Occasionally, these companies also engage in joint projects or academic project commercialization.

(5) Government and Security Agencies

Another frequent user of the research results is the government sector and security agencies. These collaborations typically involve security-related research projects, where the preferred form of cooperation is through joint research initiatives. However, due to the sensitive nature of these projects, they are often under a non-disclosure agreement.

Commercialization of R&D&I results

The faculty's income of licences is slowly increasing. While in recent years, there are some, in the selected period of 2019 - 2023 the only notable income from licences is the income from licencing of final theses. At the faculty, assignments of final theses from an industry partner rare in the form of working on a real problem of the partner. Such assignments are now very common. They mostly concern the development or improvement of internal processes or software of the company. The faculty decided to respond to this by introducing an internal process leading to the joint commercialisation of school works in the form of a fee-based waiver of the right to licence the commercialisation of school work. The administrative fee introduced in this way allowed for less control over the results of the theses produced and therefore the transfer of the results into practice. Let us give examples of such theses: Security analysis of smart lockers, Multiple Object tracking in Top-View CameraVideo-Sequences, Versatile Hardware Framework for Elliptic Curve Cryptography, Robust flash memory bootloader for a microcontroller over near field communication or A model for dictated number recognition for an interactive voice response (IVR) company.

As for other sources of income besides licencing incomes, the faculty has partners involved in the Industrial PhD framework, sponsoring a specific student, partners supporting talented students (in the form of donations).

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

Type of revenue	Revenue (in thousands CZK/EUR)

	2019	2020	2021	2022	2023
Industrial PhD framework		432 / 17 041	1 056 / 41 657	480 / 18 935	600 / 23 669
Support for talented students	131 / 5 160	150 / 5 917		145 / 5 704	12 / 473
Donation made to support the education of PhD students, specifically for the Computer Architecture and Diagnostics seminars	130 / 5 128				
Licensing of final theses		110 / 4 339	120 / 4 734	170 / 6 706	60 / 2 367
Total	692 / 27 298	1 176 / 46 391	795 / 31 345	672 / 26 509	692 / 27 298

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

FIT CTU is regularly involved in popularization and communication with the public by organizing or participating in various activities and events (lectures, seminars, summer schools, excursions, fairs, competitions...) and publishing news and scientific and other achievements of students and employees of the faculty, especially on the web, social networks and through the media. As part of the popularization of science and information technology, FIT experts and scientists also appear in the media and present these areas, their applications and future visions to the general public.

Specific examples:

Technology [Podcast Ones and Zeros](#), which the faculty started publishing in 2021. The goal is to let listeners get a glimpse into the world of IT and show them how it affects the world around us. The podcast is therefore also suitable for the general public. Interesting questions from the world of ones and zeros are answered directly by experts from FIT CTU in the podcast. Some of the most popular episodes are:

- Why is mathematics important for computer science?
- How do algorithms recommend content on the Internet?
- When will drones deliver our shopping?
- Can we live without artificial intelligence?
- What are the risks of using the same passwords?
- How can artificial intelligence be used in space exploration?

<https://fit.cvut.cz/cs/zivot-na-fit/aktualne/podcast>, in Czech only.

The next example of PR activities is organizing events for high school students, the number of which has grown significantly in recent years. Throughout the year, FIT CTU organizes excursions to

laboratories, during which they can learn about new technologies. In May, a two-week internship is held for students of secondary industrial schools. In July and August, summer schools are available for high school students on various topics according to current trends. Newly, the faculty conducts one-day workshops for high school students on weekends. A traditional event is the Open House, which is held twice a year and is not only for prospective students but is also open to the public.

The number of public outreach events in which faculty participates has also increased. Traditional events include the Researchers' Night, Science Fest or the CTU Children's Summer University. In recent years, the faculty has been involved, for example, in the Science Fair, AI Days, or Maker Fair. At these events, FIT experts and their students present the world of IT in an entertaining way through faculty projects and practical theses.

The next example is FIKS, which stands for FIT Computer Science Correspondence Seminar and is a competition for high school students interested in computer science, mathematics and programming. Students solve interesting algorithmic problems over the course of several months and receive feedback and comparison with other solvers. The best of them are invited to a joint camp, and successful solvers can even be admitted to a Bachelor's degree without an entrance exam.

Another example is the series of lecture called Informatics Evenings, where domestic and foreign experts from the world of IT present. The series is open to the public and a recording is made of most events, which is publicly available on the faculty's website and YouTube channel for all interested parties.

The faculty research group Graphs, Games, Optimization, Algorithms, Theoretical Computer Science (G²OAT) of FIT CTU organizes the G²OAT Seminar focused on the areas of its research. The speakers are both members of the group and other FIT CTU academics, as well as external guests, including foreign ones.

Every year, FIT CTU organizes the LAW FIT conference, a meeting of experts who discuss current issues linking the fields of law and information technology. The conference is open to students and the public.

FIT regularly concludes new memoranda of cooperation and joins various initiatives and alliances, the outputs of which are also educational and popularization activities for the public and applicants. For example, FIT has been a member of the Alliance for Electrical and Computer Engineering since 2024 with the aim of increasing interest in IT fields. In 2023, FIT signed a Memorandum of Cooperation with the House of Lobkowicz with the aim of digitising and making the Lobkowicz collections accessible to the general public.

FIT participates in the prg.ai initiative, which seeks to nurture new AI talent at various levels of education, from teaching AI in high schools and universities to upskilling employees and the public.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

Recommendation 3.2:

In the past years, we also obtained some larger projects (BigCode, Polirural+, Rigid), lowering the disbalance between small and large project numbers. We consider this growth to be natural, as large project requires a better prepared administration with sufficient know-how. In 2019, we had about 1.5 FTE of experienced project managers, while at this moment, in 2025, we are over 4.5 FTE. The benefit of small projects is as follows: they are simple to administer, important for researchers to gain experience and items for their CV, and mostly risk-free of additional costs.

Recommendation 3.3 and 3.7:

While we were not able to significantly increase our incomes from licences, we have managed to increase incomes from licencing of final theses results and we have been constantly improving our system of cooperation with industry. We have decided to build a sustainable model of collaboration with industrial partners through the Faculty Partnership Program. Since its inception, this program has gradually expanded from an initial 40 companies to approximately 60 partners in the field of information technology. Instead of a one-time transfer of technologies, we strive for long-term relationships with companies of various sizes that engage with the academic environment and gradually increase their involvement.

The program is divided into three levels of partnership (gold, silver, bronze), allowing companies to enter into collaboration flexibly and increase their commitment according to their capabilities and needs. Companies remain engaged over the long term, contribute to student education and research, while the faculty benefits from stable financial support.

Each partner contributes approximately 100,000 CZK annually, which is utilized by the faculty as part of its supplementary activities. These financial resources are used to support educational and research activities, creating a positive impact not only on faculty but also on industrial partners.

Our jobs fair called COFIT is a proof that the Partnership Program creates and increases the involvement of companies at the Faculty (<https://fit.cvut.cz/en/cooperation/for-students/cofit-job-fair/past-events>).

Recommendation 3.5:

As already mentioned, the faculty methodology to evaluate research outputs has been incrementally improved to fit our needs. For instance, in contrast to the university and state-level methodology, it includes evaluation of conferences which are important for many research domains at the faculty. The increase in quality can be seen in the data: 1) articles with a co-author from FIT, ranked by best AIS quartile - 2019: Q1:7, Q2:10, Q3:7, Q4:3; compared to 2023: Q1: 15, Q2: 18, Q3: 6, Q4: 4; 2) conference proceedings with a co-author from FIT, ranked by CORE ranking,

if available, otherwise internal ranking (using CORE grades): 2019: A*: 6, A: 18, B: 48, C: 62; compared to 2023: A*: 11, A: 20, B: 29, C: 69.

Recommendation 3.6:

At the faculty level, we have not implemented a system that would aim to increase the number of interdisciplinary projects. In other words, such projects are rather ad-hoc or within an already established cooperation.

Recommendation 3.11 and 3.12:

We have further developed our internal methodology for evaluation of scientific outputs to incentivise quality and included the possibility of ad-hoc faculty level rewards for specific achievements.

Recommendation 3.12:

FIT CTU has been actively involved in popularization for a long time. In recent years, we have set up new processes in internal communication and increased the cooperation of the Office of Public Relations with individual faculty departments and other departments, such as laboratories or research groups. This has had a positive effect both in terms of greater involvement of faculty experts in popularisation events and in obtaining more information about the results and achievements of individuals and groups, which the Office of Public Relations then uses to promote the faculty.

The Office of Public Relations publishes the results in the form of press releases to the media and actively collaborates with the media (<https://fit.cvut.cz/cs/media-a-pr/tiskove-zpravy>, <https://fit.cvut.cz/cs/media-a-pr/fit-v-mediich>, in Czech only), on the faculty and university websites, on faculty and university social media (IG, FB, X, LinkedIn and YouTube) and in internal communications. For example, in the evaluation period (2019-2023), FIT CTU issued 93 press releases and had just under 700 media outputs, including media such as Czech Television, Czech Radio, Forbes, CzechCrunch and Vědavýzkum.cz. Moreover, FIT CTU is regularly involved in many popularization events, such as Researchers' Night, Science Fest, CTU Children's Summer University, Science Fair, AI Days or MakerFair. At these events, FIT experts and their students present the world of IT in an entertaining way through faculty projects and practical theses.

In 2021, the faculty's Office of Public Relations began publishing a technology podcast, called Ones and Zeros. In the podcast, the experts from FIT CTU answer interesting questions from the world of ones and zeros.

In addition to the podcast, the Office of Public Relations also produces other multimedia outputs such as videos, which are also produced in cooperation with the new faculty Recording Studio. Thanks to state-of-the-art technology and staffing, it supports the creation of online teaching materials and the presentation and popularisation of science and research.

The faculty has also created a new lecture series from the research group Graphs, Games, Optimization, Algorithms, Theoretical Informatics (G²OAT) at FIT CTU, focusing on the areas of its research.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)
AI Awards Success Story	3.3.	https://fit.cvut.cz/en/life-at-fit/fit-live/success-stories/20408-precipitation-forecast-research-using-ai-made-it-to-the-finals-of-the-ai-awards
NERD Reputation Database	3.3.	https://github.com/CESNET/NERD
RDMkit	3.3.	https://rdmkit.elixir-europe.org
Fair data / COVID-19	3.3.	https://virus.img.cas.cz
ELIXIR-CONVERGE project page	3.3.	https://cordis.europa.eu/project/id/871075
Data Stewardship Wizard Homepage	3.4.	https://ds-wizard.org
Software ipfixprobe	3.4.	https://github.com/CESNET/ipfixprobe
Software MassSpecBlocks	3.4.	https://ms.biomed.cas.cz/msb
Archived Dataset fo Software System for semi-automatic creation of datasets 1	3.4.	https://zenodo.org/records/5956044
Archived Dataset fo Software System for semi-automatic creation of datasets 2	3.4.	https://zenodo.org/records/3906526
Archived Dataset fo Software System for semi-automatic creation of datasets 3	3.4.	https://zenodo.org/records/4911551
Podcast Ones and Zeros (in Czech)	3.6	https://fit.cvut.cz/cs/zivot-na-fit/aktualne/podcast
Cofit / facult job fair	3.7.	https://fit.cvut.cz/en/cooperation/for-students/cofit-job-fair/past-events
Faculty press releases (in Czech)	3.7.	https://fit.cvut.cz/cs/media-a-pr/tiskove-zpravy
Faculty in media (in Czech)	3.7.	https://fit.cvut.cz/cs/media-a-pr/fit-v-mediich

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: KLOKNER INSTITUTE, CZECH TECHNICAL UNIVERSITY IN PRAGUE

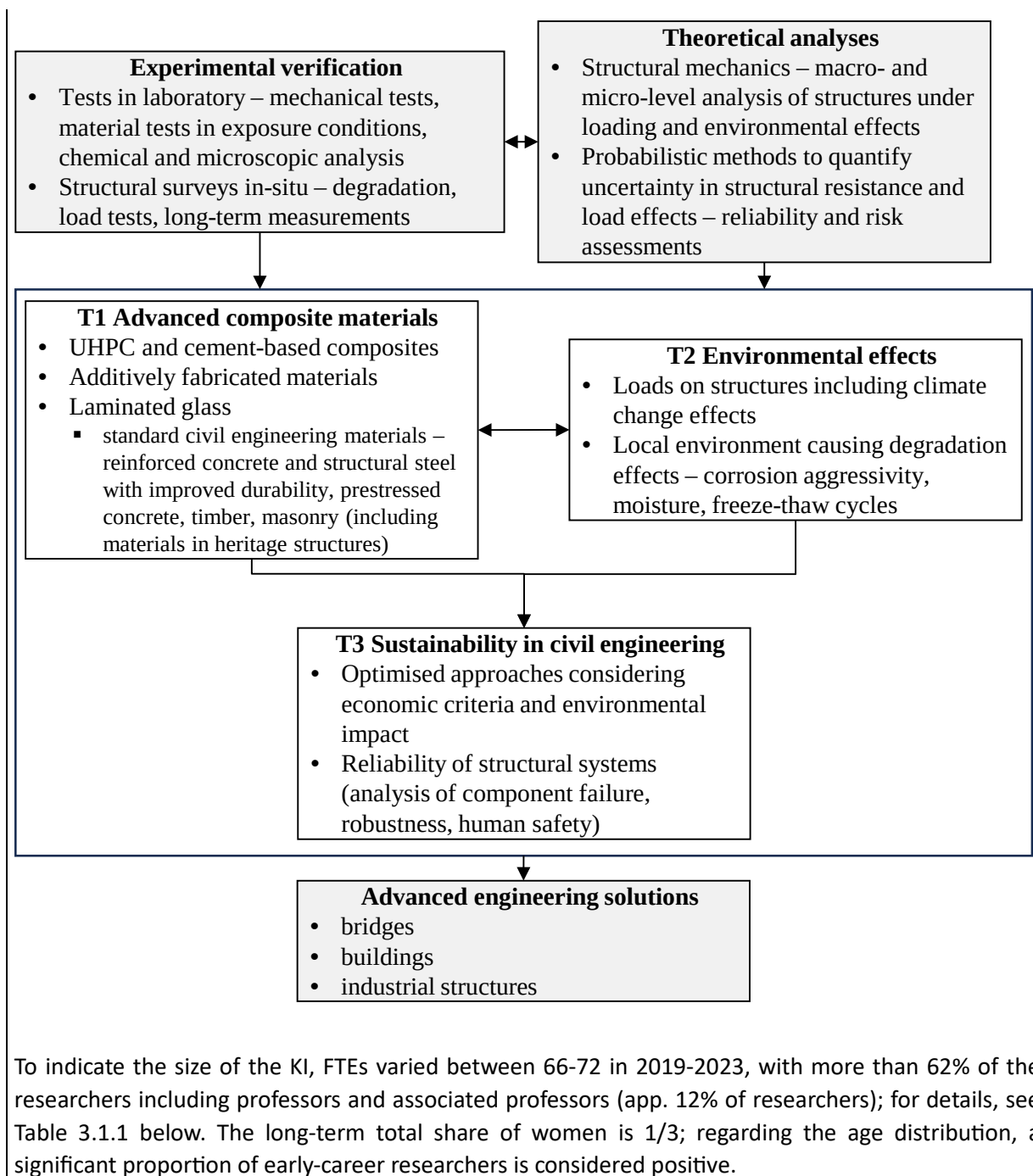
FORD: 2 - Engineering and technology

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

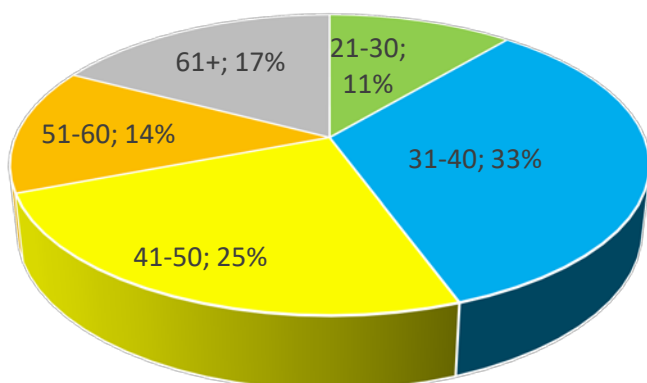
3.1 Introductory information about the unit under evaluation

Since 1921, the Klokner Institute (KI) has continuously become a Czech leader and internationally recognised institute in experimental and theoretical research of building materials and structural systems. The mission of KI consists of a variety of research activities complemented by dissemination activities and lecturing in university and lifelong education. The KI is intensely focused on transferring research results into practice, also significantly contributing to national and international standardisation.

KI has four specialised departments – Experimental Investigations, including in-situ structural surveys, Materials Engineering, Structural Mechanics, and Structural Reliability, as well as accredited laboratory and forensic engineers. Basic and applied research is balanced in the KI's activities; the fields of technology cover mainly civil engineering, with strong contributions from materials and chemical engineering, and applications to military and mechanical engineering. Basic research fields include primarily mathematics (statistics and probabilistic methods, numerical methods), physics (primarily mechanics), and chemical sciences. The main KI topics are summarized in the chart below.



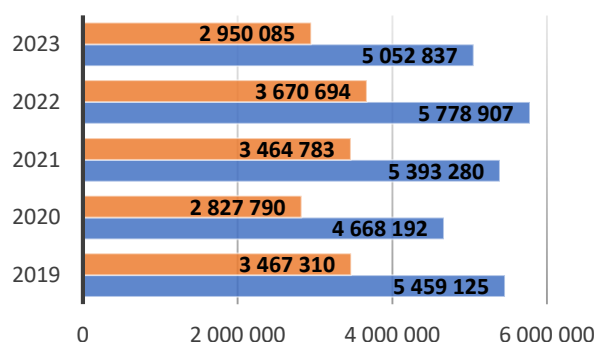
Age distribution of employees



The KI recognises the importance of transferring research results into practice. Therefore, it continues to promote active collaboration with national and international industrial partners. Primarily under contract research, these activities have resulted in several novel industrial applications (design and technologies for innovative materials, numerical procedures for structural design, structural health monitoring systems) and applied research results (patents, prototypes, verified technologies). The industry recognizes the strong position of KI - according to the CTU annual reports for 2019-2023, KI and FEE are CTU's leaders in contract research.

Year	Total revenue EUR	Total revenue CZK	Contract research and expert activities revenue EUR	FTE	Revenue per FTE EUR	Revenue per FTE CZK
2019	5 459 125	140 146 657	3 467 310	66,5	82092	2107469
2020	4 668 192	123 445 682	2 827 790	69,2	67459	1783897
2021	5 393 280	138 310 656	3 464 783	70,6	76392	1959074
2022	5 778 907	141 958 843	3 670 694	71,1	81279	1996608
2023	5 052 837	121 303 460	2 950 085	71,8	70374	1689463

Revenue of institution in EUR



	2019	2020	2021	2022	2023
Contract research and expert activities revenue EUR	3 467 310	2 827 790	3 464 783	3 670 694	2 950 085
Total revenue EUR	5 459 125	4 668 192	5 393 280	5 778 907	5 052 837

The KI established research cooperation with all the leading Czech institutions in civil engineering (Faculties of Civil Engineering in Prague, Brno, and Ostrava, Institute of Theoretical and Applied Mechanics of Academy of Sciences, TU Liberec, University of Defence). Its outstanding position in research is evidenced by a citation impact – one of the CTU's leaders in citation rate per FTE.

The average citation rate of articles in impacted journals authored or co-authored by KI staff according to the internal database of CTU (V3S) is ~19 citations per article in the evaluated period. The average number of citations per publication in an impacted journal authored or co-authored by KTU is almost double compared to the CTU's average, exceeding it by approximately 80%.

An important part of the KI strategy is international collaboration in research and standardisation. The Institute cooperates with leading foreign universities and research centres such as the Politecnico di Torino a Torroja Institute, Madrid (reliability of concrete structures), TNO and TU Delft (reliability of structures and risk assessment, construction glass), TU Ghent (reliability of concrete and glass construction), de Coimbra – Polo II (glass structures), University of Stellenbosch, South Africa (principles of structural design), JRC Ispra (reliability of structures, climatic changes and their influence on building structures) or LafargeHolcim Research & Development (R&D), France (advanced static and dynamic testing UHPC). KI experts are often leaders in standardisation – Czech standards CSN, European EN, and international ISO.

For more than 30 years, the KI has been running a PhD programme focusing on structural materials, testing, and reliability in construction, which approximately 30 students attend. As part of lifelong learning, it offers courses focused on structural materials, design, and surveys, mainly in cooperation with the Czech Chamber of Authorized Engineers and Technicians in Construction CKAIT and the Czech Concrete Society CBS.

The KI has established itself as a leading forensic engineering institute in the fields of civil and chemical engineering. Between 2019 and 2023, its reports covered cases involving bridges, tunnels, monuments, and other significant structures. The institute actively engages with the public through television and radio broadcasts, print media, and social media platforms, maintaining a strong reputation while handling high-profile cases within the construction industry.

To indicate the KI strategy for the subsequent years, the main topics should include the following:

- Development of advanced engineered materials (ultra-high-performance concretes UHPC, glass),
- 3D printing of structural materials including the development of materials, technologies, and the reliability basis for structural design,
- Machine learning: processing of structural health monitoring data, reliability analysis, design optimisation,
- Risk optimisation of technological systems in hazard situations (civil and military applications),
- Development of corrosion protection based on concept of 'green chemistry': coatings for sustainability in construction.

Table 3.1.1 - Staffing per FTE¹

Academic/ Professional position	Total / Of which women					
	year 1	year 2	year 3	year 4	year 5	Total
Professor	1,10/ 0,00	1,10/ 0,00	1,10/ 0,00	2,00/ 0,00	2,00/ 0,00	7,30/ 0,00

¹ The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the

Associate Professor	4,20/ 1,00	4,20/ 1,00	4,20/ 1,00	3,20/ 1,00	3,20/ 1,00	19,00/ 5,00
Assistant Professor	0,00/ 0,00	0,00/ 0,00	0,00/ 0,00	0,00/ 0,00	0,00/ 0,00	0,00/ 0,00
Assistant	0,00/ 0,00	0,00/ 0,00	0,00/ 0,00	0,00/ 0,00	0,00/ 0,00	0,00/ 0,00
R&D Personnel ²	25,3/ 13,1	24,4/ 11,9	25,2/ 11,8	25,9/ 12,4	26,5/ 12,4	127,2/ 61,4
Researchers in other categories ³	34,90/ 9,90	38,6/ 10,70	39,2/ 10,70	39,1/ 11,20	39,2/ 11,70	190,8/ 54,20
Technical and economic staff ⁴	1,00/ 0,00	1,00/ 0,00	1,00/ 0,00	1,00/ 0,00	1,00/ 0,00	5,00/ 0,00
Scientific, research and development staff involved in teaching activities	5,30/ 1,00	5,30/ 1,00	5,30/ 1,00	5,20/ 1,00	5,20/ 1,00	26,30/ 5,00
Early career researchers ⁵	28,5/ 7,9	27,9/ 6,60	27,4/ 6,2	26,3/ 6,7	24,9/ 6,4	134,8/ 33,7
Total ⁶	66,5/ 24,0	69,2/ 23,6	70,6/ 23,5	71,1/ 24,6	71,8/ 25,1	349,3/ 120,6

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

² The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

³ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁴ Who participates in the management and support of R&D&I in the institution.

⁵ See Definition of Terms in Methodology HEI2025+.

⁶ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the first year of the evaluation period (numbers of physical employees and personnel)⁷

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	0	0	0	0	1	0	2	0
Associate Professor	0	0	0	0	1	0	0	0	1	1	2	0
Assistant Professor	0	0	0	0	0	0	0	0	0	0	0	0
Assistant	0	0	0	0	0	0	0	0	0	0	0	0
R&D Personnel ⁸	0	0	1	1	9	2	7	4	11	7	2	2
Researchers in other categories ⁹	0	0	22	4	14	6	3	1	2	1	1	0
Technical and economic staff ¹⁰	0	0	0	0	0	0	0	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	0	0	0	0	1	0	0	0	2	1	4	0
Early career researcher ¹¹	0	0	22	4	0	0	0	0	0	0	0	0
Total ¹²	0	0	23	5	24	8	10	5	15	9	7	2

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

⁷ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁸ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁹ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁰ Who participates in the management and support of R&D&I in the institution.

¹¹ See Definition of Terms in Methodology HEI2025+.

¹² Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the last year of the evaluation period (numbers of physical employees and personnel)¹³

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	0	0	0	0	1	0	1	0
Associate Professor	0	0	0	0	1	0	0	0	1	1	2	0
Assistant Professor	0	0	0	0	0	0	0	0	0	0	0	0
Assistant	0	0	0	0	0	0	0	0	0	0	0	0
R&D Personnel ¹⁴	3	0	3	2	6	2	7	3	9	5	2	2
Researchers in other categories ¹⁵	3	0	24	6	12	7	3	1	3	1	0	0
Technical and economic staff ¹⁶	0	0	0	0	0	0	0	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	0	0	0	0	1	0	0	0	2	1	3	0
Early career researcher ¹⁷	3	0	24	6	0	0	0	0	0	0	0	0
Total ¹⁸	6	0	27	8	19	9	10	4	14	7	5	2

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

¹³ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁴ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁵ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁶ Who participates in the management and support of R&D&I in the institution.

¹⁷ See Definition of Terms in Methodology HEI2025+.

¹⁸ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

Table 3.1.4 – Students

Type of study	year 1		year 2		year 3		year 4		year 5		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate	0	0	0	0	0	0	0	0	0	0	0	0
Master's ¹⁹	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral	39	9	41	9	30	4	20	3	21	3	39	9
Lifelong Learning Courses	37	10	27	3	32	2	42	8	38	7	176	30
Total	76	19	68	12	62	6	62	11	59	10	215	39

Table 3.1.5 - Study programmes in Czech/English

Type of study programme	Total ²⁰ / Of which professional study programmes											
	year 1		year 2		year 3		year 4		year 5		Total	
Undergraduate	0	0	0	0	0	0	0	0	0	0	0	0
Master's	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral	4/0	4/0	6/0	6/0	6/0	6/0	4/0	4/0	5/1	5/1	25/1	25/1
Lifelong Learning courses	4/0*	4/0*	3/0*	3/0*	3/0*	3/0*	4/0*	4/0*	5/0*	5/0*	19/0*	19/0*
Total	8/0	8/0	9/0	9/0	9/0	9/0	8/0	8/0	10/1	10/1	44/1	44/1

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

*Short-term courses (1-2 days), mostly organised with the Czech Chamber of Civil Engineers and Technicians Active in Construction CKAIT and/ or with the Czech Concrete Society CBS.

3.1.6 – R&D&I capacities

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
1. Natural Sciences	1.1 Mathematics		Zvolte položku.	0,4
	1.2 Computer and information sciences		Zvolte položku.	
	1.3 Physical sciences		Zvolte položku.	
	1.4 Chemical sciences	0,4	Balanced basic and applied research	
	1.5 Earth and related environmental sciences		Zvolte položku.	
	1.6 Biological sciences		Zvolte položku.	

¹⁹ All master's degree students are listed, regardless of the length of their programme of study.

²⁰ The total number of study programmes for which admissions have been announced in a given academic year.

	1.7 Other natural sciences		Zvolte položku.	
2. Engineering and Technology	2.1 Civil engineering	76,97	Balanced basic and applied research	99,24
	2.2 Electrical engineering, Electronic engineering, Information engineering	0	Zvolte položku.	
	2.3 Mechanical engineering	3,05	Balanced basic and applied research	
	2.4 Chemical engineering	2,74	Balanced basic and applied research	
	2.5 Materials engineering	16,48	Balanced basic and applied research	
	2.6 Medical engineering		Zvolte položku.	
	2.7 Environmental engineering		Zvolte položku.	
	2.8 Environmental biotechnology		Zvolte položku.	
	2.9 Industrial biotechnology		Zvolte položku.	
3. Medical and Health Sciences	2.10 Nanotechnology		Zvolte položku.	
	2.11 Other engineering and technologies		Zvolte položku.	
	3.1 Basic medicine		Zvolte položku.	
3. Medical and Health Sciences	3.2 Clinical medicine		Zvolte položku.	
	3.3 Health sciences		Zvolte položku.	
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries		Zvolte položku.	
	4.2 Animal and Dairy science		Zvolte položku.	
	4.3 Veterinary science		Zvolte položku.	
	4.4 Other agricultural sciences		Zvolte položku.	
5. Social Sciences	5.1 Psychology and cognitive sciences		Zvolte položku.	
	5.2 Economics and Business		Zvolte položku.	
	5.3 Education		Zvolte položku.	
	5.4 Sociology		Zvolte položku.	
	5.5 Law		Zvolte položku.	
	5.6 Political science		Zvolte položku.	
	5.7 Social and economic geography		Zvolte položku.	
	5.8 Media and communications		Zvolte položku.	
	5.9 Other social sciences		Zvolte položku.	
6. Humanities and the Arts	6.1 History and Archaeology		Zvolte položku.	0,37
	6.2 Languages and Literature		Zvolte položku.	
	6.3 Philosophy, Ethics and Religion		Zvolte položku.	
	6.4 Arts (arts, history of arts, performing arts, music)	0,37	Applied Research	
	6.5 Other Humanities and the Arts		Zvolte položku.	
Total		100 %	-	100 %

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

Despite the adverse impact of COVID-19 pandemic, the KI continued international and national research collaborations and many of its results were highly recognised by the scientific community:

- Innovations related to ultra-high-performance concrete (UHPC) resulted in global pioneering bridge applications that received awards from research and professional organisations in architecture and civil engineering; an overview of the KI's UHPC applications is attached, *KI_3.2_UHPC footbridges_monograph*.
- Participation in international research resulted in the study on structural design and climate change that received the IABSE Outstanding Paper Award 2023.
- The KI's PhD students are actively involved in basic and applied research projects. Therefore, their dissertations regularly win awards, primarily for applications in concrete and cement composites, but also for their contributions to the protection of cultural heritage or corrosion protection.
- Memberships in Editorial Boards of prestigious journals provide evidence of recognition of the experts of the KI in various fields of technology (structural concrete and glass, reliability and safety, heritage preservation). In these fields, the KI's experts have been regularly invited to review applications on national and international grant calls. Strong international collaboration is also documented by memberships in scientific committees of prestigious international conferences (fib and IABSE conferences, ICASP, ICOSAR, ESREL, etc.). The KI organised the International Probabilistic Workshop IPW 2022 jointly with the University of Stellenbosch, South Africa, with speakers from 11 countries from three continents – Africa, Australia and Europe. The KI, jointly with the Brno University of Technology, organises annual WTA conferences on the rehabilitation of buildings (WTA Days and CRRB); see also 3.5 Transfer of results.

KI researchers contribute significantly to international research under the following organisations:

- Réunion internationale des Laboratoires d'Essai et de Recherches sur Matériaux et les Constructions (RILEM) – KI being a founding member (*KI represented by its director*)
- International Council for Building Research Studies and Documentation (CIB)
- International Association for Bridge and Structural Engineering (IABSE – *Assoc. Prof. Sykora and Dr. Tej*)
- International Federation for Structural Concrete (*fib* – *Prof. Kolisko – Technical Council, assembly of leaders of national groups, Dr. Citek - Youth Group of fib, Assoc. Prof. M. Sykora* is a member of the management board of *fib* COM3 Existing concrete structures and chair of TG3.1 Reliability and safety evaluation, lead author of *fib* Model Code 2020, Chapters 11 Structural performance evaluation framework, 12 Principles of structural design and assessment, and 13 Actions on structures)
- Scientific and Technical Association for Building Rehabilitation and Monument Preservation (WTA – *Dr. Pernicova and Prof. Kolisko – members of the national committee*)
- Joint Committee on Structural Safety (JCSS – *Prof. Holicky, Assoc. Prof. Markova and Assoc. Prof. Sykora – Czech representatives in WP1 Probabilistic Model Code; WP2 Risk-Informed Decision Support for Systems Involving Structures; WP3 JCSS Continuing Education and Advanced School; TG1 JCSS Special Task Force on Resilience and Sustainability in the Built Environment*)
- Joint Research Centre of the European Commission (JRC), Safety & Security of Buildings, TG Numerical simulation for hostile vehicle mitigation (*Assoc. Prof. Sykora*)

They are active in international standardisation through ISO and the European Committee for Standardisation CEN. In the field of load modelling, structural reliability, and risk assessment, the KI experts are recognised as leading European experts. They were selected and continue to be involved in the CEN and ISO teams for revisions of structural design codes. They were/ are leaders of the CEN project teams on assessing existing structures, thermal loads, and reliability assessment of towers and masts; they were leaders of subtasks within teams on snow loads and climate change. They are Czech national representatives for CEN/ TC 250 Eurocodes, TC 250/ SC1 and SC10 for loads on structures and basis of structural design, and WGs on assessment and retrofitting of existing structures, climatic loads, traffic loads on bridges, and in the Horizontal Group - Bridges of CEN.

Furthermore, the KI's experts serve as:

- reviewers of fib bulletins, international journals and dissertations at foreign universities (strong cooperation particularly with University of Stellenbosch, South Africa) – mainly in civil and chemical engineering,
- members of editorial boards of national professional journals,
- lecturers at CTU and within lifelong education courses.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period (see the attachment *KI_3.2_awards UPHC footbridges_OTHERS*)

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
Dr. Petr Tej et al.	UHPC long-span footbridge between Holesovice and Karlin in Prague (put into operation in 2023): 1. IABSE International Award 2024 (finalist) 2. Iconic Award for Innovative Architecture and Materials in Munich 3. Best Czech Civil Engineering Work 2023 4. Opera Pragensia 2023 - Prague City Council Award for the best quality and most beneficial public buildings 5. National Architecture Award – Grand Prix of Architects 2024 6. Vit Branda's Award for Improvement of Public Space 2024 See Section 3.4 for technical details.	1. International Association for Bridge and Structural Engineering (IABSE) 2. German Design Council 3. Czech Chamber of Authorised Engineers and Technicians in Civil Engineering 4. Prague City Council 5. Czech Chamber of Architects 6. Obec architektu (Community of Czech Architects)
Dr. Petr Tej et al.	UHPC footbridge over the Dretovický stream in Vrapice (in cooperation with FA CTU): 1. Footbridge awards 2020 2. Czech Award for Architecture 2019: <i>The footbridge is an elegant masterpiece made possible by using state-of-the-art UHPC material. The footbridge is an example of cutting-edge bridge engineering. It is an outstanding piece of architecture; it appears to float due to its extremely thin form.</i> Facebook post reached 1,2M followers.	1. Journal Bridge Design & Engineering 2. Czech Chamber of Architects
Dr. Petr Tej et al.	UHPC footbridge over the Lubina River in Pribor - Czech Award for Architecture 2019	Czech Chamber of Architects

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
Dr. Petr Tej et al.	UHPC footbridge over the Vltava River in Luzec nad Vltavou - <u>Award of the Czech Concrete Society for Civil Engineering Works Built between 2017-2020</u>	Czech Concrete Society (CBS)
Assoc. Prof. Miroslav Sykora	A 2022 paper "Investigating the Effects of Climate Change on Structural Actions" by Orcesi, Sykora et al. received the <u>IABSE Outstanding Paper Award 2023</u> , category: Scientific paper	Association for Bridge and Structural Engineering (IABSE)
Dr. David Citek (2022 winner) Dr. Tomas Bittner (2019, 2 nd place)	<u>CBS Outstanding Dissertation</u> in the technology of concrete	CBS (Czech Concrete Society)
Dr. Milan Rydval (winner) Dr. Sarka Nenadalova , Ph.D. (honourable mention)	<u>WTA Best Dissertation 2019</u> in rehabilitation of buildings	WTA (Scientific and Technical Association for Building Rehabilitation and Monument Preservation)
Ing. Tomas Chobotsky	<u>HYTEP Prize competition for an excellent diploma thesis in the field of hydrogen and hydrogen technologies</u> (2 nd place, 2023)	HYTEP (Czech Hydrogen Technology Platform)

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of scientific journal, ISSN
Prof. Milan Holicky	International Journal of Safety and Security Engineering, ISSN: 2041-9031 (Print); 2041-904X (Online)
Prof. Milan Holicky, Assoc. Prof. Miroslav Sykora	International Journal of Heritage Architecture, Print ISSN: 2058-8321, Electronic ISSN: 2058-833X
Assoc. Prof. Miroslav Sykora	- Structural Safety (ISSN 0167-4730, D1-Q1) - Structural Concrete (ISSN 1464-4177, Q2) - Acta Polytechnica (EISSN 1805-2363, Q3)
Dr. Klara Vokac Machalicka	International Journal of Structural Glass and Advanced Materials Research, ISSN: 2616-4507 (Print), ISSN: 2616-4515 (Online)

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
Dimitris Diamantidis, <u>Miroslav Sykora</u>	Reliability differentiation and uniform risk in standards: a critical review and a practical appraisal	Scientific Symposium FUTURE TRENDS IN CIVIL ENGINEERING Zagreb, Croatia, 17 October 2019	2019
<u>Miroslav Sykora</u> , Katerina Kreislova, <u>Petr Pokorny</u>	Corrosion of Historic Grey Cast Irons: Indicative Rates, Significance, and Protection	STREMAH 2019 – 16th International Conference on	2019

		Studies, Repairs and Maintenance of Heritage Architecture Conference, 7-9 October 2019, Seville, Spain	
Sophie Eberhardt, Martin Pospisil, Pavel Ryjacek, <u>Miroslav Sykora</u>	Heritage Value Assessment Method – Application to Historic Steel Bridge in Prague	STREMAH 2021 – 17th International Conference on Studies, Repairs and Maintenance of Heritage Architecture Conference, 26–28 May 2021	2021
<u>Miroslav Sykora</u>	Reliability Assessment of Existing Bridges according to <i>fib</i> Model Code 2020	Assessment of Existing Bridges based on Recent Guidelines and Standards, IABSE webinar, 26 May 2023	2023

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year
Prof. Dimitris Diamantidis	OTH Regensburg, Germany	1. Probabilistic assessment of existing buildings and bridges including structures with heritage value; 2. Semi-probabilistic method for reliability verification; 3. Target reliability levels for existing structures; 4. Partial factors for assessment; 5. Case studies, practical applications, numerical examples	2019-2022
Prof. Johan Retief	Stellenbosch University, South Africa	Assessment of model uncertainties for structural resistance	2019

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the research project/programme call	Name of the contracting authority/guarantor of the project/programme call	Year
Prof. Jiri Kolisko, Dr. Miroslav Vokac	National evaluation of research institutions	Government of the Czech Republic	2019-2023
Prof. Jiri Kolisko, Assoc. Prof. Jana Markova, MSc. Adam Zabloudil	Various programmes including Transportation 2020+/ 2030+	Technology Agency of the Czech Republic	2019-2023
Prof. Milan Holicky, Assoc. Prof. Miroslav Sykora	Research and Innovation Support and Advancement	National Research Foundation, South Africa	2023
Prof. Milan Holicky, Prof. Jiri Kolisko, Dr. Miroslav Vokac	Memberships in the Evaluation Panels P104 Building materials, architecture	Czech Science Foundation	2019-2023

	and civil engineering, and P105 Structural mechanics and structures, fluid mechanics and geotechnics		

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

In this section, 10 projects are briefly presented. More details are provided in the attached document (see the list of attachments at the end of this report).

GA20-24234S New generation of ecological anti-corrosion coatings for conventional concrete reinforcement based on functional nanodisperse organosilanes (2020-2022)

Objective:

Develop innovative, sustainable coatings for protecting conventional (carbon steel) reinforcement in concrete structures, providing superior corrosion resistance compared to traditional epoxy coatings.

Innovations:

- Development of nanodisperse organosilane coatings optimized for enhanced durability and adhesion
- Elimination of hazardous components typically found in epoxy coatings, improving environmental sustainability
- Improved bond strength with concrete surfaces, allowing application even on slightly corroded reinforcement

Research Approach:

- Laboratory testing under simulated corrosive conditions
- Evaluation of mechanical performance and adhesion properties
- Field testing in real-world infrastructure applications

Key Results:

- Innovative organosilane-based coating with superior performance
- Improved corrosion resistance and longer service life demonstrated by a prototype
- Published research findings and patents for innovative formulations

Impact on Industry:

- Potential for large-scale use in reinforced concrete structures in harsh environments, such as coastal areas, tunnels, and bridges
- Collaboration with construction companies to implement coatings in pilot projects
- Reduced environmental impact through sustainable material alternatives

Interdisciplinarity: Chemistry, Materials Science, Civil Engineering.

TH02020690 Concrete with excellent resistance in aggressive environments (2017-2020)

Objective:

Develop high-performance concrete mixtures with exceptional resistance to chemically aggressive environments, such as agricultural and industrial applications.

Innovations:

- Identification of organomeric agents resistant to silage solutions, petroleum products, and strong acids
- Optimization of concrete formulations to maximize durability and chemical resistance
- Validation of new concrete mixes through rigorous testing

Research Approach:

- Experimental testing of resistance to organic acids and aggressive chemicals
- Structural validation of reinforced elements
- Collaboration with industry partners for prototype development

Key Results:

- Development of three utility models and two prototypes
- Demonstrated a 50% increase in resistance to aggressive chemicals
- Published research findings in peer-reviewed journals

Impact on Industry:

- Extended service life of concrete structures in high-exposure environments
- Reduced maintenance costs for agricultural and industrial facilities
- Commercial application of optimized concrete formulations

Interdisciplinarity: Materials Engineering, Chemical Engineering, Structural Design.

GA22-14105S Adhesive joints in structural glass applications - combined effect of long-term static loading and humidity (2022-2026)

Objective:

Investigate the long-term mechanical performance of adhesive joints in structural glass applications, considering the combined effects of static loading and humidity.

Innovations:

- Advanced analysis of polymer degradation under environmental stressors
- Development of predictive models for adhesive joint performance
- Establishment of best practices to increase safety and durability

Research Approach:

- Controlled environmental testing on adhesive joints
- Finite element modelling to simulate real-world stress conditions
- Collaboration with industry partners to refine practical guidelines

Key Results:

- New predictive models for the evaluation of the durability of adhesive joints
- Contribution to international standards for bonded glass applications

- Improved understanding of humidity-induced degradation mechanisms

Impact on Industry:

- Strengthened use of adhesive joints in glass structures
- Development of reliable bonding techniques for architectural applications
- Cost reductions in glass construction through improved material efficiency

Interdisciplinarity: Civil Engineering, Materials Science, Experimental Mechanics.

GA23-06222S Stochastic interaction of climatic actions in structural reliability (2023-2025)

Objective:

Develop advanced probabilistic models to assess the reliability of structures exposed to stochastic climatic interactions.

Innovations:

- Development of statistical methods for spatial and temporal analysis of climatic parameters
- Improved stochastic modelling techniques to predict extreme weather effects on structures
- Integration of meteorological and structural engineering data for optimized design

Research Approach:

- Statistical analysis of climatic variability
- Predictions through computational modelling, probabilistic analyses, and demonstrations by case studies
- Close collaboration with meteorologists and reliability engineers

Key Results:

- Improved prediction models for climate-induced structural failures
- Enhanced reliability assessment techniques for critical infrastructure
- Contributions to international research on climate adaptation strategies

Impact on Industry:

- Increased resilience of bridges, towers, and large-span structures
- Practical applications in regulatory frameworks for climate adaptation
- Improved safety protocols for structures in regions prone to extreme climatic events

Interdisciplinarity: Civil Engineering, Climatology, Statistics, Machine Learning.

TH02020373 Service life enhancement and construction speed-up of elements of traffic infrastructure using UHPC (2017-2020)

Objective:

Develop innovative structural elements using Ultra-High-Performance Concrete (UHPC) to improve construction efficiency and durability.

Innovations:

- Design of UHPC-based prefabricated structural elements

- Reduction of material consumption and carbon footprint through optimized mix formulations
- Enhancement of mechanical properties to increase service life

Research Approach:

- Laboratory testing of mechanical performance and durability
- Field implementation of prototypes in infrastructure applications
- Life-cycle analysis of UHPC-based components

Key Results:

- Four utility models and one prototype bridge girder developed
- 50% reduction in raw material consumption
- Demonstrated lower CO₂ emissions in UHPC applications

Impact on Industry:

- Faster and more efficient bridge and road construction
- Reduction in maintenance and material costs for transport infrastructure
- Increased adoption of UHPC as a sustainable construction material

Interdisciplinarity: Structural Engineering, Materials Science, Sustainability Research.

DH23P03OVV024 Technologies and procedures for the protection of historic masonry bridges of the 19th and early 20th centuries (2023-2027)

Objective:

Develop advanced methods for the protection, survey, and continuous structural health monitoring of historic masonry bridges, ensuring compliance with heritage preservation requirements while maintaining safety standards for modern traffic loads.

Innovations:

- Integration of high-strength cement-based composites for minimal intervention reinforcement
- Implementation of UAV-based structural health monitoring and IoT technologies
- Development of new non-invasive survey techniques to assess the condition of historic bridges

Research Approach:

- Field studies on selected heritage bridges to validate rehabilitation techniques
- Laboratory testing of novel composite materials with minimal impact on historic structures
- Collaboration with heritage preservation authorities to balance technical and conservation requirements

Key Results:

- Development of preservation guidelines aligned with UNESCO heritage conservation standards
- Pilot applications for bridges with significant historical and technical value

- Improved assessment methodologies using digital modelling and remote sensing technologies

Impact on Industry:

- Direct application of developed technologies in heritage conservation projects
- Enhanced knowledge base for engineers, architects, and preservationists
- Long-term cost savings by reducing maintenance needs through advanced monitoring

Interdisciplinarity: Civil Engineering, Materials Science, Digital Monitoring Technologies.

TH02020730 Progressive bridge structures based on novel timber-high strength concrete composites (2016-2019)

Objective:

Develop innovative bridge structures by combining ultra-high-performance concrete (UHPC) with timber, optimizing structural performance while minimizing environmental impact

Innovations:

- Combination of UHPC with timber for durable and sustainable composite structures
- Development of prefabricated bridge elements to accelerate construction and reduce material waste
- Reduction of overall CO2 emissions through optimized material utilization

Research Approach:

- Experimental validation of composite timber-UHPC structural behaviour
- Finite element modelling to optimize structural efficiency
- Prototype implementation in a pilot project

Key Results:

- Development of an innovative timber-concrete composite (TCC) bridge system
- Completion of a pilot application: footbridge in Pilsen
- Significant contributions to sustainable construction practices and material efficiency

Impact on Industry:

- Increased use of renewable materials in bridge construction
- Expansion of timber-concrete applications in both infrastructure and residential buildings
- Reduction in lifecycle costs and environmental footprint of bridges

Interdisciplinarity: Civil Engineering, Structural Mechanics, Experimental Research, Materials Engineering.

TN02000033 NCC for industrial 3D printing (2023-2028)

Objective:

Advance additive manufacturing technologies through efficient and sustainable use of raw materials, enabling the development of innovative products and materials with enhanced mechanical and functional properties.

Innovations:

- Optimization of digital fabrication techniques for precision and material efficiency
- Interdisciplinary networking of research institutions and industry leaders to accelerate innovation
- Application of AI-driven optimization for 3D printing processes

Research Approach:

- Development of new composite materials specifically designed for additive manufacturing
- Collaboration between leading universities and industrial partners to improve production techniques
- Experimental validation of printed components for various industries, including automotive and healthcare

Key Results:

- Several utility models and patents related to new 3D printing materials
- Synergies established among research institutions and global industry leaders
- Implementation of additive manufacturing solutions in medical, automotive, and construction applications

Impact on Industry:

- Expansion of 3D printing in various industrial sectors, including architecture and engineering
- Reduction of raw material waste and energy consumption in manufacturing processes
- Strengthened competitiveness of Czech industry in advanced manufacturing technologies

Interdisciplinarity: Additive Manufacturing, Materials Science, Industrial Engineering, Digital Technologies.

Contract research – TSK (roadway authority for Prague) – Optimisation of structural surveys and maintenance of road bridges (2019-2023)

Objective:

Develop optimized strategies for the structural assessment and maintenance of road bridges in Prague, focusing on long-term durability and cost-effective maintenance.

Innovations:

- Development of a comprehensive strategy for bridge surveys based on advanced diagnostic techniques
- Implementation of non-destructive testing methods tailored to various bridge types
- Pilot studies of AI-assisted structural reliability assessments
- Recommendations for updating bridge management systems.

Research Approach:

- Data collection and processing using advanced monitoring tools
- Development of risk assessment models to prioritize maintenance activities
- Close cooperation with municipal authorities and infrastructure managers

Key Results:

- Improved maintenance planning strategies for more than 700 bridges in Prague
- Development of an AI-based predictive maintenance model for bridge infrastructure
- Increased efficiency in bridge maintenance, reducing long-term costs

Impact on Industry:

- Enhanced decision-making processes for road bridge management
- Implementation of new non-destructive testing techniques in practical applications
- Cost-effective solutions for municipalities responsible for critical infrastructure

Interdisciplinarity: Civil Engineering, AI-based Diagnostics, Infrastructure Management.

Contract research – CEZ, a.s. (central European leader in power generation) – Implementation of new technologies in monitoring and reliability assessments of concrete structures in power plants (2019-2023)

Objective:

Develop advanced methods to optimise survey strategies, reliability, and risk assessments of concrete structures in nuclear, thermal, and fossil power plants.

Innovations:

- Integration of UAV-based monitoring and machine learning for predictive maintenance
- Development of probabilistic risk models for improved reliability assessments
- Implementation of new materials and maintenance strategies for extended service life

Research Approach:

- Use of UAVs for large-scale infrastructure monitoring
- Application of AI in processing data on structural health monitoring
- Collaboration with leading industrial partners to apply research in real-world scenarios

Key Results:

- New methodologies for predicting degradation and optimizing maintenance planning
- Reduced operational risks and maintenance costs for power plants
- Enhanced structural safety and extended service life of critical energy infrastructure

Impact on Industry:

- Strengthened reliability and efficiency of power plant infrastructure
- Adoption of innovative monitoring technologies by CEZ and other energy companies
- Improved safety protocols and decision-making based on predictive analytics

Interdisciplinarity: Civil Engineering, Climatology, Machine Learning.

Table 3.3.1 Projects supported by public funds

In the role of beneficiary						
Provider ²¹	Project name	Support (in thousands CZK/EUR) ²²				
		year 1 2019	year 2 2020	year 3 2021	year 4 2022	year 5 2023
Ministry of Culture of the Czech Republic	DG16P02M050 Optimisation of Observations and Assessment of Heritage Structures (2016-19, total fund 14836/567)	3 862 / 152 347				
Ministry of Culture of the Czech Republic	DG20P02OVV005 Technologies and Procedures for the Protection of Historic Concrete Bridges		3 374 / 133 097	4 068 / 160 473	3 700 / 145 957	
Ministry of Culture of the Czech Republic	DH23P03OVV024 Technologies and Procedures for the Protection of Historic Masonry Bridges of the 19th and Early 20th Centuries (2023-27, total fund 15160 / 609)					3820 / 150 690
GACR (Czech Science Foundation)	GA17-22796S Experimental and Numerical Analysis of Bond Behaviour Between Steel Reinforcement and Ultra High Performance Concrete (UHPC) at Elevated Temperatures (2017-21, total fund 5874/227)	1910 / 75 345				
GACR	GA20-01781S Uncertainty Modelling in Safety Formats of Concrete Structures		2343 / 92 426	2481 / 97 870	2481 / 97 870	
GACR	GA20-24234S New Generation of Ecological Anti-Corrosion Coatings Conventional Concrete Reinforcement Based on Functional Nanodisperse Organosilanes		1159 / 45 720	1206 / 47 574	1206 / 47 574	
GACR	GA22-14105S Adhesive Joints in Structural Glass Applications - Combined Effect of Long-Term Static Loading and Humidity (2022-26, total fund 3659/147)				1263 / 49 822	
GACR	GA23-06222S Stochastic Interaction of Climatic Actions in Structural Reliability (2023-25, total fund 6633/268)					2167 / 85 483
GACR	GA23-08038S Optimized Detailing of Reinforcement in Cementitious Composites (2023-25, total fund 4854/197)					1578 / 62 249

²¹ If the provider is from abroad, please indicate the provider's country of origin in brackets. For the determination of the country of origin of the provider, the place of residence of the provider is decisive.

²² Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

TACR (The Technology Agency of the Czech Republic)	TJ01000156 Development of new generation of mineral plaster (2017-19, total fund 2223/87)	955 / 37 673				
TACR	TJ02000368 Development of new generation of noise barriers with extended service life	764 / 30 138	928 / 36 607	945 / 37 278		
Total		7491 / 295 503	7804 / 307 850	8700 / 343 195	8650 / 341 223	7565 / 298 422
In the role of another participant						
Provider ²³	Project name	Support (in thousands CZK/EUR)				
		year 1	year 2	year 3	year 4	year 5
TACR	CK01000108 New Approaches to Surveys of Pre-Stressed/Post-Tensioned Concrete Bridge Beams		500 / 19 724	494 / 19 487	981 / 38 698	165 / 6509
TACR	CK02000329 UHPC as the Main Load-Bearing Structure for Middle-Span Bridges (2021-24, total fund 5059/205)			614 / 24 221	1 779 / 70 178	2 004 / 79 053
TACR	CK03000125 Innovative Diagnostic Methods for Assessment of Safety and Durability of Weathering Steel Bridges (2022-25, total fund 4586/185)				1 098 / 43 314	1 164 / 45 917
Ministry of Industry and Trade of the Czech Republic	FV10295 Safety Glass with Reinforcement (2016-19, total fund 2376/91)	728 / 28 718				
Ministry of Industry and Trade of the Czech Republic	FV10509 Research and Development of New Floor Mixture with the Contents of Recycled Raw Materials with Guaranteed Qualities (2016-19, total fund 2080/80)	434 / 17 120				
Ministry of Industry and Trade of the Czech Republic	FV20585 Operational Methods of Monitoring and Prediction of Service Life for Safe Bridges (2017-20, total fund 5700/219)	1430 / 56 410	1430 / 56 410			
TACR	FW01010539 Safe Use of fly Ash from NOX Reduction Technology at CMB Concrete Plants		1251 / 49 349	1303 / 51 400	1328 / 52 387	633 / 24 970
TACR	FW06010422 Simulation and Design of Structures from Digital Concrete (2023-25, total fund 4808/193)					1603 / 63 235

²³ Ibid.

Ministry of Education, Youth and Sports of the Czech Republic	LTT18003 Probabilistic Analysis of Deteriorating Structural Systems (2018-22, total fund 1935/75)	495 / 19 527	239 / 9 428	495 / 19 527	256 / 10 099	
TACR	TH02020373 Service Life Enhancement and Construction Speed-Up of Elements of Traffic Infrastructure Using UHPC (2017-20, total fund 2880/111)	841 / 33 176	607 / 23 945			
TACR	TH02020690 Concrete with excellent resistance in aggressive environments (2017-20, total fund 2975/114)	36 / 1420	555 / 21 893			
TACR	TH02020729 Research and Development of New Generation Silicon Carbide Briquettes in Order to Improve Their Utility Properties (2017-19, total fund 2713/106)	936 / 36 923				
TACR	TH02020730 Progressive bridge structures based on novel timber-high strength concrete composites (2016-19, total fund 4780/185)	3113 / 122 801				
TACR	TN02000033 NCC for Industrial 3D Printing (2023-28, total fund 21228/853)					3900 / 153 846
TACR	TE01020068 Centre of Research and Experimental Development of Reliable Energy Production	1700 / 67 061				
TACR	CZ.02.1.01/0.0/0.0/16_025/0007424 3D Print in Civil Engineering and Architecture	4940 / 194 872	4420 / 174 359	4318 / 170 335	648 / 25 562	
Total		14653 / 578 028	9002 / 355 108	7224 / 284 970	6090 / 240 238	9981 / 373 530

In Table 3.3.2, selected contracts are presented only, to indicate the KI's main activities in the evaluated period.

Table 3.3.2 - Contract research activities

Client ²⁴	Activity name	Revenue (in thousands CZK/EUR)				
		year 1	year 2	year 3	year 4	year 5
TSK (technical road management of the capital city of Prague)	Optimisation of strategies for surveys and maintenance of bridges, load tests, reliability assessments of degrading bridges	37 260/ 1 451 400	11 953/ 452 027	23 043/ 898 545	20 267/ 825 040	15 830/ 659 401

²⁴ If the client is from abroad, indicate in brackets the country of origin of the client.

SZ (technical road management of the rail roads in CZ)	Optimisation of strategies for surveys and maintenance of bridges, load tests, reliability assessments of degrading bridges, technical support during building process of new structures)	7513/ 292 658	15 381/ 581 634	8017/ 312 597	10 296/ 419 151	10 694/ 445 443
RSD and SUS (technical road management of the highways and roads in CZ)	Optimisation of strategies for surveys and maintenance of bridges, load tests, reliability assessments of degrading bridges, technical support during building process of new structures)	2267/ 88 316	2561/ 96 846	135/ 5258	5958/ 242 520	1703/ 70 951
Dopravní podnik hl. m. Prahy (Prague Transport provider)	Surveys, maintenance and service life predictions for steel structures in various types of buildings	1113/ 43 345	2343/ 88 588	282/ 10 996	602/ 24 519	2738/ 114 060
KS Prefa leader in UHPC development and production of prefabricates	Development of UHPC, material and structure testing, structural design	108/ 4194	13/ 477	284/ 11 057	1767/ 71 940	481/ 20 036
ORLEN Unipetrol (Poland, leader in petrochemistry in CZ)	For buildings, towers, masts, and industrial bridges advanced methods of structural surveys (UAV-based, specialised chemical analyses), large concrete structures – recommendations for maintenance, predictions, support for decision-making	360/ 14 031	74/ 2805	173/ 6751	50/ 2019	269/ 11 221
SURAO (Czech Radioactive Waste Repository Authority)	Low-alkali concrete for nuclear waste disposals – development, design, experimental verification meeting the standards of the Governmental Office for Nuclear Safety	1840/ 71 673	95/ 3579			
VSL Systems (Switzerland), Freyssinet (France)	Testing of prestressing steels for common and special applications. Development of special grouting mortars.	575/ 22 386	1235/ 46 719	1247/ 48 620	664/ 27 011	1287/ 53 598
Holcim - Lafarge innovative centre (France)	Fatigue analysis of UHPC, dynamic testing	553/ 21 560		498/ 19 422	301/ 12 268	
SAINT-GOBAIN IndustrieKeramic Rodental GmbH (Netherlands)	Analysis and testing of glass elements	254/ 9895	127/ 4805	328/ 12 780	501/ 20 400	22/ 900
PPC CAB A.S. (USA), CERISOL - ISOLADORES Serzedo (Spain), GRID SOLUTIONS S.P.A (Italy), CERALEP SN (France), ARTECHE (Spain) - ceramic insulator and elements producers	Analysis and testing of ceramic elements and parts of insulators	735/ 28 630	688/ 26 010	1574/ 61 390	582/ 23 680	2159/ 89 940
LAPP INSULATORS GMBH (Germany), PFISTERER SWITZERLAND (Switzerland) - polymeric insulators producers	Analysis and testing of polymeric elements and parts of insulators	1390/ 54 135	775/ 29 320	503/ 19 600		466/ 19 430

PEIKKO GROUP CORP. (Finland)	Development, analysis and testing of special steel elements for joining concrete structural members and its parts	137/ 5355		169/ 6600		
Pontex (leading design and consultancy office of transport infrastructure)	Surveys of exposed bridge structures, material and load tests, structural analysis, measures	6104/ 237 768	1784/ 67 480	20 163/ 786 250	3517/ 143 177	1785/ 74 366
AFRY (Sweden), Mot McDonald (England), Pragoprojekt, Top Con, Sudop, Metroprojekt, Novak a partner, Nemec and Polak, AED, INSET, MDS (leading design and consultancy offices)	Surveys of exposed structures (buildings, bridges), material tests, structural analysis, measures	6439/ 250 830	15 924/ 602 188	3276/ 127 741	12 716/ 517 635	5213/ 217 153
Aquatis, part of Safichem group (Switzerland)	Design of water management structures - sewers, sewage treatment plants, water reservoirs, dams and their parts (analysis and design of special concretes for massive structures)	688/ 26 781				995/ 41 438
EGU and CEPS (engineering applications and research in energetics), cooperation with foreign clients as PCI (USA)	Experimental research and verification of components of power systems and power regulation	2441/ 95 088	812/ 30 720	1461/ 56 953	1224/ 49 824	901/ 37 545
Forensic reports for court and police	Technical assistance in solving professional problems in connection with the evaluation of buildings, structures, projects and their failures and defects. Determining the causes of problems. Preparation of forensic expert reports and expert reports.	341/ 13 281	263/ 9963	319/ 12 447	816/ 33 208	313/ 13 022
Expert activities for municipalities, public administration (cities, regions, ministries)	Technical assistance in solving professional problems in connection with the evaluation of buildings, structures, projects and their failures and defects. Determining the causes of problems. Preparation of forensic expert reports and expert reports.	1914/ 74 548	5102/ 192 952	7300/ 284 675	9076/ 369 458	6518/ 271 511
Avers, Eurovia (France), Hochtief (Germany), Chladek a Tintera, Firesta, Metrostav, PORR (Austria), Skanska (Sweden), Stavby mostu, STRABAG (Austria), Subterra, Syner, VCES, Zakladani staveb (leading construction companies in CZ)	Technological support in construction, development of new technologies, testing of materials, design of measures, surveys	2403/ 93 619	3293/ 124 526	3235/ 126 126	3044/ 123 924	5973/ 248 791
Sipral - leading company in the field of glass building cladding	Development and testing of facade elements	140/ 5434	56/ 2124	161/ 6259	153/ 6208	37/ 1550

CEZ (No.1 in power generation in central Europe, owner of nuclear and conventional power stations in CZ)	Reliability analysis of systems, structural surveys	58/ 2271	94/ 3543	371/ 14 473	445/ 18 112	180/ 7498
VUT Brno, FCE (TU Brno)	Materials research – use of waste and recycled materials in concretes, experimental verifications	393/ 15 292	354/ 13 372	237/ 9234	180/ 7335	168/ 6997
CAS (Czech Standardisation Body)	Development of Czech standards and Czech National Annexes to the Eurocodes and ISO standards (basis of structural design and assessment of existing structures, actions on structures, design and assessment of concrete structures, specifications for concrete and masonry, testing of materials and structures etc.), representation of the Czech Republic in international standardisation committees.	641/ 24 978	17/ 628	110/ 4289	24/ 995	9/ 379
All other contractors - more than 200 different companies	Consultancy - failures of structures, material and technology development etc. - testing of material and elements - in situ surveys and measurements - structural analysis	13 345/ 519 841	11 833/ 447 483	15 970/ 622 720	17 988/ 732 271	13 080/ 544 855
Total		89 013/ 3 467 309	74 778/ 2 827 789	88 854/ 3 464 783	90 171/ 3 670 695	70 823/ 2 950 085

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

Five publications, and five results of applied research are presented below to provide insights into the impact of basic and applied research by KI. The results marked with (*) have been evaluated as *excellent at an international level* in the national evaluation of R&D results. As the research results are closely related to the projects described in Section 3.3, their main contributions are highlighted in the short lists.

01 Physical-Based Model for Exposure Coefficient and Its Validation towards the Second Generation of Eurocode EN 1991-1-3 for Roof Snow Loads (LTT18003)*

- Snow loads dominate the reliability of many roof structures, including long-span roofs of industrial halls and halls where people gather, such as stadia or concert halls. The ground snow loads are highly variable in both temporal and spatial terms. Roof loads are then affected by climatic effects (wind drifts, ambient air temperature variability, humidity) and the properties of the roof (shape, slope, slipperiness, thermal insulation, heating regime).
- In the paper published in a Q1 journal, an international team of co-authors (Norway, Italy, and Czechia) addresses the effects of wind on conversion from ground-to-roof snow loads (exposure coefficient), considering a range of European climates. A model of the exposure factor that accounts for the main physical and local climatic effects on roof snow loads was validated and the range of its application was identified using an extensive database of roof snow load measurements along with an advanced theoretical model.
- The results obtained by the new model are critically compared with the estimates based on the JCSS Probabilistic Model Code, which is considered a reference model unless detailed numerical modelling is carried out for a particular structure. It is demonstrated that the new model reflects typical European snow and wind climates well.
- Therefore, the paper provides key background information on the revision of the model for the exposure coefficient in the Eurocode on snow loads. The new exposure coefficient model

corrects the primary Eurocode model deficiency, where no account for wind velocities expected at the site during a snow season is taken. According to prEN 1991-1-3, the exposure coefficient affects all snow load cases on all types of structures covered by the European standard; its use in the design and assessment of existing structures will thus have an enormous economic impact. Additionally, experts from the US, Canada, Japan, China, etc., are just considering the model in the ongoing revision of ISO 4355 for roof snow loads. Thus, a worldwide impact is foreseen and the paper was evaluated as outstanding.

- In the study, M. Sykora (KI) played a crucial role. In close cooperation with Prof. Thiis (NTNU) and Prof. Formichi (Univ. Pisa), he developed the study concept and drafted about 25% of the main text. He commented on the manuscript at all stages. He took the lead in all aspects of statistical uncertainty and uncertainty quantification.

02 JRC Report Thermal Design of Structures and the Changing Climate (LTT18003)*

- The JRC Technical Report presents the methodology for adapting structural design to climate change toward a method for new thermal design maps for structural design considering the changing climate. The report critically analyses the EU Strategy for adaptation to climate change. Taking into account the general probabilistic models of thermal actions applied in reliability verifications of civil engineering structures, adjustments of the models for thermal actions are discussed. Probabilistic analysis of the expected variations of climate factors that would directly affect the design values for thermal actions then provides the theoretical background for developing the thermal maps for structural design considering the influence of climate changes.
- The report presents a scientific and technical background intended to stimulate further discussions about the implications of climate change on the thermal design of key construction works, such as bridges. It is widely known that adapting design procedures to the foreseen effects of climate change is of utmost importance for society.
- J. Markova (KI) is a recognized leading European expert in modelling thermal actions. In addition to many scientific publications, she developed a chapter "Thermal actions" in the JCSS Probabilistic Model Code, which serves as a reference for developing models for thermal actions in design standards. She was a leader of the CEN project team and was responsible for revising EN 1991-1-5 for thermal actions on structures. Based on her distinguished expertise in the field, she was asked to contribute to the JRC report by drafting the key chapter "6 Potential implications of changes in thermal actions in structural design" and served as a reviewer for all other chapters of the report. By affecting structural design approaches in Eurocodes, the JRC report has enormous economic impact; the result was evaluated as outstanding.

03 Structural behavior of double-lap shear adhesive joints with metal substrates under humid conditions (GA16-17461S)*

- Adhesive bonding has become a promising technology for joints in structural systems. Durability in various environmental exposures is a key factor in the design of adhesive joints. The mechanical properties of the joints are difficult to predict due to the complicated interactions between various degradation processes. To fill the gap in existing knowledge, the study investigates the effect of water on adhesive joints with various metal substrates and their treatments in civil engineering and architectural applications.
- The original data and findings for adhesive bonding in facades are provided. The article was rated outstanding due to the importance of the topic and the complexity of applied experimental procedures and methods.
- It was published in the International Journal of Mechanics and Materials in Design, an international platform for disseminating recent advances and original works in mechanics and materials engineering and their impact on the design process.

04 Timber-UHPFRC composite connection - Analysis and experiments (TH02020730)*

- The KI researchers developed an innovative timber-concrete composite structural system. The precast ultra-high-performance fiber-reinforced concrete (UHPFRC) bridge deck is connected to timber girders. The structural system was designed and tested. A non-linear finite-element model was developed and validated to verify various geometries and combinations of materials of the joint. The complex experimental campaign accompanied by detailed numerical modelling demonstrated many advantages of the composite structure developed with respect to sustainability; the use of natural and renewable structural materials with advanced concrete, which provides the necessary stiffness, lateral load redistribution, and protection of the timber against unfavourable environmental effects.
- Both timber and UHPFRC are efficient materials characterised by a high ratio of load-bearing capacity to self-weight. The novel application of UHPFRC leads to a significantly thinner bridge deck, faster construction, and improved durability, thus reducing material consumption while maintaining the mechanical properties of the structure.
- This pioneering application of UHPFRC for timber-concrete composite structures was published in a Q1 journal. An experimental structure with a span of 9.5 m was realized, and a footbridge using this coupling system is currently being designed and should be executed (see info about project TH02020730).

05 Changes in bond strength properties of hot-dip galvanized plain bars with cement paste after 1 year of curing (GA17-22796S)*

- The article experimentally investigates the effect of the corrosion of hot-dip galvanized steel on the porosity development of cement paste in the interfacial transition zone between materials. Advanced physical-chemical analysis included unique, very long exposure times (up to 1 year).
- The results of this experimental study support the conclusions of a minority of previous studies, confirming the views on the ineffectiveness of hot hot-dip galvanizing as corrosion protection for concrete reinforcement since increasing the porosity of the cement paste can significantly reduce the bond strength of hot-dip galvanized ribbed reinforcement. Furthermore, a reduction in the thickness of the hot-dip galvanized coating on the surface of the reinforcement is observed. Corrosion of the coating in the active state in fresh cement paste is shown to significantly reduce the thickness of the layer and even cause transverse cracks permeable to corrosion stimulators.
- As hot-dip galvanized coatings are currently being considered suitable corrosion protection for conventional concrete reinforcement, the study provides essential insights – these coatings do not provide sufficient corrosion protection for service life exceeding 100 years, especially in areas with higher chloride exposures. To provide a comprehensive insight, this article emphasizes the suitability of these coatings, particularly for other environments where the ability of cathodic protection of the hot-dip galvanized coating can be fully utilized.
- The article, published in Q1 journal – Construction and Building Materials, was rated as outstanding due to its novelty, complexity of the experimental programme (design of experiments, experimental methods, and analysis and interpretation of results), and great potential for industrial applications and expected economic benefits.

Applied research results:

06 Holesovice-Karlin footbridge: a bridge that connects more than just river banks (“Hol-Ka”, in Czech “girl”)

- The Holesovice-Karlin footbridge is more than a new Prague bridge over the Vltava. It is a symbol of innovation in materials and bridge engineering. The KI’s experts are behind every

construction detail – from the choice of materials to load tests to the advanced structural health monitoring system. Thanks to their know-how, Prague has an elegant structure and an innovative, durable, and safe bridge that will serve for decades.

- One of the KI's key tasks was to ensure the structure's long service life. The footbridge was designed with an emphasis on resistance to dynamic loads, environmental effects, and scour. Experts, therefore, conducted extensive testing of the materials and optimised the composition of the concrete to give it exceptional strength and low porosity, and thus resistance to aggressive environments.
- Another crucial aspect was the stability and safety of the exceptionally slender structure during operation. The structure was subjected to static and dynamic tests that simulated a variety of loads, from standard pedestrian and cyclist movement to extreme conditions such as high winds or structural vibrations. The Klokner Institute helped to design and verify the geometry of the bridge to eliminate dynamic effects.
- To create a bridge of the future, the designers equipped it with an intelligent monitoring system. The KI designed and installed sensors to monitor structural stresses, temperature changes, and mechanical loads. This data is continuously analysed and provides an early warning system to prevent potential failures.
- The Holesovice-Karlin footbridge implements the results of the scientific work of the Klokner Institute and pushes the boundaries of modern bridge engineering. Its story shows how academic research influences the real world – creating beautiful, functional structures and also safe, durable solutions for future generations.
- In 2023 and 2024, the footbridge and the design team led by Ing. Petr Tej, Ph.D. (Head of the Department of Structural Mechanics in the KI) received the National Architecture Award–Grand Prix of Architects 2024, the IABSE International Award, the Iconic Award for Innovative Architecture and Materials in Munich, and Vit Branda's Award for Improvement of Public Space.



07 Methodology of Estimation of Service Life of Industrial Chimneys and Cooling Towers

- Cooling towers and industrial chimneys are the key components of conventional and nuclear power plants, heating and chemical plants. These immense structures are exposed to adverse environmental influences, which causes degradation processes to develop, leading to

excessively costly maintenance. The degradation processes affecting these concrete and masonry structures depend on the properties of the construction materials, the performance of protective coatings, and local environmental influences, which can scarcely be described by common deterministic methods without conservative assumptions. Maintenance of these structures is then usually based on long-term experience and often unnecessarily expensive measures.

- The proposed methodology for assessing the actual conditions of cooling towers and industrial chimneys and predicting their service life was developed to optimize decision-making about their repairs. KI led the consortium with CEZ, a.s. (a leading Central European power producer) and the Institute of Applied Mechanics (UAM) Brno.
- The methodology is based on relevant standards (Eurocodes, ISO, International Atomic Energy Agency). It provides new methods for assessing the reliability of existing structures and predicting the service life of these specific structures. The methodology is largely based on the results of probabilistic analyses for which the input probabilistic models were updated based on measurements from more than 40 cooling towers and chimneys (surveys including 3D scans by UAVs and meteorological data) and the latest findings in the literature. Probabilistic modelling of the spatial variability of material properties and environmental effects partly relied on Bayesian updating, considering observations of surface cracking (significantly affected by corrosion).
- The certified methodology is continuously applied to assess the service life of industrial chimneys and cooling towers at the nuclear and conventional plants of CEZ, a.s. and ORLEN Unipetrol, a.s. The KI's benefit associated with using this methodology in assessments of cooling tower and industrial chimney service life is estimated at approximately CZK 500k (20k €) per year. Both operators (CEZ, a.s. and ORLEN Unipetrol a.s.) estimate savings related to optimizing surveys and repair costs in the order of several million CZK per year.
- The knowledge gained in developing this methodology is systematically applied in international research (JCSS – modelling of degradation of concrete structures, article in Structural Safety, Q1, 2025; fib TG 8.8 – modelling of degradation of reinforced and prestressed concrete structures, preparation of fib bulletin).

08 Patent – Method of Optimizing the Concrete Reinforcement Detailing and Orientation in Concrete

- The patent introduces a new method of reinforcing concrete structural members based on optimising the directions and dimensions of concrete reinforcement inserted into the formwork during their execution. The method is tailor-made for 3D printing and is largely applicable to all types of structural members – bar-shaped (such as beams or columns), 2D (walls and slabs), and 3D massive members such as foundation blocks.
- The method introduces an iterative process – a detailed numerical model follows preliminary structural analysis carried out by common methods. A spatial mesh system splits the volume of the geometric model of the structural member into small discrete volumes whose shapes are selected to reflect shape of the structural member. The size is tuned to meet the requirements for the fineness of the resulting spatial reinforcement mesh. Then, the magnitudes of tensile stresses and spatial vectors of their directions at individual discrete nodes of the mesh are determined, for example, by the finite element method, the boundary element method, or the finite difference method. Based on this, the directions of reinforcements in individual discrete nodes given by the resulting direction of the tensile stress and the diameters of individual reinforcement bars corresponding to the magnitudes of these tensile stresses are determined. The resulting spatial reinforcement mesh is modelled by CAD software and printed using the Direct Metal Laser Sintering 3D metal printing method. The produced spatial reinforcement mesh is inserted into the formwork, and concrete is cast.

- This multivariate computing approach provides key insights to distribute and arrange dispersed concrete reinforcement correctly. This makes it possible to design and execute structures with increased load-bearing capacity while reducing the consumption of construction materials, contributing positively to sustainability in construction.

09 ISO 10252:2020. Bases for design of structures — Accidental actions (FV20585)*

- By focusing on accidental actions due to natural causes and human activities, the ISO standard systematically applies the principles of reliability and risk-based decision in designing and assessing structures subjected to extreme actions. Based on the intensive cooperation of leading experts from Europe, North America, Australia, and Asia, ISO 10252 is based on the most recent scientific knowledge. The models for effects of impact loads (road and railway vehicles, ships, planes, helicopters, falling or sliding objects), various types of explosions (interior or exterior, dust explosions, high-energy explosions), and unidentified accidental actions (by assuming damage to parts of the structure) have been improved or newly proposed.
- The 2020 edition of ISO 10252 was rated as outstanding as it presents significant progress in the available models compared to Eurocodes, ASCE, Australian, Japanese, and other international standards. It promotes the international harmonization of structural design practice while allowing each national economy to specify its levels of structural performance and safety by its own needs and available economic sources (by specifying the target reliability level). The desired harmonization should promote compatibility, interchangeability, consistency, and comparability of structural standards developed by different economies. Accidental situations are of key importance for the reliability of critical infrastructures. Implementing the principles and models provided in ISO 10252 will benefit society significantly; this is why this research result was evaluated as outstanding.
- The KI's researchers utilized the results of their previous research supported by the Czech Ministry of Interior and Czech Science Foundation. They contributed mainly to the probabilistic modelling of impacts due to the road and railway vehicles, proposing adequate design models ensuring specified target reliability. They further contributed to modelling loads due to forklifts in industrial plants and developed the other parts of the standard.

10 3D Printed Arch Concrete Footbridge

- Prototype of an arch concrete footbridge verified novel application of UHPC material and structural design by 3D printing. The prototype has a span of 6 m and a width of 1 m. It consists of two 3m-long parts and two concrete blocks simulating supports. The weight of the prototype is 1.5t.
- The experimental research project demonstrated the current advances in additive technologies and the great possibilities of structure shaping. The prototype was subjected to load tests and measurements which confirmed theoretical assumptions. The girder was authorised for use and installed as a footbridge over the outlet of the lake (Solopisky, at the border of Prague), where its natural rough surface with its characteristic interwoven print layers blends harmoniously with the surrounding nature. The innovative footbridge was appreciated by civil engineers and architects alike.



Table 3.4.1 - Overview of research results in the period under evaluation ([an overview of the KI's main results in 2019-2023 is attached, KI 3.4.1 Overview of research results](#))

Type of result ²⁵	Year of application	Name
01 - Paper in journal (Q1)	2022	Physical-Based Model for Exposure Coefficient and Its Validation towards the Second Generation of Eurocode EN 1991-1-3 for Roof Snow Loads
02 – Monograph	2020	Thermal Design of Structures and the Changing Climate
03 – Paper in journal (Q2)	2019	Structural behavior of double-lap shear adhesive joints with metal substrates under humid conditions
04 – Paper in journal (Q1)	2022	Timber-UHPFRC composite connection - Analysis and experiments
05 - Paper in journal (Q1)	2019	Changes in bond strength properties of hot-dip galvanized plain bars with cement paste after 1 year of curing
06 – Real-world awarded application of innovative technologies, implementation of KI's patents, prototypes, and verified technologies and methodologies in practice	2022	Holesovice-Karlin footbridge: a bridge that connects more than just river banks
07 – Certified technology	2019	Methodology of Estimation of Service Life of Industrial Chimneys and Cooling Towers
08 – Patent	2019	Method of Optimizing the Concrete Reinforcement Detailing and Orientation in Concrete
09 – International standard	2020	ISO 10252 Bases for design of structures — Accidental actions
10 – Prototype	2021	3D Printed Arch Concrete Footbridge

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

²⁵ Specify the specific type of result. Add rows as needed.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

As one of CTU leaders (according to CTU annual reports), the KI is strongly dedicated to the commercialization of its R&D&I results. Its strategy largely relies on intensive cooperation with industry through contract research and applied research projects. The contacts are established and strengthened by:

- Cooperation in professional associations (Prof. J. Kolisko chaired the Czech Concrete Society CBS in 2011-2019) and standardisation committees, joint membership in various expert committees supporting the decision-making of the Czech government and municipalities (see 3.6 on popularisation) and informal meetings at conferences.
- Leading industry experts are members of the KI Scientific Board and the Management Board of the KI Ph.D. Programme.
- New contacts are often established with participants in lifelong education courses and readers of the KI conference and journal papers – to disseminate principal outcomes of particularly applied research projects among Czech researchers and civil engineers, the KI experts keep publishing in national journals and at national conferences.

Contract research revenues have been varying in 2019-2023 as result of the covid-19 pandemic. Despite this, the total revenues from collaboration with industrial partners confirmed the leading role of KI within the university. The average income per FTE in this period was 46 kEUR, well above the CTU average. A positive aspect is that key contracts are medium or long-term. Revenues from non-public sources resulted mainly from the collaboration with partners focusing on the urgent needs of the industry, such as materials and technology research, assessment of damaged structures, strategies for structural health monitoring, surveys of large or exposed structures and risk assessments of technological systems. In the evaluated period, collaboration with more than 260 partners per annum occurred. The outcomes of this collaboration included expert reports (~300/year), forensic engineering reports (~45/y), test protocols on tests (~1000/y), patents, prototypes, and many structural applications (mainly bridges, but also buildings).

In the 2014-2018 evaluation period, the KI reported the share of revenues from foreign contractors around 4-5% and the IEP recommended increasing this share. With a strong focus on internationalisation, the KI significantly strengthened cooperation with foreign companies and the share increased to 10-11%, reaching its maximum of 18,0% in 2023.

Year	Contract research and expert activities Total revenue in thousands €	Revenue from foreign entities k€	Share of income from foreign entities %	FTE	Revenue per FTE k€	Revenue per FTE thousands CZK
2019	3 467	399	11,5	66,5	52,1	1 339
2020	2 828	298	10,5	69,2	40,9	1 081
2021	3 465	351	10,1	70,6	49,1	1 259
2022	3 671	350	9,5	71,1	51,6	1 268
2023	2 950	530	18,0	71,8	41,1	986

KI's research findings are directly applied in forensic engineering reports. Between 2019 and 2023, the institute produced over 200 reports, primarily addressing structural and geotechnical failures, including excessive cracking and the quality of built-in concrete. To a lesser extent, these reports also examined

façade and plaster deterioration, the adverse effects of fire and moisture, and leakages. The diverse range of investigated structures included:

- Bridges and tunnels on highways and regional roads;
- Heritage monuments and sacral architecture;
- Structures affected by the tunnelling of the new D line of the Prague metro;
- Airport and river port terminals, shopping malls, industrial halls, etc.



Note that the key industrial partner (KS Prefa – #1 in UHPC production in the Czech market) has expressed interest in the application of the patented method related to UHPC. Details of the contract have been negotiated since 2024, expected revenues are 16 k€/year.

Main users of KI results:

1. Authorities responsible for the management of transportation networks (RSD – Czech highways, motorways, and 1st class roads manager, TSK – technical road management of Prague, SZ Správa železnic – Czech manager of national and regional railway infrastructure):

- surveys of large, exposed, heavily deteriorated and/ or unique structures – mainly bridges and tunnels,
- methodologies and strategies for surveys and maintenance,
- advanced experimental and survey methods.

See also Section 3.3 Research projects.

2. Concrete producers (KS Prefa – #1 in UHPC production in the Czech market, Metrostav and Eurovia – #1 and #2 – construction companies, Skanska, etc.):

- developments of ultra-high performance concrete UHPC – mix design, technology, structural reliability
- concretes for special applications (aggressive environments, long service life),
- massive structures – design to eliminate hydration heat issues, structural health monitoring, including the upgrade of the 2nd largest Czech dam Orlik (Vltava river) and design of a new dam Nove Herminovy to protect the northern Moravia from floods
- statistical methods for conformity control using advanced laser-based techniques.

It should be noted that similar long-term collaboration focused on applications of glass structures has been established with design office HABENA and producer NAUPO, with several successfully completed applied research projects and pilot practical applications.

3. Owners of industrial structures (CEZ, a.s. – the leader in nuclear and conventional power generation in Central and South-Eastern Europe, ORLEN Group – crude oil processing, production, and distribution, petrochemical products etc.) – buildings, towers, masts, and industrial bridges:

- steel structures – specialised corrosion surveys, anticorrosion protection including advanced coatings,
- large concrete structures – recommendations for maintenance, predictions, support for decision-making,
- advanced methods of structural surveys (UAV-based, specialised chemical analyses).

See also 3.3 Research projects and 3.4 Research results.

4. Owners of heritage monuments (mainly the Czech government and municipalities):

- surveys (primarily based on non- and semi-destructive techniques) and interpretation of results, reliability assessments, and optimisation of maintenance strategies, long-term structural health monitoring systems,
- methodologies certified by NPU the National Heritage Institute for heritage preservation, focused on specific issues (preservation of historic metal and masonry bridges, industrial heritage buildings, Czech concrete heritage,
- 2019-2023 applications include:
 - UNESCO-protected masonry and historic steel bridges (part of the Historic Centre of Prague),
 - UNESCO monument – the Cathedral of the Assumption of Our Lady and St John the Baptist in Sedlec near Kutna Hora, 1142: innovative measurement and regulatory system of the interior microclimate (prototype developed by the KI) was installed in 2018 in the treasury of the cathedral:
 - Valued monstrosities, paintings, and historical writings require specific conditions for storage and preservation (humidity and ambient temperature, avoiding surface condensation and conditions for mould growth).
 - While being challenged by the influence of the external climate and the requirement to expose these valuables to visitors, the KI's system controls ventilation and air conditioning systems to maintain the indoor climate within the limits and prevent significant rapid fluctuations in the indoor microclimate parameters.
 - Following its validation, the system has been successfully controlling air conditioning units since 2019.



- industrial heritage – historic buildings of several railway stations (e.g. in Prague or in Ceske Budejovice),
- sacral architecture – many churches.

5. Universities – as an example of cooperation with research institutions, a long-term cooperation with Brno University of Technology is presented:

- Team of Prof. R. Drochytka, Institute of Technology of Building Materials and Components:

- o UHPC,
- o surveys and rehabilitation of exposed concrete structures,
- o the two institutes jointly organise annual WTA conferences on rehabilitation of buildings (WTA Days and CRRB Int Conf on Rehabilitation and Reconstruction of Buildings),
- Team of Prof. D. Lehky and Prof. D. Novak, Institute of Structural Mechanics:
 - o joint research efforts related to reliability theory and numerical simulation methods, degradation processes, uncertainty quantification,
 - o reliability of degrading structures, cracking in reinforced concrete structures, time-variant reliability analysis (durability and service life predictions).

In a similar way, the KI collaborates with other major Czech TUs. For instance, the memorandum of cooperation with TU Ostrava with the Centre of nanotechnologies provided a framework for cooperation that resulted in Czech patent, prototype, and application for a European patent on anticorrosion surface treatment of steels; the results of the joint research under the KI's leadership are utilised in a dissertation. In the field of chemical engineering, a long-term cooperation is established with The University of Chemistry and Technology, Prague.

The KI experts intensively cooperate with colleagues from other CTU's units, mainly Faculty of Civil Engineering, Fac. Architecture, and Transportation Sciences. They run joint research projects and cooperate on expert reports.

BUT and CTU leading experts serve as members in scientific boards of the Faculty of Civil Engineering BUT and of the KI.

Note that the key industrial partner (KS Prefa – #1 in UHPC production in the Czech market) has expressed interest in the application of the patented method related to UHPC. Details of the contract have been negotiated since 2024, expected revenues are 16 k€/year.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation.

Type of revenue	Revenue (in thousands CZK/EUR)				
	year 1	year 2	year 3	year 4	year 5
-	-	-	-	-	-
Total					

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

During the evaluation period, the KI actively focused on the popularization of R&D&I and public engagement. Beyond the social media initiatives (see #3 below), these efforts were primarily conducted in collaboration with CTU faculties (notably FCE and FA). The flagship event was the Children's University summer camp, led by Dr. Michaela Kostelecka (formerly of KI, now at the Faculty of Civil Engineering). In the KI, this program engaged primary school students in hands-on activities, including

static and dynamic structural testing, controlled chemical experiments, microstructure analysis, and 3D printing of concrete elements and sculptures.

To illustrate KI's public engagement, the following 10 key examples are provided (see attachment *KI_3.6_KI in media 2019-2023_summary.pdf*):

1. Television and Radio Broadcasts

- 35 TV appearances (mainly on Czech public television and local Prague stations) and numerous radio segments
- Topics covered: seismic events in Turkey and Syria (2023), local floods, and the 2021 Liberec cable car collapse



2. Print media: ~400 contributions in the evaluated period in the Czech media including the leading newspapers (MF DNES, Metro, Hospodářské noviny, Lidové noviny, Právo, E15, Kladenský deník), leading professional journals (SILNICE ŽELEZNICE, Konstrukce), and local newspapers (Zpravodaj města Písku, Nymburský deník).

3. Social Media Impact

- KI launched its Facebook page in 2022; the post about the Dretovický Brook bridge (see Section 3.2) reached 1.2 million followers.
- International reach: primarily English (119 mentions), followed by German (11) and six other languages (disregarding Slovak).
- Top platforms: ResearchGate (~930k reach), Wikipedia (510k), Wiley (194k).
- The audience ratio is female/male 55%/45%.

Details in the first 25 pages of the attachment *KI_3.6_KI in media 2019-2023_summary.pdf*.



4. Repair of heritage bridge in Liben (Libeňský most, 1928)

- KI conducted structural surveys and monitoring for the pioneering plain concrete bridge, proposing an innovative UHPC repair to maintain heritage value while meeting modern traffic demands.
- Experts advised the Prague City Council and communicated findings via public fora.

<https://www.praha.camp/magazin/detail/bourani-a-rozsireni-ci-rekonstrukce-jaka-je-budoucnost-dost-mozna-jedineho-kubistickeho-mostu-na-svete>



5. International Colloquium on Bridge Repair/ Replacement of Steel Bridge in Vyton

The railway bridge (1901), with a span of 72 meters and a total length of 285 meters, is a key element but also a bottleneck in the TEN-T trans-European railway network. It is part of a UNESCO World Heritage site and a notable landmark in Prague. The KI has conducted an advanced structural survey and is currently running an online monitoring system to ensure safe traffic flow under constrained conditions. KI experts were involved in the conceptual design, provided advisory support to the Prague City Council in decision-making, and collaborated with the public in partnership with SZ (Czech railway manager), FCE, and internationally recognized experts, including Prof. Brühwiller from EPFL, Switzerland. The Director of KI is also a member of the Colloquium (expert panel).



6. Holesovice-Karlin footbridge:

- The award-winning structure generated significant public interest.
- KI experts, including Dr. Peter Tej and Prof. Jiri Kolisko, participated in numerous interviews and media reports; see *KI_3.2_UHPC footbridges_monograph.pdf* or:

<https://www.jednoustopouceskem.cz/listing/stvanicka-lavka-holka/>

7. Trojska lavka (footbridge in Troja, Prague)

- Following its catastrophic collapse, the KI provided technical analyses and expert testimonies in court proceedings (finished in 2022-2023).
- The case strengthened KI's media reputation, leading to coverage of international bridge failures since then (e.g., Morandi Bridge, bridges in Baltimore and Dresden, the collapse of the cable car in Liberec, CZ).



8. Load tests and monitoring of bridges and buildings – The KI is regularly commissioned to conduct load tests on major road (highway), railway, and pedestrian bridges. Between 2019 and 2023, these tests were performed on reinforced and prestressed concrete, steel, masonry, and timber bridges. For instance, continuous structural health monitoring systems have been installed to provide real-time data on two key road bridges and one railway bridge in Prague, all of which are UNESCO-protected. Additionally, deformations are being monitored on the Liben Bridge and the Holesovice-Karlin footbridge.

Furthermore, the institute has carried out crack monitoring and structural assessments, offering operational recommendations for several critical structures, including:

- Veletržní palác (the main market hall at the Prague Exhibition Grounds),
- Vodní tvrz Jeseník (Water Fortress),
- ED Kladno (a key station in the power distribution network between the Czech Republic and Germany),
- The International Laser Centre ELI in Brezany,
- Pavilion G of Nemocnice Kralovské Vinohrady (one of Prague's main hospitals).

Additionally, structural assessments and operational recommendations were provided for glass structures, particularly facades, including those of the Moravian Regional Archives in Brno and the National Technical Library in Prague.



9. Monographs: selected results of the KI's research activities were communicated to the public. Besides many contributions in media, the following selected books provided an overview of research findings, including civil engineering, architecture, and heritage preservation aspects:

- Schneiderová Heralová, R. et al. Udržitelná správa stavebních objektů kulturního dědictví (Sustainable Management of Cultural Heritage Buildings), 2021
- Ráftl, J.; Cítek, D. et al. 3D STAR - 3D tisk ve stavebnictví a architektuře (3D STAR - 3D Printing in Construction and Architecture), 2022 (attachment *KI_3.6_3D Star-monograph about 3Dprinting.pdf*)
- Tej, P.; Scheinherr, A.; Kolísko, J.; Beran, L.; Hulec, M. Libeňský most 1922-2022 (Liben bridge 1922-2022), 2022 (attachment *KI_3.6_Libensky_most_1922_2022_ebook.pdf*)
- Tichý, M.; Sedláková, R.; Kolísko, J.; Hrabánek, M. Palác Elektrických podniků v běhu času (Palace of Electric Companies in Course of Time), 2023



10. Presentation of research results on exhibitions – KI organized or participated in exhibitions presenting the research results to the professional and general public. Posters with basic technical information and photographic documentation were prepared, fragments and models were exhibited, and moderated discussions with the authors were held. The exhibitions were usually accompanied by book publications. Selected examples of exhibitions:

- Building Fair Brno 2023, Festival of Architecture, 2-4 March 2023 - 3D printing in construction and architecture, including statues, 16 thousand visitors from 10 countries; large-scale demonstration by the statues of Karyatid of Erechthea in the Acropolis optimized for 3D printing from concrete - without human intervention, with complete digitization process including computational methods (nozzle paths on edges, overhangs)
- exhibition on heritage steel bridges, their surveys, assessments and maintenance, organised as part of the international conference IABSE Symposium Prague, 2022: Challenges for Existing and Oncoming Structures, 25-27 May 2022 (~360 visitors)
- exhibition in the lobby of the Faculty of Architecture, CTU in Prague, 27 September - 7 October 2022, with participation of e.g. SZ (railway manager), TSK Prague, National Heritage Institute, CTU leaders, the chairman of the editorial board of the magazine Stavebnictví (Civil Engineering), the director of ČKAIT (Czech Chamber of Authorised Civil Engineers) and representatives of major design offices and testing laboratories (~1,000 participants over two weeks)

- this successful exhibition then took place in 15.11.-30.12.2022 in Ceske Budejovice, in February 2023 in Hradec Kralove (~350 visitors). In 2023, it has been permanently installed in the exhibition hall of the National Heritage Institute in Ostrava.



IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

Evaluation (2014-2020) – only critical comments highlighted:

Report 2020 - Recommendation 3.2, 3.3 and 3.4: ... Efforts should be made to **reduce the number of small tasks** in favor of larger ones of presumably greater scientific value... However, **more cooperations with foreign entities** would open up new research topics.

To enhance the visibility of the KI, the scope of the main R&D topics (flowchart in Section 3.1) has been narrowed. Based on current research trends and industry needs, key topics now include modern cement-based composites, laminated glass, 3D printing, reliability and risk analysis with a focus on sustainability and climate change effects. The KI continues to rely on both experimental and theoretical research activities.

In contract research, several major framework contracts have been established, including those with TSK, RSD, and SUZ (road management across Czechia), SZ (railway network), as well as design and consultancy offices such as AFRY and Mot McDonald, and VCES (see Table 3.3.2). Additionally, several long-term projects have been initiated, such as the National Centre for Industrial 3D Printing (2023-2028).

Revenues from cooperation with foreign entities have, on average, doubled compared to the 2014-2018 period, and more than tripled in 2023 following the resolution of the COVID-19 pandemic (see Section 3.1).

Report 2020 - Recommendation 3.5 through 3.9: ... A **critical internal assessment of the benefits from the patents** would be useful.... No spin-offs or licensed patents are listed in the self-evaluation report in the time period 2014-2018. This suggests a **careful consideration of the spin-off strategy of both the Klokner Institute and the Czech Technical University**. If necessary, this strategy should be adapted to the needs of the Klokner Institute. Given its excellent cooperation with industry and, thus, its understanding of the industrial needs, the set-up of spin-offs should be feasible provided a clear patent strategy was available.

The KI follows the CTU's general patent and spin-off strategies, with patents primarily resulting from collaborations with industrial partners who become co-owners. Given their investment in development, these partners typically aim to protect know-how and maintain control over patent transfers. The established model of cooperation between public research organizations and industry supports this approach, emphasizing long-term collaboration over immediate revenues from intellectual property.

To enhance patent commercialization, the KI is strengthening industry partnerships, optimizing licensing strategies, and expanding expertise in technology transfer. Ongoing efforts include reviewing licensing agreements, exploring new collaboration models, and seeking partners beyond the construction sector. Additionally, expert support in commercialization has been enhanced through training of its researcher, and discussions with government institutions are underway to refine support mechanisms for innovation.

Report 2020 - Recommendation 3.10 and 3.11: Scientific acknowledgments are first of all a consequence of the high quality of research, carried out by the members of a research unit. Personal acquaintances, made e.g. at international congresses and conferences, may result in an increase of such acknowledgments. The same holds true for memberships in editorial boards of scientific journals and in working commissions of professional associations. Hence, apart from striving for scientific excellence, **efforts to enhance the scientific visibility should be made**.

KI is a partner in numerous international research initiatives and collaborations (see mainly Section 3.2). Relative to its size, KI is well-integrated into international research networks, associations, and organizations. The internationalization of its research is further supported by its active involvement in international standardization (CEN, ISO).

Report 2020 - Recommendation 3.12: **The Klokner Institute should improve public relations concerning its activities in the popularization of R&D&I and communication with the public.**

The popularization and communication with the public have been significantly improved. The main communication channels include TV and radio broadcasting, print media, and social networks (see Section 3.6).

While the KI's focus on technical topics for the coming years is given at the end of Section 3.1, brief remarks on the personnel KI's strategy to be followed are given at the end of this report. Based on the available personnel data from the Klokner Institute, the age structure appears to be relatively favourable, with more than 72% of scientific and academic staff under the age of 50. This indicates a strong potential for further professional development and long-term institutional stability. Regarding a lower number of associate professors, this can be interpreted in several ways:

1. Openness to young researchers – The KI actively provides opportunities for younger scientific staff, aligning with the broader academic trend of supporting early-career researchers in their professional growth.
2. Focus on applied research – Given the nature of the Institute's research activities, there may be a stronger emphasis on applied research and collaboration with industry partners, where academic titles are a secondary measure of expertise.
3. Systematic development plan – A lower number of associate professors can be seen as an opportunity for future growth. The KI can actively support habilitations among its staff and implement a strategy to systematically enhance scientific excellence.
4. Interdisciplinary collaboration – The engagement of external associate professors and senior researchers in various research projects and teaching activities allows for a dynamic involvement of top experts without the necessity of direct employment.

To conclude, while the current personnel structure reflects a strong foundation with a predominance of younger researchers, the KI recognizes the need for continuous academic advancement. By fostering career progression, expanding strategic collaborations, and emphasizing excellence in both research and education, the Institute is well-positioned to strengthen its academic standing and maintain its leading role in the field.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)
KI_3.2_awards UPHC footbridges_OTHERS.pdf	3.2	https://owncloud.cesnet.cz/index.php/s/kmIfL4EvclmJooP
KI_3.2_UHPC footbridges_monograph.pdf	3.2	https://owncloud.cesnet.cz/index.php/s/9ICip3LN4tWKjFy
KI_3.3_detailed description of 10 projects.pdf	3.3	https://owncloud.cesnet.cz/index.php/s/1YH8dhKHZiVpuwC
KI_3.4.1_ Overview of research results.pdf	3.4	https://owncloud.cesnet.cz/index.php/s/1vYgdLv4fkCRPP9
KI_3.6_KI in media 2019-2023_summary.pdf	3.6	https://owncloud.cesnet.cz/index.php/s/Mo4LUVwHbQAA7m0
KI_3.6_3D Star-monograph about 3Dprinting.pdf	3.6	https://owncloud.cesnet.cz/index.php/s/ZVpkAYxbXFkKA4x
KI_3.6_Libensky_most_1922_2022_ebook.pdf	3.6	https://owncloud.cesnet.cz/index.php/s/aLGhKKLCU2l0ka1
<u>Repair of heritage bridge in Liben</u>	3.6	https://www.praha.camp/magazin/detail/bourani-a-rozsireni-ci-rekonstrukce-jaka-je-budoucnost-dost-mozna-jedineho-kubistickeho-mostu-na-svete
<u>Holesovice-Karlin footbridge</u>	3.6	https://www.jednostopouceskem.cz/listing/stvanicka-lavka-holka/

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: Masaryk Institute of Advanced Studies (MIAS) CTU

FORD: 5 - Social sciences

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

Mission: The Masaryk Institute of Advanced Studies (MIAS) of the Czech Technical University (CTU) in Prague continues the traditions and needs of its founding; it is an institution that meets the social-scientific challenges of technological change and reflects them in research and education. The MIAS prepares quality managers who are and will be at the forefront of promoting various innovations; their qualifications must therefore include an understanding of current technological trends, an acceptance of social responsibility and an awareness of the need for lifelong learning. The MIAS has long been involved in the education of teachers of technical disciplines, emphasising the development of didactics, at the level of secondary and higher education pedagogy and lifelong learning. It perceives internationalisation as an important tool for the development of study programmes and research, and, therefore, the quality language training is an important part of the educational processes. The Institute strengthens the space for cooperation with other parts of the CTU in Prague and fulfils the social role of universities through its public activities.

Vision: The MIAS aims to become a top university institution that addresses contemporary society's challenges. The long-term development of the institute is based on conceptual approaches that do not only follow immediate particularistic interests, but aim at deeper synergy within the CTU and that allow to distinguish between short-term effects and long-term trends and create space for international cooperation. The institute is founded on the implementation of the principles of humanity and ethics in teaching and research, respect for the principles of non-discrimination and

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

equal opportunities. The use of modern didactic tools and approaches brought about by current technologies must not lose its human and social dimension.

The development and activities of the Institute were significantly affected by the internal crisis that escalated in 2019 and resulted in the departure of the former management and about 70% of the staff (academic, research, administrative, etc.) in 2020. The new leadership focused on addressing the crisis situation. The priority in 2020 and 2021 was to keep students and ensure quality teaching. In terms of R&D, the first priority was to ensure the completion of running projects. The first years of the transformation were complicated by the Covid-19 restrictions (2020/2021), which limited in particular the setting up of internal communication and the creation of research teams.

After the initial overcoming of the crisis situation, conceptual steps were initiated concerning:

a) Closer linking of the MIAS with the faculties of CTU - synergy effect

The MIAS coordinated the project of the National Renewal Plan that resulted in the accreditation of 7 study programs preparing future teachers of technical and natural sciences to be realized on 5 faculties. MIAS provides the pedagogical, psychological and didactic part of the study programmes. Launched in 2022 (successfully accredited in January 2025). The project corresponds to the CTU Strategic Plan, the Strategy of the Czech Republic's Educational Policy 2030+ (p. 53), the Strategic Framework of the Czech Republic 2030 (p. 39), the National Research and Innovation Strategy for Smart Specialisation of the Czech Republic 2021-2027 (RIS3 Strategy, p. 49) and at the European level the European Skills Agenda 2020 (Action 4: Making vocational education and training future-proof, p. 9).

b) Initiation of research activities

- Contract research - the first 4 contract research studies were carried out in 2023.
- Applied research projects - The success rate of newly submitted projects was not very high, 2 projects were newly acquired and implemented in the period by Technological Agency of the Czech Republic (MIAS project leader), one project funded by Norwegian funds (MIAS co-leader).
- Networking with the international environment - ERASMUS+ projects, research fellowships abroad (2023 - University of Rennes, France), recruitment of postdocs (since 2021) and their involvement in research activities, support for participation in major international conferences (resulted in 2024 in obtaining the first Inter-Excellence basic research project (partners from 3 universities in the USA involved)).
- Supporting high quality publishing (we fund proof reading and open access).

Organisational structure of the Institute: the management of the Institute consists of a Director, a Deputy Director, two Coordinators (for Studies and for R&D) and an Economic Secretary. In terms of gender structure, there are 2 women and 3 men. In addition, the Institute has 5 professional institutes - 3 women and 2 men chair them. The administrative units are 5 departments, the heads of the departments are 2 women and 3 men. It can be said that the MIAS has a balanced gender representation in management.

The staffing trends must be seen in the light of the 2019/2020 crisis. The numbers of associate professors and professors (lower units) are weaker in the period under review. The number of assistant professors shows an initial caution in recruitment, with an increase from about 2022. Women exceed 50%. Technical and economic staff remain roughly the same over the period under review, with women traditionally over-represented.

The study programmes include the Bachelor's programme in Economics and Management and the follow-up Master's programme in Innovation Project Management. From 2021 onwards these programmes have been offered also in English. Both programmes are academic in character, but the Bachelor programme has been accredited as a professional programme since 2023. Students are being admitted to the new teacher-oriented Bachelor programme called Vocational teacher education since 2021.

The number of students corresponds to the capacity of the Institute, the basic strategy is not to increase the number of students significantly, but to deepen the quality of teaching and leave space for academic staff to do research. The gender balance of students is excellent (F 50%: M50%, with minor fluctuations). Positive results are shown also in the student mobility, and the internationalization of teaching especially under the ERASMUS programme.

We see a clear increase in the number of students in the LL programmes, which has become more oriented towards the professional public and has responded to social demand with the offer of 4-semester course "Educational Consultant" (responding to the worsening psychological state of pupils and the shortage of school psychologists and educational consultants).

Table 3.1.1 - Staffing per FTE²

Academic/ Professional position	Total / Of which women					
	year 1	year 2	year 3	year 4	year 5	Total
Professor	2,0/1,0	3,5/2,0	1,5/1,0	2,5/1,5	2,5/1,5	12,0/7,0
Associate Professor	10,6/4,7	13,9/5,7	8,3/2,7	9,1/2,5	8,8/2,5	50,5/18,1
Assistant Professor	37,9/20,4	48,7/24,7	27,5/15,5	39,0/24,0	36,7/20,3	189,8/104,9
Assistant	0,0/0,0	0,0/0,0	0,0/0,0	0,0/0,0	0,0/0,0	0,0/0,0
R&D Personnel ³	12,8/7,0	14,0/7,0	5,3/1,5	5,0/1,5	4,0/0,5	41,1/17,5
Researchers in other categories ⁴	0,3/0,0	0,3/0,0	0,0/0,0	1,0/0,0	2,0/0,0	3,6/0,0
Technical and economic staff ⁵	31,4/23,0	38,3/27,6	32,9/24,9	32,9/25,9	32,1/24,6	167,5/125,9
Scientific, research and development staff involved in teaching activities	7,5/5,0	8,0/5,5	3,5/1,5	3,5/1,5	3,5/1,5	26,0/15,0
Early career researchers ⁶	0,5/0,0	0,5/0,0	0,0/0,0	1,0/0,0	2,0/0,0	4,0/0,0

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

Total ⁷	94,9/56,1	117,6/65,9	74,4/44,6	88,4/54,4	85,1/48,4	464,4/273,3

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the first year of the evaluation period (numbers of physical employees and personnel)⁸

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	0	0	0	0	0	0	0	0
Associate Professor	0	0	0	0	1	1	0	0	0	0	0	0
Assistant Professor	0	0	1	0	1	1	0	0	0	0	0	0
Assistant	0	0	0	0	0	0	0	0	0	0	0	0
R&D Personnel ⁹	2	0	7	4	4	1	2	2	2	1	0	0
Researchers in other categories ¹⁰	0	0	0	0	0	0	0	0	1	0	0	0
Technical and economic staff ¹¹	0	0	0	0	0	0	0	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	0	0	3	2	4	2	1	1	1	1	0	0
Early career researcher ¹²	0	0	1	0	0	0	0	0	0	0	0	0
Total ¹³	2	0	8	4	6	3	2	2	3	1	0	0

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the last year of the evaluation period (numbers of physical employees and personnel)¹⁴

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	0	0	0	0	1	1	0	0
Associate Professor	0	0	0	0	0	0	0	0	0	0	0	0
Assistant Professor	0	0	0	0	0	0	0	0	1	1	0	0
Assistant	0	0	0	0	0	0	0	0	0	0	0	0
R&D Personnel ¹⁵	0	0	0	0	2	0	1	0	1	1	1	0
Researchers in other categories ¹⁶	0	0	2	0	0	0	0	0	0	0	0	0
Technical and economic staff ¹⁷	0	0	0	0	0	0	0	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	0	0	0	0	2	0	0	0	2	2	0	0
Early career researcher ¹⁸	0	0	2	0	0	0	0	0	0	0	0	0
Total ¹⁹	0	0	2	0	2	0	1	0	3	3	1	0

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students

Type of study	2019		2020		2021		2022		2023		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate	493	223	570	304	559	275	654	313	646	326	2922	1441
Master's ²⁰	246	91	252	141	284	143	317	164	339	177	1438	716
Doctoral	0	0	0	0	0	0	0	0	0	0	0	0
Lifelong Learning Courses	136	100	141	81	445	237	672	433	880	587	2274	1438
Total	875	414	963	526	1288	655	1643	910	1865	1090	6634	3595

work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

Table 3.1.5 - Study programmes in Czech/English

Type of study programme	Total ²¹ / Of which professional study programmes											
	2019		2020		2021		2022		2023		Total	
Undergraduate	5/1	2/0	3/0	2/0	4/1	3/0	4/1	3/0	6/2	3/1	22/4	13/1
Master's	4/1	0/0	3/0	0/0	4/2	0/0	3/1	0/0	3/1	0/0	17/5	0/0
Doctoral	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Lifelong Learning courses	13/0	2/0	12/0	0/0	85/5	21/2	77/3	12/0	73/1	12/0	260/9	47/2
Total	9/2	2/0	6/0	2/0	8/3	3/0	7/2	3/0	9/3	3/1	39/9	13/1

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
1. Natural Sciences	1.1 Mathematics	0	Zvolte položku.	0
	1.2 Computer and information sciences		Zvolte položku.	
	1.3 Physical sciences	0	Zvolte položku.	
	1.4 Chemical sciences	0	Zvolte položku.	
	1.5 Earth and related environmental sciences	0	Zvolte položku.	
	1.6 Biological sciences	0	Zvolte položku.	
	1.7 Other natural sciences		Zvolte položku.	
2. Engineering and Technology	2.1 Civil engineering	3,78	Applied Research	3,93
	2.2 Electrical engineering, Electronic engineering, Information engineering	0	Zvolte položku.	
	2.3 Mechanical engineering	0,15	Applied Research	
	2.4 Chemical engineering	0	Zvolte položku.	
	2.5 Materials engineering	0	Zvolte položku.	
	2.6 Medical engineering	0	Zvolte položku.	
	2.7 Environmental engineering	0	Zvolte položku.	
	2.8 Environmental biotechnology	0	Zvolte položku.	
	2.9 Industrial biotechnology	0	Zvolte položku.	3,93
	2.10 Nanotechnology	0	Zvolte položku.	
	2.11 Other engineering and technologies	0	Zvolte položku.	
3. Medical and Health Sciences	3.1 Basic medicine	0	Zvolte položku.	0
	3.2 Clinical medicine	0	Zvolte položku.	

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

	3.3 Health sciences	0	Zvolte položku.	
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries	0	Zvolte položku.	0
	4.2 Animal and Dairy science	0	Zvolte položku.	
	4.3 Veterinary science	0	Zvolte položku.	
	4.4 Other agricultural sciences	0	Zvolte položku.	
5. Social Sciences	5.1 Psychology and cognitive sciences	3,3	Applied Research	96,07
	5.2 Economics and Business	42,83	Applied Research	
	5.3 Education	26,76	Applied Research	
	5.4 Sociology	2,54	Applied Research	
	5.5 Law	8,25	Applied Research	
	5.6 Political science	3,4	Applied Research	
	5.7 Social and economic geography	6,46	Applied Research	
	5.8 Media and communications	0	Zvolte položku.	
	5.9 Other social sciences	02,54	Applied Research	
6. Humanities and the Arts	6.1 History and Archaeology	0	Zvolte položku.	0
	6.2 Languages and Literature	0	Zvolte položku.	
	6.3 Philosophy, Ethics and Religion	0	Zvolte položku.	
	6.4 Arts (arts, history of arts, performing arts, music)	0	Zvolte položku.	
	6.5 Other Humanities and the Arts		Zvolte položku.	
Total		100 %	-	100 %

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the previous five-year period based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

The Masaryk Institute of Higher Studies of the CTU in Prague has established itself as an important contributor to the research community, especially in the field of pedagogy and didactics of technical disciplines, economics, and innovation management. The academic staff of the Institute have received recognition for their contributions to both the university and their disciplines. In particular, the Associate Prof. Dana Dobrovská, PhDr., CSc. was awarded the Medal for Significant Contribution to the Development of the CTU in April 2022 by the Rector of the CTU in Prague. This award is in recognition of her major influence on the international recognition of Czech engineering pedagogy, especially through her leadership role as President of International Monitoring Committee IGIP. The expertise of MIAS pedagogues is recognised internationally through invitations to lecture at major academic events both internationally and in the field of science and research in the Czech environment. Associate Prof. Ing. David Vaněček, Ph.D., who is a respected expert in the Czech and international environment in the field of pedagogy and teaching methodology he is a pioneer in the use of artificial intelligence and modern technologies in educational processes, and regularly participates in expert panels on the setting of didactics of technical fields. He has succeeded in building a network of international contacts, which in turn has resulted in the submission of international projects. The Director of the Institute, Prof. PhDr. Vladimíra Dvořáková, CSc. is a respected personality on the Czech and international Political science scene, where she is often a guest of expert discussions in the Czech and foreign media in relation to political events such as electoral processes both in the Czech Republic and abroad, oligarchic structures and corruption. She is a well-known expert in the field of quality assurance in higher education and she often serves as an evaluator of the Institutions of Higher Education and particular study programs. Coordinator for Science, Research and Development Associate Professor. Ing. Lucie Plzáková, PhD. regularly participates in expert panels and discussions in the field of service economics, specifically in tourism. She is a member of the prestigious International Association of Scientific Experts in Tourism (AIEST), which is dedicated to improving the global tourism industry through the analysis of trends and the latest developments in tourism and insightful solutions to emerging problems, founded in 1951 in Switzerland. She is also a member of the Association of Scientific Experts in Tourism of the Czech Republic, a member of the Certification Commission of Destination Management Organizations, Czech Tourism, and is regularly invited by the professional body such as the Association of Trade and Tourism to give expert lectures, especially in the area of local taxation of tourism and its impact on the local economy.

MIAS has foreign staff from France, Ukraine, Kazakhstan and Colombia, Turkey, and Portuguese. They are in regular contact with the research community in their countries, which also strengthens MIAS' involvement in professional networks, particularly in the fields of economics and management.

MIAS honours the openness and accessibility of the campus to the general public and makes sure that students and academics are in contact with practice, regularly inviting well-known personalities not only from universities but also from civil and political life and business for public discussions. In the past, discussions have been held with representatives of the European Commission or the European Parliament. Furthermore, MIAS has strengthened its research community through lectures and meetings with representatives from Columbia University, Cornell University and Loyola University from the United States. The MIAS community is strengthened by regular contact from the business world through invited lectures by representatives of successful companies operating in the Czech or Central European market. Examples include close cooperation with Škoda Auto, Peugeot, Alza CZ, Komerční banka, a.s. and others. There are also important personalities from business in Scientific Board of Mias , i.e, Hana Součková, SAP CR – Managing Director & Legal Representative at Forbes – 4 years in the row awarded in the list of “Most influential woman” Awarded between Top Woman Managers in the Czech Republic.

Due to their expertise, Prof. Dvořáková, Director of the Institute and Associated Prof. Vaněček, Deputy Director of the Institute, are invited as evaluators or correspondents of calls for research projects. Associate Prof. Plzáková is a frequent reviewer of articles submitted to journals in the field of tourism in quartiles Q1 and Q2 according to the Web of Science evaluation. This year she is a candidate for a permanent member of the Tourist Research Center (as the first Czech in a history of TRC), which is a very narrow circle of max 50 people from all over the world who set trends in research in the economic field of tourism.

The Masaryk Institute of Advanced Studies of the CTU in Prague has established itself as a major contributor to the research community through a complex combination of professional excellence, international cooperation, social relevance and expert activity. The Institute is systematically building its position through several complementary levels - from active participation in international organisations to connecting academia with practice. The uniqueness of the MIAS approach lies in the combination of a strong international dimension, which includes both foreign academics and cooperation with prestigious foreign institutions, with a deep knowledge of the local environment and its specific needs. This synergy allows the Institute not only to contribute to the development of theoretical knowledge in key areas of its work, but also to actively influence educational practice and public discourse. The expert evaluation activities of the academic staff further strengthen the position of the MIAS as a respected member of the research community with a significant impact on shaping standards and research direction in its fields of study, which are economics, management, innovation in the business sphere, but also in the spatial dimension of the regions, and pedagogy, didactics and psychology in relation to technical education.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
Doc. PhDr. Dana Dobrovská, CSc.	Medal for Significant Contributions to the Development of CTU (April 2022)	Rector – CTU in Prague

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of scientific journal, ISSN
Y. Ilker Yorulmaz, Ph.D.	Psychology in the Schools, Online ISSN:1520-6807 Print ISSN:0033-3085 (since 2023 – member of editorial review board)

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
Doc. Ing. Lucie Plzáková, Ph.D.	Pandemic, war and energy price crisis: an analytical perspective about system-wide shocks	55th Meeting of the Tourist Research Centre	2023
Prof. PhDr. Vladimíra Dvořáková, CSc.	Promoting digital literacy to close the digital divide	EC Directorate-General for communications networks, content and technology. High-Level multi-stakeholder event on the Future of the Internet	2022
Doc. Ing. David Vaněček, Ph.D. and Doc. PhDr. Dana Dobrovská, CSc.	Technical Skills Training Backed by Augmented Reality (Highlighted speakers)	3rd World Conference on Research in Education, Brussels, Belgium	2021
Doc. Ing. Lucie Plzáková, Ph.D.	Local Tourism Taxes in the Context of Collaborative Economy	MODUL University Vienna, Research event	2021

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year
Robert H. Frank	Cornell University	The Libertarian Welfare State: regulation, redistribution, and methodological individualism	2023
Tuugi Chuluun	Loyola University, Maryland	Round table discussion – teaching methodology and strategies of research	2023
Věra Jourová	Vice president of the European Commission	Discussion with guest of MIAS	2021
Luděk Niedermayer	Member of European Parliament	Discussion with guest of MIAS	2021

Jan Švejnar	Columbia University	Discussion with guest of MIAS	2021
Martin Seitz	Hyundai Motor Czech	Discussion with guest of MIAS	2021

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the research project/programme call	Name of the authority/guarantor project/programme call	Year
Prof. PhDr. Vladimíra Dvořáková, CSc. Expert	TITSMSMT933: Evaluation of the impact of systemic changes in higher education since 2016	Technology Agency of the Czech Republic	2021-2022
Prof. PhDr. Vladimíra Dvořáková, CSc.	Democratic Efficacy and the Varieties of Populism in Europe (DEMOS) Member of the Advisory Board	European Commission Grant Agreement ID: 822590 Horizon 2020	2020-2022
Doc. Ing. David Vaněček, Ph.D.	Expert advisory body of the Ministry of Education, Youth and Sports of the INTER EXCELLENCE programme of international cooperation in research and development.	Ministry of Education, Youth and Sports	2019-2023

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the evaluation period²³. This should be done from the full list in annex tables (Table 3.3.1-3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

Self-assessment:

The Masaryk Institute of Advanced Studies of the CTU in Prague complements the technical focus of the CTU faculties with its social scientific research activities. The mission of MIAS is mainly to prepare quality economists and managers for middle and high-level management of Czech and international companies operating mainly in technical fields. Similarly, the mission of MIAS is to prepare quality teachers of secondary and higher education institutions educating students in technical fields. The focus of research activities also corresponds to this mission. In the period under evaluation, as mentioned at the beginning of chapter 3.1, the structure of MIAS has been significantly disrupted, which has had an impact on the research potential. Nevertheless, several research and contractual research projects have been carried out, building on the practice-oriented Bachelor's degree programme in Economics and Management. Most of the projects in the period under evaluation were focused on education and pedagogy, in some cases interdisciplinary dealing with management in education:

- The project **"Improvement of systems and processes of permitting new construction in Prague: affordable housing"**, where Technology Agency of the Czech Republic (here and after TACR) was the provider, aimed at the long-term sustainable development of Prague, allowing for the responsible preservation of the landscape around the city and at the same time slowing of the widening of the social gap. The main goal of the project was to develop proposals for changes in legal regulations and regulations of a non-legislative nature for the authorization of new construction in Prague based on a comprehensive assessment of the current state of decision-making mechanisms and comparative analysis with similar cities in nearby foreign countries. The project has contributed to the fulfilment of the MIAS mission, particularly in the area of contributing to strengthening the cohesion of society and raising the standard of living of the citizens of the capital city of Prague. The project was coordinated by MIAS in cooperation with Architects Headhand, s.r.o. and the Institute of Planning and Development of the City of Prague, a contributory organization. The experience and professional erudition of MIAS staff contributed to the cooperation with practice and the transfer of knowledge from academia to public administration. A total of 12 project results were entered into the RIV (Register of Information on Results). The project was supported by a total amount (not only for the period under review) of 6478 ths. CZK / € 255 542.
- The project **"Management structure models for pre-primary, primary and secondary schools (ISCED 0-3) - case studies"**, provided by TACR, aimed to identify (1) which areas of non-teaching activities are necessary to carry out and which areas of non-teaching activities it carries out by its legal personality. 2) Describe the current models of school management structure in different legal forms of different types of founders. 3) To compare these models of governance structure of public with private-law founders in order to make possible legislation that would allow public-law founders to draw inspiration from the practice of private-law founders in order to make school governance more effective. 4) Identify the obstacles that prevent public law founders from implementing measures to improve the efficiency of school management and prepare a proposal for changes to remove them (draft RIA report). The project strengthens the MIAS mission in the pedagogical and social fields. Firstly, it reflects the experience in pedagogical management processes into proposals for public administration in school management issues, with which the social role is closely linked. The level of primary and secondary education is a reflection of the maturity of society and through such projects MIAS fulfils the social role of the university. The

management of the project was entirely under the responsibility of MIAS, which was the only beneficiary and project implementer. The solutions proposed in the project outputs completely support the principles of modern and sustainable school management in the Czech Republic and are a response to current trends in education. The composition of the research team of 4 men and 2 women was gender balanced. In total (not only for the period under review), the project was supported with the amount of 1761 ths. CZK / € 69 467.

- The project **"Evaluation of the piloting of the middle tier of management support in education"**, provided by TACR, built on the previous project. The aim of this project was to evaluate the usefulness of the pilot testing of the middle tier model in the districts of Svitavy and Semily for the principals of local kindergartens and primary schools and to compare the usefulness and suitability of other existing middle tier models in the Czech Republic in relation to the identified needs of school principals and to formulate recommendations for setting up middle tier activities of the Ministry of Education in the current legal framework. Specific case studies in selected districts provided an evaluation of the proposed solutions in the previous project. The solutions reflect the experience of a coherent team from the fields of management, pedagogy, public administration and sociology. MIAS was the only beneficiary and project implementer. With this project, MIAS strengthens its mission, especially in the area of the social role of the university, by transferring its expertise and skills into practice, and thus contributes to improving the quality of Czech education. By reflecting their experience in curriculum development, MIAS experts have contributed to the dissemination of knowledge from the tertiary sphere of education to the lower levels of the educational structure in the Czech Republic. The project was supported with a total of 2414 ths. CZK / € 95 227. The structure of the research team, led by the Director of the Institute, was gender balanced.
- The project **"Development of digital competences of teachers of social sciences at secondary vocational schools"**, provided by TACR, aimed to contribute to solving the current problem of underdeveloped digital competences of teachers of social sciences in secondary vocational education. The starting point was the assumption that if these teachers are not digitally proficient, they will not be able to develop students' digital competences, which will negatively affect their employability in the labour market in the context of the transition to Industry 4.0, their readiness for further professional education and their ability to participate in lifelong learning. The application guarantor of the project outputs was the National Institute for Education, which guaranteed the transformation of the project results into the system of further education of teaching staff. The project made a significant contribution to the mission of MIAS by linking the social science and technology aspects of education. By focusing on the development of digital competences of social studies teachers, the project supports the preparation of graduates able to cope with Industry 4.0 and participate in lifelong learning. The project was conducted fully by MIAS and the gender structure of the project team was gender balanced (4 women: 3 men). The project was supported in its entirety, regardless of the period under evaluation, with an amount of EUR 3416 ths. CZK / € 134 753. A total of 18 results of the project were entered in the RIV (Register of Information on Results) and the TACR evaluation committee assessed the project as very successful and beneficial.
- The project **"Integration of children from foster care into society and their adaptation to the labor market"**, provided by TACR, aimed to map the factors influencing the integration of adolescents from foster care into society and their successful adaptation to the labor market and to improve the effectiveness of forms of support for adolescents leaving

institutional care. The current situation of a surplus of employment opportunities could help overcome barriers resulting from the syndrome of institutional dependence, hereditary poverty and others, which, according to existing research, reduce the ability of the target group to adapt to a new environment. With this project, MIAS is making a significant contribution to its mission in fulfilling the social role of the university. The contribution of MIAS to the societal contribution of the university through the transfer of experience and knowledge beyond the technical disciplines to the social space is precisely one of the strong reasons for the MIAS' existence as an integral part of a technically oriented university. The project was coordinated by MIAS with a slightly female-dominated research team and another project partner, the non-profit organization Yourchance. The project was supported in the total amount of 7244 thousand EUR. CZK / 285 760 €. In total, 12 results were submitted to RIV, which included, in addition to publications, workshops with the professional community and professional conferences.

- The project **"Interdisciplinary collaborative approaches to learning and teaching in HE"**, provided by the European Commission, aimed to promote and integrate innovative interdisciplinary, collaborative content-based approaches in language teaching and learning and redesign the learning environment through partnering with digital technologies in order to enable HE students to individualise and internationalise their learning pathways and empower freedom of mobility. MIAS was the lead investigator of the project, with other members of the project team being representatives from the following institutions: Budapest Business School (Hungary), Polytechnic Institute of Castelo Branco (Portugal), University of Extremadura (Spain) and University of Algarve (Portugal). The focus and content of the project contributes to the mission and scope of MIAS, in particular in the area of strengthening quality pedagogical approaches to education and enhancing the competences of teachers in response to new technological challenges and the internationalisation of the educational process. The MIAS project team was supported by a total of EUR 6099 ths. CZK / € 240 598.
- The project **"Transfer of experience in urban development and renewal planning to Moldova"** supported by Ministry of Foreign affairs had the main objective to transfer knowledge in the field of urban development and renewal planning in the conditions of transition economy and management of limited resources in the conditions of Moldova. The project was implemented in cooperation with the Alecu Russo State University in Balti, where the professional capacity of this public university was strengthened through the sharing of know-how and teaching materials. In addition to the main objective of the project, the situation for future primary research in the field of urban and municipal waste management, and in the field of urban planning and architecture was mapped by MIAS researchers. As the research team is cooperating with universities in Ukraine, where it is implementing two other projects later than the reporting period, and with a university in Kosovo, it is collecting documents and materials for a joint project to be submitted for funding at European level in the future. The contribution of the project to the fulfilment of the MIAS mission is mainly its international character with a dimension of knowledge and experience transfer to less developed countries. It is a strong motive of social solidarity with an impact on the long-term sustainability of urban settlement planning solutions in less developed countries. The project was supported with a total amount of 707 ths. / € 27 890. The project team was gender balanced (2 women and 2 men).
- The project **"Building Digital Resilience by Making Digital Wellbeing and Security Accessible to All"**, which was supported by the EC under the ERASMUS+ Cooperative

Partnership Call, aimed to develop a Digital Resilience Building Manual and Methodology, to develop Digital Resilience Building Training Program and Training Materials and to develop Digital Resilience Building Open Educational Resources (OER) Platform. The main coordinator of the project was the University of Nitra, Slovak Republic and other partners were Mugla Sıtkı Kocman University-Turkey, Asociacion de Innovacion Formacion y Empleo - Spain, Szigija Skopje Foundation - North Macedonia, Foundation Maker's Place - Greece, European Institute for Innovation - Technology, Germany. The content of the project corresponds to the research focus of the Department of Pedagogical, Didactic and Psychological Studies at MIAS under the leadership of Associate Prof. Vaněček. Based on the outputs of the project, an article was presented in the scientific journal Education, science, art and society in the 21st century: innovative approaches and competencies. A postdoc from Turkey, who worked at MIAS for one year, was included in the project. The involvement in the project and the publication of project outputs support the perception of MIAS as an international institute following modern trends in digital technologies and their application in pedagogical and didactic practice. MIAS was supported by its part of the project with a total of 585 ths. CZK / € 25 066.

- The project **"Digital age and threats to human rights"**, which was supported by Norwegian funds through the Czech Ministry of Finance, focused on the online environment in which human rights and digital rights intersect. The competence and experience of MIAS staff in semantic, algorithmic and financial analysis of online social networks was used by the research team to identify behaviours and patterns of communication in the digital world, in order to determine whether they are violating human rights, particularly for vulnerable social groups such as ethnic minorities and women. The project was conceived in partnership with Forum 50% and Inlustria (expertise of target groups and research activities) and the CTU in Prague (research and training activities, space for the topic in teaching). The focus of the project again emphasises the role of MIAS in the social environment and as an important complementary component to the technical faculties of CTU. With this project, MIAS clearly fulfils the third role of universities. The MIAS expert team was supported in this project with 515 ths CZK / € 20 283.
- MIAS has been involved in the activities of the V4 countries as part of the project **"Current Issues in Business from a V4 Perspective"** supported by the International Visegrad Fund. The project was focused on preparation, teaching and further development (over 3 years) of a new course in English offered in the undergraduate programme Economics and Management and for all CTU students as well as international exchange students and involving a Polish, Hungarian and Slovak guest lecturer, as well as a business practitioner. This activity contributed both to the internationalization of teaching and also to the cooperation between the faculties of CTU, where the developed courses were also offered to students of other faculties. Students had benefit from interdisciplinary and multicultural experience as well as numerous networking opportunities. The project was supported with 126 ths CZK / 4970 €.

MIAS is also focusing on contract research projects from 2023 for two reasons. Firstly, MIAS offers a practically oriented bachelor's degree program from 2023, and thus there is an increased emphasis on cooperation with companies, both on the part of students ("mandatory internships") and on the part of teachers. The second reason is the use of potential in human capital, especially in terms of knowledge and experience, and the aim is to transfer this capital into practice, both in the cooperation with enterprises and in the cooperation with municipalities in the Czech Republic.

Project results are regularly presented by MIAS staff at Czech and international conferences. For this purpose, MIAS has developed a system of support including guidelines for submitting applications for participation in conferences and professional events. All employees know the procedure for obtaining support for the popularisation of their outputs. MIAS researchers regularly participate in the Annual IGIP conference focus on engineering pedagogy, selected conferences focusing on new trends in management, selected current issues in economics as well as regional development and tourism, urban and territorial development.

Table 3.3.1 Projects supported by public funds

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
Technology Agency of the Czech Republic	Improvement of systems and processes of permitting new construction in Prague: affordable housing	2348 CZK / 92623 €	1233 CZK / 48639 €	-	-	-
Technology Agency of the Czech Republic	Management structure models for pre-primary, primary and secondary schools (ISCED 0-3) - case studies	-	-	-	-	699 CZK / 27574 €
Technology Agency of the Czech Republic	Evaluation of the piloting of the middle tier of management support in education	-	-	-	1142 CZK / 45049 €	1272 CZK / 50178 €
Technology Agency of the Czech Republic	Development of digital competences of teachers of social sciences at secondary vocational schools	770 CZK / 30375 €	1000 CZK / 39448 €	111 CZK / 4379 €	-	-

²⁵ If the provider is from abroad, please indicate the provider's country of origin in brackets. For the determination of the country of origin of the provider, the place of residence of the provider is decisive.

²⁶ Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

Technology Agency of the Czech Republic	Integration of children from foster care into society and their adaptation to the labor market	1591 CZK / 62761 €	1432 CZK / 56489 €	1242 CZK / 48994 €	1524 CZK / 60118 €	-
European Commission	Interdisciplinary collaborative approaches to learning and teaching in HE	706 CZK / 27850 €	1302 CZK / 51360 €	652 CZK / 25720 €	3439 CZK / 135661 €	-
Ministry of Foreign Affairs, Czechia	Transfer of experience in urban development and renewal planning to Moldova	-	-	-	-	707 CZK / 27890 €
Total		5415 CZK / 231 609 €	4967 CZK / 195 937 €	2005 CZK / 79 093 €	6105 CZK / 240 828 €	2678 CZK / 105 641 €
In the role of another participant						
Provider ²⁷	Project name	Support (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
European Commission	Building Digital Resilience by Making Digital Wellbeing and Security Accessible to All	-	-	-	-	272 CZK / 10741 €
Ministry of Finance: Norwegian funds	Digital age and threats to human rights	-	-	-	200 CZK / 7874 €	315 CZK / 12409 €
Visegrad Found	Current Issues in Business from a V4 Perspective	126 CZK / 4970 €	-	-	-	-
Total		126 CZK / 4970 €	-	-	200 CZK / 7874 €	587 CZK / 23156 €

Table 3.3.2 - Contract research activities

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
JEDNOTA, Consumer Cooperative, Nová Paka	Analysis of civic amenities in Nová Paka Municipality	0	0	0	0	69 CZK / 2722 €

²⁷ Ibid.

²⁸ If the client is from abroad, indicate in brackets the country of origin of the client.

DRFG Investment Group, a.s.	Strategy and ESG reporting	0	0	0	0	96 CZK / 3787 €
JEDNOTA, Consumer Cooperative, Nová Paka	Identification of the needs of civic amenities and services in Nová Paka Municipality and its catchment area and proposal for their supplementation	0	0	0	0	55 CZK / 2170 €
Czech fintech association, z.s.	Analysis of forthcoming financial regulation	0	0	0	0	50 CZK / 1972 €
Total		0	0	0	0	270 CZK / 10651 €

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the evaluated period, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁹, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

The research report **"Case studies of management structure models for pre-primary, primary and secondary schools"** (the report is a follow-up to the project with the same title) has several positive impacts on society. First of all, it contributes to more effective school management, leading to better use of resources and improving the quality of education. The report identifies areas where savings and improvements can be made, for example through the sharing of non-teaching activities between schools. This can lead to better use of resources and increased efficiency of the school system. The results of the report are mainly used by the Ministry of Education, Youth and Sports (MEYS). Furthermore, the results are relevant for school establisher, such as municipalities, regions and voluntary associations of municipalities, which can apply the report's recommendations to optimise school management. The research findings may also be useful for school legal entities, contributory organisations, private schools and other educational institutions looking for ways to improve their management and efficiency. The gender dimension is considered in the results presented with regard to the designation of professional groups, i.e. male and female pupil, male and female teacher. The implications of the results with regard to sustainability are significant. The report looks at ways to increase the efficiency of school management and thereby reduce costs, which can lead to a more sustainable use of public funds. The report also recommends streamlining administrative processes and using modern technology, which can lead to a reduction in the environmental footprint of schools. Overall, the report supports sustainable practices in education that can have long-term positive impacts on the environment and society. The MEYS has published the report on its website and is actively working with it.

²⁹ See Terms definition.

The final report of the **“Evaluation of the piloting of the middle tier of management support in education”** (the report is a follow-up to the project with the same title), prepared by the MIAS researchers, brings several positive impacts on society. The piloting tested a model of support for the primary management line of the Czech education system, which includes the state and the principals of primary and kindergarten schools. This model proved to be functional and appropriate, with the identified needs of schools being broader, especially in the areas of reducing non-teaching workload and supporting pedagogical leadership. The implementation of the research findings has had a number of positive impacts on society. Examples include improving the quality of education, setting up more effective school management, with support in non-teaching activities enabling principals to devote more time to pedagogical leadership, and last but not least, post-crisis support. The results of the report are mainly used by the Ministry of Education, Youth and Sports, which is the end user. Furthermore, the results are relevant for school founders, school principals and other actors in the education system, such as regional authorities and municipalities. The results of the report have a positive impact on the sustainability of the education system. More effective school management and a reduction in non-teaching workload contribute to the long-term sustainability and quality of education. Overall, the report provides valuable insights and recommendations that can lead to further improvements in the Czech education system. The MEYS has published the report on its website and is actively working with it.

The research report **“Integration of children from foster care into society and their adaptation to the labour market”** (the report is a follow-up to the project with the same title) has several positive impacts on society. First of all, it contributes to better integration of adolescents from children's homes into society and the labour market, which can reduce their risk of social exclusion, unemployment and homelessness. The report also highlights the importance of systematic preparation for leaving the children's home, which can lead to better coping with independent living and reduced dependence on social services. The results of the research are used by various institutions, including children's homes, non-profit organisations working with adolescents, and state institutions such as the Ministry of Education, Youth and Sports. These institutions can use the research findings to improve their programmes and services aimed at supporting adolescents in their transition to independent living. The gender dimension is reflected in these results. For example, the report states that women are more likely to underestimate themselves, which can affect their self-esteem and ability to cope with problems. Conversely, men tend to overestimate their abilities, which can lead to problems in dealing with real-life situations. These findings can help in designing specific support programmes for boys and girls. Impacts of the results with regard to sustainability include a reduction in the risk of social exclusion and unemployment, which can lead to better economic stability and reduced costs of social services. In addition, the report supports the development of social and soft skills, which are key to the sustainable development of society. Overall, it contributes to creating a more inclusive and sustainable society.

The work **“Variants of the administrative division of the territory of Prague with regard to the functioning of the construction authorities ”** (the report is a follow-up to the project “Improvement of systems and processes of permitting new construction in Prague: affordable housing”) has several positive impacts on society. First of all, it provides a professional basis for decision-making on the change of the city's status, which can lead to significant savings in direct public administration costs. Savings in the order of tens of millions of crowns can be achieved by optimising administrative zoning. In addition, accelerated permitting of construction works in the territory of the capital city of Prague can bring a turnover of billions of crowns, which will subsequently increase tax collection. This economic benefit promotes the development of the city and improves the quality of life of its inhabitants. The results of this work are mainly used by political and administrative institutions that

decide on the administrative division of the city. The main users include the Prague City Hall and other public administration bodies in Prague. These institutions use the maps as a basis for strategic planning and decision-making. The gender dimension is not explicitly taken into account in these results. However, optimising administrative zoning and fast-tracking construction permits can indirectly contribute to equality of opportunity by promoting economic growth and creating new job opportunities for all citizens regardless of gender. The results have a positive impact on the sustainability of the city. Accelerated permitting of construction works contributes to faster infrastructure development, which improves the quality of life of residents and supports the sustainable development of the city. Overall, the work contributes to the economic, social and environmental sustainability of the City of Prague.

The research report "**Experience of primary school pupils and teachers with distance learning in the second half of the 2019/2020 school year**" has several positive impacts on society. First and foremost, it provides valuable insights into how distance learning has impacted pupils and teachers during the COVID-19 pandemic. The report identifies key areas where distance learning has been successful, such as increasing teachers' digital skills and promoting pupil autonomy. The report also offers recommendations for improving the organisation of distance learning, which may lead to more effective learning in the future. The results of this report are mainly used by schools, teachers, parents, school founders and the Ministry of Education, Youth and Sports (MEYS). Schools and teachers can benefit from the recommendations for improving distance learning, while parents gain information on how to support their children during distance learning. School founders can use the results to optimise support to schools and the MEYS can use the report to develop educational guidelines and policies. The report focuses on the experiences of all pupils and teachers regardless of gender, contributing to equality of opportunity in education. The recommendations for improving distance learning are universal and can be applied to all pupils and teachers. The results of the report have a positive impact on the sustainability of the education system. The report promotes more effective use of digital technologies, which can lead to the long-term sustainability of the educational process. Recommendations for improving the organisation of distance learning can contribute to better management of crisis situations in the future. Overall, the report contributes to the development of a resilient and adaptable education system that is able to respond to emergency situations and ensure continuity of education.

The research report "**Affordable and sustainable housing in strategic settlement plans**" (the report is a follow-up to the project "Improvement of systems and processes of permitting new construction in Prague: affordable housing") provides a comprehensive analysis of the affordability and sustainability of housing, which is key to improving the quality of life of residents. The report identifies measures that cities and municipalities can use to increase housing affordability, such as political, legislative, social, economic, environmental and cultural instruments. In this way, it promotes social cohesion, economic efficiency and environmental friendliness. The results of this report are mainly used by cities and municipalities, which can implement the recommended measures in their strategic plans, not only in Prague. Furthermore, the results are relevant for government institutions such as the Ministry of Regional Development, which can use the report to develop housing policy. Academic institutions and research organisations can use the report as a basis for further research in the field of housing and urban planning. The report is also relevant for non-profit organisations and civic initiatives working on affordable housing issues. The gender dimension is not explicitly taken into account in these results. However, the recommended measures are universal and can be applied to all population groups. The report promotes the use of environmentally friendly technologies and practices, such as energy management in housing and the expansion of blue-green infrastructure. In this way, it contributes to protecting the environment

and improving the quality of life of residents. Recommendations for improving housing affordability can also lead to the economic sustainability of cities by promoting a stable and affordable housing market.

Table 3.4.1 - Overview of research results in the period under evaluation

Type of result ³⁰	Year of application	Name
Research Report	2024	Case studies of management structure models for pre-primary, primary and secondary schools
Research Report	2023	Evaluation of the piloting of the middle management support in education
Research Report	2022	Integration of children from foster care into society and their adaptation to the labour market
Specialized Map with Expert Content	2020	Variants of the administrative division of the territory of the capital city Prague with regard to the functioning of the construction authorities
Research Report	2020	Experience of primary school pupils and teachers with distance learning in the second half of the 2019/2020 school year
Research Report	2019	Affordable and sustainable housing in strategic settlement plans

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)³¹, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).³²

Additionally, the evaluated unit shall briefly comment on the funds received during the evaluation period from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

³⁰ Specify the specific type of result. Add rows as needed.

³¹ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

³² If the commercialisation of R&D&I results is carried out in this way.

Self-assessment:

The Masaryk Institute of Advanced Studies of CTU focuses on socio-economic fields in its research and educational activities. Therefore, the results of its activities cannot be expected to produce patents, licenses or prototypes that would be marketable either independently or within start-ups or spin-off companies. The transfer of results into practice stands on four pillars. The first pillar is applied research, where so-called application guarantors from state and public administration organisations, non-profit organisations and entrepreneurs are part of the research team. These application guarantors guarantee that research results (certified methodologies, maps, guidelines, proposed models, procedures, and other forms of outputs) will be applied in practice. This activity is usually paid within a grant. The second pillar for the transfer of outputs, knowledge and expertise are the business entities and public administration organisations (to a lesser extent) to which the students of the Bachelor's degree programme in Economics and Management attend for mandatory practices (from 2023 pilot launch of practices, from 2025 mandatory for all enrolled students). Based on the conclusion of cooperation agreements with these partners, in addition to the recruitment of students, there is also a subsequent demand for contract research, which brings in funding. The third pillar is the active participation of MIAS staff in professional organisations, initiatives and panels. Their expertise again leads to a demand not only for contract research but also for involvement in existing networks of other entities (universities and non-university entities) that subsequently address joint research tasks. The fourth pillar is lifelong learning, where MIAS monetises the knowledge and experience of its staff in a range of professional and language courses responding to society-wide demand.

MIAS managed to carry out 4 **contract researches** in the last year 2023 within the assessment period, two of them were related to the analysis of amenities of the Nová Paka Municipality and the subsequent continuation focused on the elaboration of the Building Programme for the location of the missing amenities. Furthermore, based on the concluded framework contract with the retail company DRFG a.s., a Report and a draft ESG Strategy for its headquarters in Prague were prepared in the first year of the 2023 solution. The fourth contractual research concerned the Analysis of the forthcoming EU financial regulation in relation to the financial bond markets.

From 2019 to 2023, MIAS has organized more than 110 **lifelong learning courses** for the general public. This is a significant means for MIAS to transfer social science knowledge and skills into practice and to monetise itself. More than half of the courses focused on language training, especially in the first two years of the evaluation period. In the following years, there were more courses focusing on other areas (in addition to language courses). MIAS regularly organized courses for professional coaches, both a basic course and advanced or team courses (under the auspices of the International Coach Federation). In addition, MIAS educated foreigners in the Czech language, prepared students for the entrance exams to the Czech Technical University, offered didactic courses in English for English teachers and interested members of the public, and from 2022 offered a 4-semester course for Educational Counsellors. It is the organisation and realization of lifelong learning courses that have significant financial benefits for MIAS.

MIAS significantly strengthens the social role of CTU, so the commercialisation of results into practice is at a lower level than at the technical faculties of CTU.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

Type of revenue	Revenue (in thousands CZK/EUR)				
	2019	2020	2021	2022	2023
Lifelong learning courses	10151 CZK / 400 434€	5336 CZK / 210 493 €	7206 CZK / 284 260 €	11485 CZK / 453 057 €	14355 CZK / 566 272 €
Contract research	-	-	-	-	270 CZK / 10 651 €
Total	10151 CZK / 400 434€	5336 CZK / 210 493 €	7206 CZK / 284 260 €	11485 CZK / 453 057 €	14625 CZK / 566 923 €

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the evaluated period and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

The MIAS began to appear more significantly in the public space during this period (in line with the MEP2020 recommendation). In the period 2021-2023, it is mentioned in the monitoring about 100 times, and in dozens of cases it is not just a brief mention, but comments, expert statements, interviews, etc. of the MIAS staff in the media space (mainly public television, radio, press). In addition, of course, the MIAS communicates on social media. The MIAS organised lectures by distinguished guests (listed in Table 3.2.4), which were also open to the public, and two book launches on democracy and its threats were held in 2021 for the wider public. Several activities took place outside the MIAS, to which MIAS persons were invited - the Summer School for teachers "civic education" Olomouc - 2022 and 2023, lectures intended for secondary school students (Grammar School Zlín 2023, Grammar School Zatlanka 2022), for NGOs - an invited lecture for the Union of Lawyers (intended for female lawyers), for European Federalists. The activities of the MIAS link the professional approach and results of R&D&I with corporate practice and reach out to the wider public in cooperation with other faculties (Automotive Day - 2022 and 2023, continues in the following years, Science Fest, etc.).

- **Communication in the public space:** Communication was mainly related to higher education and education issues in general, especially in connection with the amendment of the Higher Education Act, politics, economic issues. The most significant social impact with high viewership was the comments made in connection with the live presidential election results in the Czech Republic (28 January 2023) in a live broadcast on public television, where the Director of the MIAS, as the main invited expert, made several expert commentaries and analysis, including the final assessment of the results (these were tens of minutes of comments).
- **Membership in expert bodies and professional communities:** Through their involvement in professional structures (associations, trade unions, advisory bodies, public organizations, etc.), the MIAS staff not only communicate and popularize their knowledge and project outputs, but also highlight the good reputation of CTU MIAS. Examples include cooperation

or membership with: the Association of Small and Medium Enterprises and Tradesmen of the Czech Republic, the Certification Commission of Destination Management Organizations-CzechTourism, the Working Group on the Creation of the Tourism Act - Ministry of Regional Development, Working commission of the president of the Council of government for coordination of the struggle against corruption and transparency of state administration- Ministry of Justice, the Association for the Development of Collective Bargaining and Labour Relations - Ministry of Labour and Social Affairs, membership in the Office for Supervision of the Economy of Political Parties and Political Organizations through doc. Vymětal, who was named to this position by the President of the Senate of the Czech Republic.

- **Organisation of professional conferences and events:** Building on the Interdisciplinary Collaboration in Learning and Teaching in Higher Education project, MIAS organised three interdisciplinary conferences on technical education in 2021, where researchers presented project results and shared best practices with conference participants. The Regional Development between Theory and Practice international conference was held in 2022 and 2023, and MIAS continues to run this conference to the present day. Similarly, two GISPLAN conferences (2022, 2023) were organized to share knowledge and experience in the field of urban and regional planning. In 2021, conferences on Technical Education in the Czech Republic were organized on the issue of disciplinary didactics. Also in 2021, MIAS organized a conference for young CTU academics on Innovation and Strategic Management in the Pandemic Era.
- **Science popularization events:** Regular participation in events aimed at popularizing science both for the general public and for teenagers and children. At these events, MIAS presents the Institute's activities in both its educational and research activities. Examples of regularly recurring events are: the Night of Scientists, the Science Fair, ScienceFest.
- **Involvement in competitions, workshops and collaborations:** MIAS is actively involved in competitions, workshops and collaborations that have an impact beyond the academic environment. Such an example can be given participation in EuroTeQ Collider, a Challenge Based Learning (CBL) initiative within EuroTeQ Engineering University, where CTU is a member. The aim of this initiative is to bring together students, academics, industry partners, start-ups, government and societal institutions to work together to find solutions to real-world problems. EuroTeQ Collider is linked to the UN Sustainable Development Goals (SDGs) and focuses on societally relevant challenges across Europe, while supporting the development of participants' personal and professional skills.
- **Media presentation of alumni and students:** Among MIAS graduates and also current students are well-known students, especially due to their professional sports careers. Meetings, discussions and interviews with such students are organised and subsequently posted on the school's website and MIAS social networks.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

As already mentioned, the 2020 evaluation took place in a situation where there was a significant discontinuity in the Institute in terms of staffing and new management. On the one hand, this meant that the critical evaluation of the 2014-2018 period was linked to the previous management and its conception of the Institute, while the new management was looking for further ways to develop the institution, and the first period necessarily had to be devoted to overall stabilisation. It must be said that the discussions with the evaluation panel and the recommendations for the further development of the Institute were very important for setting the overall concept of the Institute's activities.

The basic recommendations of the MEP can be summarized in a few points:

- ***Strengthening research, involvement of a wider range of academic staff and in terms of research areas in research, societal relevance of research.***

Here it must be said that the establishment of quality research is a long-term process. In terms of research areas, research has been carried out in the fields of education, psychology and cognitive science, with penetration into other social sciences (sociology, political science - public administration, management). Here, applied research projects (TACR) have been obtained, international cooperation has started to develop, and this has been reflected in the acquisition of the high-quality basic research project Interexcellence in 2024. The results of applied research have been put into practice and are used by many secondary schools (both grammar schools and vocational), and is also used by public administration in education policy setting. To a lesser extent, the basic or applied research was developed in another important area of the Institute's activity, namely Economics. Although research projects were submitted, none was obtained in the period under review (later partial cooperation within the framework of CTU projects). The quality of publications was partially improved, but no significant shift was achieved in the period under review. A new Motivation Programme for MIAS staff has been prepared and is currently being piloted. This should support a higher level of involvement of MIAS staff in project and publication activities in the future. One HORIZON project was submitted this year, another is in preparation, as well as other projects have been submitted to the TACR call and an INTERREG CZ-PL project is being prepared.

- ***Closer cooperation with the public and corporate sphere in both teaching and research.***

Contract research, which was virtually absent in the previous period, was launched in the period under review and its development continues at present. In addition, outside the assessment period from 2023 onwards, three contract research studies have been carried out and two are under preparation. Cooperation in teaching has also developed - not only the participation of experienced and prominent representatives of the corporate sphere in teaching, but also the involvement of the corporation directly in teaching-related events. For example, the International Project Workshop is a semester-long teaching course implemented in cooperation between two to three universities from abroad, where students work partly in-person and partly online on a specific project assigned by companies (usually international companies) and then present the results to the management of these companies. The companies also participated in this project with sponsorship donations, which for example covered the costs of transporting students to the kick-off meeting abroad or students' accommodation. The cooperation with practice is also deepening thanks to the development of student internships. Since 2022, internships have

taken the form of optional courses, and now three-month internships are accredited as part of the Bachelor's degree.

- ***Strengthening public awareness activities.***

MIAS, also because of the areas in which they operate, must necessarily fulfil the social role of universities. There has been a significant shift in this sense. The activities that have been done in this respect are described in the section above and further work is being done intensively on the promotion of science, research and communication with the public. The MIAS PR team has been strengthened and this is bearing fruit.

The Masaryk Institute of Advanced Studies of CTU is actively working on the systematic development of scientific research activities. The management of the Institute focuses on creating transparent rules for science and research, regularly organizes scientific research seminars, optimizes administrative processes and builds a motivating environment for academic staff, particularly focusing on supporting the participation of MIAS researchers in international conferences and strengthening their publishing activities. The aim of these efforts is not only to increase the scientific performance of the institution, but above all to create conditions that will naturally stimulate the interest of employees in engaging in research activities. Emphasis is placed on linking teaching and research activities, promoting interdisciplinary cooperation and ensuring sufficient material and personnel resources, which should ultimately contribute to strengthening the position of the MIAS within the scientific community and increasing its competitiveness in the field of research.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED:

University Centre for Energy Efficient Buildings

FORD: 2 - Engineering and technology

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organizational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

Mission and vision

We are a center of top-tier interdisciplinary research dedicated to developing technologies and solutions that contribute to sustainable development in the construction industry. We bring innovations for a sustainable future, focusing on buildings, cities, energy, and the environment.

Societal contribution of our research

We bridge the gap between science and the entire supply chain in construction and energy, collaborating with professional associations, local governments, central state administration, and the non-profit sector.

We conduct research and development of specific products or independent verification of their technical properties for businesses. We also develop our own proprietary solutions, which we offer for licensing. We assist architects and developers in implementing new technologies and energy-efficient, environmentally friendly solutions in their projects. We provide cities and municipalities with expert advice on energy planning and urban development, acting as an independent consultant in the adoption of new technologies and defining requirements for new construction. For central state administration, we offer expertise in drafting strategic documents, legislation, standards, and grant programs. Additionally, we provide specialized courses and professional training in construction and energy.

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

Long-term goals in research

Our long-term objective is to continuously enhance the societal impact and economic value of research in our key focus areas, particularly:

- **Buildings and Energy** – Increasing the share of renewable energy sources, improving energy storage and sharing systems, ensuring energy flexibility, enhancing building resilience, and strengthening cybersecurity.
- **Sustainable Construction and Circular Economy in Building** – Developing materials and construction solutions that reduce environmental impact while maintaining high building quality.
- **Healthy and Comfortable Environments** – Innovating solutions to ensure a healthy indoor microclimate, high-quality lighting, and integrating telemedicine services into buildings.
- **Urban Innovations** – Decarbonizing urban energy systems, developing energy communities, and increasing climate adaptation and resilience in cities.
- **Digitalization in Construction** – Advancing digitalization and the use of AI in planning and designing new buildings, manufacturing construction materials and prefabricated structures, and managing buildings and energy networks.

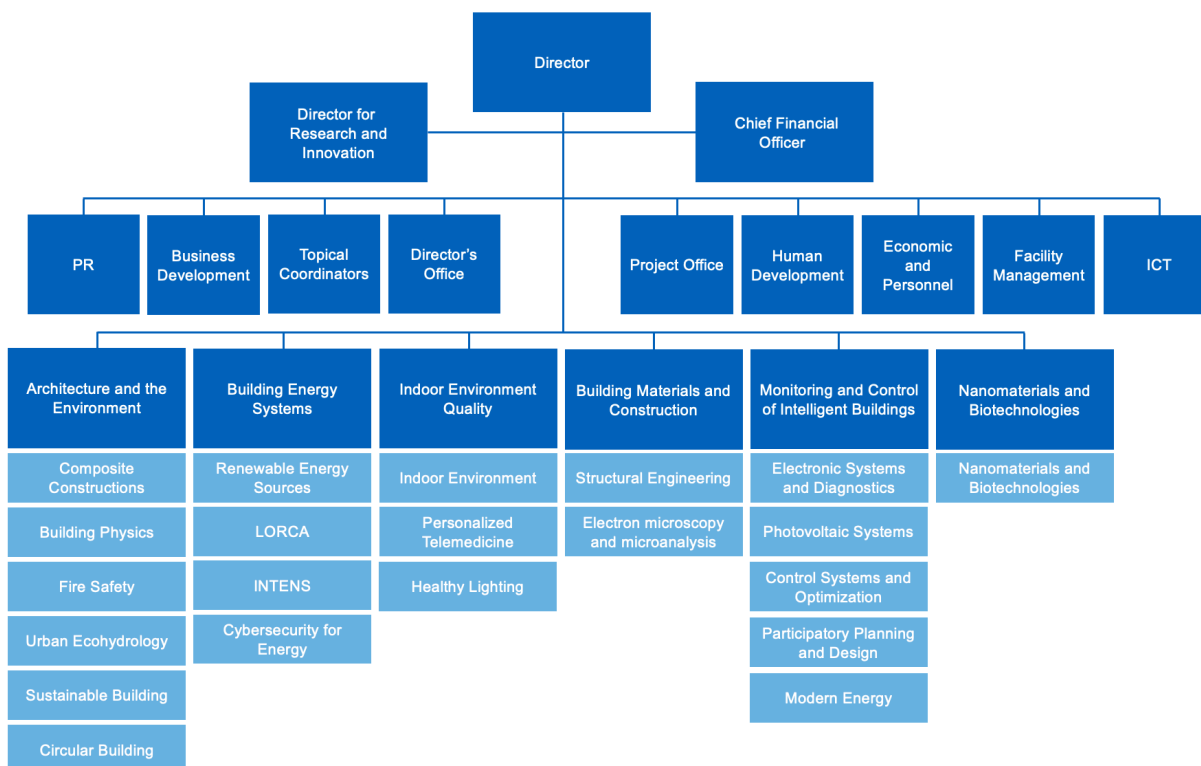
Distribution of the research activities by the type of research

At UCEEB, applied research predominates. Out of the total number of 185 ongoing projects in the monitored period, 19 were predominantly fundamental research projects, which accounts for slightly over 10 % of the total.

Contract research accounts for approximately 15% of the center's budget on average.

Organizational structure

UCEEB consists of six research departments, divided into 21 research teams, supported by an administrative unit. A detailed organizational breakdown is presented in the following diagram.



Personnel Composition

UCEEB is characterized by a high number of employees shared with other university faculties. The following tables provide statistics on core employees who have their primary contract with UCEEB. Many of these employees also have joint appointments with faculties where they are involved in teaching. Most shared appointments are with the Faculty of Civil Engineering, Faculty of Mechanical Engineering, Faculty of Electrical Engineering, and Faculty of Biomedical Engineering. Employees whose primary affiliation is with other university departments are listed under those departments for statistical consistency.

Since UCEEB is not directly involved in teaching, it does not have academic positions such as professor, associate professor, assistant professor, or lecturer. Instead, it employs only research staff, technicians, and administrative personnel.

Number of students and study programs

UCEEB does not participate in traditional teaching and, therefore, does not have enrolled students. However, every year dozens of students from various faculties conduct the research and experimental components of their final theses at UCEEB, spanning all levels of study, from bachelor's to doctoral programs.

As part of our collaboration with industry, local governments, and state administration, we organize professional education courses and seminars. These include training sessions for authorized professionals in the certification of sustainable buildings (SBToolCZ), courses on recycling and circular construction, training in the design and implementation of photovoltaic systems, and more. The number of courses and graduates is detailed in the tables.

Table 3.1.1 - Staffing per FTE²

Academic/ Professional position	Total / Of which women					
	2019	2020	2021	2022	2023	Total
Professor	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
Associate Professor	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
Assistant Professor	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
Assistant	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
R&D Personnel ³	7.0 / 0.6	7.2 / 0.6	7.2 / 0.6	6.2 / 0.6	6.2 / 0.6	33.8 / 3.0
Researchers in other categories ⁴	92.9 / 23.7	87.8 / 24.3	81.5 / 20.0	89.8 / 24.0	90.9 / 25.0	442.8 / 117.0
Technical and economic staff ⁵	30.8 / 18.9	35.8 / 22.3	34.1 / 22.2	26.1 / 15.6	24.1 / 13.6	150.8 / 92.5

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

Scientific, research and development staff involved in teaching activities	4.0 / 2.0	4.0 / 2.0	4.5 / 2.0	4.5 / 2.0	4.5 / 2.0	21.5 / 10.0
Early career researchers ⁶	77.2 / 20.5	68.7 / 19.9	63.4 / 14.4	65.2 / 16.4	60.2 / 16.3	334.7 / 87.4
Total ⁷	130.6 / 43.1	130.8 / 47.2	122.8 / 42.8	122.1 / 40.2	121.2 / 39.2	627.4 / 212.5

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁸

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	0	0	0	0	0	0	0	0
Associate Professor	0	0	0	0	0	0	0	0	0	0	0	0
Assistant Professor	0	0	0	0	0	0	0	0	0	0	0	0
Assistant	0	0	0	0	0	0	0	0	0	0	0	0
R&D Personnel ⁹	0	0	4	1	3	0	1	0	2	0	0	0
Researchers in other categories ¹⁰	38	13	60	20	13	2	3	0	5	0	1	0
Technical and economic staff ¹¹	0	0	0	0	0	0	0	0	1	0	0	0
Scientific, research and development staff involved in teaching activities	0	0	3	1	1	1	0	0	0	0	0	0
Early career researcher ¹²	38	13	60	20	0	0	0	0	0	0	0	0
Total ¹³	38	13	64	21	16	2	4	0	8	0	1	0

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁴

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	0	0	0	0	0	0	0	0
Associate Professor	0	0	0	0	0	0	0	0	0	0	0	0
Assistant Professor	0	0	0	0	0	0	0	0	0	0	0	0
Assistant	0	0	0	0	0	0	0	0	0	0	0	0
R&D Personnel ¹⁵	0	0	4	1	3	0	2	0	0	0	0	0
Researchers in other categories ¹⁶	19	5	53	18	28	10	4	0	5	0	0	0
Technical and economic staff ¹⁷	0	0	0	0	0	0	0	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	0	0	1	0	4	2	0	0	0	0	0	0
Early career researcher ¹⁸	19	5	53	18	0	0	0	0	0	0	0	0
Total ¹⁹	19	5	57	19	31	10	6	0	5	0	0	0

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students

Type of study	2019		2020		2021		2022		2023		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate	-	-	-	-	-	-	-	-	-	-	-	-

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

Master's ²⁰	-	-	-	-	-	-	-	-	-	-	-	-
Doctoral	-	-	-	-	-	-	-	-	-	-	-	-
Lifelong Learning Courses	-	-	-	-	-	-	88	2	483	7	571	9
Total	-	-	-	-	-	-	88	2	483	7	571	9

Table 3.1.5 - Study programmes in Czech/English

Type of study programme	Total ²¹ / Of which professional study programmes											
	2019		2020		2021		2022		2023		Total	
Undergraduate	-	-	-	-	-	-	-	-	-	-	-	-
Master's	-	-	-	-	-	-	-	-	-	-	-	-
Doctoral	-	-	-	-	-	-	-	-	-	-	-	-
Lifelong Learning courses	-	-	-	-	-	-	2/0	0/0	3/0	0/0	3/0	0/0
Total	-	-	-	-	-	-	2/0	0/0	3/0	0/0	3/0	0/0

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
1. Natural Sciences	1.1 Mathematics	-	Zvolte položku.	2.23 %
	1.2 Computer and information sciences	0.88 %	Applied Research	
	1.3 Physical sciences	-	Zvolte položku.	
	1.4 Chemical sciences	-	Zvolte položku.	
	1.5 Earth and related environmental sciences	1.35 %	Balanced basic and applied research	
	1.6 Biological sciences	-	Zvolte položku.	
	1.7 Other natural sciences	-	Zvolte položku.	
2. Engineering and Technology	2.1 Civil engineering	47.26 %	Applied Research	92.01 %
	2.2 Electrical engineering, Electronic engineering, Information engineering	7.44 %	Applied Research	
	2.3 Mechanical engineering	4.86 %	Applied Research	
	2.4 Chemical engineering	-	Zvolte položku.	
	2.5 Materials engineering	6.35 %	Balanced basic and applied research	

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

	2.6 Medical engineering	0.62 %	Applied Research	
	2.7 Environmental engineering	23.88 %	Applied Research	
	2.8 Environmental biotechnology	-	Zvolte položku.	
	2.9 Industrial biotechnology	-	Zvolte položku.	
	2.10 Nanotechnology	1.53 %	Balanced basic and applied research	
	2.11 Other engineering and technologies	0.06 %	Applied Research	
3. Medical and Health Sciences	3.1 Basic medicine	-	Zvolte položku.	4.00 %
	3.2 Clinical medicine	0.09 %	Applied Research	
	3.3 Health sciences	3.80 %	Balanced basic and applied research	
	3.4 Medical biotechnology	0.11 %	Applied Research	
	3.5 Other medical sciences	-	Zvolte položku.	
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries	-	Zvolte položku.	-
	4.2 Animal and Dairy science	-	Zvolte položku.	
	4.3 Veterinary science	-	Zvolte položku.	
	4.4 Other agricultural sciences	-	Zvolte položku.	
5. Social Sciences	5.1 Psychology and cognitive sciences	-	Zvolte položku.	0.35 %
	5.2 Economics and Business	-	Zvolte položku.	
	5.3 Education	-	Zvolte položku.	
	5.4 Sociology	-	Zvolte položku.	
	5.5 Law	-	Zvolte položku.	
	5.6 Political science	-	Zvolte položku.	
	5.7 Social and economic geography	0.35 %	Applied Research	
	5.8 Media and communications	-	Zvolte položku.	
	5.9 Other social sciences	-	Zvolte položku.	
6. Humanities and the Arts	6.1 History and Archaeology	-	Zvolte položku.	1.41 %
	6.2 Languages and Literature	-	Zvolte položku.	
	6.3 Philosophy, Ethics and Religion	-	Zvolte položku.	
	6.4 Arts (arts, history of arts, performing arts, music)	1.41 %	Balanced basic and applied research	
	6.5 Other Humanities and the Arts	-	Zvolte položku.	
Total		100 %	-	100 %

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

Position in the research community

UCEEB holds a strong position in the international research community, particularly in sustainable buildings, energy efficiency, and environmental technologies. It is recognized for its interdisciplinary research and applied solutions in smart buildings, renewable energy systems, and automation in construction. Its research contributes to the development of innovative technologies in building automation, energy storage, and green infrastructure, with applications for both urban and industrial environments.

The center collaborates closely with Czech and international companies to apply research findings in real-world construction and energy projects. UCEEB also supports government and EU agencies by providing research-based recommendations on decarbonization, green infrastructure, and climate adaptation policies.

Researchers at UCEEB publish in high-impact journals and participate in global academic networks, enhancing the center's influence in the fields of civil engineering, energy systems, and IoT-based building management.

International collaboration

UCEEB is actively involved various joint research projects in EU-funded programs such as Horizon Europe, Interreg, and other international research initiatives that focus on sustainable construction and innovative energy systems. In the reported period, UCEEB participated in 29 international projects (H2020 and HE: 13, Interreg: 5, other funding schemes: 11). In the number we count projects with international partners and/or funded by foreign funding agency.

In 9 of them UCEEB was in the role of coordinator

The center develops its academic partnerships and collaborates with universities and research institutions worldwide to exchange knowledge, share resources, and co-author scientific publications on energy efficiency, circular economy, and digitalization in construction.

Our researchers have been active in various international research networks such as COST (CA21103; CA20139; CA23104), IEA (IEA EBC Annex 57, 72, 82 and 89; IEA Energy Storage Tasks 36 and 44; and IEA Heat Pump Annex 58), EERA (EERA JP Smart Cities) and in various professional associations (ASHRAE, ASME, DLA, iISBE, EGU, fib, InterPore, IWG5, KCORC, SFPE, SLTBR).

UCEEB hosts and participates in international conferences, workshops, and expert panels, fostering global dialogue and innovation in the field of sustainable and intelligent buildings. The largest international event organized by UCEEB in collaboration with the Faculty of Civil Engineering is the

international conference series Central Europe towards Sustainable Building. In 2019 it hosted 240 delegates from 43 countries and in 2022 during COVID there were 150 participants from 28 countries.

Even though UCEEB does not participate in the regular study programs, it accepts foreign students for fellowships.

Prestigious awards

The UCEEB's recognitions included several types of prestigious awards: prizes for outstanding outputs of our projects (products and their practical applications), awards recognizing the contributions of our scientists to the scientific and/or professional community, awards for the excellent execution of our projects, and individual awards for outstanding presentations of research results. The top 10 examples are presented in the table 3.2.1 below.

The most prestigious recognition is the set of awards for the S.A.W.E.R., which is a unique technology for extracting water from extremely dry desert air. It was part of the Czech EXPO pavilion in Dubai and it won the Best Innovation Award and several other international and national awards. More importantly, this technology has been further developed into and is in the final stage of negotiation for licensing. The second highly appreciated output of our research with multiple awards was the energy plus retrofitting project of a secondary school in Prague. In this project, a novel low-carbon curtain wall system *envilop* developed at our research centre, has been applied. The project also used a certification scheme SBToolCZ that we developed in collaboration with the Faculty of Civil Engineering, and we participated in the energy concept of this successful project.

Involvement in evaluation of national and international research project calls

Besides the participation in the research projects, our researchers also contribute to the evaluation of project proposals. At the national level, they are involved in the evaluation at the Grant Agency of the Czech Republic (fundamental research) and Technology Agency of the Czech Republic (applied research), at CzechInvest (funding for innovative start-up companies).

Our researchers also participate in the project evaluation for the European Commission (details cannot be disclosed due to signed NDAs).

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
S.A.W.E.R. – Technology for extracting water from dry desert air	1) UAE Innovates Award 2022 – Best Innovation 2) World Expo Awards – Honorable Mention for the Best Use of Technology 3) ESG Award, category Innovation, technology, and energy 2022 4) Green Hero for Tomáš Matuška	1) Center for Governmental Innovation of Mohammed bin Rashid Al Maktoum, i.e. the ruler of Dubai and prime minister of the United Arab Emirates 2) EXHIBITOR Magazine of EXPO Dubai 3) Social Responsibility Association 4) Komerční banka
Energy plus retrofitting project of COPTH Českobrodská in Prague	1) Urban Planning Award 2022 2) European Solar Prize 2023 in the category Solar Architecture 3) two honourable mentions at Stavba roku 2022 (Building of the Year 2022) 4) Czech Adaptterra Award for the category Built Environment	1) EUROSOLAR 2) The European Association for Renewable Energy 3) Nadace pro rozvoj architektury a stavitelství (Foundation for the Development of Architecture and Construction)

	5) Wood Design & Building Award 6) BIG SEE Architecture Award 2024	4) Nadace Partnerství (Partnership Foundation) 5) Canadian Wood Council 6) BIG SEE
Biodynamic circadian LED floor lamp Sunflow developed in our research project	LIT Lighting Design Awards 2023	LIT Design Awards
Municipality of Mikolajice for the smart and ecological municipality energy system incorporating a pellet cogeneration unit WAVE developed and produced at UCEEB	Smart Cities 2022 Award	Smart City Innovations Institute
Prof. Ing. Petr Hájek, CSc.	Medal of Merit 2020	Fédération Internationale du Béton
Ing. Jakub Maščuch, Ph.D.	1) Innovators 20 (2021) 2) Silver Medal of Prof. Vladimír List	1) Hospodářské noviny 2) Czech Union of Employers in the Energy Sector
doc. Ing. Petr Kuklík, CSc.	Čestná uznání Vladimíra Lista (Vladimír List Honorable Mention) for long-term significant contribution to the development of technical standardization in the field of wooden structures	ČAS – Czech Standardization Agency
doc. Ing. Tomáš Matuška, Ph.D.	REHVA Professional Award in Science 2023	REHVA
Ing. Nikola Pokorný	Werner von Siemens Award – Best Thesis 2021	Siemens Česká republika
Project RESINDUSTRY	Top 10 projects of Interreg Europe	Interreg Europe

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of scientific journal, ISSN
prof. Ing. Karel Kabele, CSc., FEng.	Energy and Built Environment, ISSN: 2666-1233 Energy and Buildings, ISSN: 0378-7788
Doc. Ing. Antonín Lupíšek, Ph.D.	ZeroBuild Journal, ISSN: 2980-0048
Prof. Ing. Petr Hájek, CSc.	ZeroBuild Journal, ISSN: 2980-0048
Prof. Ing. Jan Tywoniak CSc.	ZeroBuild Journal, ISSN: 2980-0048
Doc. Ing. Tomáš Matuška, Ph.D.	Journal of Heating, Ventilation, Sanitation, ISSN: 1210-1389
Ing. Pavel Kopecký, Ph.D.	Journal of Heating, Ventilation, Sanitation, ISSN: 1210-1389
prof. Ing. Karel Kabele, CSc.	Journal of Heating, Ventilation, Sanitation, ISSN: 1210-1389
doc. Ing. Vladimír Zmrhal, Ph.D.	Journal of Heating, Ventilation, Sanitation, ISSN: 1210-1389
Ing. Sofiane Kichou, Ph.D.	Energies, ISSN: 1996-1073, guest editor Frontiers in Energy Research, ISSN: 1664-8714, guest editor
Doc. Ing. Antonín Lupíšek, Ph.D.	Energies, ISSN: 1996-1073, guest editor

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
Prof. Ing. Petr Hájek, CSc.	Concrete Structures for Sustainable and Resilient Built Environment	KCI – Korean Concrete Institute	2023
Ing. arch. Lenka Maierová, Ph.D.	The time for the light and the time for the darkness	ETH Zürich	2023
Ing. Jan Včelák, Ph.D.	Integrated Optic Fibre Sensors for Structural Health Monitoring	Empa – Swiss Federal Laboratories for Materials Science and Technology	2023
Ing. Jan Špale	The Energy Challenge of 21st Century: Large Scale Medium Duration Energy Storage	Purdue University – Herrick Laboratories	2023
Doc. Ing. Antonín Lupíšek, Ph.D.	Adapting Systems and Components to the Next Generation Needs	University of Bologna, NEXT BUILT	2022
Ing. Marek Petreje, doc. Ing. Michal Sněhota, Ph.D.	Hybrid Green Roof Amended with Recycled Material	Grenoble Institute of Technology	2022
Ing. Jan Včelák, Ph.D.	Novel Heating and Cooling Technology as a Flexible Load for Optimized PV Utilization in buildings	Gebze Technical University	2022
Prof. Ing. Petr Hájek, CSc.	Advanced Concrete Structures for Sustainable Built Environment	Manipal University Jaipur, India	2022
Prof. Ing. Petr Hájek, CSc.	Textile Reinforced Silicate Composites – Challenge and Opportunity	Slovak Academy of Science	2021
Prof. Ing. Petr Hájek, CSc.	Concrete Structures for Sustainable and Resilient Built Environment	SSCS 2019 Strategies for Sustainable Concrete Structures, Lecco, Italy	2019

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year
Dr. Rolf Frischknecht	ETH Zürich	The Buried Giant: Construction Materials Shape the Environmental Footprint of Buildings	2022
Prof. Wolfgang Streicher	University of Innsbruck	A Fossil Free Future - Scenarios for Austria - Implications for Europe	2022
Miles Kenneth Oglethorpe	The International Committee for the Conservation of the Industrial Heritage,	Making Our Industrial Heritage Work for the Future, in The Context of Climate Change	2022
Prof. Karsten Voss	University of Wuppertal	Solar Decathlon Europe 21/22 – Experiences and Findings	2022
Prof. Harald S. Müller	Karlsruhe Institute of Technology	A New Generation of Sustainable Structural	2019

		Concretes – Design Approach and Material Properties	
Prof. Martin Teperspur and Doris Österreicher	The University of Natural Resources and Life Sciences, Vienna	Large Scale Urban Developments in Austria – Challenges and Opportunities Based on Two Case Study Examples	2019
Prof. Thomas Lützkendorf	Karlsruhe Institute of Technology	Sustainability in Building Construction – a Multilevel Approach	2019
Richard Lorch	International Journal Building Research & Information	Buildings and Climate Change: Accelerating Transformation	2019

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the Research project/programme call	Name of the contracting authority/guarantor of the project/programme call	Year
prof. Ing. Petr Hájek, CSc.	GA ČR panel 105	Grant Agency of the Czech Republic	2021-2025
Doc. Ing. Antonín Lupíšek, Ph.D.	Prostředí pro život	Technology Agency of the Czech Republic	2022-2023
Ing. Jan Špale	Theta	Technology Agency of the Czech Republic	2022-2023
Ing. Václav Novotný, Ph.D.	Theta	Technology Agency of the Czech Republic	2022-2023
Doc. Ing. Antonín Lupíšek, Ph.D.	Ecotech	CzechInvest	2023
prof. Ing. Jan Tywoniak, CSc.	Trend	Technology Agency of the Czech Republic	2019-2023
doc. Ing. Petr Kuklík, CSc.	INTER-EXCELLENCE	Ministry of Education, Youth and Sports	2019-2023
doc. Ing. Tereza Pavlů, Ph.D.	Trend, Epsilon, Zéta	Technology Agency of the Czech Republic	2019-2023
Ing. Jan Včelák, Ph.D.	Inovace	CzechInvest	2022-2023
prof. Ing. Petr Hájek, CSc.	Expert Committee for the Evaluation of Technical Documentation of New School Construction Projects	Ministry of Education, Youth and Sports	2022-2023

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the period of 2019–2023²³. This should be done from the full list in annex tables (Table 3.3.1-3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment: The following text presents the 10 featured projects. A complete database of our research projects is available at <https://www.uceeb.cz/en/portfolio-en/>.

University Centre for Energy Efficient Buildings – Sustainability Phase, 2016-2020 (LO1605)

Funding agency: Ministry of Education, Youth and Sports

Programme / Call: National Programme for Sustainability I / Národní program udržitelnosti 5 (SMSM2016LO5)

Participants: CTU UCEEB

Budget total: 18.2 mil. EUR

Justification of selection:

This project represented the largest initiative undertaken during the reporting period and played a critical role in the successful establishment and early development of the UCEEB. As a foundational project, it enabled the Centre to consolidate its research capacities and build a stable institutional framework for long-term interdisciplinary collaboration. The project laid the groundwork for a wide range of subsequent research activities across multiple scientific domains, including building energy systems, sustainable materials, indoor environmental quality, and smart technologies for the built environment. It acted as a catalyst for further national and international research projects, fostering the development of new partnerships and enhancing UCEEB's visibility within the European research landscape.

One of the most significant outcomes of the project was its contribution to high-quality scientific output. It resulted in the publication of numerous peer-reviewed articles in prestigious international journals, several of which have since become highly cited. Notable examples include articles published in *Energy and Buildings* (DOI: 10.1016/j.enbuild.2018.01.033, 108 citations), *Materials* (DOI: 10.3390/ma12121923, 59 citations), *Renewable Energy* (DOI: 10.1016/j.renene.2020.03.090, 49 citations; and DOI: 10.1016/j.renene.2018.08.113, 40 citations), *Sustainability* (DOI: 10.3390/su12156151, 42 citations), and *Urban Planning* (DOI: 10.17645/up.v6i1.3545, 40 citations). In total, the project generated 405 results, including 188 peer-reviewed scientific articles, 142 conference proceedings papers, 24 functional samples, 14 utility models, and 4 patents. These outputs reflect not only the project's scientific excellence but also its strong orientation toward

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

applied research and innovation. By translating research findings into practical solutions and intellectual property, the project significantly contributed to UCEEB's mission of bridging academia and industry and advancing sustainable technologies for the built environment.

Centre for Advanced Materials and Efficient Buildings, 2018-2021 (TN01000056)

Funding agency: Technology Agency of the Czech Republic

Programme / Call: National Centres of Competence 1: Support programme for applied research, experimental development and innovation / NCK 1 (STA02018TN010)

Participants: CTU UCEEB, Brno University of Technology, Technical University of Liberec, Mendel University in Brno, AERS s.r.o., AGROP NOVA a.s., AZS 98, s.r.o., FENIX Trading, s. r. o., GEOTest, a.s., HOCHTIEF CZ a. s., INFRAM a.s., KNAUF INSULATION, spol. s r.o., KNAUF Praha, spol. s r. o., KOMA MODULAR s.r.o., KRONOSPAN OSB, spol. s r.o., Kloboucká lesní s.r.o., Město Třešť, PREFA KOMPOZITY, a.s., REGULUS spol. s r.o., RD Rýmařov s. r. o., SEDUM TOP SOLUTION s.r.o., SUBTECH, s.r.o., Siemens, s.r.o., Skanska a.s., TKP geo s.r.o., Teco a.s., VDT Technology a.s., WAFE s.r.o., Wienerberger s.r.o., cadconsulting, spol. s r.o., di5 architekti inženýři s.r.o.

Budget total / CTU: 7.8 mil. EUR / 2.9 mil. EUR

Justification of selection:

The project, led by the University Centre for Energy Efficient Buildings (UCEEB), was implemented as part of the National Competence Centres programme, which supported applied research, experimental development, and innovation in the Czech Republic. This initiative brought together four leading academic institutions and twenty-nine industrial partners, creating a unique interdisciplinary platform focused on enhancing material and energy efficiency within the construction sector—an area that lies at the very core of UCEEB's mission.

By fostering close collaboration between academia and industry, the project significantly advanced the development and practical application of sustainable construction solutions. Key areas of research included the design and testing of innovative construction materials with improved performance and durability, circular construction, the development of technologies to enhance energy efficiency in buildings, and the optimization of integrated water management systems. Special emphasis was also placed on the implementation of Building Information Modeling (BIM) to streamline planning, design, and efficient operation of buildings.

The project produced a total of 168 measurable results, including 27 peer-reviewed scientific articles, 38 functional samples, one working prototype, and 18 software tools. These outputs exemplify the project's strong focus on practical outcomes and technology transfer. Many of the solutions developed are already being used by participating companies, demonstrating the project's tangible contribution to innovation in the construction industry and its long-term societal impact.

S.A.W.E.R., 2018-2020

Customer: KGK EXPO

Participants: CTU-UCEEB

Budget total: 1.49 mil. EUR

Justification of selection:

The Solar Air Water Earth Resource (S.A.W.E.R.) project, developed by UCEEB in collaboration with the Faculty of Mechanical Engineering, is an innovative system designed to extract water from arid desert air using solar energy. This technology was prominently featured in the Czech Republic's pavilion at

EXPO 2020 in Dubai, demonstrating its potential to transform desert environments into fertile landscapes.

The concept of S.A.W.E.R. originated from the idea of harnessing solar energy to produce water in desert conditions. The system operates in two stages: first, it uses a desiccant material to adsorb water vapor from the air; second, it heats this material to release the absorbed moisture, which is then condensed to produce water. This method allows the system to produce up to 200 liters of water per day, significantly surpassing traditional condensation techniques that yield about 10 liters per day. Prior to its installation at EXPO, a mobile version of the S.A.W.E.R. system was successfully tested in the Sweihan desert near Abu Dhabi.

For EXPO 2020, the system was integrated into the Czech pavilion to showcase its capabilities. It not only extracted water from the desert air but also enriched it with nutrients to irrigate a garden surrounding the pavilion, effectively turning the arid environment into a green oasis. The pavilion's design emphasized the synergy between technology and nature, with the S.A.W.E.R. system serving as the technological core.

The S.A.W.E.R. system garnered significant attention and acclaim during EXPO 2020. Besides other awards and recognitions, it received the "Best Innovation that Creates Opportunity" award at the UAE Innovates awards, highlighting its potential to address water scarcity in desert regions. The success at the EXPO has opened avenues for further collaborations and applications in other arid areas, demonstrating the global relevance and impact of this Czech innovation.

RESINDUSTRY – Policies for Renewable Energy Sources in industry, 2019-2022 (PGI06158)

Funding agency: Interreg Europe

Programme / Call: Interreg / Interreg Europe

Participants: CTU-UCEEB (lead partner), LAB University of Applied Sciences (until 2019 LAMK Lahti University of Applied Sciences Ltd), Consortium Extremadura Energy Agency (until 2022 Association Extremadura Energy Agency – AGENEX), Tartu Regional Energy Agency – TREA, Marshal Office of Świętokrzyskie Region, Vorarlberg University of Applied Sciences, Ministry for Gozo

Budget total / CTU: 1.6 mil. EUR / 0.22 mil. EUR

Justification of selection:

The RESINDUSTRY project coordinated by UCEEB was recognized as one of the top 10 most successful projects within the Interreg Europe programme. Its primary aim was to boost the energy independence and sustainability of the European industrial sector by increasing the use of renewable energy sources (RES) and reducing reliance on fossil fuels.

RESINDUSTRY sought to enhance the competitiveness of European industries by lowering energy costs through greater RES integration. A significant focus was also placed on improving policy instruments—particularly regional Operational Programmes—so that they better support investments into renewable energy technologies for industrial use. This was achieved by working closely with stakeholders and public authorities across seven partner regions in Europe.

Throughout the project, RESINDUSTRY delivered impactful outcomes. Seven regional action plans were developed, influencing over €8 million in structural funds and €2.5 million in additional financing. The project organized 83 policy learning events, which facilitated knowledge exchange and the sharing of best practices between policymakers, industry representatives, and energy experts. Additionally, it supported capacity-building for 90 professionals and produced regional assessments and policy reports that mapped the potential of renewable energy technologies in various industrial contexts.

The project demonstrated how interdisciplinary collaboration, strategic planning, and evidence-based policy support can accelerate the deployment of renewable energy solutions in one of the most energy-intensive sectors—industry. Furthermore, it positioned UCEEB as a key player not only in technological development, but also in international cooperation and policy advocacy for sustainable energy systems.

SPARCS – Sustainable energy Positive & zero cARbon Communities, 2019-2024 (GA 864242)

Funding agency: European Commission

Programme / Call: H2020 / H2020-LC-SC3-2019-ES-SCC

Participants: Teknologian Tutkimuskeskus VTT OY (coordinator), CTU-UCEEB, Espoon Kaupunki, Stadt Leipzig, Município Da Maia, Reykjavíkurborg, Statutarni Mesto Kladno, *Dimos Kifissia*, *Lviv City Council*, *KONE Oyj*, *SIEMENS Osakeyhtiö*, *PLUGIT Finland OY*, *Kiinteistö Oy Lippulaiva*, *Suomen Rakennusinsinöörien Liitto RiL Ry*, *Adven Oy*, *Fraunhofer Gesellschaft Zur Förderung Der Angewandten Forschung EV*, *Bable GmbH*, *WSL Wohnen & Service Leipzig GmbH*, *Stadtwerke Leipzig GmbH*, *Cenero Energy GmbH*, *Seecon Ingenieure GmbH*, *Universitaet Leipzig*, *Sociedade Portuguesa de Inovacao Consultadoria Empresarial E Fomento da Inovacao SA*, *CNET Centre for New Energy Technologies SA*, *Orkuveita Reykjavíkur SF*, *Suite5 Data Intelligence Solutions Limited*, *Vernt Monoprosopi Anonymi Etairia Aeiforon Proionton Kai Ypiresion*, *National Ecological Centre of Ukraine*, *Lviv Municipal Enterprise Lvivavtodor*, *Civiesco srl*, *Gopa Com.*, *Motor Oil (Hellas) Diilistiria Korinthou A.E.*, *Municipal Institution City Institute*

Budget total / CTU: 23.8 mil. EUR / 0.4 mil. EUR

Justification of selection:

The SPARCS project supported the transition of cities toward carbon neutrality by developing smart, sustainable and energy-positive urban districts. UCEEB has played an active role in this project, representing the Czech Republic through its collaboration with the city of Kladno.

Kladno, traditionally an industrial hub, is undergoing a significant transformation to become a more sustainable and resilient city. In cooperation with UCEEB, the municipality focused on increasing the share of renewable energy, implementing smart energy management, and improving the overall energy performance of urban infrastructure. A central element of this cooperation was the preparation of a Positive Energy District (PED) in the Sletišťe district. The goal is to create a part of the city that generates more energy than it consumes, powered entirely by local renewable sources and supported by energy-efficient buildings, mobility solutions and smart technologies.

The innovative work in Kladno under the SPARCS project was also featured in the Czech Television documentary *Green is the New Black*. The film captures the city's efforts to move from its coal-heavy industrial past toward a cleaner, smarter future. It presents Kladno as a testbed for sustainable solutions and highlights the role of UCEEB researchers in shaping this transition. The documentary has helped raise public awareness of climate challenges and showcased the real-world impact of research institutions on local development.

Through its role in SPARCS, UCEEB has contributed significantly to promoting practical applications of its research in sustainable energy and urban transformation. The project supports UCEEB's mission by advancing innovation in energy-positive districts, influencing municipal planning and policies, and engaging citizens and stakeholders in the co-creation of smart energy solutions. It demonstrates how applied research and cross-sectoral collaboration can drive systemic change toward climate-neutral cities and communities.

MORE-CONENCT – Development and advanced prefabrication of innovative, multifunctional building envelope elements for MODular RETrofitting and CONNECTIONS, 2014-2019 (GA 633477)

Funding agency: European Commission

Programme / Call: H2020 / H2020-EE-2014-1-PPP

Participants: Huygen Installatie Adviseurs (Coordinator), CTU-UCEEB, Stichting ZUYD Hogeschool, BJW BV, Timmerfabriek WEBO BV, Rigas Tehniska Universitate, Latvian Wood Construction Cluster, Zemgales Tehnologiskais Centrs, Tallinna Tehnikaülikool, MATEK AS, Ref Ehitustood Ou, Universidade Do Minho, DARKGLOBE, CENERGIA Energy Consultants APS, Innogie APS, Invela, RD Rymarov sro, ECONCEPT AG, Gaiurb - Urbanismo E Habitacao EM

Budget total / CTU: 5.6 mil. EUR / 0.3 mil. EUR

Justification of selection:

The MORE-CONNECT project was a European initiative focused on accelerating the deep renovation of existing buildings using prefabricated, multifunctional facade elements. The goal was to create scalable, cost-effective renovation solutions that achieve nearly Zero-Energy Building (nZEB) standards with minimal disruption for occupants.

A key innovation of the project was the development of modular facade panels that integrate insulation, ventilation, energy systems, and smart technologies. These panels were designed for mass production, but with flexibility for customization based on local climate, building typology, and user preferences. MORE-CONNECT also promoted the creation of automated production lines and one-stop-shop services to simplify and streamline the renovation process.

UCEEB's contribution to the project was significant. In collaboration with the Czech largest producer of prefab timber housing RD Rýmařov, UCEEB developed and demonstrated a complex prefabricated renovation system for a deep energy refurbishment of Czech multifamily residential buildings. It enables fast installation of façade elements and reducing renovation time to just a few days.

MORE-CONNECT contributed directly to UCEEB's mission by promoting energy efficiency, advancing building technology innovation, and strengthening ties between research and industry. The project demonstrated how modular prefabrication can transform the renovation sector, offering practical solutions to help meet Europe's climate and energy goals.

Combined heat and power (CHP) ORC unit with thermal output of 120 kW in containerized configuration, 2018-2020 (TK01020061)

Funding agency: Technology Agency of the Czech Republic

Programme / Call: Programme for funding of applied research, experimental development, and innovation THETA / THETA 1 (STA02018TK010)

Participants: CTU-UCEEB (lead partner), BHC Jílové s.r.o., Ing. Miroslav Šamata

Budget total / CTU: 402 kEUR / 167 kEUR

Justification of selection:

The project was carried out under the leadership of UCEEB developed a compact, efficient energy system based on Organic Rankine Cycle (ORC) technology, tailored for biomass fuel sources.

The result is a containerized unit capable of producing both heat and electricity from biomass, particularly wood chips. With a thermal output of 120 kW, the unit is designed for small-scale industrial, agricultural, and municipal applications where there is stable heat demand and access to local biomass. The containerized format ensures high mobility, easy deployment, and integration into existing infrastructure, making it suitable for facilities such as woodworking plants, hotels, farms, or district heating systems in rural areas.

The unit combines a biomass combustion system with an ORC module that efficiently converts thermal energy into electrical power. This cogeneration approach significantly increases energy utilization compared to separate systems. The compact, modular design minimizes installation time and cost while offering a sustainable and decentralized energy solution. There are already running three units in various locations in Czechia.

The project represents a step forward in the practical use of ORC technology and supports UCEEB's mission to advance innovative, sustainable energy systems that can be implemented in real-world conditions. By utilizing renewable biomass, the system reduces greenhouse gas emissions and promotes local energy independence. It also contributes to circular economy principles by turning wood waste into useful energy.

PLURAL – Plug-and-Use Renovation with Adaptable Lightweight Systems, 2020-2024 (GA 958218)

Funding agency: European Commission

Programme / Call: H2020 / H2020-NMBP-ST-IND-2020-singlestage

Participants: Ethnicon Metsovion Polytechnion (Coordinator), CTU-UCEEB, Proigmenes Erevnitikes & Diahiristikos Efarmoges, Dimos Varis - Voulas – Vouliagmenis, FENIX TNT sro, Obec Kasava, Bergamo Technologie SPZOO, DAIKIN Airconditioning Hellas SA, Netcompany-Intrasoft SA, OST - Ostschweizer Fachhochschule, Institut de Tecnologia de la Construcció de Catalunya, Pich-Aguilera Arquitectos SL, Fundació Institut de Recerca de L'energia de Catalunya, Agència De L'habitatge de Catalunya, ZRS Architekten Gesellschaft Vonarchitekten MBH, Recuair S.R.O., Denvelops Textiles SL, RD Rymarov sro

Budget total / CTU: 9.66 mil. EUR / 0.55 mil. EUR

Justification of selection:

The PLURAL project was a European research initiative focused on developing innovative, modular, and lightweight facade solutions for energy-efficient building renovation. The goal was to accelerate the decarbonization of the building stock by providing prefabricated “plug-and-use” elements that are adaptable, scalable, and easy to install with minimal disruption to occupants.

These developed prefabricated panels integrate a range of technologies, including insulation, ventilation, heating and cooling systems, as well as smart sensors. Designed for different climate zones and building typologies, they enable deep renovation of residential buildings to nearly zero-energy standards in a cost-effective and time-efficient manner.

The UCEEB played a key role in the successful demonstration installation in the village of Kašava in the Czech Republic and for the design and testing of the HVAC systems for other demos as well as for the implementation of smart monitoring technologies. Its expertise ensured the successful integration of these advanced components into the renovation process and provided valuable insights into the system's long-term performance.

PLURAL contributes directly to UCEEB's mission of advancing sustainable and energy-efficient building technologies. The project enabled UCEEB to translate cutting-edge research into practical applications, support innovation in the construction sector, and promote data-driven renovation methods that are both scalable and future-ready.

RENCO – Recycled Environmental Concrete for Building Construction, 2016-2020 (FV10397)

Funding agency: Ministry of Industry and Trade of the Czech Republic

Programme / Call: TRIO / TRIO 1 (SMPO201600001)

Participants: AZS 98, s.r.o. (lead partner), CTU-UCEEB

Budget total / CTU: 998 kEUR / 160 kEUR

Justification of selection:

The RENCO project was dedicated to the development of environmentally sustainable concrete for use in building construction. The central objective of the project was to reduce the environmental burden of conventional concrete production by incorporating recycled aggregates, thereby contributing to the advancement of circular construction practices.

Over the course of the project, extensive research activities were carried out, resulting in significant scientific contributions in the field of recycled concrete. Among the key outcomes was the publication of the article *“The Utilization of Recycled Masonry Aggregate and Recycled EPS for Concrete Blocks for Mortarless Masonry,”* which has been widely cited.

An important achievement of the RENCO project was the successful construction of an experimental residential structure utilizing recycled concrete. This building served as a proof of concept, demonstrating the technical feasibility, structural performance, and practical applicability of recycled concrete in real-world construction scenarios. The data and experience gained from this implementation provided valuable insights for future research and application.

Importantly, the RENCO project served as a catalyst for a series of subsequent initiatives aimed at further exploring and refining the use of recycled materials in construction.

The RENCO project significantly contributed to fulfilling UCEEB’s mission by promoting innovative, energy-efficient, and environmentally responsible building practices. Through the integration of recycled materials and the advancement of circular construction methods, the project reinforced UCEEB’s commitment to sustainable development and applied research in the built environment.

Analytical Tasks for Czech Standardization Agency (2020-2025)

Customer: Czech Standardization Agency

Participants: CTU-UCEEB

Budget total: 1.96 mil. EUR

Justification of selection:

We are collaborating with the Czech Agency for Standardization on eight analytical tasks that have directly influenced Czech standards. This contract has been selected because of its size and its direct impact in the Czech national standards.

The contract is broken into these tasks:

- Fire Safety of External Thermal Insulation Composite Systems (ETICS)
- Establishing Normative Conditions for Increased Use of Wood in Construction Concerning Fire Safety
- Fire Safety of Assembled Façade Systems
- Revision of Classification of Structural Components from a Fire Safety Perspective
- Fire Resistance of Lightweight Roof Coverings
- Fire Safety of Refrigerants for HVAC Systems
- Pre-Demolition Audit and Building Deconstruction
- Recycled Materials in Construction – Testing and Preparation of Standards
- Determining Mechanical Properties of Hardwood Species

This project has significantly contributed to UCEEB’s mission of increasing the energy efficiency (tasks related to thermal insulation, facade systems, roofs, HVAC systems), environmental impacts of buildings (tasks related to timber structures) and development of the circular economy in construction (tasks related to pre-demolition auditing and recycling).

Table 3.3.1 Projects supported by public funds

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands EUR) ²⁶				
		2019	2020	2021	2022	2023
Technology Agency of the Czech Republic	Grate coatings of a biomass combustion chamber preventing high-temperature corrosion and abrasion	-	-	-	29.8	61.2
Technology Agency of the Czech Republic		64.8	-	-	17.0	75.3
Technology Agency of the Czech Republic	Advanced design methods for key elements of multi-storey timber buildings	20.6	-	-	-	24.7
Technology Agency of the Czech Republic	Advanced Modular Cloud Computing System for Bridge Infrastructure Monitoring Utilizing Fibre Optics	-	-	-	71.3	162.7
Ministry of Culture	Architectural and Festive Lighting in the Context of Historic Buildings and Spaces	-	-	-	-	31.1
EUKI	CirCon4Climate - Strengthening Circular Construction Practices	-	-	-	-	67.4
Technology Agency of the Czech Republic	Comprehensive setting of conditions for the establishment and operation of energy communities in the conditions of the Czech Republic, including pilot projects	-	-	-	20.2	73.5
Technology Agency of the Czech Republic	DEPLOYMENT OF SMART RENEWABLE ENERGY COMMUNITIES	-	-	-	13.1	83.8
Interreg	Design and test of policies for reducing, repairing, recovering and reusing waste from electrical, electronic equipment and plastic in Central Europe	-	-	-	-	69.4
Technology Agency of the Czech Republic	Development of efficient tools to minimize production of construction and demolition waste, its monitoring and reuse	-	-	17.7	15.3	20.7
Grant Agency of the Czech Republic	Enabling energy transition in postsocialist housing cooperatives	-	-	-	-	47.5
EUKI – European climate initiative	Energy Efficiency Network – a cross-border energy consultant training	-	3.7	36.2	41.0	41.1
Ministry of Education, Youth and Sports	Engagement for sustainability - University leaders in SDGs II (UNILEAD II)	-	-	-	-	29.8

²⁵ If the provider is from abroad, please indicate the provider's country of origin in brackets. For the determination of the country of origin of the provider, the place of residence of the provider is decisive.

²⁶ Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

Grant Agency of the Czech Republic	Hydrological performance of multi-layered constructed soils	-	-	-	14.5	35.2
Interreg	Improving policies for waste management of electrical and electronic equipment	-	-	-	-	48.7
Ministry of the Interior	Increase the efficiency of the recovery of odor molecules with a composite nanofiber layer for use in criminal practice	-	-	-	20.8	13.9
Technology Agency of the Czech Republic	Increasing the safety of traction batteries for transport	-	-	-	-	84.0
Laudes Foundation	INDICATE - natIoNal buiLDing ICa dATa accElerator	-	-	-	-	100.7
European Climate Foundation	Life-cycle global warming potential of buildings	-	-	-	24.9	9.2
Erasmus+	Light and Illumination for Human Health - Realm Life Appl	-	-	-	-	0.2
Technology Agency of the Czech Republic	Methodology for smart thermal grid planning: exemplary scenarios and coordination tools for Power2Heat system integration at the municipal level	-	-	-	13.5	70.9
Technology Agency of the Czech Republic	Mobile recycling line for processing construction waste from mineral thermal insulation materials and use of recycled material including possibility of direct application on construction	-	-	7.2	8.3	-
Grant Agency of the Czech Republic	Possibilities of using natural fibers for the production of hybrid textile reinforcement in concrete	-	-	-	70.1	100.2
Ministry of Education, Youth and Sports	Sustainable and safe use of secondary materials as a key to circular built environment	-	-	-	-	18.5
Technology Agency of the Czech Republic	Tribotechnics of volumetric expanders for distributed energy systems	-	-	-	38.6	45.4
Operational Programme Research, Development and Education	Education Methodology for Sustainable Building	95.5	38.5	200.7	228.3	417.8
Ministry of Education, Youth and Sports	Dejvice Campus – Blue-Green Infrastructure (Diagnosis of the Current State of Rainwater Management and Water Balance Calculation)	-	-	-	85.8	-
Ministry of Health	Comprehensive pre-clinical evaluation of lateral lumbar spine fusion with hybrid biodegradable nanocomposite porous implant	22.2	21.8	-	25.7	-
Ministry of Education, Youth and Sports	University leaders in SDG (UNILEAD)	-	-	-	16.8	-
Ministry of Education, Youth and Sports	Long-term Concept of Development of a Research Organization	315.6	330.0	465.3	745.1	897.1

Grant Agency of the Czech Republic	Interactions between wooden surface and planar particles of TiO ₂	34.5	36.4	-	-	4.6
Ministry of Education, Youth and Sports	Sustainability Office	-	3.0	1.5	1.4	-
Ministry of Education, Youth and Sports	National database of building materials life cycle impacts and evaluation tool for buildings	1026.0	668.8	-	-	-
Ministry of Education, Youth and Sports	Low cost turboexpanders for decentralized energy applications – possibilities of 3D print manufacturing from modern plastic materials	13.0	13.0	-	-	-
EU ERDF – Operational Program Entrepreneurship and Innovation for Competitiveness	Supporting photovoltaic system for city electric buses, trolleybuses and buses	-	-	1.4	-	-
Technology Agency of the Czech Republic	Czech participation in the Annex 72 of the International Energy Agency	52.6	51.7	43.6	18.0	-
Ministry of Education, Youth and Sports	Improving the Quality of Support Infrastructure in the Field of Energy Efficient Buildings (Inform EEB-CZ)	75.2	138.7	162.1	46.9	-
Ministry of Education, Youth and Sports	Active Mineral Additives and Related Durability Properties of Portland Cement Based Concrete	33.6	25.2	-	-	-
Technology Agency of the Czech Republic	Hybrid wood-concrete supporting construction systems	-	7.0	28.1	-	-
Ministry of Health	Functionalized nanofiber mesh for incisional hernia prevention	45.7	45.7	-	-	-
Ministry of Health	Functionalized nanofibers for external coating of colorectal anastomoses	22.4	-	-	-	-
Grant Agency of the Czech Republic	Fungal growth on the surface layer of wood-based materials under dynamic boundary conditions	-	30.8	31.0	31.6	-
Grant Agency of the Czech Republic	Modern mosaic mortars in a microscope – methods for their materials characterization and degradation studies	37.8	37.8	-	-	-
Grant Agency of the Czech Republic	Transport of water, suspended particles and heat in engineered soils of urban green infrastructure	59.8	-	-	-	-
Technology Agency of the Czech Republic	Optimised expanders for small-scale distributed energy systems	-	0.3	50.7	63.2	68.7
Operational Programme Enterprise and Innovation for Competitiveness	Waste heat utilization for energy storage based on the concept of Carnot batteries	-	17.4	48.3	69.3	-
Technology Agency of the Czech Republic	Innovative ventilation unit with thermoelectric modules for control of air temperature	75.8	25.5	99.3	58.8	-
Technology Agency of the Czech Republic	Mechanical grater system for alternative biomass fuels with high water and ash content integrated into	12.8	32.3	47.0	34.7	-

	a combustion chamber of a microgeneration ORC unit					
Technology Agency of the Czech Republic	Predictive control of battery storage using photovoltaic energy source based on cloud irradiance forecast service	23.8	-	-	-	-
Technology Agency of the Czech Republic	Expert System for Digitizing and Integrating Data from Construction	-	-	39.1	-	-
Technology Agency of the Czech Republic	Control of battery storage for applications in industry in accordance with the requirements of the customer and distribution network	100.0	95.9	17.7	-	-
Technology Agency of the Czech Republic	System for fully stand-alone renewable electricity production	23.7	37.2	57.4	-	-
Technology Agency of the Czech Republic	Power generation ICE directly cooled by ORC working fluid for complex WHR	19.5	38.9	56.5	-	-
Technology Agency of the Czech Republic	Database of embodied environmental impacts of building construction systems and its applications for use in BIM tools Archicad and REVIT.	30.8	29.0	10.8	-	-
Technology Agency of the Czech Republic	Smart City Compass: Software supporting implementation and evaluation of smart measures in cities	43.7	66.7	42.5	-	-
Technology Agency of the Czech Republic	WATER IN THE CITY: Blue and Green Infrastructure Interdisciplinary	56.9	89.8	34.9	-	-
Technology Agency of the Czech Republic	Structural Health Monitoring of Bridges Utilizing FBG Sensor Technology	44.8	60.0	54.1	-	-
Technology Agency of the Czech Republic	Development of concrete lightweight columns with carbon reinforcement as element for load-bearing structures with loading and fire tests	45.6	68.2	60.3	-	-
Technology Agency of the Czech Republic	Automated fault detection and diagnostics system for building services	36.1	35.6	50.2	-	-
Technology Agency of the Czech Republic	3D active ceiling for indoor environment improvement	39.7	-	-	-	-
Technology Agency of the Czech Republic	Livable cities and communities: Guidelines for planning of public space in digital era	50.3	55.2	12.7	-	-
Technology Agency of the Czech Republic	Mobile Autonomous Unit for Water Generation in Desert Areas	125.7	115.9	30.1	-	-
Technology Agency of the Czech Republic	Quality and sustainable public construction: functional specifications, decision making and communication in building projects	57.8	56.0	24.9	-	-
Technology Agency of the Czech Republic	Autonomous curtain wall panel	76.0	48.4	19.5	-	-
Technology Agency of the Czech Republic	Combined heat and power (CHP) ORC unit with thermal output of 120 kW in containerized configuration	83.7	50.2	-	-	-

Technology Agency of the Czech Republic	Battery storage integration into a woodchip fired micro CHP (combined heat and power) ORC unit with thermal output of 50 kW	34.6	17.3	-	-	-
Technology Agency of the Czech Republic	Research of additive manufacturing (3D print) possibilities for manufacturing of expanders for low temperature decentralized energy applications	16.0	-	-	-	-
Technology Agency of the Czech Republic	Innovation and Development of New Fixings for Timber and Timber-concrete Structures	26.4	-	-	-	-
Technology Agency of the Czech Republic	Decision support system of urban mobility and intelligent settlement services including specific needs of individual persons	23.1	-	-	-	-
Technology Agency of the Czech Republic	Interruption of thermal bridge with variable applications	33.5	-	-	-	-
Technology Agency of the Czech Republic	Advanced control of heating and cooling systems by thermal comfort	33.6	-	-	-	-
Technology Agency of the Czech Republic	Centre for advanced materials and efficient buildings	574.5	486.3	459.2	247.1	-
Technology Agency of the Czech Republic	Use of local biomass as a fuel source, produced by aerobic fermentation technology, in the Wave system	44.7	74.3	46.7	27.7	-
Operational Programme Research, Development and Education	Centre of Advanced Photovoltaic	99.0	93.3	102.4	114.9	40.9
Operational Programme Research, Development and Education	Development of capacity for strategic research management at CTU in Prague	66.7	44.2	51.4	61.0	-
Operational Programme Research, Development and Education	International Mobility of Researchers in CTU	37.7	0.1	-	-	-
Operational Programme Research and Development for Innovation	Smart Prague Technology Transfer	541.0	-	-	-	-
Operational Programme Research, Development and Education	Assistance Vouchers of the Capital City of Prague	-	-	-	15.4	-
Ministry of Education, Youth and Sports	Design and Verification of Properties of Concrete with Recycled Sand from Construction and Demolition Waste	-	78.0	121.6	101.2	-
Technology Agency of the Czech Republic	Development of Tools for Optimal Energy Response of Buildings to Future Smart Grid Requirements and Their Impact on the Energy Market and the Environment	14.0	36.0	32.8	26.8	-
Central Bohemian Innovation Centre	Improvement of External Communication of the Research Team and Its Research Activities through Videos	-	-	6.5	-	-

Interreg	Policies for Renewable Energy Sources in industry	-	76.3	85.2	51.4	-
Ministry of Education, Youth and Sports	Principles of Sustainable Construction and the FIRSTLIFE Project within the International SDE21/22 Competition	-	-	-	6.4	-
Ministry of the Interior	Security Research – Modeling of Thermal Degradation and Combustion	-	2.7	-	-	-
Technology Agency of the Czech Republic	Simulation, Testing, and Digitalization for Construction 4.0	24.0	58.6	17.4	3.8	-
Total		4,434.5	3,323.7	2,666.8	2,475.8	2,739.9

In the role of another participant						
Provider ²⁷	Project name	Support (in thousands EUR)				
		2019	2020	2021	2022	2023
Technology Agency of the Czech Republic	On-line sensors and monitoring for conventional power industry	-	18.1	21.0	43.8	36.7
Operational Programme Enterprise and Innovation for Competitiveness	Advanced sensor for monitoring steel structures	-	-	25.8	90.5	57.4
Operational Programme Enterprise and Innovation for Competitiveness	Advanced shading systems for buildings	-	-	64.1	107.1	68.5
Technology Agency of the Czech Republic	Analysis of the potential for development of micro-cogeneration in the Czech Republic and a proposal for a suitable incentive system	-	-	-	35.6	43.8
Operational Programme Technology and Applications for Competitiveness	Application 1 - System for evaluating and facilitating the selection of electric cars and advanced inspection of the technical condition of the battery	-	-	-	-	7.0
Operational Programme Technology and Applications for Competitiveness	Application of intensive coherent source for environmental	-	-	-	-	18.6
Horizon Europe	Boosting the uptake of circular integrated solutions in construction value chains	-	-	-	-	42.8
Horizon 2020	Climate Positive Circular Communities	-	-	-	95.9	515.8
Technology Agency of the Czech Republic	Condition diagnostics and protection of bridge constructions system with application of WIM system	-	-	36.9	32.6	68.5
Technology Agency of the Czech Republic	Creating Actionable Futures	-	-	-	19.1	36.9

²⁷ Ibid.

Technology Agency of the Czech Republic	Digitation and automation of production processes of prefabricated energy efficient timber buildings	-	-	89.1	113.0	117.4
EUKI	Energy Efficiency Network – a cross-border energy consultant training	-	-	-	-	-
Operational Programme Enterprise and Innovation for Competitiveness	Equipment for obtaining water from the environment of desert air	-	-	-	229.5	139.2
Grant Agency of the Czech Republic	Experimental and numerical assessment of the bearing capacity of notches in timber beams at arbitrary locations using LEFM	-	-	43.8	54.5	40.2
Operational Programme Enterprise and Innovation for Competitiveness	Facade system with integrated heat exchanger	-	-	39.9	68.3	34.3
Horizon Europe	Accelerate poSitive Clean ENergy Districts	-	-	-	-	49.4
Horizon Europe	GLoalFlex - A Global as well as Local Flexibility Marketplace to Demonstrate Grid Balancing Mechanisms through Cross-sectoral Interconnected and Integrated Energy Ecosystems enabling Automatic Flexibility Trading	-	-	-	-	74.5
Operational Programme Enterprise and Innovation for Competitiveness	Healthy window	-	-	28.8	197.0	161.0
Horizon 2020	Highly advanced modular integration of insulation, energising and storage systems for non-residential buildings'	8.0	40.8	117.4	52.9	139.0
Operational Programme Enterprise and Innovation for Competitiveness	Inferential sensing of concentration/viscosity of abrasive slurries.	-	-	15.6	56.8	8.6
Operational Programme Enterprise and Innovation for Competitiveness	interGraces - Platform for integration of IoT components into SOA systems	-	-	-	94.5	88.1
Erasmus+	Light and Illumination for Human Health - Realm Life Appl	-	-	-	1.1	1.3
Operational Programme Enterprise and Innovation for Competitiveness	Microcogeneration from non-standard solid biofuels	-	-	-	44.3	85.6
Operational Programme Enterprise and Innovation for Competitiveness	Modular heating and hot water preparation system	-	-	23.7	45.2	29.9
Operational Programme Enterprise and Innovation for Competitiveness	Multifunctional compact source of heat and cold	-	-	28.2	64.1	16.1

Technology Agency of the Czech Republic	Municipalities talk about water: Communication of the implementation of rainwater management measures in cities	-	-	13.1	9.0	27.1
Technology Agency of the Czech Republic	Nanofibrous wound dressings with encapsulated bacteriophages for treatment of infected wounds.	-	-	-	48.2	-
National Recovery Plan	National Centre for Energy II	-	-	-	-	21.0
Technology Agency of the Czech Republic	Nature-Like Lighting for Laboratory Animal Facilities	-	-	-	-	42.6
Horizon Europe	New European Bauhaus STAvangeR	-	-	-	4.2	17.7
Operational Programme Enterprise and Innovation for Competitiveness	New generation of lighting with safety features	-	-	42.5	126.9	76.0
Horizon 2020	Plug-and-use renovation with adaptable lightweight systems	-	5.2	189.7	140.6	148.1
Technology Agency of the Czech Republic	Prefabricated recyclable wood-based frame building system	-	-	-	82.2	106.4
Technology Agency of the Czech Republic	Preparation of tools and models for the implementation of the	-	-	-	-	54.6
Operational Programme Enterprise and Innovation for Competitiveness	Pressure monitoring of wheelchair seating system	-	-	56.8	84.7	66.0
Horizon 2020	PROBONO The Integrator-centric approach for realising innovative energy efficient buildings in connected sustainable green neighbourhoods	-	-	-	5.7	7.9
Operational Programme Enterprise and Innovation for Competitiveness	R&D of II. generation of intelligent roof "EMETEC"	-	-	81.9	177.8	255.0
Operational Programme Enterprise and Innovation for Competitiveness	Recycling technology of construction and demolition waste for zero-waste system	-	-	37.5	74.4	70.8
Operational Programme Enterprise and Innovation for Competitiveness	Research and development of radio communication in IoT for industrial automation and smart metering	-	-	-	87.0	36.7
Technology Agency of the Czech Republic	Resilience of Smart Cities and Villages of the Moravian-Silesian Region	-	-	-	-	1.4
Operational Programme Enterprise and Innovation for Competitiveness	RoboPID - diagnostics and automatic tuning of controller parameters for industrial use in buildings	-	-	-	96.8	103.5
Technology Agency of the Czech Republic	Stationary and mobile devices to support circadian synchronization, treatment and prevention of mental disorders through full spectrum-light phototherapy	-	57.9	66.4	33.4	20.6

Horizon 2020	Sustainable energy Positive & zero cARbon Communities	4.8	86.7	88.9	37.1	85.1
Technology Agency of the Czech Republic	System for complex monitoring of timber constructions	-	-	42.0	35.1	86.3
Operational Programme Enterprise and Innovation for Competitiveness	Wireless sensors for diagnostics of inaccessible parts of building structures	-	-	17.5	215.6	171.2
Ministry of Health	Comprehensive pre-clinical evaluation of lateral lumbar spine fusion with hybrid biodegradable nanocomposite porous implant	11.9	3.7	-	-	-
Ministry of Education, Youth and Sports	Enabling the participation of research organizations in the European Energy Research Alliance (EERA)	5.0	10.9	9.6	-	-
Technology Agency of the Czech Republic	Hybrid wood-concrete supporting construction systems	78.4	79.1	124.9	25.6	-
Ministry of Industry and Trade	Recycling of modern and recycled materials	14.3	15.4	-	-	-
Ministry of Industry and Trade	Flexible construction system on basis of timber and high-performance concrete structures for energy efficient residential buildings	91.2	39.0	-	-	-
Ministry of Industry and Trade	Recycled Sand from CD Waste for Concrete and Mortars	83.4	76.8	-	-	-
Ministry of the Interior	Analysis of Security Approaches in the Design of Fire Protection of Buildings and Solution Proposal for the Czech Republic	37.5	12.4	-	-	-
Operational Programme Enterprise and Innovation for Competitiveness	Waste heat utilization for energy storage based on the concept of Carnot batteries	-	26.2	-	-	-
Technology Agency of the Czech Republic	Ontorun - automatic tagging of building data	-	-	7.2	-	2.8
Technology Agency of the Czech Republic	Recycling and transformation of construction plasterboard waste into new products for construction and value-added applications	-	-	-	14.6	17.5
Technology Agency of the Czech Republic	METAMORPH - Advanced hybrid organic-inorganic nanofibers for CO2 capture and photocatalysis	-	-	-	98.1	76.8
Technology Agency of the Czech Republic	Next Generation District - Complex design and control of local distribution networks using advanced control theory and numerical optimisation methods	45.0	21.2	22.6	30.9	-
Technology Agency of the Czech Republic	Projections of the flexibility in low and high voltage distribution networks related to electromobility and distributed-energy installations, particularly stationary batteries, in the Czech Republic until 2040	29.2	29.4	8.0	-	-
Technology Agency of the Czech Republic	Effective and safe energy from biomass	39.6	31.1	44.5	-	-

Technology Agency of the Czech Republic	Green Roofs and Facades as a Tool for Improvement of Thermal and Water Balance in Industrial Space	40.5	38.4	39.8	-	-
Technology Agency of the Czech Republic	Hydronics 4.0	140.8	114.9	82.9	-	-
Technology Agency of the Czech Republic	Environmentally friendly resilient residential buildings	114.2	104.2	-	-	-
Technology Agency of the Czech Republic	Environmentally Efficient Construction and Demolition Waste for Structures	42.6	43.9	-	-	-
Technology Agency of the Czech Republic	Oak fastener in timber structures: materials for normative anchorage	25.7	-	-	-	-
Operational Programme Enterprise and Innovation for Competitiveness	MARLIN: Making existing buildings smarter and more energy efficient	1.2	14.8	13.5	10.0	-
Operational Programme Enterprise and Innovation for Competitiveness	Development of fibre optic measurement instruments for underground constructions and retaining structures	-	5.0	32.1	51.9	-
Operational Programme Enterprise and Innovation for Competitiveness	Resource-Efficient Factories by integrating intelligent COMposite material applications	-	-	-	29.8	96.6
Operational Programme Enterprise and Innovation for Competitiveness	Open dispatching system with principles of business intelligence and semantic data description	-	-	59.5	87.6	57.2
Operational Programme Enterprise and Innovation for Competitiveness	Research and development of a mobile condensing minipower plant based on CHP and RES sources with built-in heat and electricity accumulation supplemented by intelligent control system	28.3	191.2	-	94.0	62.7
Operational Programme Enterprise and Innovation for Competitiveness	Turboexpander for a biomass-fired CHP ORC unit	-	-	68.5	144.4	51.4
Operational Programme Enterprise and Innovation for Competitiveness	Wall-building ventilation system	-	-	21.4	51.8	58.2
Operational Programme Enterprise and Innovation for Competitiveness	Mobile protective barriers suitable for urban areas for protection enhancement of soft targets against vehicle ramming attack	-	-	19.5	39.6	26.3
Operational Programme Enterprise and Innovation for Competitiveness	Development of Low-carbon Energy in Small and Medium-sized Municipalities	-	-	-	46.0	81.7
Operational Programme Enterprise and Innovation for Competitiveness	Predictive control and diagnostics of district heating systems	-	-	37.9	68.4	17.9

Operational Programme Enterprise and Innovation for Competitiveness	Fully automatic hot water boiler for biomass	-	21.9	91.6	115.7	2.5
Operational Programme Enterprise and Innovation for Competitiveness	Development of continual brazing furnace with combined displacements of products and integrated energy center	134.8	122.7	-	-	-
Operational Programme Enterprise and Innovation for Competitiveness	Research of the influence of used components on the led chip in the framework of the development of a new led module, intended for demanding applications in the chemical industry	-	-	43.8	77.2	-
Operational Programme Enterprise and Innovation for Competitiveness	Development of the energy-efficient heat recovery	48.3	32.9	-	1.1	-
Operational Programme Enterprise and Innovation for Competitiveness	Air handling unit with thermoelectric heating and cooling	79.5	193.5	-	-	-
Operational Programme Enterprise and Innovation for Competitiveness	System for efficient energy management	38.8	-	0.9	-	-
Operational Programme Enterprise and Innovation for Competitiveness	Multi-level Integrated energy planning and management for Advanced Renewable Cities	41.7	11.0	-	-	-
Operational Programme Enterprise and Innovation for Competitiveness	Tools for active energy management	57.4	-	-	-	-
Operational Programme Enterprise and Innovation for Competitiveness	Utilization of Waste Heat by its Transformation into Electric Energy	28.0	-	-	-	-
Operational Programme Enterprise and Innovation for Competitiveness	Protection against Electrical Arc and Fire Prevention	31.0	-	-	-	-
Operational Programme Enterprise and Innovation for Competitiveness	Development of new technologies firing lightweight ceramic aggregate	70.1	33.3	-	-	-
EU ERDF – Operational Program Entrepreneurship and Innovation for Competitiveness	Industrial Research and Experimental Development for Production in The Company VUP Medical, a.s.	59.2	3.8	-	-	-
Operational Programme Enterprise and Innovation for Competitiveness	Advanced Concrete Elements with Woven Reinforcement	3.3	-	-	-	-

Horizon 2020	Development and Advanced Prefabrication of Innovative, Multifunctional Facade Elements for Modular Retrofitting and Connection	17.7	-	-	-	-
Interreg	Towards low carbon city districts through the improvement of regional policies	-	-	-	3.9	-
Interreg	Financial Instruments for Energy Renovation Policies	9.7	-	4.6	56.5	-
Interreg	Policies for Renewable Energy Sources in industry	31.1	-	-	-	-
Operational Programme Enterprise and Innovation for Competitiveness	Research and Development of a System for Personalized Presentation of Scientific and Expert Capacities	-	-	-	48.4	7.3
Ministry of the Interior	Security Research – Modeling of Thermal Degradation and Combustion	44.6	43.3	38.2	34.9	-
Interreg	Towards low carbon city districts through the improvement of regional policies	13.2	55.9	48.1	0.1	-
Technology Agency of the Czech Republic	Utilization of Advanced Technologies in the Field of Odorology	-	52.5	60.8	61.6	24.7
Total		1,547.5	1,6260	2,007.4	3,986.8	3,991.9

Table 3.3.2 - Contract research activities

Client ²⁸	Activity name	Revenue (in thousands EUR)				
		2019	2020	2021	2022	2023
UNICO.ai CZ, s.r.o.	Design of a wireless communication system, an innovative project in the field of electrical engineering	7.6	-	-	-	-
UNICO.ai CZ, s.r.o.	Assessment of technical feasibility of projects in the field of electrical engineering (bluetooth tracker, wireless power transfer)	4.4	-	-	-	-
Baumit, spol. s r.o.	2022 Baumit Vapour diffusion	-	-	-	5.3	-
ABADIA a.s.	Abadia Voucher Balconies	-	-	-	-	16.8
AGROP NOVA a.s.	AGROP NOVA - fire openness of walls	-	-	-	2.4	-
Metrostav, a.s., divize 9	Master Manual Update	10.7	-	-	-	-
Metrostav, a.s., divize 9	Master's Handbook Update - Seminar	2.2	-	-	-	-
Czech Standardization Agency	Update of the recyklujmestavby.cz website	-	-	-	15.7	-
Obec Měňany	Analysis and design of heat supply system optimization	-	-	-	-	4.8
Liberecký kraj	Analysis of the effective use of secondary raw materials in the Liberec Region	-	-	-	-	6.4
Středočeské inovační centrum	Analysis of needs and prerequisites for the management of the Smart Cities concept in the Central Bohemia Region	15.7	-	-	-	-

²⁸ If the client is from abroad, indicate in brackets the country of origin of the client.

Obec Měňany	Needs analysis for setting up measures within the strategic development of the municipality	-	-	-	-	3.2
Město Kutná Hora	Analysis of the readiness of the city of Kutná Hora for the introduction of Smart City	7.6	-	-	-	-
Technofiber s.r.o.	Analysis of ozone propagation in a room during its disinfection	-	-	4.8	-	-
SOLIDSUN s.r.o.	Analysis of technical systems of family houses with regard to meeting future energy performance requirements of buildings	-	2.1	-	-	-
BOVA Březnice spol. s.r.o.	Analysis of the load-bearing capacity of the fittings of the company BOVA Březnice spol. s.r.o.	16.0	-	-	-	-
BOVA Březnice spol. s.r.o.	Analysis of the bearing capacity of the fittings of BOVA Březnice spol. s.r.o. II	-	15.9	-	-	-
LAYWOOD group s.r.o.	Load capacity analysis of prefabricated panels for timber buildings	16.8	-	-	-	-
CZECH PAN s.r.o.	Load capacity analysis of sandwich panels	-	11.4	-	-	-
Voda Červený Kostelec, s.r.o.	Analysis of sludge utilization and energy of WWTP	2.8	-	-	-	-
Stedina s.r.o.	Sanitation-free tap	-	-	-	-	20.0
Nanuntio s.r.o.	Biosensors	3.9	-	-	-	-
BlazeCut s.r.o.	BlazeCut - extinguishing bus engines	-	-	-	5.6	-
proFem - centrum pro oběti domácího a sexuálního násilí, o.p.s.	PROFEM Centre	10.5	-	-	-	-
INTAR a.s.	SBToolCZ certification - IZS Karlovy Vary	-	-	11.5	-	-
Energy Benefit Centre a.s.	Certification SBToolCZ - New building of the SŠŽ Sokolov school on p. p. no. 386/1, k. ú. Sokolov	-	-	-	10.7	-
Energy Benefit Centre a.s.	Certification SBToolCZ - Secondary School of Applied Arts Ceramics and Glass Karlovy Vary (2022)	-	-	-	8.3	-
Multiple conference participants	CESB22	-	-	-	54.9	-
Centrum pasivního domu	CPD-Update of the Strategic Research Agenda document	-	2.4	-	-	-
Czech Standardization Agency	Technical Normalization Centre	23.0	14.7	-	35.0	-
Česká zemědělská univerzita v Praze	CZU public lighting and insects	-	-	-	6.0	-
BYDLEX s.r.o.	Českobrodská-Consultation and control of the implementation of the construction	-	-	2.9	-	-
RERA a.s.	DigiVill - Use of digitalization in public administration - Cross-border analysis of approaches and tools for public spaces	-	-	-	3.9	-
Regulus, s.r.o.	Dynamic CT test	4.8	-	-	-	-
Slavos Slaný, s.r.o.	EA ČOV Slaný	-	-	-	-	6.0
ecokit s.r.o.	ECOKIT	-	-	5.2	-	-
ecokit s.r.o.	ECOKIT - consultation	-	-	4.0	-	-

monom works s.r.o.	Energy concept of the Jalový dům housing complex	-	-	-	-	2.2
Město Týnec nad Sázavou	Energy concept of KC Týnec	-	-	-	2.4	-
Obec Soběhrdy	Energy concept: New multifunctional municipal office building	-	-	-	3.0	-
Město Slaný	Energy management City of Slany	-	-	-	5.8	-
E-expert, spol. s r.o.	Energy plus district for Karviná - Site analysis part	-	5.2	19.8	-	-
Úřad vlády ČR	Energy Poverty in Danube Region	7.4	-	-	-	-
FÉNIX Trading s.r.o.	Environmental footprint of Fenix	-	-	-	11.2	-
Impregnace Soběslav, s.r.o.	EPD Wooden sleepers	-	5.6	-	-	-
AGROP NOVA a.s.	EPD products Novatop	-	-	-	11.4	-
Equidomus s.r.o.	EQUIDOMUS	15.9	-	-	-	-
EXCON, a.s	Excon_Ocelodům_2023	-	-	-	-	13.4
České vysoké učení technické v Praze, fakulta stavební	Experimental measurements of the thermal-hydraulic properties of 3 capillary mat samples	-	-	8.8	-	-
Fénix s.r.o.	Fenix PV Forecast SK-PL	-	-	-	-	13.0
Fénix s.r.o.	Fenix inverter power control	-	-	-	3.8	-
FENIX Trading, s. r. o.	FENIX: HES control and API, DES portal	-	-	-	9.0	-
Chart Ferox, a.s.	FEROX	-	-	-	56.5	-
České vysoké učení technické v Praze	GAČR - trials in RCTs	-	-	-	4.8	-
Fakulta stavební ČVUT v Praze	H-CEMENT - 4 fire protection tests for steel construction	3.2	-	-	-	-
HELUZ cihlářský průmysl v.o.s.	Heluz - dynamic simulation of thermal and humidity behaviour of a building using HELUZ unfired bricks	4.7	-	-	-	-
více objednatelů (viz HitHit)	HitHit Water in the city	-	-	-	11.8	-
Městská část Praha 5	Evaluation framework for sustainability of construction in Prague 5	-	-	-	-	21.8
Kancelář generálního komisaře účasti České republiky na Všeobec	Hybernace Expo Legacy	-	-	-	12.0	-
České vysoké učení technické v Praze Fakulta elektrotechnická	IAQ sensors for FEL	2.7	-	-	-	-
Obchodní akademie Česká Lípa	IAQ04 - Ceska Lipa	-	-	2.0	-	-
Sociální služby města Kroměříže	ICT for Kroměříž	-	9.4	-	-	-
JRD Services s.r.o.	INDICATE - LCA analysis of an apartment building	-	-	-	-	4.0
CPI Services, a.s.	INDICATE - LCA residence Malkovského and Nová Zbojovka for CPI PG	-	-	-	-	6.4

UNICO.ai CZ, s.r.o.	The Rustavi Innovation Ecosystem - good practice research	-	-	2.1	-	-
Městská část Praha 7	Installation of 10 air quality sensors for Prague 7	-	4.9	-	-	-
GRIDEO s.r.o.	Intelligent community energy infrastructure transfer point	16.0	-	-	-	-
IPR Praha	IPR - Urbania II	-	4.0	-	-	-
IPR Praha	IPR - Exhibition	2.6	-	-	-	-
Instytut Techniki Budowlanej	ITB burner calibration	-	-	-	-	2.0
TGS nástroje-stroje-technologické služby spol. s r.o.	IV TGS	-	-	15.9	-	-
IXSOL s.r.o.	IXSOL	-	-	-	15.6	-
JRD Development s.r.o	JRD - participation Silurian	-	-	12.8	-	-
Czech Standardisation Agency	Catalogue of secondary raw materials II - stages 2a.2b,3	-	-	68.0	-	-
K.B.K. fire, s.r.o.	KBKfire PV panel tests	-	-	-	3.4	-
YOUNG4ENERGY s.r.o.	Comprehensive design of energy saving measures in brewery operation(Y4E)	-	15.5	-	-	-
Obec Soběhrdy	Concept of modernisation of energy management of buildings in the municipality of Soběhrdy	-	-	2.2	-	-
SYNER, s.r.o.	Control activities - SOŠ Učňovská II	-	-	-	7.0	-
Česká spořitelna, a.s.	EU Taxonomy Consultation for Česká spořitelna	-	-	-	3.2	-
A.D.N.S. architekti s.r.o.	Consulting services for ADNS architects - renovation of the building CR Římská 499/15	-	-	3.9	-	-
Karlovarský kraj	Regional Office of the Karlovy Vary Region - Building B	-	-	-	12.1	-
Město Krásná Hora nad Vltavou	Krásná Hora nad Vltavou - Basis for commissioning of the planning study	-	-	-	-	2.4
Ministry of the Environment	Criteria for environmental evaluation of New Green Savings projects	-	-	7.9	-	-
Saint-Gobain Construction Products CZ a. s., divize Isover	Laboratory measurements of the improvement of step sound insulation by Rigistabil floors	2.1	-	-	-	-
MFS DX s.r.o.	LCA of TTC OXYMA office building for MFS DX	-	-	-	-	4.8
MFS DX s.r.o.	LCA Halls GLP - Bratislava Airport	-	-	-	-	8.4
Wienerberger s.r.o.	LCA of material variants of the Wienerberger family house	-	-	-	-	7.6
AERS s.r.o.	License AERS II - Comprehensive Battery Storage Management System	-	-	2.8	-	-
ALTEKO, s.r.o.	Licence Alteko	-	-	-	-	2.0
EMET inovation s.r.o.	EMET licence	-	-	-	-	2.0
Feramat Energies, s.r.o.	Feramat DH4.ENERGY licence	-	-	-	-	2.0
CV Machining s.r.o.	License project VIVA	-	-	-	-	9.2
QUANTUM, a.s.	License Quantum	-	-	-	-	2.0
TECHTRANS PT s.r.o.	Licence TECHTRANS Multiheat	-	-	-	-	2.0

Subterra a.s.	Licence Agreement - Envelop for the construction of the Reconstruction of the School Českobrodská 362/32a, Prague 9	-	-	18.6	-	-
DAMGAARD Consulting s.r.o.	DAMGAARD License Agreement	-	-	20.0	-	-
Safibra s.r.o.	License Safibra TACR FBG bridge	-	-	6.0	-	-
LINET spol. s r.o.	Linet gas consumption monitoring	-	7.9	-	-	-
Středočeské inovační centrum	Energy management solutions manual for municipalities	-	9.9	-	-	-
Medicalc software s.r.o.	Medicalc - database test	40.0	-	-	-	-
LIKO-S a.s.	CO2 concentration measurement and flow visualization in the acoustic cell	-	-	-	-	2.3
Městská část Praha 7	Air quality measurements for Prague 7 including data processing and analysis	-	3.2	-	-	-
Saint-Gobain Construction Products CZ a.s., divize Rigips	Measurement of laboratory sound insulation of plasterboard walls	4.4	-	-	-	-
Saint-Gobain Construction Products CZ a.s., divize Rigips	Measurement of laboratory sound insulation of plasterboard walls	6.8	-	-	-	-
ELSYMCO s.r.o.	Measurement of technical parameters of the ventilation unit	-	-	-	-	2.1
Stroj-energijska tehnika d.o.o.	Measurement of collector thermal output	-	-	-	-	2.8
Spectrasol, s.r.o.	Measuring the effect of lighting on the performance of high school students, compared to a control group of students.	-	2.0	-	-	-
GT Energy s.r.o.	Methodological procedure for the design of air-to-water heat pumps - phase 1	-	-	-	-	3.9
magistrát hl. m. Prahy, Odbor ochrany prostředí	Methodology for the adaptation of school facilities in the territory of the capital city Prague	-	-	15.8	-	-
Metrostav a.s.	Metrostav-Historic windows	8.7	-	-	-	-
Metrostav a.s.	Metrostav-PKS windows 2019-experiment	15.3	-	-	-	-
AVAPS s.r.o.	miniFUR Supplement	-	-	-	3.0	-
AVAPS s.r.o.	miniFUR Development of a validation furnace for medium-scale fire tests	-	20.0	-	-	-
Město Horní Slavkov	Local Energy Concept of Horní Slavkov	-	-	-	-	19.8
CA Immo Real Estate Management Czech Republic s.r.o.	Local HVAC survey for WELL certification	-	-	2.6	-	-
Strojírenské inovační centrum, s.r.o.	MMcite - Parklet study	-	-	-	-	12.0
Skanska Reality a.s.	MOCU - Residential project Modřanský cukrovar - facade Rebetong - testing	-	-	-	11.3	-
Faster CZ spol. s r.o.	License IAQ Faster 2022	-	-	-	-	2.2
Město Litoměřice	Technology options for ZEVO Litoměřice	-	-	14.8	-	-

Městský úřad Rožnov pod Radhoštěm	Offer optimization and control of the cultural house project	4.2	-	-	-	-
Městský úřad Rožnov pod Radhoštěm	Offer optimization and control of the project of the cultural house II.	2.5	-	-	-	-
MFS Digital	OXYMA CAPEX / OPEX Analysis Tool - Stage 1 - Simulation	-	-	-	-	18.0
InoSens s.r.o.	DESIGN OF ELECTRONICS AND FIRMWARE FOR SENSORS USING IOT TECHNOLOGY	-	14.2	-	-	-
EGF Energy, spol. s r.o.	Draft methodology for the use of participatory design for the preparation of investment projects	-	15.9	-	-	-
Národní dřevařský klastr	NDK-Fibreboard	205.0	-	-	-	-
Nemocnice Valtice s.r.o.	Hospital Valtice - critical infrastrucutre	-	-	-	6.0	-
Národní filmový archiv	NFA to IFA	-	6.2	-	-	-
NOHO s.r.o.	NOHO - workshop Nové Kukleny	-	2.6	-	-	-
nano power a.s.	OP PIK voucher - Cooling of battery modules with non-conductive liquid	-	-	20.0	-	-
Asistenční centrum, a.s.	Opponent's opinion Mělník	-	-	-	-	3.2
AZS RECYKLACE ODPADU s.r.o.	Optimisation of the use of recycled brick aggregates for concrete screeds and mortars	-	-	-	-	19.9
Metrostav a. s.	Verification of noise transmission from a hot tub through the roof structure	-	3.5	-	-	-
Institut plánování a rozvoje hlavního města Prahy	Palmovka - socio-anthro survey	-	17.3	-	-	-
PASSERINVEST GROUP, a.s.	Parametric study to determine daylighting requirements	-	4.8	-	-	-
PKS okna a.s.	PKS windows 2019 - calculations	2.5	-	-	-	-
Státní fond životního prostředí České republiky	Background study on Energy Plus Buildings in the Non-Residential Sector (OPŽP)	-	-	7.6	-	-
Statutární město Chomutov	Support for the preparation of a project for the conversion of the former city spa into a 21st century library	-	-	-	-	8.0
Město Strmilov	Support for the reconstruction of the House of Culture Part B: Functional assignment	-	6.4	-	-	-
Dopravní podnik Karlovy Vary, a.s.	Support for the development of public lighting in Karlovy Vary	-	-	17.2	-	-
PROGRESUS invest holding s.r.o.	Support for the development of a structural system for wood and concrete-based residential buildings	-	-	-	3.4	-
Ústav pro studium totalitních režimů	SBToolCZ consultancy: the building of the Institute of Structural Engineering	5.1	-	-	-	-
Výstaviště Praha, a.s.	Assessment of the energy solution of the Holešovice Market Hall	-	-	-	-	5.4
Enerfis s.r.o.	Thermal comfort assessment for BREEAM assessment	-	-	2.4	-	-

JAGA N.V. - org. složka	Assessing the effect of the convector on thermal comfort and airflow	-	-	-	7.0	-
MESSY s.r.o.	Fire test of measures for fire-safe application of cellulose insulation in integration with the chimney body	3.1	-	-	-	-
PLOMER Engineering, s.r.o.	Prague voucher - Modular battery backup energy storage for electromobility and energy	16.5	-	-	-	-
FENIX Trading, s. r. o.	Predictive algorithm for storage charging control	-	-	-	30.0	-
Obec Trojanovice	Project HOPE - Revitalisation of the Frenštát Mine brownfield	-	-	-	-	5.9
DAM architekti s.r.o.	Preliminary evaluation of the impact of passive shielding	-	2.0	-	-	-
PLOMER Engineering s.r.o.	Additional PV system for transport vehicles	-	13.2	-	-	-
Rezidence Kladno s.r.o.	Case study of energy systems of family houses Residence Kladno Dubí Location Sever	-	-	2.4	-	-
Statutární město Chomutov	Preparation of the Smart City Chomutov concept	15.5	-	-	-	-
Brilon a.s.	Preparation of expert input to design documents for ventilation units	-	2.2	-	-	-
Metrostav a.s., Divize 9	Handbook Fire safety in buildings + 4 seminars	-	4.5	-	-	-
Centrum pasivního domu, z.s.	Smart City Židlochovice Framework Contract	-	3.0	-	-	-
Smíchovská střední průmyslová škola, Praha 5, Preslova 25	Reconstruction of classroom lighting - supply of modern lighting in 6 selected classrooms of the school using more efficient light sources	-	-	93.7	-	-
ČEZ a.s.	Review of high-temperature heat pumps	-	-	-	5.0	-
Saint-Gobain Construction Products CZ a.s. Divize Rigips	Review of technical documents and experimental analysis	-	4.6	-	-	-
Dopravní podnik hl. m. Prahy, akciová společnost	Plants in the metro - pilot installation	-	-	-	16.0	-
Městská část Praha 8	RSOP - SOD1a) Proposal for a System of Evaluation of Construction Plans	-	3.6	-	-	-
Městská část Praha 8	RSOP - SOD2 Elaboration of evaluation criteria	-	7.4	-	-	-
Městská část Praha 8	RSOP - SOD3 Setting up the verification process and optimising the evaluation system	-	9.0	-	-	-
České vysoké učení technické v Praze	SBToolCZ: Preliminary evaluation of the PD for Building B of FSV CTU	-	-	-	2.7	-
nano power a.s.	SIC voucher - Electrical communication unit incl. electrical wiring for battery storage	-	20.0	-	-	-
MoistureGuard s.r.o.	SIC voucher MoistureGuard	15.2	-	-	-	-
BARVY A LAKY HOSTIVAŘ, a.s.	Simulation of the energy performance of a building with a different type of roof structure	-	-	11.8	-	-
Město Slaný	Slaný - consultation SCZT	-	-	-	-	11.9
Město Slaný	Slaný - opinion boiler room K45	-	-	-	-	4.0
TUSPO CO. s.r.o.	Smartseal	-	-	-	14.4	-

Metrostav a.s.	Cooperation in the field of airtightness and implementation of airtightness tests - Green Port Strašnice project	-	-	-	7.9	-
CA Immo Real Estate Management Czech Republic s.r.o.	Determination of measures to improve the health safety of the common areas of the Amazon Court office building	-	-	4.4	-	-
CA Immo Real Estate Management Czech Republic s.r.o.	Determination of measures to improve the health safety of the common areas of the Visionary office building	-	-	4.4	-	-
Deloitte Advisory, s.r.o.	Product Carbon Footprinting - Epoxy Resins for Deloitte	-	-	-	6.6	-
AQTpipe s.r.o.	Determining the performance of ceiling heating and cooling	-	-	-	-	2.5
AQTpipe s.r.o.	Determination of ceiling heating and cooling performance for a composition with acoustic panels	-	-	-	-	2.1
Město Semily	Strakonice	-	-	-	20.2	-
SVÚM a.s.	Study - analysis of sliding materials in the energy sector	4.4	-	-	-	-
Město Týnec nad Sázavou	Study and additional consultations for the installation of a photovoltaic (PV) source on the roof of the cultural centre in Týnec nad Sázavou	-	-	-	-	4.2
Pražská developerská společnost, příspěvková organizace	Study of the energy solution for the construction of Dolní Počernice	-	-	3.6	-	-
ra15, a.s.	Olbracht Study for ra15 (part 1)	3.6	-	-	-	-
Olomoucký kraj	Study Olomouc Region	11.6	-	-	-	-
Pražská developerská společnost, příspěvková organizace	Study specifying the energy solution for the construction of Dolní Počernice in Phase 1 - Part 1	-	-	14.8	-	-
SVÚM a.s.	SVÚM - application of sliding materials in power equipment	-	-	-	-	3.6
SVÚM a.s.	SVUM - resistance with alloy degradation	-	-	-	-	4.8
SVÚM a.s.	SVÚM - material testing in corrosive environment	-	-	-	-	2.4
Technický a zkušební ústav stavební Praha, s.p.	SBToolCZ auditor training	-	-	-	3.9	-
SEVEN Energy s.r.o.	SEVEN FVE training	-	-	-	4.6	-
Multiple customers	SBToolCZ 2019 training	4.1	-	-	-	-
Česká geologická služba	Synergys Technical Study	-	-	-	39.6	-
ČVUT - FBMI	Therapeutic ultrasound	-	11.5	-	-	-
Visionary Prague, s.r.o.	Visionary thermal imaging	3.1	-	-	-	-
TESAŘSTVÍ BISKUP, s. r. o.	The Bishop's Carpentry - a study of the FVE	-	-	-	2.5	-
Atrea, s.r.o.	Air-to-water heat pump testing	-	-	5.4	-	-
Městská část Praha 5	Sustainable Prague 5: adaptation of the methodology	-	-	-	4.0	-

Město Slaný	UEK city Slaný	-	-	-	17.2	-
Město Strakonice	UEK City of Strakonice	-	-	14.4	-	-
ÚSTAV HEMATOLOGIE A KREVŇÍ TRANSFUZE	UHKT - Energy concept of the campus part 2	-	-	-	6.7	-
RD Rýmařov s. r. o.	Carbon footprint of building structures of RD Rýmařov	-	-	-	2.7	-
Fénix Trading s.r.o.	UI Optimization Simulator	-	-	-	4.8	-
Fénix Trading s.r.o.	Application of a genetic algorithm for SAS battery storage management in the Jeseník production plant - phase 1	-	-	-	21.2	-
Fénix Trading s.r.o.	Application of a genetic algorithm for SAS battery storage management in the Jeseník production plant - phase 2	-	-	-	25.3	-
Město Horní Slavkov	Territorial Energy Concept (part: Energy Community Concept)	-	-	-	-	4.8
ProNanoTech s.r.o.	Variable contact angle measuring device	-	14.8	-	-	-
Obec Jinočany	Vision for the development of the new city centre	-	-	-	9.3	-
Obec Zduchovice	Vision for the development of the Zduchovice municipality	-	-	-	-	6.6
ZAKLÁDÁNÍ STAVEB, a.s.	Fibre optics for the Pohůrka Tunnel load test	29.8	-	-	-	-
Spectrasol, s.r.o.	The effect of full-spectrum light on the visually impaired	-	-	-	34.4	-
Multiple customers	Water in the city: books on sale (123 pcs)	-	-	-	3.1	-
Prague Institute of Planning and Development	Analysis of the possibility of using international evaluation tools for municipalities in Prague	-	-	-	-	39.4
Městská knihovna v Praze	Entrance area of the Barrandov branch	-	2.4	-	-	-
Výzkumný ústav Silva Taroucy pro krajinu a okrasné zahradnictví, v.v.i.	VUKOZ supply of sensors-joint work on the experiment	-	-	4.6	-	-
Městská část Praha 7	Evaluation of outdoor air measurement data for Prague 7	-	2.9	-	-	-
State Environmental Fund of the Czech Republic	Computing tools New Green Savings (Area C)	-	-	8.0	-	-
ENERGOCENTRUM PLUS, s.r.o.	Settlement of the license from the Scada BI project	-	-	-	-	3.2
Window Holding a.s	Settlement of the license agreement from the Healthy Window project	-	-	-	-	41.1
Pronanotech, s.r.o.	Development of a methodology for market-competitive production and processing of advanced nanofibers	-	19.7	-	-	-
Wienerberger s.r.o.	Waste heat recovery Tondach Hranice	-	-	8.0	-	-
ACOND a.s.	Development of a partial software management block	-	-	-	8.0	-

AZS BETON s.r.o.	Development of concrete formulations with a lower carbon footprint	-	-	-	-	8.8
MAS Bohdanečsko, z. s.	Training and development of community energy projects at the MAS level: mapping	-	-	2.7	-	-
Fraunhofer-Institut für Holzforschung	Fraunhofer WKI 2019	14.4	-	-	-	-
Univerzita Karlova	Foreign publications	-	-	-	2.4	-
Ministry of Regional Development	Providing training in the use of the Smart City Compass software tool and providing expert and consultancy support to users of this software tool	-	-	7.8	7.8	-
Ministry of Regional Development	Provision of modifications and maintenance of the Smart City Compass software tool	-	-	-	6.6	-
Obec Trojanovice	Design principles for sustainable construction and energy concept for the CÉRKA project in Trojanovice	-	-	-	15.2	-
Zakládání staveb, a.s.	Slat load tests	29.8	-	-	-	-
Loyd Group s.r.o.	ZEVO PoC	-	-	76.0	-	-
Národní ústav duševního zdraví, příspěvková organizace	Evaluation of the effectiveness of the pilot installation of biodynamic lighting in DS TGM in Beroun	11.4	-	-	-	-
FIRESI s.r.o.	Test of automatic fire extinguishing system for bus engine compartment	-	-	2.3	-	-
Fakulta stavební ČVUT v Praze	Fire protection test of steel structure with wooden cladding	-	3.2	-	-	-
Saint-Gobain Construction Products CZ a.s. divize Weber	Test for the determination of the production and selected parameters of combustion products	-	-	2.3	-	-
JRD Development s.r.o.	Airtightness test - apartment house Michle	-	6.9	-	-	-
SVÚM a.s.	Testing the opaciometer concept in an operational environment	2.0	-	-	-	-
Státní fond životního prostředí	Change of the criteria of OPIE OP5 SC5.2	4.0	-	-	-	-
Město Chýně	Elaboration of the energy community concept for the town of Chýně	-	-	-	-	9.5
Czech Standardization Agency	Drafting a catalogue of secondary raw materials/materials suitable for use in the construction industry - 2. Part 1, stage 1	16.0	-	-	-	-
Prof. Ing. Petr Hájek, CSc	Seismicity and resilience search processing	10.0	-	-	-	-
Prof. Ing. Petr Hájek, CSc	Preparation of technical documents for the assessment of building resilience	-	11.2	-	-	-
Město Žatec	Žatec - stage I - analysis	-	-	-	-	4.4
Multiple customers	Contracts under NDA	351.5	1115.1	580.7	735.3	598.0
Multiple customers	Contracts below 2,000 EUR	60.1	72.6	64.2	71.4	108.6
Total		1081.2	1,534.6	1211.2	1,480.4	1127.7

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁹, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

We have selected ten results, of which 8 are already applied and two that are well on their way to practical application.

Applied results

MoistureGuard

The MoistureGuard system was developed through a collaborative research and development effort between our timber construction specialists and experts in sensor technology. It consists of a set of sensors designed specifically for timber buildings, capable of detecting moisture intrusion and providing early warnings to building owners. By alerting users to potential moisture problems before they escalate, the system helps prevent serious structural damage, ultimately increasing the durability and safety of wooden buildings.

Following the success of the first functional prototypes, a spin-off company was established to bring the product to market. Today, this company, SENSOMATIC, has installed nearly 1,000 systems across Europe and is preparing to expand into Japan.

The project not only delivers technological and economic benefits by reducing risks for timber building owners, but it has also led to the creation of a fast-growing business. Additionally, UCEEB benefits from the project through licensing revenues, further supporting ongoing research and innovation in the field. By bridging advanced sensor technology with timber construction expertise, MoistureGuard has become a unique solution for improving the longevity and reliability of wooden structures.

Smart control algorithms for battery energy storage systems

In collaboration with AERS, we have developed a cloud-based solution that acts as a supervisory control system for home battery storage units. The system evaluates data on household energy consumption, weather forecasts, solar panel irradiation, and spot electricity prices, and based on this information, it sends control commands to the battery storage unit. This ensures that the operation of the storage system is optimized for maximum economic benefit to the owner. The control algorithms have been successfully licensed to AERS, enabling their implementation in real-world applications. They are already commercially running in more than 100 households and saving money to their owners and the number of installations is rising.

²⁹ See Terms definition.

envelop – low carbon building envelope for energy efficient buildings

Envelop is a lightweight timber-based curtain wall system developed by CTU UCEEB as an alternative to traditional metal-based facades, aiming to enhance energy efficiency in both new constructions and renovations. This innovative system has been licensed to several companies, facilitating its broader application in sustainable architecture. A notable implementation of Envelop was the comprehensive renovation of the Českobrodská Secondary School in Prague, transforming the 1970s-era building into a modern, energy-positive educational facility. The project utilized the Envelop facade system, with HOCHTIEF securing the license for its application and NEMA overseeing the manufacturing process. This renovation not only elevated the building to an energy-plus standard but also garnered multiple national and international accolades. For CTU UCEEB, the Envelop initiative has yielded economic benefits through licensing fees and, more importantly, contributes to the long-term reduction of buildings' energy consumption and carbon footprints. This project exemplifies the successful integration of research and industry collaboration, advancing sustainable building practices.

SBToolCZ – national certification system for sustainable buildings

SBToolCZ is a national certification system originally developed at the Faculty of Civil Engineering in 2008 and further advanced at UCEEB since 2016. SBToolCZ is fully adapted to Czech building standards and common construction practices. It provides an independent, certified assessment of building quality and has been successfully used in recent years for sustainable public procurement by Czech cities and regions. Its main societal and environmental contributions are in the fact, that the system enables to assess quality of buildings and the level of their sustainability, and it is a practical instrument for considering these aspects in public tenders. For UCEEB it has economic benefits coming from the licensing fees for each awarded certification and for the trainings of accredited persons.

Wave – ORC machine for production of electricity and heat from biomass

The Wave cogeneration unit is the result of years of research into machines that generate electricity from waste heat using the Organic Rankine Cycle (ORC). This particular system is a biomass combustion unit with a thermal output of 120 kW and approximately 8 kW of electrical power. It has obtained all necessary certifications and is ready for market deployment. The system is a scalable solution housed in a standard shipping container. One half of the container contains the biomass combustion equipment with heat exchangers for flue gas extraction, while the other half houses the ORC unit that generates electricity. The device can operate in island mode and serves as a backup power source. Currently, four Wave units are in operation, supplying electricity and heat. A pilot unit with a capacity of 50 kW has been installed in Mikolajice, Písek, and Herálec, while fully operational 120 kW units are installed at UCEEB. The Wave cogeneration unit contributes to society and the economy by promoting energy self-sufficiency, reducing reliance on fossil fuels, lowering carbon emissions, and providing a cost-effective, scalable solution for decentralized renewable energy production.

Contribution to development of Eurocode 5 standard

Our colleague Petr Kuklík is a member of CEN/TC 250/SC5, the subcommittee responsible for Eurocode 5: Design of Timber Structures. His expertise has helped shape the guidelines ensuring the

safety and efficiency of timber structures across Europe. He has made significant contributions to the development of this standard, particularly in areas related to the structural performance, fire resistance, and reliability of timber constructions, including timber-concrete composite structures. SC5 focuses on defining design principles, material properties, load-bearing capacities, and construction methods for wooden buildings and hybrid timber systems. This standard helps to introduce more timber buildings to the EU market, which in effect reduces the environmental impact of construction.

Water in the City – a popular handbook on blue and green infrastructure

“Water in the City” is a handbook designed to assist urban planners, architects, and designers in planning and implementing blue-green infrastructure in cities. The guide was developed as part of the TAČR Zéta project in collaboration with UJEP and is available for free download at www.vodavemeste.cz. According to website records, over 2,000 professionals have already downloaded it, providing detailed information on their professional backgrounds and intended use of the book. In addition to the digital version, 120 printed copies were distributed to all municipalities with over 10,000 inhabitants, receiving positive feedback from local governments. Due to high demand from architects and designers for a printed edition, a crowdfunding campaign was launched on the Hithit platform, successfully raising over €13,000. As a result, the guide is now also available in bookstores. By providing essential knowledge on sustainable urban water management, *Water in the City* fosters environmentally responsible city planning, supports local economies through infrastructure projects, and promotes long-term resilience against climate challenges.

Analytical Tasks for Czech Standardization Agency

We are collaborating with the Czech Agency for Standardization on eight analytical tasks that have had a direct impact on Czech national standards. This contract was selected due to its scale and its significant influence on the development of Czech standards.

The scope of these tasks includes:

- Fire safety of external thermal insulation composite systems (ETICS)
- Establishing normative conditions for the increased use of wood in construction concerning fire safety
- Fire safety of assembled façade systems
- Revision of the classification of structural components from a fire safety perspective
- Fire resistance of lightweight roof coverings
- Fire safety of refrigerants for HVAC systems
- Pre-demolition audit and building deconstruction
- Recycled materials in construction – testing and preparation of standards
- Determining the mechanical properties of hardwood species

This project has significantly contributed to UCEEB’s mission by enhancing energy efficiency (through tasks related to thermal insulation, façade systems, roofs, and HVAC systems), reducing the environmental impact of buildings (through the increased use of timber structures), and promoting circular economy principles in construction (through pre-demolition auditing and the use of recycled

materials). By improving fire safety regulations, encouraging sustainable building practices, and optimizing material use, this initiative not only enhances public safety but also fosters economic growth by supporting innovation and sustainability in the construction sector.

Results realistically heading to application

S.A.W.E.R., MAGDA and EWA – producing water from arid desert air

The successful S.A.W.E.R. technology, which demonstrated the ability to produce drinking water from dry desert air at EXPO Dubai, has led to several follow-up R&D projects MAGDA and EWA. In these projects, we downsized the system and, in collaboration with KARBOX, adapted it for the needs of the defense industry. At the request of a serious potential client, the technology was successfully tested in the Australian desert, confirming its effectiveness under real-world conditions. Currently, negotiations are in an advanced stage regarding the licensing of this exceptional technology.

Rooftop root water treatment plant and green roof from recycled materials

One of the key outcomes of the National Competence Center CAMEB was a functional prototype of a rooftop root-based greywater treatment system and the development of a green roof layering system utilizing recycled materials. These results were further advanced by our colleague Marek Petreje through a technology transfer voucher, allowing for the refinement and practical application of these innovations. Currently, negotiations are underway between him and CTU regarding the establishment of a spin-off company dedicated to the design and delivery of these sustainable systems.

Gender dimension of the research results

Generally, we consider the gender dimension when planning our research projects. Typically, this is relevant in the sociological research which we conduct in the relation to energy efficiency, sustainability and societal acceptance of innovative solutions. It also relates to the research in the field of indoor environment of buildings and in assistive technologies. The above-listed results do not fall to these categories, so the gender dimension was not the topic of investigation in these cases.

Sustainability

Most of the above-listed projects have a potential positive impact on the environment, thus supporting the environmental part of sustainability. The certification system SBToolCZ is developed directly to assess and promote sustainability in construction projects. Several of the results support the decarbonization of the built environment by supporting the development of the materials with low embodied carbon, such as timber and other natural materials that can replace more environmentally intensive alternatives (MoistureGuard, Envilop, analytical task for the Czech Standardization Agency focused on fire resistance of tall timber buildings, Eurocode 5). Other above-mentioned projects contribute to sustainability by providing clean energy and improve utilization of renewable energy sources (battery storage control, Wave ORC). Several projects contributed to efficient water management (S.A.W.E.R., Water in a city, green roofs and rooftop grey water treatment).

Table 3.4.1 - Overview of research results in the period under evaluation

Type of result ³⁰	Year of application	Name
Functional sample	2023	Rooftop roof water treatment plant
Patent	2021	Autonomous apparatus for extracting water from the air, United States of America. Patent US11065573. 2021-07-20.
Certified Methodology	2021	Water in the City
Patent	2023	Apparatus for extracting water from air with one air duct United States of America. Patent US11828047. 2023-11-28.
Result Reflected in Legislation and Standards	2023	TNI prEN 1995-1-1 Eurocode 5: Design of timber structures – Part 1-1: General rules and rules for buildings.
Result Reflected in Legislation and Standards	2023	TNI prEN 1995-1-2 Eurocode 5: Design of timber structures – Part 1-2: Structural fire design.
Prototype	2023	Combined Heat and Power ORC Unit for Wood Waste in Containerized Configuration
Prototype	2019	Small-scale Power Plant for Low Quality Biomass as a Fuel Based on Organic Rankine Cycle with Automatic Operation
Sold licence	2019, 2020	System for Comprehensive Evaluation of Moisture in Wooden Constructions, Utility Model CZ 27978. 2015-03-17.
Sold licence	2020	Light Curtain Wall from Wood-Based Panels, Utility Model CZ 26609. 2014-03-13.

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercializes R&D&I results (e.g. selling licenses, setting up start-up or spin-off companies, etc.)³¹, providing brief description of the commercialization methods used. The effectiveness of the transfer of results and the commercialization of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).³²

Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licenses sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

³⁰ Specify the specific type of result. Add rows as needed.

³¹ In the case of military HEIs, their specific position is considered when evaluating the commercialisation/evaluation of R&D&I results.

³² If the commercialisation of R&D&I results is carried out in this way.

Self-assessment:

Technology transfer

Our technology and know-how transfer system are built on several key pillars, ensuring that our research findings are effectively translated into practical applications. These pillars include licensing agreements for our intellectual property, providing research and development services to industry partners, and participating in pilot projects to test and refine innovative solutions. Additionally, we actively engage in professional training programs, equipping specialists with cutting-edge knowledge and skills. A crucial aspect of our approach is also the transfer of expertise to our students through education and hands-on experience through their active involvement in our research projects and in international competitions such as the Solar Decathlon. This comprehensive strategy enables us to maximize the real-world impact of our research while fostering innovation and collaboration across academia and industry.

Commercialization of R&D&I results

Our research institute actively commercializes its research outcomes by focusing on the licensing of our protected intellectual property and proprietary know-how. Over the past years, our licensing revenues have seen significant growth, increasing from €2.9 thousand in 2019 to €86.9 thousand in 2023. This upward trend reflects our commitment to transforming innovative research into practical applications while fostering collaborations with industry partners.

Five most typical users of our results

1. **Industrial enterprises** benefit from our technologies and collaborative research efforts, integrating innovative solutions into their production and development processes.
2. **Investors in the construction sector** apply our innovations to enhance the sustainability and efficiency of their projects.
3. **Start-up companies** leverage our research results as the foundation for their business models, transforming scientific advancements into market-ready solutions.
4. **Local governments** utilize our methodologies and tools to improve the sustainability of their investment projects and urban planning strategies.
5. **Professional community** gains access to our expertise through specialized training programs and the innovative tools we develop, which facilitate their technical work and decision-making.

Five examples of commercialized results

The following selected five examples illustrate the variety of commercialization of our results. The first two examples represent a commercialization of through licensing to existing industrial companies, the third one represents licensing to a start-up company that has been founded to bring our research outcomes to the market, the third one represents an example how we commercialize our know how through providing lifelong expert education and accreditation and the last example presents a gathering of donations from the end users and supporters of our guidelines through a crowdfunding campaign.

1. In collaboration with the company **AERS**, we have developed an **advanced predictive control system for home battery storage**. This system enables advanced control by optimizing battery

usage and electricity trading with the grid, ultimately improving the economic return for the device owners. Our proprietary know-how has been **licensed** to AERS, ensuring that our innovative approach contributes to the wider adoption of smart energy management technologies. Now, there are over 200 units installed at the customers' homes.

2. **Envilop** is an innovative **lightweight timber-based façade system designed for energy-efficient new buildings and renovations**. It offers a high-performance, sustainable solution for modern construction and is available through licensing. The first major installation of Envilop was part of the energy-positive renovation of COTH High School on Českobrodská Street in Prague. The construction company SUBTERRA, responsible for the renovation, acquired the **license** to implement the system. The project has received numerous national and international awards, highlighting its impact and innovation in sustainable building practices.
3. The **MoistureGuard** system was developed through the collaboration of our experts in sensor technology and timber construction. It consists of a **set of sensors and a control unit that enables the early detection of moisture leaks in wooden buildings**. The technology was initially **licensed** to a newly established start-up co-founded by our employees, which has since grown into the successful company SENZOMATIC. Today, SENZOMATIC has almost one thousand installations across Europe and is now preparing to expand into the Japanese market, further demonstrating the global potential of this innovative solution.
4. **SBToolCZ** is a **national certification system for sustainable buildings**, originally developed at the Faculty of Civil Engineering in 2008 and further advanced at UCEEB since 2016. Unlike competing systems, SBToolCZ is fully adapted to Czech building standards and common construction practices. It provides an independent, certified assessment of building quality and has been successfully used in recent years for sustainable public procurement by Czech cities and regions. Commercialization is carried out through **paid training programs** for accredited professionals and **licensing fees** for each certified project.
5. **"Voda ve městě / Water in a city"** was a collaborative project supported by the Technology Agency of the Czech Republic (TA ČR), involving ČVUT UCEEB and UJEP. The key outcome of the project was a **comprehensive guide for urban planners, architects, and municipalities**, titled **"Voda ve městě"**, which provides in-depth guidance on **implementing blue-green infrastructure** in urban environments. The handbook supports conceptual design and demonstrates practical implementation through real-world case studies. It is freely available online at www.vodavemeste.cz, where it has already been downloaded by several thousand professionals. Additionally, a printed version is available in select bookstores, made possible by a crowdfunding campaign on Hithit, where we successfully raised over €13,000 from individual supporters.

Funds received during the period of 2019–2023 from non-public, non-grant sources

Commercialization at UCEEB in the period of 2019-2023 was focused primarily on selling licenses for protected intellectual property and for technological know-how. In this period, we did not receive and donations nor have any spin-off company yet. The summary of revenues from the sold licenses and donations is presented in table 3.5.1.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

Type of revenue	Revenue (in thousands CZK/EUR)				
	2019	2020	2021	2022	2023
Sold licences	73 / 2.9	643 / 25.7	940 / 37.6	1,386 / 55.4	2,173 / 86.9
Total	73 / 2.9	643 / 25.7	940 / 37.6	1,386 / 55.4	2,173 / 86.9

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularization of R&D&I and communication with the public (e.g. popularization lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

We tailor our science popularization efforts to three key target groups: the public, high school students, and the professional community.

For the public, we engage in large-scale events such as our participation in EXPO Dubai, deliver lectures at Science Café, and appear in media broadcasts on television and radio. Additionally, we produce educational videos on YouTube, making scientific topics more accessible to a wider audience.

High school students benefit from guided tours of our laboratories, where they gain firsthand insight into cutting-edge research and its real-world applications.

For professionals in the field, we actively contribute to trade fairs and conferences, publish popular science articles, and take part in expert discussion podcasts. Furthermore, we regularly share insights through specialized online platforms and professional journals, ensuring that our research reaches relevant industry groups.

Examples of R&D&I popularization for public

Media appearances

Between 2019 and 2023, CTU UCEEB strengthened its media and PR strategy with the goal of increasing awareness of its research activities and expert contributions. Through active collaboration with the media and systematic communication, we achieved significant media coverage, including articles in professional journals, online media, as well as television and radio. Experts from CTU UCEEB contribute their expertise to thematic reports and discussion programs focused on sustainable construction and energy innovations, including broadcasts on Czech Television and Czech Radio. For instance:

- “What does it take to build a sustainable house?”, A. Lupíšek and K. Klepačová on Czech Radio in 2020 (<https://www.youtube.com/watch?v=Q7leQTMF0QQ>)
- “How to deal with high energy prices? Scientists from CTU store surplus energy in batteries” J. Včelák and P. Wolf on ČT24 in 2021 (<https://ct24.ceskatelevize.cz/clanek/veda/jak-na-vysoke-ceny-energii-vedci-z-cvut-ukladaji-prebytky-do-baterii-27595>)

- *"Kladno without carbon"* M. Kuzmič in a documentary on ČT2 in 2021
(<https://www.ceskatelevize.cz/porady/1095913550-nedej-se/221562248420002/>)

Czech pavilion at EXPO Dubai

CTU UCEEB played a significant role in the Czech exhibition at EXPO 2020 in Dubai through the development of the S.A.W.E.R. (Solar-Air-Water-Earth-Resources) technology, which can produce water from dry desert air using only solar energy. This innovative system was a key feature of the Czech pavilion and earned recognition from the event organizers, receiving the award for "Best Innovation" at the World Expo.

Science café Kladno

On October 24, 2023, at Science Café in Kladno, Associate Professor Tomáš Matuška delivered a lecture titled "How to Turn Air into Water" which presented the device that we developed for the EXPO exhibition in Dubai. He discussed innovative methods for extracting water from atmospheric air, emphasizing their potential applications in arid regions.

R&D&I popularization for high school students

CTU UCEEB provides guided tours of its laboratories for high school students, providing them with a unique opportunity to explore cutting-edge research in sustainable construction, energy efficiency, and environmental technologies. These excursions offer experiences with innovative systems, allowing students to see firsthand how scientific principles are applied in real-world solutions. Through discussions with researchers, students gain insights into modern engineering challenges and career opportunities in the field of sustainable development. By engaging young minds in this way, UCEEB aims to inspire the next generation of engineers and scientists while fostering interest in technological innovation and environmental responsibility.

Examples of R&D&I popularization for the professional community

Regular participation in the Smart City Expo World Congress

The Smart City Expo World Congress is the world's largest and most influential event dedicated to urban innovation, held annually in Barcelona. It brings together leaders from global companies, governments, and organizations to explore the latest advancements in smart city technologies and solutions, fostering collaboration and knowledge exchange to create better urban environments. CTU UCEEB has actively participated in this prestigious event, showcasing innovative solutions and contributing to discussions on urban development. For instance, during the 2022 edition, representatives from CTU UCEEB, including Michal Kuzmič and Jana Simcinova, were present at the congress, engaging with attendees and highlighting the center's advancements in smart city initiatives.

FOR ARCH trade fair

At the FOR ARCH trade fair, employees from CTU UCEEB actively disseminate our research findings to a diverse audience. They participate in specialized conferences, such as the 9th annual "Fire Safety of Buildings" conference organized by TZB-info in collaboration with the Professional Chamber of Fire Protection. Through presentations and discussions at these events, our team showcases innovative solutions and shares insights on energy-efficient building technologies and sustainable construction practices.

Aquatherm

At the AquaTherm trade fair, employees from CTU UCEEB actively disseminate our research findings to a diverse audience. They participate in specialized conferences, deliver presentations, and engage in discussions, showcasing innovative solutions and sharing insights on energy-efficient building technologies. This activity helps us to communicate our outcomes to sustainable construction practices and facilitate the transfer of knowledge to industry professionals and the broader public.

Dřevostavby Volyně

At the Dřevostavby Volyně conference, which brings together hundreds of timber construction experts from across Europe, CTU UCEEB actively contributes to the dissemination of cutting-edge research. Our team regularly organizes specialized presentation blocks, showcasing the latest advancements in wooden structures, energy efficiency, and sustainable building technologies.

Popularization articles at a main Czech portal focusing on HVAC

Employees of CTU UCEEB actively engage in popularizing our research findings through the TZB-info.cz portal, a leading platform for building services and energy efficiency. By contributing articles and participating in interviews, they effectively disseminate knowledge and innovations to both professionals and the general public.

Professional streamed discussions at TVIZE

Experts from CTU UCEEB have actively participated in professional discussions on construction, architecture, energy, and ecology on the TVIZE platform. These discussions have had a significant impact, garnering tens thousands of views. Discussions are available at the links provided in the list of links related to the criteria 3.7.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

The following text summarizes the main **recommendations** from the previous evaluation period (**R**) and describes the implemented improvement **measures** (**M**).

R: The percentage of revenues from abroad should be increased.

M: Over the past period, we have made a concerted effort to increase our involvement in international projects. To achieve this, we have taken a more systematic approach to monitoring international funding opportunities and calls, ensuring that we identify and respond to relevant opportunities in a timely manner.

Additionally, we have actively engaged in international research networks such as COST, IEA, and EERA, which has strengthened our collaborations and visibility within the global research community. A key factor in our progress has also been the recruitment of more international researchers, whose expertise and connections have significantly contributed to our successful participation in international projects.

As a result of these targeted efforts, approximately one-third of our current projects now have an international dimension, marking a significant step forward in our global research engagement. We remain committed to further expanding our international collaborations and leveraging these connections to enhance the impact of our research.

R: Advice is to concentrate on specific research directions, as the topics. / Abstracts of the different projects indicate a very broad thematic range. / To increase the scientific visibility and output even from applied research projects 2 to 3 R&D&I fields should be defined thus to sharpen the profile of the Centre to a larger extent as it is now the case.

M: In the past period, we have concentrated on better aligning our research projects with our mission, ensuring they focus on our core research areas—sustainable building and energy at the scale of buildings and cities.

Our research teams serve as the main drivers of these topics, and to enhance their visibility, we have provided a clearer presentation of their focus areas and key research themes on our website. Additionally, we have introduced a structured approval process for project proposals, which includes presentations and discussions to assess their alignment with our center's mission.

At the same time, when our research results prove applicable in other fields, we actively facilitate their transfer to maximize the impact and benefit of the resources invested in our research.

R: Collecting patents should not be given priority in the early stage of the UCEEB. / The number of patents should be increased over the years, given the close cooperation with industry. The University or the Centre do not necessarily need to hold all these patents as they become quite costly over the years. Even more important would be that staff members are mentioned as co-inventors when they have contributed to the innovation. Even when the rights are transferred to industry what is typically the case in joint projects with industry it is documented that usefully results were gained through the cooperation, thus serving as basis for future industrial cooperations.

M: Our center focuses on applied research and the transfer of research outcomes into everyday life. One of the key pathways for this transfer is the licensing of protected intellectual property. Therefore, securing patent protection for our innovative solutions is a logical step in ensuring their impact and successful commercialization.

Recognizing the importance of intellectual property, the number of new patents is an integral part of our internal evaluation system, reflecting our commitment to transforming research into practical applications.

During the monitoring period, we registered a total of 30 granted patents, including 17 in the Czech Republic, 4 in the European Union, 4 in the United States, 3 in Australia, and one each in Canada and Israel.

R: The spin-off needs the full commitment of the Rectorate, to grow as expected.

M: The support for research commercialization and the establishment of spin-off companies provided by our rectorate has significantly improved in the past period, and we strongly feel this backing. Courses focused on intellectual property protection and its commercialization are now regularly organized, and we maintain ongoing consultations with the technology transfer coordinator regarding our plans to establish spin-off companies. One such case is currently in an advanced stage of negotiation.

Furthermore, representatives of the rectorate actively participate in presentations at our Innovation Day, further strengthening the connection between research, commercialization, and institutional support.

R: Basically, well-established prizes and awards given either on national and on international level need to be targeted, so to strengthen the research activities and to increase the scientific reputation and visibility of the Centre, especially outside Czech Republic.

M: In the past period, we have received numerous international and national awards, which we deeply appreciate. These accolades recognize both our innovative technologies and demonstration projects, as well as individual contributions to specific activities and lifetime achievements in our field.

Since our focus is on transferring innovations into everyday life, we consider the most prestigious award to be the **Best Innovation Award at EXPO Dubai**, recognizing our groundbreaking contributions to sustainable technologies. The S.A.W.E.R. system, designed to generate water from arid desert air, has gained international acclaim, particularly at EXPO Dubai. The **UAE Innovates Award 2022** was granted by the Center for Governmental Innovation under the patronage of Sheikh Mohammed bin Rashid Al Maktoum, highlighting the project's global significance in sustainability.

We significantly contributed to **Energy-plus retrofitting project of CPTH Českobrodská in Prague**. This ambitious energy-plus retrofit project exemplifies our commitment to sustainable urban development. The European Solar Prize 2023, awarded by EUROSOLAR and the European Association for Renewable Energy, underscores the project's innovation in solar architecture. The Czech Adapterra Award further highlights its role in climate resilience and adaptation.

Our research project supported by TA ČR led to the development of **the Sunflow LED lamp**, which was recognized at the LIT Lighting Design Awards 2023 for its innovative approach to human-centric lighting, enhancing well-being through biodynamic circadian regulation.

The municipality of Mikolajice was honored with the **Smart Cities 2022 Award** for integrating our WAVE pellet cogeneration technology, demonstrating a real-world application of innovative decentralized energy solutions.

More examples of our awards are listed in Table 3.2.1.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)
Database of our research projects	3.3	https://www.uceeb.cz/en/portfolio-en/
Handbook Water in the City	3.4, 3.5	www.vodavemeste.cz
"What does it take to build a sustainable house?", A. Lupíšek and K. Klepačová on Czech Radio in 2020	3.6	https://www.youtube.com/watch?v=Q7leQTMFOQQ
"How to deal with high energy prices? Scientists from CTU store surplus energy in batteries" J. Včelák and P. Wolf on ČT24 TV channel in 2021	3.6	https://ct24.ceskatelevize.cz/clanek/veda/jak-na-vysoke-ceny-energii-vedci-z-cvut-ukladaji-prebytky-do-baterii-27595
"Kladno without carbon" M. Kuzmič in a documentary on ČT2 TV channel in 2021	3.6	https://www.ceskatelevize.cz/porady/1095913550-nedej-se/221562248420002/

<i>"We all want to save on energy. But first we need to know how to measure it." J. Maščuch in moderated discussion at online platform tvize</i>	3.7	https://tvize.cz/watch/jakub-mascuch-vsichni-chceme-usetrit-na-energii-nejdrive-ji-ale-musime-umet-merit
<i>"Building materials are running out, they have to be recycled. The Czech Republic could be a leader in combined construction." M. Volf in moderated discussion at online platform tvize</i>	3.7	https://tvize.cz/watch/stavebni-material-dochazi-musi-se-recyklovat-cesko-by-mohlo-byt-lidrem-v-kombinovanych-stavbach
<i>"Community energy will enable the sharing of electricity between people. It will also bring green energy to historic city centres." P. Wolf in moderated discussion at online platform tvize</i>	3.7	https://tvize.cz/watch/komunitni-energetika-umozni-sdileni-elektřiny-mezi-lidmi-zelenou-energii-dovede-i-do-historických-center-měst
<i>"Renewable sources and recycling of construction waste will help decarbonise the construction industry." A. Lupíšek in moderated discussion at online platform tvize</i>	3.7	https://tvize.cz/watch/antonin-lupisek-dekarbonizaci-stavebnictví-pomohou-obnovitelné-zdroje-i-recyklace-stavebního-odpadu
<i>"A healthy indoor environment is not only fresh air, but also light, warmth and acoustics. People have different needs." D. Adamovský in moderated discussion at online platform tvize</i>	3.7	https://tvize.cz/watch/zdravé-vnitřní-prostředí-není-jen-cerstvý-vzduch-ale-i-světlo-teplo-a-akustika-lidé-mají-rozdílné-potřeby
<i>"Timber buildings are common in Europe today, but they are slowly gaining ground in our country. We export wood unnecessarily cheaply." P. Kuklík in moderated discussion at online platform tvize</i>	3.7	https://tvize.cz/watch/drevostavby-jsou-dnes-v-evrope-bez-ně-u-nás-se-prosazují-pomalu-drevo-vyvážíme-zbytečně-levně

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED:

CZECH INSTITUTE OF INFORMATICS, ROBOTICS AND CYBERNETICS CTU

FORD: 2 - Engineering and technology

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organizational structure and size (staffing, number of students, number of study programs implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

The Czech Institute of Informatics, Robotics, and Cybernetics (CIIRC) at the Czech Technical University (CTU) was founded on July 1, 2013, as the university's youngest institute. Its primary mission is to integrate research capacities in key technological fields in both fundamental and applied research, with artificial intelligence (AI) as the unifying element. CIIRC's application areas include industrial manufacturing, robotics, biomedical systems, smart cities, and intelligent energy distribution. Since its inception, CIIRC has embraced the philosophy of "linking excellence with applications."

The vision of CIIRC is to establish itself as a world-class research institution, recognized on the global research stage and capable of competing with top-tier research organizations. The core activities of the institute rest on three fundamental pillars: excellence in research, advanced infrastructure, and technology transfer with practical applications.

Research and Development Contribution

From its inception, CIIRC has focused on assembling internationally competitive research teams. The institute has successfully attracted leading researchers back to the Czech Republic, including Josef Šivic, Josef Urban and Robert Babuška. Supported by three projects within the „Excellent Research Teams“ call of the Operational Program RDE (funded by MEYS), their teams have formed the foundation of CIIRC's basic research since 2017. Already in 2015, Josef Urban received ERC Consolidator Grant, which became the first one at CTU. CIIRC is home institution of many distinguished researchers such as Vladimír Kučera, Tomáš Mikolov, Václav Hlaváč, Olga Štěpánková, Torsten Sattler, Tomáš Pajdla, Zdeněk Hanzálek, Libor Přeučil, Mikoláš Janota, Lenka Lhotská and many others, whose expertise has played a vital role in shaping CIIRC's research excellence.

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

Following the completion of the CIIRC building in 2017, the institute developed a unique experimental and testing facility - RICAIP Testbed Prague. Supported by the Horizon 2020 Teaming for Excellence RICAIP project with nearly 50 million EUR in funding, this facility focuses on Industry 4.0 concepts. It is equipped with the latest technologies for development and testing innovative solutions for advanced and fully integrated industrial production and processes for smart factories. The first phase of this infrastructure development concluded in 2023. The testbed, a unique facility in CEE, is connected to industrial testbeds at CEITEC BUT and at ZeMA and DFKI in Germany and collaborates with broader network of testing and experimentation facilities across Europe. At the same time, CIIRC has developed research infrastructure for biomedical research, enabling further innovation and knowledge transfer.

By the end of 2023, CIIRC had established a comprehensive AI ecosystem, combining outstanding infrastructure and excellent research teams. Key components include the National Competence Center - Cybernetics and Artificial Intelligence (since 2019). CIIRC has participated within 2 out of 5 Teaming projects in the Czech history – Research and Innovation Centre on Advanced Industrial Production and Center for Artificial Intelligence and Quantum Computing in System Brain Research. CIIRC also takes part within 4 out of 7 projects of the European Networks of Excellence Centres in AI, Data and Robotics (AI NoEs): ELISE, TAILOR, euROBIN, ELIAS and VISION CSA. CIIRC has been involved in several projects of Digital Innovation Hubs (2019) and joined initiatives of EDIH – European Digital Innovation Hub and TEF - AI-MATTERS (2023). These achievements have enabled a balanced distribution of research capacities across basic, applied, and contract research, with fluid transitions between these categories.

CIIRC is deeply engaged in international collaboration, both within and beyond the EU. It plays a pivotal role in connecting Czech AI research with the global community. The institute was instrumental in founding AICZECHIA in 2017, an association of top Czech AI researchers. Today, CIIRC is active in major EU AI associations and is hosting CAIRNE Office Prague, ELLIS Unit Prague and EIT Manufacturing Hub Czechia. Cooperation with business sector and especially SME's is conducted through the ecosystem of the National Centre for Industry 4.0. On the national level, CIIRC contributed to several government strategies – especially in Industry 4.0, National Strategy for AI and NAPAN (National action plan for Alzheimer disease and similar).

Organizational Structure and Resources

In 2023, CIIRC's budget exceeded 520 million CZK (approximately 20 million EUR), with only 4% coming from institutional funding. The institute is predominantly funded through EU grants (42%), national projects (30%), and industry partnerships (24%), making it nearly self-sustainable.

In 2023, the CIIRC employed 254 employees - 181 members of the research staff and 73 members of the admin staff. Administratively, the institute is structured into eight scientific departments, four centres, Director's Office and Project Management Office. An international RICAIP centre is organisationally incorporated under CIIRC with a maximum level of autonomy. Research projects are typically executed by interdisciplinary project teams, fostering collaboration between departments.

The management of CIIRC consists of:

- **Director:** Dr. Ondřej Velek
- **Scientific Director:** Prof. Vladimír Mařík
- **Deputy Directors:** Prof. Vladimír Kučera and Prof. Václav Hlaváč
- **Treasurer:** Ing. Tomáš Masár

The **Managerial Board**, composed of top management and department heads, oversees operations. Additionally, the **Assembly** supports research orientation and researcher career development. CIIRC also benefits from guidance provided by the **Scientific Council** and the **International Advisory Board**.

Educational Contributions and Student Engagement

CIIRC is committed to nurturing young researchers and fostering an inclusive environment for women. The institute's researchers supervise over 90 Ph.D. students across 15 faculties in the Czech Republic and internationally. However, due to current Czech legislation, CIIRC cannot lead its own Ph.D. programs. To address this, the institute established the Ph.D. Education Centre in collaboration with the Faculty of Electrical Engineering at CTU. 32 staff members are engaged in teaching and educational activities across five faculties of CTU.

The institute's key long-term strategic goals include:

1. Keeping and strengthening the position of a premier research and experimental center for intelligent manufacturing and smart production, recognized at a European level and respected by academia and industry worldwide.
2. Continue to strengthen the CIIRC's position as a leading AI research center, driving fundamental AI research and technological breakthroughs, thus enabling the use of new AI methods and technologies by other research communities.
3. Supporting the Czech and European economic and societal transformation through AI applications, including the development of advanced computational and communication infrastructure. To co-create and contribute national and European Strategies, Policies and Action plans.
4. Advancing diagnostics and treatment for neurodegenerative diseases, particularly Alzheimer's and Parkinson's, through AI-driven solutions. This effort has been accelerated through collaboration with leading institutions such as the Brain Institute in Paris, Mayo Clinic, and Leibniz Supercomputing Center within CLARA initiative, under the coordination of the INDRC Centre.

Table 3.1.1 - Staffing per FTE²

Academic/ Professional position	Total / Of which women					
	2019	2020	2021	2022	2023	Total
Professor	5,8/1,0	5,8/1,0	5,8/1,0	5,8/1,0	5,8/1,0	29,0/5,0
Associate Professor	2,0/0,0	2,0/0,0	2,0/0,0	2,0/0,0	2,0/0,0	10,0/0,0
Assistant Professor	5,1/0,0	5,1/0,0	5,0/0,0	5,0/0,0	5,0/0,0	25,0/0,0
Assistant	0,0/0,0	0,0/0,0	0,0/0,0	0,0/0,0	0,0/0,0	0,0/0,0
R&D Personnel ³	73,3/15,5	68,8/16,4	63,7/16,4	65,0/17,0	61,2/19,2	331,9/84,5
Researchers in other categories ⁴	67,1/5,4	77,4/7,1	82,8/8,6	92,0/9,2	106,8/11,5	426,1/41,7

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

Technical and economic staff ⁵	53,6/40,5	56,3/40,8	57,5/42,5	69,6/54,0	72,9/55,3	309,8/233,0
Scientific, research and development staff involved in teaching activities	12,9/1,0	12,9/1,0	12,8/1,0	12,8/1,0	12,8/1,0	64,0/5,0
Early career researchers ⁶	48,6/4,8	56,0/6,9	58,2/8,4	64,5/9,0	69,6/11,2	296,8/40,4
Total ⁷	206,8/62,4	215,4/65,2	216,7/68,4	239,3/81,1	253,6/87,0	1131,8/364,1

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the first year of the evaluation period (numbers of physical employees and personnel)⁸

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	1	0	1	0	2	0	2	1
Associate Professor	0	0	0	0	1	0	1	0	0	0	0	0
Assistant Professor	0	0	1	0	3	0	2	0	0	0	0	0
Assistant	0	0	0	0	0	0	0	0	0	0	0	0
R&D Personnel ⁹	34	5	37	7	23	6	6	1	3	1	2	0
Researchers in other categories ¹⁰	22	4	36	3	19	2	5	0	2	0	3	0
Technical and economic staff ¹¹	0	0	0	0	0	0	0	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	0	0	1	0	5	0	4	0	2	0	2	1
Early career researcher ¹²	22	4	37	3	0	0	0	0	0	0	0	0
Total ¹³	56	9	74	10	47	8	15	1	7	1	7	1

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the last year of the evaluation period (numbers of physical employees and personnel)¹⁴

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	0	0	2	0	1	0	3	1
Associate Professor	0	0	0	0	1	0	1	0	0	0	0	0
Assistant Professor	0	0	0	0	2	0	2	0	1	0	0	0
Assistant	0	0	0	0	0	0	0	0	0	0	0	0
R&D Personnel ¹⁵	18	4	25	5	26	12	5	0	3	1	2	0
Researchers in other categories ¹⁶	58	11	33	5	30	1	9	0	5	0	5	0
Technical and economic staff ¹⁷	0	0	0	0	0	0	0	0	0	0	0	0
Scientific, research and development staff involved in teaching activities	0	0	0	0	3	0	5	0	2	0	3	1
Early career researcher ¹⁸	58	11	33	5	0	0	0	0	0	0	0	0
Total ¹⁹	76	15	58	10	59	13	19	0	10	1	10	1

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students

Type of study	year 1		year 2		year 3		year 4		year 5		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate												

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

Master's ²⁰												
Doctoral												
Lifelong Learning Courses												
Total												

Table 3.1.5 - Study programmes in Czech/English

Type of study programme	Total ²¹ / Of which professional study programmes											
	year 1		year 2		year 3		year 4		year 5		Total	
Undergraduate												
Master's												
Doctoral												
Lifelong Learning courses												
Total												

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
1. Natural Sciences	1.1 Mathematics	0,07	Basic Research	68,4
	1.2 Computer and information sciences	68,16	Balanced basic and applied research	
	1.3 Physical sciences	0,08	Basic Research	
	1.4 Chemical sciences		Zvolte položku.	
	1.5 Earth and related environmental sciences		Zvolte položku.	
	1.6 Biological sciences		Zvolte položku.	
	1.7 Other natural sciences		Zvolte položku.	
2. Engineering and Technology	2.1 Civil engineering	2,65	Applied Research	29,77
	2.2 Electrical engineering, Electronic engineering, Information engineering	15,92	Balanced basic and applied research	
	2.3 Mechanical engineering	3,17	Balanced basic and applied research	
	2.4 Chemical engineering		Zvolte položku.	
	2.5 Materials engineering		Zvolte položku.	
	2.6 Medical engineering	5,78	Applied Research	

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

	2.7 Environmental engineering		Zvolte položku.	
	2.8 Environmental biotechnology		Zvolte položku.	
	2.9 Industrial biotechnology		Zvolte položku.	
	2.10 Nanotechnology		Zvolte položku.	
	2.11 Other engineering and technologies	2,23	Balanced basic and applied research	
3. Medical and Health Sciences	3.1 Basic medicine	0,25	Basic Research	
	3.2 Clinical medicine	0,72	Applied Research	
	3.3 Health sciences			1,48
	3.5 Other medical sciences	0,51	Applied Research	
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries	0,01	Applied Research	
	4.2 Animal and Dairy science		Zvolte položku.	0,01
	4.3 Veterinary science		Zvolte položku.	
	4.4 Other agricultural sciences		Zvolte položku.	
5. Social Sciences	5.1 Psychology and cognitive sciences	0,02	Applied Research	
	5.2 Economics and Business	0,1	Applied Research	
	5.3 Education	0,1	Applied Research	
	5.4 Sociology		Zvolte položku.	0,33
	5.5 Law		Zvolte položku.	
	5.6 Political science		Zvolte položku.	
	5.7 Social and economic geography		Zvolte položku.	
	5.8 Media and communications	0,11	Applied Research	
	5.9 Other social sciences		Zvolte položku.	
6. Humanities and the Arts	6.1 History and Archaeology		Zvolte položku.	
	6.2 Languages and Literature		Zvolte položku.	
	6.3 Philosophy, Ethics and Religion		Zvolte položku.	0,00
	6.4 Arts (arts, history of arts, performing arts, music)		Zvolte položku.	
	6.5 Other Humanities and the Arts		Zvolte položku.	
Total		100	-	100 %

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the previous five-year period based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

Prominent Scientists and individual achievements

During the evaluated period, CIIRC continued to strengthen its position as a well-respected research institution at the global, European, and national levels. 299 journal papers and 480 conference papers were published by the research staff.

Thanks to many distinguished scientists, the institute has contributed significantly to the international recognition of Computer Science research at CTU, ranking 5th in Europe for Computer Vision and 7th for Robotics according to the CSRanking in the period 2018-2023. According to Research.com (as of December 2022), Dr. Josef Šivic, doc. Tomáš Pajdla, Dr. Tomáš Mikolov and Dr. Torsten Sattler ranked 2nd, 4th, 7th and 10th position among computer scientists in the Czech Republic. The top-rated research is reflected within the receiving of prestigious individual grants: Dr. Šivic was awarded an ERC Advanced Grant (2023), Dr. Mikoláš Janota secured an ERC-CZ Grant (2020).

Contributions to Applied Research

In applied research, CIIRC has led the Czech Node of the Testing and Experimentation Facilities Network for AI in Manufacturing (AI-MATTERS Project), leveraging equipment and expertise developed through the coordination of the RICAIP EU Teaming for Excellence project. The RICAIP Testbed Prague, built in collaboration with the German DFKI, has become a flagship facility for intelligent manufacturing in the Czech Republic and the broader CEE region.

Since 2023, CIIRC has been the lead entity of the ROBOPROX project, which secured EUR 20 million in funding under the OP JAK "Excellent Research" call. This project focuses on robotics and advanced industrial production, including control and optimization of production processes and computational methods for manufacturing and materials engineering.

CIIRC continues to serve as the National Centre for Industry 4.0, uniting over 60 academic and industrial bodies, together with the Czech Chamber of Commerce and the Confederation of Industry of the Czech Republic. The National Centre for Industry 4.0 has been instrumental in transferring knowledge from academia to industry, supported by the National Centre of Competence for Cybernetics and AI (2019-2022). These centers served as the foundation for EDIH CTU (European Digital Innovation Hub), an effective vehicle for technology transfer providing services to SME and public administration. CIIRC has successfully transferred research outcomes and licensed technologies to global corporations such as Amazon, Google, Siemens, Bosch, Airbus, Rockwell, Škoda Auto, Continental, Huawei and Lego, as well as several Czech SMEs.

Selected prestigious R&D&I awards

International recognition has also been driven by notable achievements, including the success of Dr. Šedivý's team, Alquist AI, which won the prestigious Amazon Alexa Prize in 2021 and secured alternating 2nd and 3rd places in subsequent evaluations. Dr. Urban's team (Dept. of AI) has consistently excelled in global competitions in automatic reasoning and machine learning.

CIIRC researchers have received several best paper awards at prestigious international conferences such as CVPR, ICCV, ECCV, SSCI, ICORES, VEHITS, CASE, ROADEF, RTCSA and others and have been invited to deliver keynote speeches at top-tier (CORE/A*-A) conferences. Between 2019 and 2023, 15 research outcomes were recognized as "excellent" by the Czech R&D&I Council.

Conferences and International Engagements

CIIRC has been at the forefront of organizing and chairing major international conferences, including:

- IEEE SMC Conference (2022) – chaired by Prof. Mařík
- EU-US Workshop on Intelligent Manufacturing (2022) – co-funded by NSF
- IEEE/RSJ IROS (2021) – chaired by doc. Přeučil
- IEEE/ECMR (2019) – chaired by doc. Přeučil

CIIRC has hosted numerous leading global researchers. Notably, the institute maintains strong collaborations with DFKI and Prof. Wahlster (co-author of the original Industry 4.0 strategic initiative), as well as with the National Institute of Informatics in Tokyo and the Mayo Clinic in Rochester, Minnesota. These partnerships provide Czech researchers with opportunities for extended research stays at top international institutions.

Editorial Boards and Professional Societies

CIIRC faculty members hold key editorial positions in international journals (see the table below) and have been elected members of prestigious professional societies. Notable distinctions include:

- Prof. Vladimír Kučera's election to the prestigious US Philosophical Society in 2023, becoming only the fifth Czech citizen to receive this honor,
- Prof. Vladimír Mařík's appointment as an IEEE Life Fellow in 2023,
- Prof. Vladimír Kučera's receipt of the "Czech Mind" award in 2021, a highly prestigious national recognition granted annually,
- Prof. Vladimír Mařík's honorary doctorate from NIMS University in Jaipur, India, in 2023

Prominence in AI Research Networks

CIIRC has been actively involved in four out of six European Networks of Excellence Centres in AI, Data, and Robotics (AI NoEs): ELISE, TAILOR, euROBIN, and ELIAS. Moreover, CIIRC had a pivotal role in the VISION CSA project, facilitating and coordinating cooperation among all AI NoEs. These activities have firmly established CIIRC as a reliable and influential partner within the European AI ecosystem. CIIRC has been an engaged member of CAIRNE (Confederation of Laboratories for Artificial Intelligence Research in Europe, formerly CLAIRE) and ELLIS (European Laboratory for Learning and Intelligent Systems), two of the most significant AI initiatives in Europe. CIIRC also leads the CAIRNE Office Prague, the ELLIS Unit Prague, and EIT Manufacturing Hub Czechia, further reinforcing its impact on the European AI research landscape. CIIRC is also a member of associations ADRA, IDSA and Gaia-X.

Evaluations and Strategic Influence

CIIRC researchers actively participate in evaluation panels for national and EU projects, including the ERC project review panels. Additionally, CIIRC experts contribute to research policy at the governmental level, serving on the Commission for the Evaluation of Research Results (KHV) under the Czech R&D&I Council. Prof. Mařík acted in the evaluated period as a vice-chair of the Czech R&D&I Council.

International Collaboration

CIIRC has played a crucial role in establishing MICARC (Marik Institute of Computing, AI, Robotics, and Cybernetics) at NIMS University in Jaipur, India, established in 2023 and set to open in April 2025. Serving as a model for successful AI institutes, CIIRC has been instrumental in designing the facility's infrastructure, aligning it with CIIRC's standards, and developing educational programs for Ph.D. candidates. The selection of CIIRC as a blueprint for this initiative underscores its international recognition and appreciation.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
prof. Dr. Ing. Zdeněk Hanzálek et al.	Best Industrial Paper Award: Accelerated RRT* and Its Evaluation on Autonomous Parking	VEHITS Conference 2019
RNDr. Martin Suda, Ph.D. et al.	World Championship in Automated Theorem Proving for Vampire system.	The CADE ATP System Competition 2019
doc. Ing. Přemysl Šůcha, Ph.D. et al.	Industry 4.0 Award 2020 for Blumenbecker Prag, CIIRC CTU and FSI BUT	Confederation of Industry of the Czech Republic
Dr. Ing. Josef Šivic et al.	The Overall Best Method for Paper "CosyPose: Consistent multi-view multi-object 6D pose estimation"	ECCV 2020
Ing. Pavel Burget, Ph.D., Ing. Alexandr Lazarov, doc. Ing. Petr Kadera, Ph.D., PhDr. Mgr. Vít Dočkal, Ph.D., Ing. Jaroslav Lískovec	European Citizen's Prize 2020 for half mask CIIRC RP95-3D	European Parliament
prof. Ing. Vladimír Kučera, DrSc., dr. h. c.	Česká hlava Award 2021	Government of the Czech Republic
Ing. Jan Šedivý, CSc. and Alquist AI Team	Amazon Alexa Prize Social Bot Grand Challenge 2021, 1st place	Amazon Science
doc. Ing. Tomáš Pajdla, Ph.D. et al.	Best Paper Award for „Learning to Solve Hard Minimal Problems“	CVPR 2022
prof. Ing. Vladimír Kučera, DrSc., dr. h. c.	Member of the American Philosophical Society 2023	American Philosophical Society
Ing. Tomáš Mikolov, Ph.D.	Test of Time Award for "Distributed Representations of Words and Phrases and their Compositionality,"	NeurIPS 2023

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of scientific journal, ISSN
Dr. Ing. Josef Šivic	International Journal of Computer Vision, ISSN 0920-5691

Dr. Ing. Josef Šivic	IEEE Transactions of Pattern Analysis and Machine Intelligence, ISSN 0162-8828
prof. Dr. Ing. Robert Babuška	IEEE Transactions on Pattern Analysis and Machine Intelligence, ISSN 0162-8828
prof. Ing. Vladimír Kučera, DrSc., dr. h. c.	International Journal of Robust and Nonlinear Control, ISSN 1049-8923, 1099-1239
prof. Ing. Vladimír Kučera, DrSc., dr. h. c.	Bulletin of the Polish Academy of Sciences, ISSN 2300-1917
prof. Ing. Vladimír Mařík, DrSc., dr. h. c.	Transactions on large-scale data- and knowledge-cantered systems, ISSN 1869-1994
doc. Ing. Václav Křemen, Ph.D., MBA	IEEE Journal of Translational Engineering in Health and Medicine, ISSN 2168-2372
doc. Ing. Václav Křemen, Ph.D., MBA	Frontiers in Neurology, ISSN 1664-2295
doc. Ing. Lenka Lhotská, CSc.	Engineering Applications of Artificial Intelligence, ISSN 1873-6769
doc. Ing. Lenka Lhotská, CSc.	Transactions on large-scale data- and knowledge-cantered systems, ISSN 1869-1994

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
Dr. Ing. Josef Šivic	"Estimating motion and forces of person-object interactions from monocular video"	Google DeepMind, London, UK	2019
prof. Dr. Ing. Robert Babuška	Kenote: "Data-driven construction of parsimonious analytic models for autonomous robots"	ECMR, Prague, CZ	2019
Ing. Jiří Kubalík, Ph.D.	Symbolic Regression for Constructing Accurate Generalized Linear Models	AI Group, Dept. of Computer Science, University of York, UK	2020
Mgr. Josef Urban, Ph.D.	AI and Theorem Proving	New Technologies in Mathematics Seminar, Harvard University, USA	2021
Mgr. Josef Urban, Ph.D.	Towards the Dream of Self-Improving Universal Reasoning AI	AGI, Palo Alto, USA	2021
doc. Ing. Václav Křemen, Ph.D., MBA	Keynote: Neuroengineering of Epilepsy Neurostimulation	Yale Comprehensive Epilepsy Center, New Haven, Connecticut	2022
doc. Ing. Václav Křemen, Ph.D., MBA	Brain Restoration-Intelligent-Sensing-Stimulation-Ecosystem in Neurology (BrainRISE)	AI Summit Mayo Clinic Rochester, Minnesota, USA	2022
Ing. arch. Michal Postránecký	Smart City Strategies and Sectors	Saitama Sustainable Cities Summit ~E-KIZUNA Global Summit~, Tokyo, Japan	2022
Ing. Milan Němý, Ph.D.	Tiny Dots: Basal Forebrain Connectivity in Normal Aging and Alzheimer's Disease.	Boston: Neuromodulatory Subcortical Systems PIA, Harvard Medical School, USA	2023
prof. Ing. Vladimír Mařík, DrSc., dr. h. c.	RICAIP Centre for Intelligent Manufacturing	Industrial AI Forum, Univ. of Maryland, USA	2023

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year
Prof. Dr. rer. nat. Dr. h.c. mult. Wolfgang Wahlster	Professor of Artificial Intelligence (AI), the founding director and currently Chief Executive Advisor (CEA) of the German Research Center for Artificial Intelligence (DFKI);	Industrial AI: Towards the Next Level of Industrie 4.0"	2019
		Hybrid Industrial AI Solutions for Industrie 4.0	2020
		Industrial Artificial Intelligence for Zero-Defect Manufacturing: The Next Decade of Industrie 4.0	2021
		Edge AI for Sustainable Industrie 4.0	2022
Prof. Dr. Holger H. Hoos	Alexander von Humboldt Professor (since 01.01.2022) for Computer Science of the Faculty of Mathematics, Informatics and Natural Sciences at RWTH Aachen University, Germany; Leiden University, Netherlands; Chair of the Board of Directors and founding member of CAIRNE - Confederation of Laboratories for Artificial Intelligence Research in Europe	Meet the European AI Ecosystem	2023
		How and why AI will shape the future of science and engineering	2023
Prof. Jay Lee	Univ. Distinguished Professor, Industrial AI Center, University of Cincinnati, USA Ohio Eminent Scholar, L.W. Scott Alter Chair Founding Director, NSF I/UCRC on Intelligent Maintenance Systems (IMS) Professor Emeritus since 2023	Industrial AI-Augmented Predictive Analytics for Highly-Connected Smart Manufacturing	2022
Prof. Dr. Mario Fritz	Faculty member at CISPA Helmholtz Center for Information Security, an honorary professor at Saarland University, and a fellow of the European Laboratory for Learning and Intelligent Systems (ELLIS)	ELSA – European Lighthouse on Secure and Safe AI	2023
Prof. Dr.-Ing. Martin Ruskowski	Technologie-Initiative SmartFactory-KL e.v., Head of the Innovative Factory Systems research department at the German Research Center for Artificial Intelligence (DFKI); Head of Chair, Department of Machine Tools and Control Systems (WSKL), RPTU Rheinland-Pfälzische Technische Universität Kaiserslautern-Landau in Kaiserslautern	Resilient, Sustainable, Future-oriented. Production Level 4 stands for the production of tomorrow	2022
Prof. Dr.-Ing. Steffen Ihlenfeldt	Director, Fraunhofer Institute for Machine Tools and Forming Technology IWU, Germany	Cognitive Production Systems: Technical Implementation on the Example of Machining Processes	2022
Patrick Pérez	Scientific Director of Valeo.ai, France	Autonomous Driving. Advances and Challenges	2022
Prof. François Yvon, Ph.D.	Senior Researcher, LISN-CNRS / Université Paris Saclay, France Formerly also Professor at the Department of Computer Science at Paris-Sud University and Director of LIMSI (Computer Science Laboratory for Mechanics and Engineering) of	How Multilingual are Large Multilingual Language Models?	2022

	the CNRS (National Center of Scientific Research)		
Prof. Céline Castets-Renard	Full Professor, Faculty of Law, Civil Law Section University Research Chair on Accountable Artificial Intelligence in a Global Context (uOttawa) Chair Law, Accountability and Social Trust in IA (Université de Toulouse)	From Ethics to AI Law: What is the Main Provision of the AI Act Regarding Social Issues?	2022
Federico M. Sciammarella Ph.D	President & CTO of MxD Chicago, USA previously associate professor at Northern Illinois University	Secure Digital Transformation in Action for US Manufacturing	2022

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the research project/programme call	Name of the contracting authority/guarantor of the project/programme call	Year
doc. Ing. Lenka Lhotská, CSc.	Panellist and Referee	Swiss National Science Foundation	2022-now
doc. Ing. Petr Kadera, Ph.D.	Erigrad, Erigrad2	H2020 INFRAIA-1-2014-2015: Integrating and opening existing national and regional research infrastructures of European interest	2016-now
prof. RNDr. Olga Štěpánková, CSc.	P103 Cybernetics and Information Processing	GAČR – Czech Science Foundation	2021-2023
Mgr. Josef Urban, Ph.D.	P103 Cybernetics and Information Processing	GAČR – Czech Science Foundation	2017-2020
Mgr. Josef Urban, Ph.D.	AI Chairs Program	French National Research Agency	2019
prof. Dr. Ing. Robert Babuška	Reviewer of ERC Projects	European Research Council	2021
Dr. Ing. Josef Šivic	ERC Starting, Consolidator and Advanced grants	European Research Council	2020 - 2024
Dr. Ing. Josef Šivic	Reviewer of Canada CIFAR AI Chairs	Canadian Institute for Advanced Research (CIFAR)	2019
doc. Ing. Tomáš Pajdla, Ph.D.	ERC Advanced Grant Peer Review Panel member	European Research Council	2021, 2023
doc. Ing. Tomáš Pajdla, Ph.D.	M17+ EP7 Panel member	The Research, Development and Innovation Council of the Czech Republic	2021-2023

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the evaluation period²³. This should be done from the full list in annex tables (Table 3.3.1-3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in the listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

CIIRC CTU has selected the following projects:

1. AI4REASON: Artificial Intelligence for Large-Scale Computer-Assisted Reasoning
2. AI&Reasoning: Artificial Intelligence and Reasoning
3. IMPACT: Intelligent Machine Perception
4. NCC CAI: National Competence Center – Cybernetics and Artificial Intelligence
5. NCC CAI: National Competence Center – Cybernetics and Artificial Intelligence
6. VISION: Value and Impact through Synergy, Interaction and cooperation of Networks of AI Excellence Centres
7. euROBIN: European ROBotics and AI Network
8. AI-MATTERS: AI MANufacturing Testing and experimenTation network For EuRopean industrieS
9. ROBOPROX: Robotics and advanced industrial production
10. Smart Counting Machines for Modular Industry 4.0 Packing Lines in LEGO

AI4REASON: Artificial Intelligence for Large-Scale Computer-Assisted Reasoning

(EC, ERC Consolidator, 2015-2020, budget: EUR 1,5 million)

In the areas of AI and automation of reasoning, it is extremely difficult to automatically prove theorems in large and complex theories. The AI4REASON project of the main investigator Dr. Josef Urban aimed to find a solution to this very complicated problem by developing novel AI methods. To do so, it created appropriate automated reasoning and machine learning techniques.

Results: The main measurable breakthroughs are large increases in the power of automated theorem proving over large formal corpora. Several new methods combining learning and proving have been developed, including direct guidance of tactical ITPs, several new approaches to premise selection and internal guidance of ATPs, conjecturing, and auto formalization.

Application potential: The main impact of the project is in AI and reasoning. The large increase in the power of the methods will likely have an immediate impact on industrial verification projects, increasing the production of fully verified software, hardware, and other technological designs. This has in turn impact on preventing costly failures of advanced technologies on which modern society critically depends. A long-term impact of this research field is increased automation of mathematics and science.

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

Contribution to mission and purpose of the evaluated unit: The transferability of the grant allowed the PI to make his move back to Czechia, bringing the first ERC to CTU.

Role: Beneficiary

Interdisciplinary aspects: Automated reasoning is applied in many areas, from research mathematics to software and hardware verification. Some of the developed methods have helped to produce new mathematical results that the experts in the field consider interesting. Automation methods were produced, which helped speed up all sorts of formal verification in the major formal proof assistants.

AI&Reasoning: Artificial Intelligence and Reasoning

(MSMT, 2017-2023, budget: EUR 4,8 million)

The main goal of the AI&Reasoning project was to build a new research group led by Dr. Josef Urban, holder of the ERC Consolidator Grant, focused on research in artificial intelligence and automatic reasoning, in collaboration with strategic international partners. The project focused on automated translation of mathematical, scientific and technical texts written in a natural language into a form that will be comprehensible for computers.

Results: Transfer of completely new methods of automatic reasoning and their use in the field of control technology, real-time scheduling, agent systems and big data, which the team was able to develop.

Application potential: The aim was knowledge transfer in the field of managing international grants (especially H2020 and ERC). The project results can advance applications in areas like robotics cell optimization and AI for Smart Cities.

Contribution to mission and purpose of the evaluated unit: The project contributed to fulfilling CIIRC CTU's vision as a "state-of-the-art research institute integrating the best research teams, young talents and unique know-how, pushing the boundaries of technical knowledge, motivating world-class performances and educating future generations of international figures". The related objective was the development of strategic international cooperation in the form of: deepening (expanding cooperation from the "individual" level to the institutional level). Another objective was the modernization of R&D infrastructure, in the form of acquisition of equipment for carrying out research activities, transfer of best practice in the field of quality management.

Role: Beneficiary (Partners: Technical University of Ostrava, University of West Bohemia)

Interdisciplinary aspects: The research in the fields of artificial intelligence and automatic reasoning was coupled with knowledge transfer in the field of managing international grants.

IMPACT: Intelligent Machine Perception (MSMT, 2017-2023, budget: EUR 4,6 million)

The IMPACT project focused on fundamental and applied research in computer vision, machine learning and robotics to develop intelligent systems that understand complex visual inputs, learn, reason, navigate and interact with dynamic environments. This all autonomously or with only minimal human supervision.

Results: A dynamic, young research team benefitted from the unique expertise of Dr. Josef Šivic, an ERC Starting Grant holder with strong experience and links to the strategic international partner, INRIA. Entirely

new machine learning methods were transferred to the team. The quality of publishing performance of the team was also improved thanks to the realization of an attractive research program in cooperation with world class researchers from INRIA and other countries.

Application potential: The main impact of the project was the transfer of knowledge in the field of international grants (especially H2020 and ERC) and the increase of the success of the grants within the team, including the award of the ERC Advanced grant to J. Šivic in 2023, through the development of strategic international cooperation, in the form of deepening (expanding cooperation from an individual level to an institutional level, sharing best practice at the strategic level,) and targeting selected areas, especially coordination grants, ERC grants, attestation and evaluation policy, etc.

Contribution to mission and purpose of the evaluated unit: The project contributes to fulfilling the CIIRC's vision as a state-of-the-art research institute integrating the best research teams, young talents and unique know-how, pushing the boundaries of technical knowledge, motivating world-class performances and educating future generations of internationally based personalities.

Role: Beneficiary

Interdisciplinary aspects: The research in the fields of computer vision, machine learning and robotics was coupled with knowledge transfer in the field of managing international grants.

NCC CAI: National Centre of Competence – Cybernetics and Artificial Intelligence

(TACR, 2019-2022, budget: EUR 6,3 million)

The National Competence Center – Cybernetics and Artificial Intelligence (NCC CAI) project aimed to create a national platform for cybernetics and artificial intelligence which interlinks research and application-oriented centers of robotics and cybernetics for Industry 4.0, Smart Cities, intelligent transport systems and cybersecurity. The connection of innovation leaders raised effectiveness of applied research in key areas, as advanced technology for globally competitive industry, ICT and transportation for the 21st century.

Results: The output of the cooperation of research and application partners is 78 binding results - 28 software results, 20 functional samples, 4 prototypes, 3 verified technologies, one specialized map and 22 other results.

Application potential: NCC CAI was closely related to the application sector and enables cross-domain collaboration, innovation development and technology transfer in 22 sub-projects.

Contribution to mission and purpose of the evaluated unit: NCC CAI has positively contributed to increasing the number of R&D workers and the involvement of young researchers – doctoral and master's students – in projects with industry. Cooperation at the center level significantly contributed to long-term cooperation of researchers on other national or international projects.

Role: Beneficiary (Partners: 3 universities, 3 institutes of Czech Academy of Sciences, and 22 companies incl. Škoda Auto, Siemens, Valeo, DEL and more)

Interdisciplinary aspects: The center has contributed to the transfer of technologies in key fields with growth prospects, to further connecting research and application partners from all over the Czech Republic, strengthening interdisciplinary cooperation and increasing the competitiveness of companies.

Collaboration with other units of the evaluated HEI: Faculty of Mechanical Engineering, Faculty of Architecture, and Faculty of Transportation Sciences

RICAIP: Research and Innovation Centre on Advanced Industrial Production

(EC, MSMT, 2019-2026, budget: EUR 47,0 million).

RICAIP is a Czech-German distributed research centre of excellence (CoE), which focuses on research in the field of robotics, machine learning and artificial intelligence (AI) for advanced industry and develops new production concepts for geographically distributed manufacturing and manufacturing as a service.

Based on a strategic partnership of four leading Czech and German research institutions, its main goal is to establish the RICAIP centre, aiming to become a key entity in major European research infrastructures for advanced industry and production.

Results: RICAIP created an interconnected state-of-the-art infrastructure for research and development which enables rapid adaptation of production according to current customer needs or available production resources. The consortium has developed and demonstrated several case studies and demonstrators, offering companies flexible solutions which can be used in real industrial applications.

Application potential: The main impacts of the project are, in collaboration with the German partners, to increase the scientific capabilities of the Czech partners, enhancing their competitiveness and economic development in the long term, as well as improving research and innovation culture in the Czech Republic.

Contribution to mission and purpose of the evaluated unit: CIIRC CTU has developed its industrial testbed infrastructure with the latest technologies for Industry 4.0 thanks to a significant part of its EUR 27 million budget, enhancing its scientific environment and becoming an acknowledged and reliable partner in the community of distinguished European centres of excellence.

Role: Beneficiary (Partners: CEITEC BUT, DFKI (DE), ZeMA (DE))

Interdisciplinary aspects: Beyond research, RICAIP also provides support to SMEs, facilitating the transfer of technology and knowledge from academia to industry. RICAIP develops strong cooperation at the international level and addresses the current needs of society.

VISION: Value and Impact through Synergy, Interaction and Cooperation of Networks of AI Excellence Centres (EC, 2020-2024, budget: EUR 2,0 million)

Europe invests in the European model of human-centric AI, with a new set of European Networks of Excellence Centres in AI, Data and Robotics (NoEs) – AI4Media, ELISE, HumanE-AI-Net, TAILOR, from 2020 to 2024, ELSA, euROBIN, d AIEDGE, ELIAS, ENFIELD since 2023.

The VISION project (CSA) brought the European AI NoEs together to reinforce, interconnect and mobilise Europe's AI community, and to accelerate Europe's transition to a world-leading position in the research, development and deployment of AI technologies. VISION's objectives were to strengthen the synergies between NoEs, foster strong connections between academia and industry, develop a European approach to AI skills education, and promote the EU as an attractive environment for AI research.

Results: Various activities applied the objectives of the project e.g. Joint Ecosystem Mapping, Common visual identity for the European NoEs, AIDA/AI PhD curriculum, European AI Trend Radar, Joint SRA,

Workshops, ESSAI Summer School... Another key aspect was the facilitation of cross-NoE coordination and communication (7 Cross-NoE working groups established).

Application potential: N/A The project allowed the provision of practical, transferable learning opportunities for AI Ph.D. students, and the creation of a map of the organisations offering R&D&I activities on AI-related themes across Europe.

Contribution to mission and purpose of the evaluated unit: CIIRC's leading role in Communication and Dissemination and in related cross NoEs activities enabled to establish strong collaboration with leading European actors in AI.

Role: Participant (Beneficiary: University of Leiden (NL), Partners: DFKI, FBK, INRIA, Intellera, THALES, TNO, UCC)

Interdisciplinary aspects: Several activities had multi-sectoral aspects such as the academic-industry collaboration (TDWs, Trend radar), education programs (suitable for both technical and non-technical fields) etc.

euROBIN: European ROBotics and AI Network

(EC, 2022-2026, budget: EUR 12,5 million)

euROBIN comprises 31 partners across 14 countries, including the highest-profile research institutions and outstanding industrial partners across sectors.

This NoE brings together European expertise on Robotics and AI, establishing the first unified pan-European platform for research and development on AI-Based Robotics. The network is open to the entire robotics community and provides mechanisms of cascade funding to welcome new members.

Results: The main breakthroughs include significant scientific advances on core questions of AI-based robotics, as well as an integrative community platform designed to offer a centralized repository for sharing software modules, data, and expertise, strengthening the scientific robotics community in Europe.

Application potential: The main impact of euROBIN is bringing together the robotics community and to benefit science, industry, and society while promoting European values. The network is a facilitator of knowledge transfer and exchange between research institutions and industry partners. Its research agenda has the main goal to take a new and integrated perspective in designing the future ecosystem of heterogeneous intelligent machines interacting with humans.

Contribution to mission and purpose of the evaluated unit: The project provides an opportunity to test CIIRC CTU's research results in new high-impact applications in collaboration with some of the best robotics research labs in Europe. CIIRC CTU builds on its world-class results in robot perception (e.g. ERC AdG FRONTIER) and investigates its adaptation to new tasks in manufacturing or home robotics, using RICAIP Testbed Prague infrastructure.

Role: Participant (Beneficiary: DLR – German Aerospace Center (DE), Partners: INRIA, CEA and 27 others)

Interdisciplinary aspects: euROBIN research agenda focuses on 4 core scientific topics: intelligent and safe interaction with humans and the environment, learning transfer, transferable knowledge representations and human-centered robotics merging disciplines including mechanical/electrical engineering, computer science, mathematics and biology/biomechanics.

AI-MATTERS: AI MANufacturing Testing and experimenTation network For EuRopean industrieS (EC, MPO, 2023-2027, budget: EUR 60,0 million)

The AI-MATTERS network connects 25 partners across 8 EU countries which all bring their unique expertise from various manufacturing sectors (automotive, circular economy, space and mobility, textile, material production).

Results: The network is developing world-class reference testing and experimentation facilities with a focus on advanced AI-based and AI-powered technologies in real-world scenarios for the manufacturing sector. Key areas include factory-level optimization, AI technology for autonomous decision making, collaborative robotics and circularity, offering also access to technology providers for the necessary expertise, professional services support on technical aspects of AI testing and access to the necessary digital infrastructure.

Application potential: AI-MATTERS aims at increasing the productivity, innovation capacity, resilience and global competitiveness of the European manufacturing sector through the integration of state-of-the-art AI and robotics technologies. AI-MATTERS overarching goal is to implement concrete steps to strengthen the implementation of human-centered AI systems in the EU. This makes it possible to solve and deploy robotics and other advanced technologies for the essential transformation of the production ecosystem in the EU.

Contribution to mission and purpose of the evaluated unit: CIIRC CTU has joined the AI MATTERS project to help enhance the competitiveness of small and medium enterprises in Central Europe, by providing them open access to its state-of-the-art RICAIP Testbed infrastructure as well as expertise for projects and services supporting the digital transformation of SMEs.

Role: Participant (Beneficiary: CEA (FR), Partners: CEITEC BUT, VŠB-TUO and 20 others)

Interdisciplinary aspects: The AI-MATTERS consortium brings diverse expertise for accelerating the uptake of AI, machine learning and AI-enabled robotics technologies in manufacturing, with a particular attention on circular economy.

ROBOPROX: Robotics and advanced industrial production

(MSMT, 2023-2028, budget: EUR 17,5 million)

The ROBOPROX project focuses on breakthrough research and development in robotics and advanced industrial manufacturing by leveraging flexible deployment of robots with a high degree of autonomy, safe collaboration with humans, control and optimization of manufacturing processes, and computational methods for manufacturing and materials engineering.

ROBOPROX will involve up to 180 top experts and offers dozens of new Ph.D. and postdoctoral positions and unique opportunities for talented scientists from the Czech Republic and abroad.

Results: Some of the expected results are 190 journal papers in Q1 WoS AIS or SJR, 130 conference papers in Core A/A* or Q2 in AIS or SJR, 20 applied results graded 1 or 2 in Methodology 17+.

Application potential: Cutting-edge research in this area will enable the development of more complex, modular and advanced solutions, and help increase the competitiveness of Czech industry. Various

applications in advanced industrial production with the aim of increasing productivity with help of robotics, automation, optimization algorithms, new materials.

Contribution to mission and purpose of the evaluated unit: CIIRC CTU will be able to pursue excellent research in the field of robotics and develop new approaches and technologies with an impact on industrial production, actively contributing to the transformation of the Czech industry and to the implementation of the priorities of the Innovation Strategy of the Czech Republic.

Role: Beneficiary (Partners: Brno University of Technology, University of West Bohemia in Pilsen, Technical University of Ostrava)

Interdisciplinary aspects: The project is interdisciplinary and promotes flexible development practices to meet changing customer requirements and to respect increasing environmental constraints.

Collaboration with other units of the evaluated HEI: Faculty of Electrical Engineering, Faculty of Mechanical Engineering, Faculty of Civil Engineering, Faculty of Information Technology, Institute of Experimental and Applied Physics at CTU.

Contract research: **Smart Counting Machines for Modular Industry 4.0 Packing Lines in LEGO** (2019–2024, budget: CZK 15,34 million)

The project focused on optimizing pre-pack packaging lines used in LEGO production. These lines utilize vibrating bowls to count and deliver LEGO bricks into individual packages. The correct parameter settings for these vibrating bowls are critical for production efficiency but require extensive training (6-12 months) for operators. The developed solution, called Virtual Operator, employs an IT architecture combining AI, EDGE, and Cloud technologies to automate and optimize the parameter settings dynamically.

Results:

- Implemented a Virtual Operator that uses AI-driven cluster analysis to determine optimal settings.
- Reduced manual adjustments needed from operators.
- Increased efficiency and reliability of the pre-pack production lines.
- Created a long-term, global knowledge base for settings optimization.
- Successfully integrated into LEGO production, proving its business case.

Application potential: The developed system can be adapted to various manufacturing industries requiring automated counting and packaging processes. The technology can be extended to other modular production environments needing high precision and quick adaptability.

Contribution to mission and purpose of the evaluated unit: The project aligns with LEGO's goal of innovation in manufacturing by leveraging digitalization and AI-driven automation to enhance efficiency, reduce labor dependency, and increase scalability. It also highlights the capabilities of Czech research institutions in developing cutting-edge industrial solutions.

Role: Beneficiary

Interdisciplinary Aspects: The project combined expertise from various fields, including industrial automation, artificial intelligence, IT architecture, and mechanical engineering, to create a highly efficient and adaptable solution.

Table 3.3.1 Projects supported by public funds

In the role of beneficiary

Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		2019	2020	2021	2022	2023
EC(BE)	AI4REASON: Artificial Intelligence for Large-Scale Computer-Assisted Reasoning (2015-2020)	38012,33/1499,5				
EC(BE)	RICAIP: Research and Innovation Centre on Advanced Industrial Production (2019-2026)	379900,55/14986,22				
GACR	Student Analyse (2018-2020)	4358/171,91				
MSMT	AI&Reasoning: Artificial Intelligence and Reasoning (2017-2023)	120945,96/4771,04				
MSMT	Cluster 4.0: Methodology of System Integration (2018-2023)	93767,45/3698,91				
MSMT	Delayed solution algorithms for future unmanned transport vehicles (2017-2019)	2022,5/79,78				
MSMT	IMPACT: Intelligent Machine Perception (2017-2023)	116487,42/4595,16				
MSMT	R4I: Robotics 4 Industry 4.0 (2017-2023)	145807,03/5751,76				
MSMT	RICAIP: Research and Innovation Centre on Advanced Industrial Production (2019-2024)	811092,45/31995,76				
MSMT	RobFyz: Enhancing Robotic Physiotherapeutic Treatments using Machine Learning (2019-2022)	661/26,07	1278/50,41	1905/75,15		
MV	Kassandra: Multi-camera vehicles' undercarriage security scanner (2017-2020)	5504/217,12				
TACR	CAK: Centre for Applied Cybernetics (2016-2019)	237818/9381,38				
TACR	ImitRob: Imitation learning supported by language for industrial robotics (2017-2019)	2539,97/100,2				
TACR	MAFRI: Transposition of MAF-type reliability indicators into the national reliability standards applicable in the corrective measures planning and evaluation in case of	3761,55/148,38				

²⁵ If the provider is from abroad, please indicate the provider's country of origin in brackets. For the determination of the country of origin of the provider, the place of residence of the provider is decisive.

²⁶ Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

	indication of generation inadequacy within the CZ grid (2018-2020)					
TACR	NCC CAI: National Centre of Competence – Cybernetics and Artificial Intelligence (2019-2022)	160000/6311,64				
GACR	PowerATP: Powering Automatic Theorem Provers by Machine Learning (2020-2022)		6547/258,26			
MSMT	POSTMAN: Powering SMT Solvers by Machine Learning (2020-2024)		38916,01/1535,15			
TACR	Pipetak: Automated robotic device for tube refilling during testing at COVID-19 (2020-2020)		887,5/35,01			
TACR	DiPreFE: Implementation of diagnostic and predictive maintenance for efficient control of photovoltaic powerplants using autonomous vehicles (2020-2024)		21662,5/854,54			
TACR	INUKEN: Development of technological unit for innovative energy storage using phase change of material (2020-2024)		17210/678,9			
TACR	Respirator: Commercialisation of the protective half mask with FFP3 security level (2020-2020)		1338,21/52,79			
GACR	MIRACLE: Robot learning multimodal representation of actions in the context of Learning by demonstration (2021-2024)			7710/304,14		
MPO	VENT-CONNECT (2021-2022)			3600/142,01		
GACR	Scheduling Tests in Medical Laboratories: Reduction of Turn-Around Time (2022-2024)				7278/287,1	
HMP	Construction 4.0 - innovative technologies, automation and robotization of construction production (2022-2022)				496,46/19,58	
MSMT	prg.ai Master: Establishing new study programmes in progressive fields (2022-2023)				2214,4/87,35	

MZD	VentConnect2: CheckMyScreen: Optimising Human-Device Interaction and Improving Safety of Mechanical Ventilation by Innovative Autonomous Alert System: Randomised Controlled Cross-over Trial (2022-2025)				13211/521,14	
TACR	CERTICAR: Platform for certification of highly automated cars (2022-2025)				26779,04/1056,37	
TACR	Energy nest: Hybrid technolog complex providing Ancillary service for grid ballancing (2022-2023)				6835,69/269,65	
EC(BE)	DeeplsaHOL: Reinforcement learning to improve proof-automation in theorem proving (2023-2025)					4215,17/166,28
EC(BE)	EDIH CTU: EDIH Czech Technical University in Prague (2023-2025)					37502,77/1479,4
MPO	EDIH CTU: EDIH Czech Technical University in Prague (2023-2025)					37502,77/1479,4
EC(BE)	Ethical Engineer: Integrating teaching ethics in artificial intelligence and robotics (2023-2026)					10140/400
GACR	iCHORES: Intuitive Collaboration with Household Robots in Everyday Settings (2023-2025)					7234/285,36
GACR	UNI-3D: A Unified 3D Map Representation (2023-2027)					40073/1580,79
GACR	Urban Traffic Control by Means of Automated Planning (2023-2025)					6229/245,72
MSMT	ROBOPROX: Robotics and advanced industrial production (2023-2028)					444511,51/17534,97
TACR	Development and application of new linguistic content for Czech speech audiometry (2023-2026)					5834,47/230,16
Total		2122678.21/83734.84	87839.22/3465.06	13215/521.3	56814.59/2241.21	593242.69/23402.08
In the role of another participant						
Provider ²⁷	Project name	Support (in thousands CZK/EUR)				

²⁷ Ibid.

		year 1 2019	year 2 2020	year 3 2021	year 4 2022	year 5 2023
EC(BE)	ARROWHEAD: Arrowhead Tools for Engineering of Digitalisation Solutions (2019-2022)	7715,91/304,38				
EC(BE)	ARtwin: An AR cloud and digital twins solution for industry and construction 4.0 (2019-2022)	9915,02/391,13				
EC(BE)	DIGICOR: Decentralised Agile Coordination Across Supply Chains (2016-2019)	11889,15/469				
EC(BE)	DISTINCT: Dementia: Intersectorial Strategy for Training and Innovation Network for Current Technology (2019-2023)	5953,99/234,87				
EC(BE)	SafeLog: Safe human-robot interaction in logistic applications for highly flexible warehouses (2018-2021)	17966,81/708,75				
EC(BE)	THERMAC: Thermal-aware Resource Management for Modern Computing Platforms in the Next Generation of Aircraft (2019-2022)	8878,84/350,25				
EC(BE)	UP-Drive: Automated Urban Parking and Driving (2016-2019)	19106,3/753,7				
EITD(BE)	DeepSpA: Deep Speech Analysis for Cognitive Assessment in Clinical Trials (2019-2019)	1521/60				
FFG(AT)	KnowDrift: Knowledge-Driven Industrial Robotics for Flexible Production (2017-2020)	554,13/21,86				
MPO	Collaborative robotic platform of the future (2019-2021)	1614,4/63,68	1991,88/78,58	1971,88/77,79		
MPO	FLOPP: Factory of the future (2017-2019)	6275,05/247,54				
MPO	GenomKit - Progressive technology for the rationalization of personalized pharmacogenomics, nutrigenomics and sports medicine (2018-2021)	4000/157,79				
MPO	HOPAX (2017-2019)	6750/266,27				
MPO	KONPOLA: Robotic cell for inspection of surface of painted uneven parts in the	2487,88/98,14				

	industrial manufacturing. (2017-2019)					
MPO	OZAS: Personal Health Assistance Systems (2017-2021)	3040/119,92				
MPO	PKPB: Supplementary platform PKPB (2019-2022)	2390/94,28	2390/94,28	2390/94,28		
MPO	Technology for industrial robots integration into production systems based on Industry 4.0 (2016-2019)	4981/196,49				
MPO	ZAJADOT: Research and realization of a testing robotic multi-wheel platform, with a focus on its centration and symmetrical passage through circular profiles of disposal boreholes for storage of disposal casks with SNF using multifunctional robotic technology (2018-2020)	3254/128,36				
MSMT	EERA-CZ 2: Enabling the participation of research organizations in the European Energy Research Alliance (EERA) (2019-2021)	331/13,06	625/24,65	562/22,17		
MV	Smart Camera - New Generation Monitoring Center (2017-2019)	4033/159,09				
MZD	Features of Electromechanical Dyssynchrony that Predict Effect of Cardiac Resynchronization Therapy (2015-2019)	5201/205,17				
TACR	CREOBOT: Research and realization of prototype of a breakthrough solution of multifunctional autonomous modular Creobot Modular for transport and manipulation in sophisticated manufacturing and assembly operations (2018-2020)	6750/266,27				
TACR	DAMias: Data-driven Asset Management in Automobile Industry Based on Semantic Modelling (2018-2019)	5807,2/229,08				
TACR	DC microgrid: DC Microgrid for apartment houses (2019-2022)	894,2/35,27	1553,2/61,27	1553,1/61,27	499,5/19,7	
TACR	Dflex: Proving usability of flexibility aggregation including demand side management for power	453,8/17,9	1201,9/47,41	1201,9/47,41	1097,2/43,28	

	system regulation purposes. (2019-2022)					
TACR	Energy Storage in Electricity Generation (2019-2023)	1068,03/42,13	1630,98/64,34	1832,49/72,29	1506,69/59,44	1449,99/57,2
TACR	HUMR: The use of humanoid robot for active ageing of older people (2019-2021)	763,56/30,12	763,56/30,12	763,56/30,12		
TACR	Ideas to Practice (2019-2021)	270/10,65				
TACR	MERKUR: Making a modern modular system for teaching mechatronics in line with the Industry 4.0 challenge (2018-2020)	2000/78,9				
TACR	MWPharmASIA - database extension of drug substances and their MWPharm models for East Asian population and development of NGS diagnostic panel and algorithm for predicting statin pharmacokinetics/dynamics (2018-2019)	2498,4/98,56				
TACR	Optimization of Dry Storage for Spent Nuclear Fuel (2019-2022)	570/22,49	1140/44,97	1140/44,97	1140/44,97	
TACR	SecureFlex: Secure power flexibility for grid control and market purposes (2018-2024)	13074,1/515,74				
TACR	VIREAS: Virtual Reality in Keeping the Elderly Active (2019-2022)	1280/50,49	1280/50,49	1280/50,49	120/4,73	
EC(BE)	BRAINE: Big data Processing and Artificial Intelligence at the Network Edge (2020-2023)		2118,31/83,56			
MSMT	BRAINE: Big data Processing and Artificial Intelligence at the Network Edge (2020-2023)		3934/155,19			
EC(BE)	DIH-World: Accelerating deployment and maturity of DIHs for the benefit of Digitisation of European SMEs (2020-2024)		1593,88/62,88			
EC(BE)	ELISE: European Learning and Intelligent Systems Excellence (2020-2024)		28360,31/118,75			
EC(BE)	SPRING: Socially Pertinent Robots in Gerontological Healthcare (2020-2024)		17847/704,02			
EC(BE)	TAILOR: Foundations of Trustworthy AI - Integrating Reasoning, Learning and Optimization (2020-2024)		2615,99/103,2			

EC(BE)	VISION: Value and Impact through Synergy, Interaction and cooperation of Networks of AI Excellence Centres (2020-2024)		6622,69/261,25			
EITM(FR)	DigTrafoRis: Digital Transformation in RIS (2020-2020)		430,95/17			
EITM(FR)	EIT M RIS Hubs: EIT Manufacturing RIS Hubs (2020-2023)		1584,38/62,5	1590,71/62,75	1438,61/56,75	1422,14/56,1
EITM(FR)	LIFT Europe: LIFT European Network of Learning Factories (2020-2020)		269,34/10,63			
EITM(FR)	M-NEST-RIS: Network for Empowering People in Added-Value (2020-2020)		1774,5/70	760,5/30		
EITM(FR)	ManuLearn: Learning through manufacturing challenges II (2020-2021)		1584,38/62,5	735,15/29		
EITM(FR)	SMART4Custom: Smartphone app for customized COVID protective respirator mask (2020-2020)		79,22/3,13			
MZD	AgingEars: Novel diagnostic methods in examination of age related changes of the auditory system (2020-2023)		361/14,24	525/20,71	525/20,71	525/20,71
TACR	ROBWELD: Automatic robot welding of various plastic basins (2020-2022)		184,28/7,27	266,18/10,5	56,25/2,22	
TACR	SM4RT: Smart Metering 4 Regulators and Society (2020-2022)		442,62/17,46	1024,29/40,41	1033,29/40,76	
TACR	SynDevAI: Research and development of AI-enabled systemic control for automatic pilot preselection and screening (2020-2022)		2694,96/106,31	2694,96/106,31	2694,96/106,31	
TACR	VR Hotel: Application of virtual reality tools into the communication skills training of hotel workers for a purpose of reduction of concerns and risks associated with the spread of COVID-19 (2020-2022)		277,6/10,95	1166,95/46,03	869,28/34,29	
TACR	VRETCity: Exposure to stressful situations in a virtual city environment (2020-2023)		1361,36/53,7	1794,52/70,79	1803,36/71,14	1794,52/70,79
EC(BE)	COGNINTEL: Cognitive production based on intelligent Energy, Quality and Maintenance Management (2021-2022)			912,6/36		

EC(BE)	CSI-COP: Citizen Scientists Investigating Cookies and App GDPR compliance (2021-2024)			3412,74/1 34,63		
EC(BE)	DIH4AI: AI on-demand platform for regional interoperable Digital Innovation Hubs Network (2021-2023)			3663,08/1 44,5		
MPO	Sabris: Production management software in the context of Industry 4.0 (2021-2023)			7225,47/2 85,03		
EITM(FR)	AIMS2: AI for Manufacturing SMEs and Students (2021-2021)			1518,47/5 9,9		
EITM(FR)	EduDevRIS: Education programs development in RIS countries (2021-2022)			558,33/22, 03	253,5/10	
EITM(FR)	RIS I4.0H: RIS Industry 4.0 Hubs (2021-2021)			1038,72/4 0,98		
EITM(FR)	SEEN for Lightweighting: Simulation Enhanced/Enabled Nuggets for Learning and Mastering Manufacturing for Lightweighting (2021-2022)			1463,96/5 7,75	306,13/12,08	
EITM(FR)	ShapiNG: Shaping the Next Generation of manufacturing professionals (2021-2023)			709,77/28	861,9/34	608,4/24
EITM(FR)	YML-TWO: Young Manufacturing Leaders - Talented Workforce for an Open society (2021-2023)			399,26/15, 75	367,58/14,5	313,38/12,36
HMP	Alzheimer: Enjoyable Neuro Inspect (2021-2023)			3072,64/1 21,21		
HMP	IKAP 2 - Innovation in education (2021-2023)			13594,04/ 536,25		
MPO	TEPLATOR: Reactivity control system design (2021-2023)			7052,42/2 78,2		
TACR	AIDTWIGLOW: Autonomous Intelligent Digital Twin of the Globalized World: digital ontology for smart analytics, simulations, projections and decision-making (2021-2023)			529,24/20, 88	700,4/27,63	33,08/1,3
TACR	Autonomous robotic system for ultrasonic and eddy current inspection of metal and composite parts of complex shapes (2021-2024)			12827,81/ 506,03		
TACR	Research and development of a robotic system for automated masonry from brick blocks (2021-2023)			4978,24/1 96,38	5024,14/198,19	2487,04/98,11

EC(BE)	AGIMUS: Next generation of AI-powered robotics for agile production (2022-2026)				23219,02/915,94	
EC(BE)	euROBIN: European ROBotics and AI NEtwork (2022-2026)				3461,85/136,56	
EITM(FR)	AMazED: Demand-driven additive manufacturing upskilling in RIS countries (2022-2022)				1394,25/55	
EITM(FR)	ConFacts: Multi-layer Connected Factories with hybrid conventional and digital components II (2022-2023)				1070,33/42,22	1131,62/44,64
EITM(FR)	Demo4Green: Green Manufacturing: Demonstrating technologies to fight Climate Change (2022-2022)				1128,08/44,5	
EITM(FR)	FactorIS II: Learning Factories for Digital Transformation of SMEs II (2022-2022)				912,6/36	
EITM(FR)	RIEMANN: ROS-based Education of Advanced Motion Planning and Control (2022-2023)				1820,41/71,81	1850,55/73
EITM(FR)	Smart DIGI: Smart Educational Framework for DIGItalization (2022-2022)				960,13/37,88	
EITM(FR)	TXR-ATG: Telemotive Xtended Reality - Augmented Training and Guidance (2022-2022)				633,75/25	
EITU(ES)	IPA2X: Intelligent Pedestrian Assistant to Everyone (2022-2022)				7382,31/291,22	
MPO	Connected Motor Starter (2022-2023)				5098,29/201,12	
TACR	DECODIS: Load control in decentralised grid (2022-2024)				1805,13/71,21	
TACR	IHPSS: Intelligent Health Promotion Service System (2022-2025)				3909/154,2	
TACR	VERTIMOVE (2022-2023)				1960,5/77,34	2071,5/81,72
EC(BE)	AI REDGIO 5.0: Regions and (E)DIHs alliance for AI-at-the-Edge adoption by European Industry 5.0 Manufacturing SMEs (2023-2025)					2918,42/115,13
EC(BE)	AI-MATTERS: AI MANufacturing Testing and experimenTation network For EuRopean industrieS (2023-2027)					69974,62/2760,34

MPO	AI-MATTERS: AI MANufacturing Testing and experimenTation network For EuRopean industrieS (2023-2027)					69974,62/2760,34
EC(BE)	AIRISE: Artificial Intelligence in Manufacturing for Sustainability as SMEs (2023-2026)					6717,75/265
EC(BE)	CoreSense: A Hybrid Cognitive Architecture for Deep Understanding (2023-2026)					11312,44/446,25
EC(BE)	DigiCare4CE: Digital transformation of long-term care facilities for older people (2023-2025)					4258,8/168
EC(BE)	ELIAS: European Lighthouse of AI for Sustainability (2023-2027)					12110,96/477,75
EC(BE)	EXA4MIND: EXtreme Analytics for MINing Data spaces (2023-2025)					6907,88/272,5
EITM(FR)	AI4ENGINE: AI for weaving KPIs monitoring and prediction (2023-2024)					2535/100
EITM(FR)	RoboTwin – motion imitating robotics (2023-2023)					1283,34/50,63
GACR	MAPLE: Multi-Robotic Path Planning and Execution (2023-2025)					3837/151,36
MZD	NPH: A Complex Multi-layer Diagnostic Battery for NPH (2023-2026)					2844/112,19
TACR	Development of modular effector design system (2023-2024)					5687,5/224,36
TACR	MCX 5G terminal for critical communication for IRS and transport (2023-2025)					2306,45/90,98
TACR	RETEMED: Recombinant Technologies for Medicine (2023-2028)					8095,04/319,33
TACR	RoVozCi: Robotic pallet jack for bricks (2023-2025)					7073,88/279,05
TACR	STUFEDU: Social and motivational factors of study and their influence on study results in tertiary education with a focus on technical fields (2023-2025)					1500/59,17
Total		163287,8/6441,3	86713,3/3420,6	862010/3400,8	75053,4/2960,7	233025/9192,3

Other projects implemented at CTU, in which CIIRC participates as a contributor, based on CTU internal agreement						
Provider	Project name	Support (in thousands CZK/EUR)				
		year 1 2019	year 2 2020	year 3 2021	year 4 2022	year 5 2023
GACR	NOPEPA (2019-2023)	2975/117.36	3224/127.18	3294/129.94	3859.29/152.24	2330/91.91
GACR	NaoSkin: Robotic self-calibration and safe physical human-robot interaction inspired by body representations in primate brains (2017-2019)	417.5/16.47				
GACR	Temporal context in analysis of long-term non-stationary multidimensional signal (2017-2019)	647/25.52				
MPO	Control platform for high-precision assembly of microelectronic components (2017-2021)	4931.51/194.54				
MSMT	AT-Lab: Modernization and adaptation of laboratories in the field of assistive technologies (2018-2022)	291.21/11.49				
MSMT	AT-PhD: Assistive Technology for Sustainable Development and Active Life of Seniors and Handicapped Persons (2018-2022)	508.03/20.04				
MSMT	INAFYM: Engineering applications of microworld physics (2017-2022)	13507.85/532.85				
MSMT	International mobility of CTU researchers (2018-2021)	3703.52/146.1				
TACR	CANUT: Centre for Advanced Nuclear Technologies (2019-2019)	1513/59.68				
TACR	IPALM: Interactive Perception-Action-Learning for Modelling Objects (2019-2022)	452.44/17.85	603.25/23.8	603.25/23.8	150.81/5.95	
MSMT	HRAward: Capacity development for strategic research management at CTU in Prague (2020-2022)		278.46/10.98			
GACR	Active non-collocated vibration absorption for robots and mechanical structures (2021-2023)			2328/91.83	2544/100.36	2484/97.99
GACR	Novel concepts for analysis and design of nonlinear controllers and compensators of flexible and chained			353.3/13.94	353.3/13.94	353/13.93

	mechanical systems (2021-2023)					
MPO	DelPred: Database systems (2020-2022)			850/33.53		
MPO	Rotana: A new generation of machining tools made of advanced materials using laser technology in their production (2021-2022)			324.4/12.8	307.6/12.13	
EITM(FR)	FlexMan: Experiential Learning for Flexible and Resilient Manufacturing (2022-2023)				629.95/24.85	721.84/28.48
EC(BE)	PROBONO: The Integrator-centric approach for realising innovative energy efficient buildings in connected sustainable green neighbourhoods (2023-2024)					800/31.56
EITM(FR)	Self-Made: Self-management & device digitalization in manufacturing (2023-2024)					1307.07/51.56
GACR	Optimizing of distribution and orientation of the reinforcement using 3D printing technology in the ultra-high performance concrete (UHPC) (2023-2024)					4854/191.48
TACR	CANUT II: Centre for Advanced Nuclear Technologies II (2023-2028)					71400/2816.57
TACR	Chatbot UPV: Development of a communication assistant using artificial intelligence (2023-2024)					4525.37/178.52
TACR	FEFEFOV: Future strategies for environment friendliness of surface vehicles (2023-2025)					3786.32/149.36
TACR	Highly productive machines for digital factory environments (2023-2024)					1225/48.32
TACR	Material sustainability in additive manufacturing (2023-2023)					2012.5/79.39
Total		28947,06/1141,9	4105,71/161,96	7752,95/305,84	7844,95/309,47	95799,1/3779,06
Total as participant		192234,82/7583,23	90819/3582,6	93962,91/3706,63	82898,36/3270,16	328824/12971,36

Providers:

Provider acronym	Provider full name	Support (in thousands CZK/EUR) ²⁸				
		year 1	year 2	year 3	year 4	year 5
EC (BE)	European Commission	499338,89/19 697,79	59158,19/23 33,66	7988,42/315,13	26680,86/1052,5	166858,8/658 2,2
EITD (BE)	EIT Digital	1521/60				
EITM (FR)	EIT Manufacturing		5722.76/225. 75	8774.88/346.15	11777.21/464.58	11173.34/440 .76
EITU (ES)	EIT Urban Mobility				7382.31/291.22	
FFG (AT)	Austrian Research Promotion Agency	554.13/21.86				
GACR	Czech Science Foundation	8397.5/331.26	9771/385.44	13685.3/539.85	14034.59/553.63	67394/2658.5 4
HMP	Capital City of Prague			16666.68/657.4 6	496.46/19.58	
MPO	Ministry of Industry and Trade	39723.84/156 7.02	4381.88/172. 86	23414.16/923.6 4	5405.89/213.25	107477.39/42 39.74
MSMT	Ministry of Education, Youth and Sports	1309125.42/5 1642.03	45031.47/17 76.39	2467/97.32	2214.4/87.35	444511.51/17 534.97
MV	Ministry of the Interior	9537/376.21				
MZD	Ministry of Health	5201/205.17	361/14.24	525/20.71	13736/541.85	3369/132.9
TACR	Technology Agency of the Czech Republic	441514.25/17 416.74	54231.92/21 39.33	33656.48/1327. 67	57985.23/2287.39	121282.65/47 84.33
Total		2314913.03/9 1318.07	178658.22/7 047.66	107177.92/4227 .93	139712.95/5511.36	922066.69/36 373.44

Table 3.3.2 - Contract research activities

Client ²⁹	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
KM Robotics s.r.o.	Transfer of intellectual property	0/0	0/0	0/0	0/0	275/11
Národní vzdělávací fond, o. p. s.	SW processing for the needs of the STRATIN+ project	0/0	0/0	41/2	0/0	0/0
Rockwell Automation s.r.o.	Detailed design of discovery and security for SBDH, document the existing solutions of the "turbine restart problem", choose one solution for implementation into SBDH	1200/47	1200/47	1200/47	1200/47	1200/47

²⁸ Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

²⁹ If the client is from abroad, indicate in brackets the country of origin of the client.

GasNet, s.r.o.	Management and development of mathematical models and procedures	1000/39	1000/39	1000/39	1000/39	0/0
North Carolina State University Sponsored Programs (USA)	NCSU Subcontract No.: 2015-0098-01: project Fusion and Modeling Algorithms (FUMA)	4126/163	0/0	0/0	0/0	0/0
Magic Eye Inc. (USA)	Development of Calibration software for Magik Eye 3D sensor system, including creating depth map look up table.	275/11	281/11	258/10	0/0	0/0
Eaton Elektrotechnika s.r.o.	Laboratory Funding and Student Research Services Agreement	2000/79	2000/79	2000/79	2000/79	2000/79
CONCERTO AI (USA)	Invoice for work done as part of Joint Laboratory Agreement between Concerto AI Inc and CIIRC	2631/104	0/0	0/0	0/0	0/0
Magic Eye Inc.	Laboratory Funding and Student Research Services Agreement	328/13	160/6	280/11	300/12	200/8
Factorio Solutions, s.r.o.	Collaborative Research Agreement	568/22	800/32	600/24	600/24	600/24
POCKET VIRTUALITY a.s.	Based on the concluded Laboratory Funding and Student Research Services Agreement	260/10	500/20	520/21	162/6	0/0
WITS COMMERCIAL ENTERPRISE PTY LIMITED (ZAF)	Contract AHTR ESKOM RFP 4600052588, Study of salts and available metals, experimental testing of nitrate salts (melting behavior, conductivity and capacity), including data and report, experimental testing of feasible metals and their corrosion behavior including reports, preliminary design of the salt loop and interface with the He and steam loops. Incl. INI preparation & admission for RSA fellow and neutronics workshop, phase changing material feasibility study for the tanks.	1733/68	0/0	0/0	0/0	0/0
ADC Automotive Distance Control Systems GmbH (DEU)	Development Agreement - ADC Automotive Distance Control Systems GmbH	700/28	0/0	0/0	0/0	0/0
LEGO Production s.r.o.	Digital Prepack	373/15	0/0	0/0	0/0	0/0
ČEPS, a.s.	Analysis of the possibilities of using the energy DataHub in specific examples from the point of view of ČEPS (the Contracting Authority) - stage III. - preparation of the final study after incorporating comments	840/33	0/0	0/0	0/0	0/0
VOLKSWAGEN AG (DEU)	Project "Biosensorics", Research of the needs of the elderly drivers	2610/103	0/0	0/0	0/0	0/0
Huawei Technologies Duesseldorf GmbH (DEU)	Research and Development Agreement - HUAWEI TECHNOLOGIES Duesseldorf GmbH	3833/151	0/0	0/0	0/0	0/0
ROMEA, o.p.s.	Virtual reality of the camp in Lety u Písek from 1942 - 1943	826/33	0/0	0/0	0/0	0/0
LEGO Production s.r.o.	Pick&Place activities - robotic cell integrated conveyors system	890/35	0/0	0/0	0/0	0/0

ČEPS, a.s.	Study of the effect of changes in the production mix of the Czech Republic on the behavior of EC CR reliability standards	590/23	0/0	0/0	0/0	0/0
ČEPS, a.s.	Study of the effect of changes in the production mix of the Czech Republic on the behavior of EC CR reliability standards	800/32	0/0	0/0	0/0	0/0
LEGO Production s.r.o.	CTU CIIRC Talking LEGO characters development	510/20	0/0	0/0	0/0	0/0
Porsche Engineering Services, s.r.o.	Simulation in the TSN project 02 - 06/2019, Assist Motion Planner, Panamera - autonomous slalom, Simulation in OMNET++ (TSN project)	1751/69	0/0	0/0	0/0	0/0
ŠKODA AUTO a.s.	Smart Assistant - fast prototype	3310/131	0/0	0/0	0/0	0/0
LEGO Production s.r.o.	Digital model of Prepack component, Smart CM Next Steps, Smart CM Pilot, SMC - support	4000/158	5120/202	1840/73	1900/75	2 475/98
ŠKODA AUTO a.s.	FAS/ADAS for special groups of drivers, Motion Sickness, HMI for external communication - experimental studies, Innovative practices for assessing customer clinics, Implementation system design for data security within communication, Validation of Neteera measuring equipment	4914/194	3433/135	7103/280	5804/229	4 743/187
Airbus Defence and Space GmbH (DEU)	ooocMBSE consulting CTU	1276/50	0/0	0/0	0/0	0/0
Digiteq Automotive s.r.o.	Simulator PDC/PLA Sensors 3 pcs	114/4	0/0	0/0	0/0	0/0
ČEPS, a.s.	Calculation of balance limits for the maximum possible installed power of renewable sources for the EC CR for 2020	200/8	0/0	0/0	0/0	0/0
Česká zbrojovka Partners SE	Analysis of development in the field of Industry 4.0 and the concept of the CZ USA digital twin	174/7	411/16	0/0	0/0	0/0
CARDAM s.r.o.	Feasibility study - Optical detection of barrel curvature	242/10	0/0	0/0	0/0	0/0
ŠKODA AUTO a.s.	Project: TP - optimization of the layout of production hall	240/9	0/0	0/0	0/0	0/0
LEGO Production s.r.o.	LEGO Adaptive Final Pack - Automatization, Digitalisation program (Mapping of current material, process, info flow and describe future state. Define gap analysis and create roadmap	1025/40	0/0	0/0	0/0	0/0
ŠKODA AUTO a.s.	Development of PDC/PLA sensor simulation	180/7	0/0	0/0	0/0	0/0
Slovenská elektrizačná prenosová sústava, a.s.	Study "Determining the maximum values of the installed power of electricity production equipment connected to the ES SR in 2021 with regard to resource adequacy"	662/26	226/9	0/0	0/0	0/0
Slovenská elektrizačná prenosová sústava, a.s.	Optimization of the ES SR model in the UPLAN software environment	151/6	31/1	0/0	0/0	0/0
Digiteq Automotive s.r.o.	Simulator of PDC/PLA sensors	190/7	0/0	0/0	0/0	0/0

Medicalc software s.r.o.	Contract research service in the form of development and implementation of control mechanisms of clinical data, execution of control imports, testing and debugging service.	300/12	0/0	0/0	0/0	0/0
ŠKODA AUTO a.s.	Project "Bin Picking - Implementation of the 3rd phase of Bin Picking at the welding plant	1911/75	0/0	0/0	0/0	0/0
Euroforum Group,a.s.	Consulting activities in the field of Industry 4.0 and digital transformation	300/12	0/0	0/0	0/0	0/0
Cargotec Oyj (FIN)	Project Sway2	281/11	287/11	0/0	0/0	0/0
LEGO Production s.r.o.	Pick&Place on semi-automatic line	666/26		0/0	0/0	0/0
ŠKODA AUTO a.s.	Analysis of costs associated with collisions	1530/60		0/0	0/0	0/0
Středočeský kraj	Elaboration of the concept "Cities of the future in the territory of BVVP Milovice - Mladá"	0/0	826/33	0/0	0/0	0/0
ŠKODA AUTO a.s.	Control unit for opening trunk doors using ultrasonic sensors	0/0	240/9	0/0	0/0	0/0
PREdistribuce, a.s.	Analysis of the benefits and risks of the AMM concept and the architecture using SEGW	0/0	324/13	0/0	0/0	0/0
E.nest Energy a.s.	Drafting and creation of a techno-economic platform for modeling operating revenues and costs of a combined energy source (gas turbine and battery storage) in different operating modes.	0/0	250/10	0/0	0/0	0/0
Univerzita Karlova	Expansion with the multiplayer function	0/0	577/23		362/14	
The Greenest Company s.r.o.	AI consulting services	0/0	499/20	0/0	0/0	0/0
Porsche Engineering Services, s.r.o.	Integration of ADAS functions into the autonomous vehicle demonstrator, Work on the integration of ADAS functions into the demo	0/0	4274/50	0/0	0/0	0/0
Středočeské inovační centrum, spolek	Verification study for the location of the World of Rescuers in the area of the area owned by the Central Bohemian Region of Vrchbělá	0/0	100/4	0/0	0/0	0/0
Digiteq Automotive s.r.o.	RDK simulator with modified FW	0/0	11/0	18/1	0/0	0/0
MĚSTSKÁ ČÁST PRAHA 6	Creation and display of a 3D visualization of the statue of Maria Theresa with the immediate surroundings of the statue and people related to the realization with subsequent display in the web interface on a computer, tablet and phone, including audio recordings about Maria Theresa and the statue	0/0	199/8	0/0	0/0	0/0
JettyRobot s.r.o.	Development work for a mobile crawler robot	0/0	6/0	1132/45	0/0	0/0
ŠKODA AUTO a.s.	Automatic generation of voice instructions for operation	0/0	0/0	1445/57	0/0	0/0

Vysoká škola chemicko-technologická v Praze	Analysis of modern methods applied in the teaching of chemical disciplines	0/0	41/2	0/0	0/0	0/0
INAPA s.r.o.	Analysis of sensor usage for real-time production monitoring	0/0	120/5	0/0	0/0	0/0
LEGO Production s.r.o.	Validation of the "bin picking" concept for paper	0/0	4100/43	0/0	0/0	0/0
VarioTec s.r.o.	Creation of a 3D model of the ignition chamber for the conversion of a diesel engine to CNG drive	0/0	150/6	0/0	0/0	0/0
BIOKYB s.r.o.	Contract research and development services related to the preparation of communication interfaces and a service SW kit based on the HL7FHIR communication standard, especially FHIR Client and Server, FHIR DSTU 2 model for testing purposes in telemedicine.	0/0	385/15	0/0	0/0	0/0
JettyVision s.r.o.	Supply of technical analysis and technical report for mobile crawler robot	0/0	100/4	0/0	0/0	0/0
ŠKODA AUTO a.s.	Unit for opening trunk doors using ultrasonic sensors, Simulation of signals for car sensors, Extended simulation of Bosch UZS sensors	0/0	0/0	2813/111	0/0	0/0
NUVIA a.s.	Development of a server-terminal application for the purpose of managing data, users and already available applications for the operation of laboratory no. 101 in building TR24 including a communication channel with a particle accelerator to ensure the safety of operators and instruments.	0/0	0/0	380/15	0/0	0/0
Beckman Coulter Česká republika s.r.o.	Processing and interpretation of laboratory data, Description of the process of processing laboratory samples with the DxA 5000 system and development of a tool for simulating laboratory operations with these systems	0/0	0/0	20/1	0/0	115/5
LEGO Production s.r.o.	Measurement of the sound pressure level of the packaging line	0/0	0/0	75/3	0/0	0/0
LEGO Production s.r.o.	Noise reduction design - Payment 2 - After the report is made	0/0	0/0	550/22	0/0	0/0
VALEO AUTOKLIMATIZACE k.s.	2021_02_ČVUT_CIIRC_medusa service	0/0	0/0	260/10	0/0	0/0
Argotech a.s.	Image capture, beam detection and calibration points 1a + 1b of the offer - document Technical specification dated 21.01.2021, Determining the focus point	0/0	0/0	73/3	158/6	0/0
Porsche Engineering Services, s.r.o.	NanoRadar demo, RUR, ROS project externals	0/0	0/0	2213/87	0/0	0/0
O2 Czech Republic a.s.	Measurement and regulation project	0/0	0/0	289/11	0/0	0/0

ČEPS, a.s.	Advisory support in determining the conditions for connecting renewable resources	0/0	0/0	438/17	0/0	0/0
PPL CZ s.r.o.	Simulation of parcel transport operations	0/0	0/0	680/27	0/0	0/0
PREdistribuce, a.s.	Validation of the functional and technical parameters of the AMM infrastructure from the point of view of future PDS tasks	0/0	0/0	264/10	0/0	0/0
EG.D, a.s.	Design of the DLMS/COSEM data model for the definition of the communication interface between HES and electricity meters	0/0	0/0	330/13	0/0	0/0
DEKONTA, a.s.	Development of SW for automated processing of visual information about the rock environment	0/0	0/0	200/8	200/8	100/4
VALEO AUTOKLIMATIZACE k.s.	the Medusa project, Project: Preannotation	0/0	0/0	1423/56	0/0	0/0
Digiteq Automotive s.r.o.	Data Acquisition by LiDAR and Camera System	0/0	0/0	740/29	0/0	0/0
Airbus Defence and Space GmbH (DEU)	DISM WP2 - Reasoning on industrial system ontology	0/0	0/0	763/30	740/29	0/0
Beckman Coulter Česká republika s.r.o.	Data analysis, Tools for simulating laboratory operations in the DxA 5000 Fit system	0/0	0/0	200/8	190/7	0/0
Teplárna Otrokovice a.s.	Heating plant study	0/0	0/0	110/4	0/0	0/0
BIOKYB s.r.o.	Testing of test samples and verification of technical parameters of the system for telerehabilitation	0/0	0/0	245/10	0/0	0/0
LEGO Production s.r.o.	Noise measurement for CE platform PP99 and control noise measurement	0/0	0/0	0/0	209/8	0/0
CertiCon a.s.	Analysis, revision	0/0	0/0	0/0	2000/79	0/0
Porsche Engineering Services, s.r.o.	Machine learning, Jupiter - externists	0/0	0/0	0/0	1996/79	0/0
Teplárna Otrokovice a.s.	"Analysis of the applicability of TEPLÁTOR in the location of Otrokovice with regard to existing technologies and low required performance"	0/0	0/0	0/0	192/8	0/0
O2 Czech Republic a.s.	Measurement and regulation project, Measuring the speed of 5G mobile networks in Prague and Moravia	0/0	0/0	0/0	789/31	700/28
ZTS - výskum a vývoj, a.s.	"Regeneration of used batteries from electric cars", project code: 313012BUN5	0/0	0/0	0/0	4825/190	1 975/78
ŠKODA AUTO a.s.	Unit for opening the trunk door using UZ sensors - extension and route planning with recharging of the electric car	0/0	0/0	0/0	376/15	0/0
JettyVision s.r.o.	Belt development	0/0	0/0	0/0	80/3	0/0
Invest & Property Consulting, a.s.	Accumulation of energy from photovoltaic panels for the multifunctional house in Strašnice	0/0	0/0	0/0	140/6	0/0

LEGO Production s.r.o.	Offer for Energy Awareness - in Prepack - Phase 1, Energy-Awareness in Prepack Lines - Phase 2	0/0	0/0	0/0	584/23	563/22
Digiteq Automotive s.r.o.	Vision performance improvements in challenging scenarios of the eSmart project, CTU 3D Vision and image processing support	0/0	0/0	0/0	116/5	186/7
ŠKODA AUTO a.s.	Design and implementation of a system prototype, Estimation of the complexity of variants of planning parts, Offer for the design and implementation of methods	0/0	0/0	0/0	1270/50	573/23
ŠKODA AUTO a.s.	Offer for design and verification of functionality, Design and implementation of a system prototype for creation	0/0	0/0	0/0	573/23	1 188/47
Continental Automotive Czech Republic s.r.o.	Study on the optimization of robotic lines	0/0	0/0	0/0	0/0	173/7
TRIX Connections, s.r.o.	Validation of an intersection control model with two AGVs in the Testbed	0/0	0/0	0/0	320/13	0/0
Continental Automotive Czech Republic s.r.o.	End to end simulations CIIRC feasibility	0/0	0/0	0/0	625/25	0/0
Lumena s.r.o.	Development of an LED micrometer	0/0	0/0	0/0	18/1	18/1
Plzeňský Prazdroj, a. s.	CIIRC water and CO2 measurement project	0/0	0/0	0/0	500/20	78/3
EZconn Czech a.s.	Laser module edge detection	0/0	0/0	0/0	0/0	124/5
DEL a.s.	Based on your order no. 4500099556 We invoice you for processing CTU CIIRC - documentation	0/0	0/0	0/0	0/0	28 518/1 125
Porsche Engineering Services, s.r.o.	Order named "Externist", Order named "CIIRC Jiří Vlasák hourly billing", Jupiter Data Analytics in Q3	0/0	0/0	0/0	0/0	1 793/71
T-Mobile Czech Republic a.s.	Cooperation on order no. 4808134653, consulting services for Chatbot development needs for T-Mobile	0/0	0/0	0/0	0/0	330/13
LEGO Production s.r.o.	Control noise measurement	0/0	0/0	0/0	0/0	303/12
Porsche Engineering Services, s.r.o.	Job named "Externist"	0/0	0/0	0/0	0/0	624/25
ŠKODA AUTO a.s.	Virtual environment for simulations	0/0	0/0	0/0	0/0	466/18
Airbus Defence and Space GmbH (DEU)	Benchmarking Barrels "Variant generation and optimization"	0/0	0/0	0/0	0/0	245/10
Zentiva, k.s.	Cooperation in the field of development of intelligent conversational means	0/0	0/0	0/0	0/0	225/9
TP Holding, a.s.	Consultation - analysis of the problem and solution of optical quality control of plastic products	30/1	0/0	0/0	0/0	0/0
Klub přátel školy, Havířov-Prostřední Suchá, z.s.	MISS RENETA 2019 Virtual transformations and filming from a VR environment	48/2	0/0	0/0	0/0	0/0
CIEE Auxiliary Prague, zahraniční pobočný spolek	Organizing virtual reality courses	16/1	0/0	0/0	0/0	0/0
ČEPS, a.s.	Provision of service services for the month of May 2024 outside the period of increased support	242/10	110/4	96/4	222/9	904/36

Compo Tech PLUS, spol. s r. o.	Consultation on the development of a robot for winding carbon fiber on a horizontal mandrel	0/0	3/0	27/1	0/0	0/0
Královéhradecký kraj	Training on the topic of digitization of teaching using online tools for teachers and students	0/0	93/4		0/0	0/0
Man Truck and Bus, SE	SW license	0/0	0/0	811/32	0/0	0/0
Foxconn Technology CZ s.r.o.	Expert opinion on the system of mobile robots	0/0	0/0	92/4	0/0	0/0
Argotech a.s.	Analysis of X-RAY images for the detection of voids in a solder joint	0/0	0/0	5/0	0/0	0/0
SLAVATA INTECH, s.r.o.	Consulting and consulting activities in the field of robotics	0/0	0/0	300/12	0/0	0/0
BIOKYB s.r.o.	Grant of license - utility model no. 34862	0/0	0/0	350/14	0/0	0/0
Garrett Motion Czech Republic s.r.o.	Consulting services - RTOS	0/0	0/0	150/6	0/0	0/0
ŠKODA AUTO a.s.	Agreement on the financing of a joint workplace	0/0	0/0	41/2	486/19	486/19
ADOBE INC. (USA)	Consulting work on Research on Video Understanding, Tech Transfers into Related Products, and Advising on Recruiting, to be performed solely by Professor Josef Sivic	0/0	0/0	0/0	1807/71	2 036/80
ROHDE & SCHWARZ závod Vimperk, s.r.o.	Cooperation with the company ROHDE & SCHWARZ	0/0	0/0	0/0	0/0	60/2
ČEZ, a.s.	Analysis carried out according to contract no. 4102662502, IsppRustLink SW module development	0/0	0/0	0/0	0/0	399/16
Eaton Elektrotechnika s.r.o.	Provision of commercial use of part no. 4 and 5 results of the project "Flexible AC/DC microgrid for apartment buildings" number TK02020005	0/0	0/0	0/0	0/0	232/9
TRIX Connections, s.r.o.	Prototype 5G IoT Gateway device	0/0	0/0	0/0	0/0	784/31
TRIX Connections, s.r.o.	CTU CIIRC - development of a material flow simulation model	0/0	0/0	0/0	0/0	890/35
Národní centrum kompetence – multiple beneficiaries	CNC machining, prototyping, testing, optimization of machining processes	883/35	947/37	1079/43	924/36	956/38
Centrum města budoucnosti multiple beneficiaries	Services of the Centre of City of the future	584/23	402/16	177/7	262/10	206/8
Consultations, projects - multiple beneficiaries	Consultations, analyses, studies	255/10	180/7	43/2	475/19	75/3
Národní centrum Průmyslu - multiple beneficiaries	Services of the National Center for Industry 4.0	3898/154	4136/163	4113/162	4757/188	6 947/274
Národní centrum Průmyslu multiple beneficiaries	Digital audit services - National Center for Industry 4.0	0/0	0/0	60/2	0/0	0/0
Národní centrum Stavebnictví - multiple beneficiaries	Services of the National Center for Construction 4.0	0/0	0/0	0/0	2500/99	2 507/99

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the evaluated period, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts³⁰, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

CIIRC CTU has selected the following 10 research results with a considerable impact on society:

1. Automated driving of Porsche Panamera
2. Second-life Batteries (Collaboration with ZTS - VÝSKUM A VÝVOJ, a.s.)
3. Rockwell Automation
4. Scheduling Algorithms for Time-Sensitive Networking (for Huawei)
5. Foot-activated Opening of the Fifth Door Using Machine Learning and Ultrasonic Sensors (for Ško Auto)
6. Method for an accurate automated non-invasive measurement of blood pressure waveform and apparatus to carry out the same (Patent US10251567. 2019-04-09)
7. Prototype of robotic arm "Pipeťák"
8. TEPLATOR: District heating source utilizing irradiated nuclear fuel
9. VENT-CONNECT: Machine Learning-Based System for Remote Monitoring in Intensive Care Units
10. DigiAudit: Technologically independent tool for Digital Maturity Assessment

Automated driving of Porsche Panamera

Reference to project (3.3.1/3.3.2): Simulation in the TSN project 02 - 06/2019, Assist Motion Planner, Panamera - autonomous slalom, Simulation in OMNET++ (TSN project)

The Porsche Panamera Automated Driving system is an advanced solution for automated car functionality, focusing on slalom maneuver trajectory planning around traffic cones. Using optimization techniques and Logic-Based Benders Decomposition, it plans the car's path. The system relies on sensors such as a monocular camera, LiDAR, and differential GPS to detect cones and position the car precisely in real-time. Executed on the NVIDIA TX2 platform, the system integrates with the car's Electronic Control Units via CAN and FlexRay buses, ensuring smooth control during high-performance maneuvers, like U-turns and lane changes.

Impacts on Society: The system advances autonomous driving technology, improving safety and performance on the road. It reduces dependence on human drivers for repetitive tasks like car testing, making the process more efficient and less error prone. Automated testing fosters innovation in car development, leading to safer, more reliable vehicles.

Use of results: The trajectory planning system is integrated into the Porsche Panamera to test the vehicle's dynamics in various conditions. It also contributes to the development of driver assistance systems for other vehicles within the Volkswagen Group.

³⁰ See Terms definition.

Potential and factual users: Automotive manufacturers, R&D teams, and organizations focused on vehicle safety and automation are key users. Testing facilities and professional drivers evaluating vehicle performance also benefit from the system.

Measurable economic impacts: Automation in vehicle testing reduces manual testing costs and accelerates the development cycle, leading to faster time-to-market. The system has helped Porsche secure contracts with the Volkswagen Group and other companies, enhancing its competitive edge.

Gender dimension: Automated driving technologies offer opportunities for a more diverse workforce, encouraging women's participation in automotive engineering and technology.

Sustainability aspects: The system optimizes driving, reduces human intervention, and enhances testing efficiency, minimizing environmental impact and improving safety, leading to fewer accidents and resource waste.

Second-life Batteries (Collaboration with ZTS - VÝSKUM A VÝVOJ, a.s.)

Reference to overview of results (3.4.1): Virtual commissioning of a battery dismantling factory and visualisation of the process using virtual reality; Design, verification and optimization of battery transport options using AGVs
Reference to project (3.3.1/3.3.2): "Regeneration of used batteries from electric cars", project code: 313012BUN5

A collaborative effort between CIIRC and Slovak company ZTS - VÝSKUM A VÝVOJ, as part of the IPCEI framework, has led to the development of a sustainable solution for managing used electric vehicle (EV) batteries. As electric vehicle adoption grows, managing used EV batteries becomes more important. Typically, EV batteries are replaced when their capacity drops below 80%, but traditional recycling methods, such as crushing and smelting, do not allow to produce new batteries. The "Second-life Batteries" solution offers an alternative by evaluating individual battery modules' condition and repurposing them for secondary applications. This involves retrofitting with advanced automation and AI, providing reliable storage options and enhancing energy security and grid stability.

Impacts on Society: The project helps to address the environmental challenges of battery waste while supporting the transition to sustainable energy solutions. It reduces the need for new raw materials, cuts down on waste, and lowers the environmental impact of battery production.

Use of results: Repurposed batteries are used in stationary storage systems to support renewable energy integration, providing stable energy storage that contributes to grid stability and energy security.

Potential and factual users: Energy companies, renewable energy providers, and industries dependent on battery storage solutions are key users of the technology. It also benefits companies in the recycling and energy sectors.

Measurable economic impacts: Repurposing used batteries offers cost savings compared to producing new ones, promoting a circular economy in the energy sector. This approach can reduce production costs for industries relying on storage solutions.

Gender dimension: Neutral.

Sustainability aspects: The solution reduces the need for new raw materials and provides efficient storage solutions that aid renewable energy integration, supporting the transition to a low-carbon economy.

Rockwell Automation: Semantic Big Data Historian (SBDH)

Reference to project (3.3.1/3.3.2): Detailed design of discovery and security for SBDH, document the existing solutions of the "turbine restart problem", choose one solution for implementation into SBDH

Within the RA-DIC laboratory, SBDH was developed as an enabler of flexible production. It features a Plug&Play cyber-physical system (CPS) concept and Apache Spark for rapid data stream processing from

shop floor sensors. Current research focuses on using OPC UA discovery to enable Plug&Play deployment of SBDH as a cloud-CPS and for dashboarding.

Impacts on society: The research advances flexible and intelligent manufacturing by enabling Plug&Play CPS components. This helps industries adapt to changing demands, reducing downtime and improving efficiency. It supports Industry 4.0 by enhancing automation, interoperability, and data-driven decision-making, leading to job creation in high-tech fields and improved working conditions.

How the results are used: The Plug&Play CPS concept allows seamless device integration into production lines without manual configuration. Implemented in the RA-DIC lab, SBDH processes real-time sensor data using Apache Spark for fast data handling, optimizing processes, detecting faults, and improving performance.

Potential and factual users:

- **Manufacturers:** Benefit from automatic device integration and real-time data analysis.
- **Power Plants:** Tested on a hydroelectric plant to optimize turbine performance.
- **Automation Companies:** Used in smart factories and IoT-enabled systems.
- **Academia and Researchers:** Valuable for AI-driven industrial research and big data processing.

Measurable economic impacts:

- **Reduced downtime:** Automatic device discovery eliminates manual configuration delays.
- **Increased efficiency:** Real-time processing ensures quick fault detection.
- **Cost savings:** Automation minimizes manual labour, reducing operational costs.
- **Scalability benefits:** Smart manufacturing systems can expand without major reconfigurations.

Gender dimension: Neutral.

Sustainability aspects:

- **Energy efficiency:** Real-time monitoring reduces energy consumption.
- **Reduced resource waste:** Optimized scheduling minimizes material waste.
- **Sustainable Industry 4.0 practices:** Enhanced interoperability extends device lifespans and reduces electronic waste.

Scheduling Algorithms for Time-Sensitive Networking (for Huawei)

Reference to project (3.3.1/3.3.2): Research and Development Agreement - HUAWEI TECHNOLOGIES Duesseldorf GmbH

Time-Sensitive Networking (TSN) is a set of standards for time-sensitive data transmission over deterministic Ethernet. It enables converged networks with real-time Audio/Video Streaming and control streams used in automotive and industrial settings. To meet hard real-time requirements, TSN requires an algorithm to synthesize time-triggered message schedules. However, the standard does not include such an algorithm. Our work provides efficient, scheduling algorithms providing results compliant with TSN for safety applications demanding time determinism and high throughput, such as automated cars, robotics, and industrial control.

Impacts on Society: Reliable real-time communication is crucial for safety-critical applications like steer-by-wire, brake-by-wire, and other high-determinism control systems affecting daily life.

Use of results: The TSN scheduling algorithm (IEEE 802.1Qbv compliant) was tested and integrated by Huawei Munich, a leading TSN switch producer. They use it as a key component of their TSN network configuration tool. In tests, two TSN switches and an IXIA traffic generator enabled communication between one PLC and 13 actuators. We obtained US patent US20220021625.

Potential and factual users: Automotive and aerospace companies, device vendors, R&D teams, and organizations working on dependable systems.

Measurable economic impacts: Our algorithm enhances TSN efficiency by reducing bandwidth usage and end-to-end latency, lowering costs for building and operating devices. Direct revenue from this contract for CTU CIIRC was approximately 4M CZK.

Gender dimension: Deterministic real-time communication enables remote operation of machines, robotics, and virtual environments, supporting women and caregivers by providing remote work opportunities in traditionally on-site industries like manufacturing, healthcare, and engineering.

Sustainability: Efficient TSN scheduling reduces latency and congestion, improving data transmission efficiency. This lowers industrial energy consumption and enhances real-time coordination of decentralized energy sources.

Foot-activated Opening of the Fifth Door Using Machine Learning and Ultrasonic Sensors (for Škoda Auto)

Reference to project (3.3.1/3.3.2): Control unit for opening trunk doors using ultrasonic sensor;; Unit for opening trunk doors using ultrasonic sensors; Simulation of signals for car sensors, Extended simulation of Bosch UZS sensors; Unit for opening the trunk door using UZ sensors - extension and route planning with recharging of the electric car

Many cars allow opening the trunk door from outside by “kick” motion below the trunk. Currently, these systems use a capacitive sensor installed specifically for this purpose. For many reasons, these sensors are not reliable enough and increase vehicle cost. In cooperation with Škoda Auto, this work proposed, implemented and evaluated a solution which allows opening the door by reusing the ultrasonic sensors for parking assistants. Sufficient performance and reliability were achieved by using machine learning techniques. Specifically, we implemented hardware and software solutions that used the VGG-inspired Convolutional Neural Network architecture to distinguish the kick that should open the fifth door, from the other movements of people and objects behind the car.

Impacts on Society: The system showed that it is possible to decrease cost and increase reliability of a function present in many common cars. This will allow putting that function into more vehicles, including lower-class ones, simplifying the lives of more people. Increased functionality and lower costs will also help the European automotive sector in general.

Use of results: The system was delivered to Škoda Auto and was presented in technology fair in Wolfsburg (Volkswagen headquarters) with positive response. The results should be further developed internally by Škoda/VW development teams.

Potential and factual users: Automotive manufacturers, R&D teams, organizations focused on comfort vehicle functions.

Measurable economic impacts: Cost reduction from the replacement of capacitive sensors from vehicles with ultrasonic sensors already used for other purposes, by using more clever data processing algorithms, which are obviously cheaper to deploy than hardware sensors.

Gender dimension: Neutral, helping both genders perform common tasks.

Sustainability aspects: The system simplifies vehicles’ mechanical design while providing better functionality. The lower number of mechanical parts has a positive effect on the environment in many phases, from vehicle manufacturing to its decommissioning and recycling.

Method for an accurate automated non-invasive measurement of blood pressure waveform and apparatus to carry out the same (Patent US10251567. 2019-04-09)

Reference to project: Apparatus for automatic analysis of blood pressure waveform and evaluating hemodynamic parameters of the cardiovascular system (MPO TRIO, 2016)

The patented method (US Patent No. 10251567 B2) enables accurate, automated, and non-invasive blood pressure waveform measurement, offering a safer alternative to traditional invasive catheter-based techniques. The system uses a cuff with at least two pressure sensors, including a differential pressure

sensor, to capture suprasystolic pressure pulsations. An electro pump inflates and deflates the cuff in a controlled manner, while a microprocessor filters signals, digitizes data, and calculates cardiovascular hemodynamic parameters. The device supports real-time monitoring and data transmission to external systems.

Positive Impacts on Society: This innovation improves cardiovascular diagnostics by providing a safer and more accessible method for monitoring blood pressure. It is particularly beneficial for elderly and high-risk individuals, enabling home-based monitoring and empowering patients to take control of their health. Early detection and management contribute to better patient outcomes and quality of life.

Use of results: The technology integrates with eHealth systems for real-time data transmission and remote monitoring by healthcare professionals. Validated in clinical studies, its accuracy matches invasive methods, making it a reliable tool for advanced cardiovascular diagnostics.

Potential and Factual Users:

- **Patients:** Especially those at high cardiovascular risk requiring frequent monitoring.
- **Clinicians:** Enhances cardiovascular assessment and disease management.
- **Researchers:** Provides a non-invasive method for cardiovascular studies.
- **Hospitals & Home Healthcare Providers:** Enables cost-effective, remote patient monitoring.

Measurable Economic Impacts: Reducing the need for expensive invasive procedures lowers healthcare costs. Supported by a **2M CZK grant (TACR Program Epsilon)**, the device's economic potential is recognized, fostering growth in the healthcare technology market.

Gender Dimension: The device is universally applicable, providing equal benefits regardless of gender. Its accessibility facilitates widespread use, overcoming barriers associated with clinic-based diagnostics.

Sustainability Aspects: Home-based monitoring minimizes hospital visits, reducing resource consumption and environmental impact, contributing to a more sustainable healthcare system.

Prototype of a robotic device "Pipeťák"

Reference to project (3.3.1/3.3.2): Pipetak: Automated robotic device for tube refilling during testing at COVID-19 (2020-2020); NCC CAI: National Centre of Competence – Cybernetics and Artificial Intelligence (2019-2022)

In March 2020, during the COVID-19 pandemic, CIIRC CTU developed an innovative robotic solution known as "Pipeťák" in just two weeks. Based on the KUKA LBR IIWA robot (€70k), this robotic station automated pipetting for COVID-19 testing, reducing manual workload and increasing efficiency. Pipeťák added the master mix - essential for virus detection - to patient samples, a task traditionally performed manually with high precision. Automating this process minimizes human error and accelerated testing. CIIRC teams, in partnership with other Czech institutions such as the Institute of Nuclear Physics (ÚJF) of the Czech Academy of Sciences, designed, built, and deployed the fully functional device. However, Pipeťák was a temporary solution. After nine months, hospitals acquired high-throughput machines, making it obsolete. It was then disassembled, and its parts returned to research.

Impacts on society: Pipeťák showcased the potential of scalable robotic solutions in healthcare, promoting sustainable approaches, and demonstrating rapid deployment and short-term scalability to manage crisis workloads.

Use of results: With the robot's assistance, the capacity of tested samples increased from dozens per day to approx. - 700 samples per day. Pipeťák alleviated the manual burden on laboratory staff, allowing them to focus on complex tasks.

Potential and factual users: The "Pipeťák" robotic station was deployed in Laboratory of Clinical Microbiology at Na Bulovce Hospital in Prague and used for nine months.

Measurable economic impacts: This solution contributes to laboratory efficiency, cost savings, and long-term benefits for healthcare automation. The automation reduced the hours required for manual testing, which requires skilled laboratory technicians.

Gender dimension: Designed for universal use, benefiting all individuals.

Sustainability aspects: Automating the pipetting process reduces the consumption of pipette tips and reagents, contributing to more sustainable laboratory practices. The ability of a research lab to provide a solution swiftly, outpacing commercial development, is sustainable.

TEPLATOR: District heating source utilising irradiated nuclear fuel

Reference to project (3.3.1/3.3.2): TEPLATOR: Reactivity control system design (2021-2023)

Description: Traditional nuclear reactors use only 5% of fuel energy, leaving 95% in spent assemblies. TEPLATOR, developed by CIIRC CTU in collaboration with FEE University of West Bohemia, offers an affordable heating alternative to coal and gas plants. It may use already irradiated nuclear fuel (within regulatory and design limits) from commercial light waterpower reactors. The concept was developed and patented in 2020.

Impacts on society: Producing no CO₂, TEPLATOR can upcycle spent nuclear fuel and generate heat more cheaply than burning coal or natural gas.

Use of results: The project's potential has attracted private investors, promising significant financial backing, and has garnered international interest, notably by the city of Slavutych in northern Ukraine.

Potential and factual users: The solution is particularly suitable for countries that have thousands of nuclear fuel assemblies stored either in intermediate storage or in spent fuel pools.

Measurable economic impacts: With an output of 50-150MW, the TEPLATOR can produce heat at a price of up to 4 EUR/GJ. The investment cost for the construction of the TEPLATOR plant is less than €30 million (2019 prices). Current Czech wholesale heat prices are 24-80 EUR/GJ. There are dozens of district heating networks in Czechia and hundreds in Europe.

Gender dimension: The device is designed for universal use, benefiting all individuals regardless of gender.

Sustainability aspects: The ability to reuse nuclear fuel, which is currently stored in secure intermediate storage facilities where there are about 20,000 spent assemblies in the Czech Republic, is unique. Independence and security of fuel supply are assured as TEPLATOR consumes only 55 fuel assemblies a year. By implementing the idea of energy storage into the TEPLATOR design, it can provide an uninterrupted supply of heat for medium to large cities.

VENT-CONNECT: Machine Learning-Based System for Remote Monitoring in Intensive Care Units

Reference to project (3.3.1/3.3.2): VentConnect2: CheckMyScreen: Optimising Human-Device Interaction and Improving Safety of Mechanical Ventilation by Innovative Autonomous Alert System: Randomised Controlled Cross-over Trial (2022-2025); VENT-CONNECT (2021-2022)

VENT-CONNECT is an advanced patient-ventilator asynchrony (PVA) detection system developed at CIIRC CTU in collaboration with FEE CTU and the 3rd Faculty of Medicine, Charles University. It enhances mechanical ventilation management by detecting and classifying PVAs in real-time directly from ventilator screen data. Using deep learning algorithms trained on expert-annotated breath waveforms, the system provides immediate alerts to clinicians, enabling timely intervention, something previously unavailable.

Impacts on society: VENT-CONNECT improves the quality of care at Intensive Care Units (ICU) by increasing patient safety via the reduction of complications related to mechanical ventilation, such as ventilator-induced lung injury and unnecessary sedation. Optimizing ventilator settings shortens ICU stays and enhances patient outcomes.

Use of results: The system delivers real-time alerts via a dedicated interface, notifying clinicians of significant PVAs and their severity. Integrated into ICU workflows, it aids healthcare providers in data-driven decision-making.

Potential and factual users: Designed for ICU clinicians, including intensivists, anesthesiologists, and nurses, VENT-CONNECT's user-friendly interface ensures accessibility for professionals with varying expertise in mechanical ventilation management.

Measurable economic impacts: By reducing ICU stay duration and mechanical ventilation dependence, VENT-CONNECT lowers hospital costs. It also minimizes alarm fatigue and streamlines workflows, improving operational efficiency and reducing staffing burdens in critical care.

Gender Dimension: The system applies universally to all mechanically ventilated patients, regardless of gender.

Sustainability aspects: VENT-CONNECT enhances ICU sustainability by optimizing ventilation management, reducing resource and medication consumption, and lowering the environmental footprint of prolonged ICU stays. Its integration into healthcare infrastructure supports long-term scalability and sustainability in critical care.

DigiAudit: Technologically independent tool for Digital Maturity Assessment

Reference to project (3.3.1/3.3.2): Digital audit services - National Center for Industry 4.0

DigiAudit is an innovative tool developed by the CIIRC team and delivered by NCI4.0 to assess and enhance the digital maturity of companies, particularly SMEs. It provides a comprehensive analysis of a company's digitalization status, identifying strengths and areas for improvement to support effective digital transformation.

The tool is available online for free, starting with a self-assessment evaluating the company from multiple dimensions such as organization, technology, and processes. After completing the online assessment, the company automatically receives a generated report containing a comprehensive evaluation of its level of digital maturity, a heatmap of development opportunities, and recommendations for key areas of further digitalization. Companies can then opt for expert consultations or an in-depth onsite investigation to align digital transformation with their specific needs. In 2022, the Czech Ministry of Industry and Trade approved DigiAudit as a mandatory attachment for applications under the Digital Enterprise National Recovery Plan, highlighting its credibility and adoption.

Impacts on society: DigiAudit helps companies navigate new technologies and define digital strategies, ensuring informed investment decisions and increased competitiveness.

Use of results: By 2023, a total of 312 entities had completed the DigiAudit. Aggregated participant data serves as a benchmark for assessing future DigiAudit participants and it is used in further analytical outputs such as the Analysis of Czech Industry or as content for professional conferences.

Potential and factual users: Manufacturing SMEs aiming to digitize but facing financial and technological barriers.

Measurable economic impacts: DigiAudit helps companies in their competitiveness, sustainability and efficiency, avoiding unnecessary investments and fostering job creation in the digital sector.

Gender dimension: The tool is designed to be universally applicable, serving all companies regardless of the gender composition of their workforce.

Sustainability aspects: Digital transformation facilitated by DigiAudit can lead to the development of new, sustainable business models alongside efficiency.

Table 3.4.1 - Overview of research results in the period under evaluation

Type of result ³¹	Year of application	Name
Software	2019	Automated driving of Porsche Panamera Authors: Záhora, J.; Sojka, M.; Hanzálek, Z.
Functional Samples	2023	Virtual commissioning of a battery dismantling factory and visualisation of the process using virtual reality; Authors: Jochman, T.; Souček, J.; Štefan, J.; Strakošová, S.; Šustr, V.; Burget, P. Design, verification and optimization of battery transport options using AGVs Authors: Dvořák, F.; Jochman, T.; Burget, P. et al.
Article/Conference paper	2019	Rockwell Automation Information Exchange and Integration Within Industrial Automation Domain Authors: Jirkovský V.; Obitko M.; Kadera P.
Article/Conference paper	2020	Requirements for Information Modelling in Manufacturing Authors: Jirkovský V.; Obitko M.; Šebek O.; Kadera P.
ASW - Software	2019	Scheduling Algorithms for Time-Sensitive Networking Authors: Vlk, M.; Brejchová, K.; Hanzálek, Z.
Software	2021	Foot-activated Opening of the Fifth Door Using Machine Learning and Ultrasonic Sensors Authors: Bouška, M.; Procházka, T.; Sojka, M.; Hanzálek, Z.
Patent	2019	Method for an accurate automated non-invasive measurement of blood pressure waveform and apparatus to carry out the same (Patent US10251567. 2019-04-09) Authors: Fabián, V.; Křemen, V.; Dobiáš, M.
Prototype	2020	Prototype of robotic arm "Pipeťák" Authors: Smutný, V.; Hlaváč, V.; Krsek, P.; Seifert, D.; Uller, M.; Běhal, R.; Mík, A.; Sejkot, R.
Utility Model	2023	A system for controlling the reactivity of small modular reactors by changing the moderator level (Czechia. Utility Model CZ 37070. 2023-05-23) Authors: Kořínek, T.; Lovecký, M.; Škarohlíd, J.; Škoda, R.; Vilímová, E.
Utility Model	2023	A mechanical reactivity control system for small modular reactors (Czechia. Utility Model CZ 37149. 2023-06-23) Authors: Hartman, P.; Zuda, M.; Jochman, T.; Kořínek, T.; Lovecký, M.; Peltan, T.; Škoda, R.; Vilímová, E. et al.
Proceedings Paper	2023	A Study of Integration of Liquid Air Energy Storage (LAES) Technology to Nuclear District Heating Facility Teplator; Škarohlíd, J.; Burian, O.; Škoda, R.; Abushamah, H.A.S.
Article	2023	Design and Operation Optimization of a Nuclear Heat-Driven District Cooling System Authors: Abushamah, H.A.S., Burian, O., Škoda, R.
Article	2022	Nuclear energy for district cooling systems – Novel approach and its eco-environmental assessment method; Authors: Saleh Abushamah, H.A., Škoda, R.
Utility model	2022	VENT-CONNECT: Machine Learning-Based System for Remote Monitoring in Intensive Care Units: Monitoring system for observing the patient's health status, Czechia. Utility Model CZ 36317. 2022-08-30. Authors: Vysloužilová, L.; Macík, M.; Samek, M.; Kubr, J.
Other Methodology (not meeting RIV conditions)	2021	DigiAudit: Technologically independent tool for Digital Maturity Assessment

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

³¹ Specify the specific type of result. Add rows as needed.

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)³², providing a brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).³³

Additionally, the evaluated unit shall briefly comment on the funds received during the evaluation period from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided on the annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization. – 5 examples

Self-assessment:

CIIRC CTU effectively transforms its research results into practical applications by establishing strong collaborations with a **diverse range of users**, which can be categorized as follows:

1. **By type of deployment:** Both **technology providers** integrating advanced solutions into their products and services to enhance their competitive edge, and **end users** optimizing operations, improving efficiency, and driving digital transformation.
2. **By size:** Organizations of **all sizes**, from start-ups and small to medium-sized enterprises (SMEs) to large corporations. Also, individuals, including professionals, staff, and the general public.
3. **By sector:** The **private/commercial sector**, including industries such as the automotive, aerospace, manufacturing, construction, logistics, healthcare etc., as well as the **public sector**, encompassing administration, universities, research institutions, professional associations and networks.
4. **By geographical scope:** Entities acting on local, national, European, international and global levels.

Through these collaborations and the broader range of users - including industry, academia, public institutions, civil society, and the general public - CIIRC CTU successfully bridges the gap between research and practical application, fostering innovation across multiple domains.

Methods for seeking new users:

1. **Direct and indirect marketing** through online (website, newsletters, social media etc.) and offline tools.
2. **Participation at fairs & events:** CIIRC's teams showcase their expertise and outcomes at the most relevant events in the field, summits and conferences.
3. **Organizing events, incl. hands-on workshops, training and Open Days** to attract both professionals and the general public.
4. **Customized user stories and best practices** to attract new clients – accelerated also thanks to CIIRC's key role as a solution provider through EDIH and TEF EU-supported schemes.
5. **Project and scientific dissemination**

Methods of commercialization of R&D&I results:

³² In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

³³ If the commercialisation of R&D&I results is carried out in this way.

1. Collaborative research with the potential for commercialization

Around 75% of external CIIRC's industrial funding comes from collaborative research, often supported by public funding sources such as the Technology Agency of the Czech Republic and EU programs.

2. Contract research

An efficient transfer method, particularly in long-term collaborations where companies sign repeated one-year contracts.

3. Joint Research Labs

Establishing joint research labs with industry partners such as Škoda Auto, Rockwell Automation, and Eaton ensures sustained funding and allows for the ongoing development of advanced technologies.

4. Start-up/spin-off

Several start-ups that originated at CIIRC (Trix Connections, Prometheus) collaborate on research and commercialization, even often without direct CTU ownership. Spin-offs involving CTU shares are now being established thanks to newly implemented legislative norms and enhanced support from the university.

5. Licensing of the IPR

While software licensing remains complex in the Czech Republic, CIIRC has successfully negotiated a few high-value agreements despite the demanding process leading on that (e.g. 8M CZK deal with Wienerberger requiring legal support and involvement of the CEO in Vienna in 2024/2025).

CIIRC secures non-public funding mainly through industrial contracts and licensing agreements. For example, consultation and pilot studies for the eRobot project generated revenue through direct collaborations with large automotive companies. Additionally, the commercial success of TRIX Connections or the bricklaying robot project contributes to sustained financial support beyond public grants. A detailed breakdown of non-public resources is provided in table 3.5.1.

Selected examples of technology and knowledge transfer:

1. Blumenbecker Prag – eRobot

Collaborative research project

Reference to project: Technology for industrial robots integration into production systems based on Industry 4.0 (2016-2019)

Within the eRobot project with company Blumenbecker Prag, CIIRC developed a tool for robotic cell designers and programmers capable of optimizing production rate and energy consumption of robotic cells. The tool communicates with a digital twin of a robotic cell designed in Siemens Process Simulate, a design tool used by the EU's main car manufacturers. The tool can automatically read all operations the robots do and, by a smart interplay between optimization and simulation, obtain new parameters of robotic programs such that the tool finds a solution minimizing the cycle time of the cell, energy consumption or the cycle time.

For this achievement, CIIRC and Blumenbecker Prag received the Industry 4.0 Award from the Confederation of Industry of the CR in 2020.

As the partner company could not commercialize the project result (due to some internal issues), CIIRC commercialized the tool for other companies. The first know-how transfer contract was with Continental, helping save 26% of energy on production lines. Another contract with Purem Rakovník (Eberspächer group), led to an optimization method that works without a digital twin. The solution is now used across the entire group.

2. Lego – Smart Counting Machines

Contract research

The collaboration between the CIIRC and LEGO focused on reducing the dependence on experienced counting machine operators, who were difficult to hire and required extensive training. The key innovation was an AI-powered solution seamlessly integrated into LEGO's industrial practice to automate the complex parameter-setting process for vibrating bowls used in Smart Counting Machines on 4PP Lines.

The AI-driven "Virtual Operator" learned optimal machine settings by observing how experienced operators manually tuned the counting machines. It analyzed performance data from different setups, identifying the most efficient configurations and continuously improving through machine learning. This approach allowed the system to autonomously adjust parameters in real time, optimizing performance and reducing the need for manual intervention.

The solution utilized a hybrid IT architecture combining EDGE and Cloud technologies. The EDGE component processed data locally for immediate response and high reliability, while Cloud technologies enabled knowledge sharing across production lines, creating a global and continuously evolving optimization framework.

By embedding AI into industrial practice, the system not only reduced manual labor dependency but also enhanced efficiency, adaptability, and long-term sustainability. With LEGO retaining full intellectual property rights (the project fully funded by industry), the project showcased the Czech Republic's leadership in AI-driven manufacturing innovation.

3. Škoda Auto - The Automotive R&D 4.0 Laboratory

Joint research lab

The Automotive R&D 4.0 Laboratory operates as a joint workplace of the Czech Technical University and the Technical Development division of ŠKODA AUTO a.s (TD Š-A). It focuses on research and pre-development of systems and functions for the automotive industry. The laboratory is equipped with state-of-the-art technologies, including an advanced vehicle driving simulator featuring immersive projection and motion systems, VR tools, car HIL systems, 3D printers, eye-tracking devices, and psycho-physiological measurement instruments.

In the years 2019-2023, the laboratory has conducted extensive work in multiple areas, including the development of partial car systems, interior components, and entire car unit concepts, as well as testing and evaluating HMI (Human-Machine Interface) solutions, including user interfaces (UI) and graphical user interfaces (GUI). It has also focused on the optimization and development of future interior design concepts, the assessment and refinement of UI and GUI elements for assistance systems, and user acceptance studies in automotive environments using advanced simulators.

For TD Š-A., the laboratory has designed completely new user interface elements for vehicle systems, following the entire development cycle—from initial design and prototype implementation to user testing in a simulator.

4. TRIX Connections – CIIRC RP95-3D – protective half mask with replaceable filters

Start-up/Spin-off

Reference to results: Respiration mask. Industrial Design CZ DM/207461. 2020-03-18; Respiration mask. European Union Intellectual Property Office (EUIPO). Industrial Design 7757083. 2020-03-31; Half – mask with replaceable filters prototype;

In March 2020, in response to the COVID-19 protective equipment shortage, CIIRC developed and certified the "CIIRC RP95-3D" half-mask in just one week. Manufactured with HP MultiJet Fusion 3D printers and a replaceable P3 filter, it provided superior protection to FFP3 respirators, offering the highest level of protection (P3), essential for healthcare professionals and high-risk individuals. This effort earned CIIRC prestigious awards, including the European Citizen's Prize (2020) from the European Parliament and an award from the R&D&I Council of the Czech Republic.

To address local shortages, CIIRC adopted a distributed production model, releasing the 3D-printing data under a free license for non-commercial use. Over 100 institutions across 30 countries, including the U.S. Navy and NATO, were able to produce the masks locally, demonstrating international collaboration. This strategy exemplified rapid international dissemination of life-saving technology in crisis response, offering substantial societal benefits.

IPR were licensed to the spin-off company TRIX Connections (exclusively, non-limited), which worked with industrial partners to adapt the design for injection moldings. This shift enabled mass production of up to 10,000 masks daily, significantly lowering costs and ensuring a steady supply. Collaborating with 30 Czech companies helped accelerate production and stimulate the local economy.

5. Wienerberger/Green Build/KM Robotics - Autonomous Bricklaying Robot WLTR

Collaborative research project with licensing

Reference to project: Robotic system for automatic masonry from clay blocks

The bricklaying robot, developed through collaboration between CIIRC, KM Robotics, and Wienerberger with support from the Technology Agency of the Czech Republic, exemplifies efficient technology transfer and commercialization. CIIRC contributed significantly by advancing AI-based methods, developing a precise localization system for identifying brick positions on pallets and in walls. CIIRC also played a role in motion planning algorithms, ensuring optimal robotic arm movements for accurate block placement. Additionally, CIIRC provided expertise in designing robot-ready bricks, consulting on block groove shapes for enhanced automation and efficiency. The system can lay 10m² of brickwork per hour, replacing six construction workers in continuous operation.

The solution was commercialized through a life-long license granted to Wienerberger and KM Robotics, who act as promoters and system distributors. Wall-building services are now provided to construction companies via Green Build Ltd.

The project was awarded 2nd place at the European Robotic Forum 2024 in the Technology Transfer Award category.

Commercialization Strategy: The intellectual property (IP) was commercialized through a one-time licensing model, granting a perpetual license. This ensured:

- Rapid market adoption by eliminating recurring fees, making it attractive early on.
- Clear IP ownership, allowing seamless integration into Wienerberger's commercial portfolio.
- Sustainable impact, as technology can be directly implemented in construction without ongoing development costs.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

Type of revenue	Revenue (in thousands CZK/EUR)				
	2019	2020	2021	2022	2023
Patent office services	0/0	0/0	811/32	0/0	0/0
Courses	16/1	0/0	0/0	0/0	0/0

Courses for Applied Sector Employees	86/3	0/0	0/0	0/0	0/0
Symposia, Congresses, Conferences	415/16	10/0	0/0	2 035/80	480/19
Consulting, Assessments, Advisory Services	3 819/151	477/19	726/29	178/7	908/36
Expertise, Measurements, Testing	17 659/697	6 412/253	7 918/312	16 624/656	40 772/1 608
Design, Prototypes, Models	24 515/967	12 399/489	19 610/774	13 667/539	12 119/478
Income from Licensing Agreements	0/0	0/0	350/14	0/0	0/0
R&D Revenue	4 921/194	3 625/143	3 407/134	4 869/192	5 111/202
Mediation Activities	7 230/285	7 120/281	6 429/254	10 647/420	12 950/511
Donations	4 032/159	6 930/273	5 185/205	5 904/233	7 294/288
Total	58 661/2 314	30 043/1 185	39 251/1 548	48 020/1 894	72 340/2 854
Patent office services	0/0	0/0	811/32	0/0	0/0

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the evaluated period and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

Between 2019 and 2023, CIIRC CTU established itself as a key player in the promotion and dissemination of scientific research and technological advancements. This was achieved through both its initiatives and the sustained media presence of its experts in public discourse. The institute actively bridges the gap between advanced research, cutting-edge technology, and public engagement, ensuring broad accessibility and understanding.

CIIRC CTU actively contributes to the popularization of science through media involvement and regular presentations by its leading researchers. Between 2019 and 2023, nearly 7,000 articles mentioning CIIRC CTU were published in professional and mass media (print and online). In terms of outreach, this statistically represents an audience of approx. 529 million (which, according to Monitora Media analytics, can be assessed as advertising value equivalent to CZK 588 million). CIIRC experts often provided expert commentary on key topics in science, technology and industry, helping to shape public understanding. Their contributions have become particularly important during the rise of artificial intelligence and the COVID-19 pandemic, when clear, unbiased and factual communication played a key role in informing the public and decision-makers.

Beyond media outreach, CIIRC CTU organized a wide range of popularization initiatives that engaged a broad spectrum of audiences, from industrial stakeholders to students, the general public, and innovation enthusiasts. Moreover, numerous events were organized, with a significant portion targeting industrial stakeholders and companies, such as Industry 4.0 Open Days, National Summits of Industry, or hands-on workshops focused on specific technologies like AI, laser technology, robotics, cybersecurity or welding. These events promoted public understanding of complex scientific concepts, providing practical insights into advanced technologies and fostering collaboration within the industry.

CIIRC CTU hosted annual popularization events like Researcher's Night, where families, young students, and the general public could interact with scientists and explore cutting-edge research through experiments and presentations. The institute also facilitates guided tours and visits for pupils and students, offering them a closer look at ongoing projects and encouraging future careers in science and technology.

CIIRC CTU also addressed topics on societal impacts of science and technology, such as gender equality in STEM through events and social media campaigns, promoting inclusivity in scientific and technical fields. By engaging various demographics through these initiatives, CIIRC CTU was crucial in making R&D&I more accessible and inspiring the next generation of innovators. A brief selection of popularization activities conducted within the period concerned is elaborated below. Most of the popularization activities continue to evolve, and many of them have been organized up to the present day.

1. Researcher's Night

Since 2019, CIIRC CTU has participated in a traditional annual event, Researcher's Night, dedicated to making science accessible and engaging for the public, in particular for families with kids. The event is part of the whole university program, and it serves as a traditional showcase of groundbreaking research and technological innovations in an interactive format. From CIIRC's perspective, Researcher's Night serves as an important bridge between academic research and society, fostering curiosity and inspiring not only future generations of scientists and engineers but also children, encouraging their interest in science and technology. Through demonstrations adapted even to the youngest audience in a playful way, hands-on activities, and expert talks, CIIRC highlights advancements in robotics, artificial intelligence, biomedicine or cybersecurity. Visitors gain insights into emerging technologies such as autonomous systems, smart factories, VR/AR and AI-driven innovations, which shape the future of industry and everyday life. By bringing complex scientific concepts to a broader audience, Researcher's Night highlights the positive impacts of research and emphasizes its real-world applications. It also encourages collaboration between scientists and the public, addressing concerns about AI and automation while showcasing their benefits. Ultimately, the event reinforces the importance of science in solving global challenges and promoting technological progress.

2. Events and guided tours for pupils/students

CIIRC CTU actively engages young students in science and technology through educational initiatives, fostering early interest in research and innovation. On 10 July 2023, CIIRC CTU participated in the **Children's University**, where fifth- and eighth-grade primary school students explored biomedical and assistive technologies and AI-driven diagnostics at the Cognitive Systems and Neuroscience lab in an engaging way.

On 13 December 2023, CIIRC CTU organized a guided tour for kids from the **nursery school in Horoměřice at the Testbed for Industry 4.0** at CIIRC CTU, offering them a hands-on experience in human-robot collaboration in simple assembly tasks with an observation of a robot responding to voice commands.

In 2023, the Institute launched via the National Centre for Industry4.0 (NCI4.0) the "**Technology Literacy (Technologická gramotnost)**", an interactive lecture for primary and secondary school students. Throughout the year, several hundred students had the opportunity to explore topics such as robotics, AI, 5G, IoT, or cybersecurity, compete for prizes, and experience these technologies hands-on in the RICAIP Testbed Prague.

These activities are just a selection of many others that underscore CIIRC CTU's commitment to popularizing science, inspiring students to pursue careers in STEM fields, and contributing to the future of technological innovation and industrial development.

3. Collaboration with Goethe Institute on cross-domain activities focusing on the intersection of AI, art and societal impacts

In 2021, CIIRC CTU advanced the public understanding of AI through its collaboration with the **Goethe-Institute's AI Residency Program**, merging scientific research with artistic creativity. Through the following initiatives, CIIRC CTU has demonstrated its commitment to AI literacy and interdisciplinary collaboration, significantly contributing to AI popularization:

As part of the pan-European project "**Generation A = Algorithm**", CIIRC CTU's **RICAIP Centre hosted three European artists** for two four-week residencies. French visual artists Douna Lim and Théo Pessio (September 2021) explored algorithms' influence on film production, gaining insights into AI's capabilities and limitations. In November 2021, UK-based artist Lily McCraith examined AI-generated images and text, assessing their impact on perception. At the end of her stay, she live-streamed a **video podcast with Sara Polak**, a Czech AI popularizer, on AI's societal implications. These residencies fostered knowledge exchange between artists and researchers, making AI more accessible to the public while encouraging public discourse on its applications and ethical considerations.

In September 2020, CIIRC CTU also contributed to the Goethe-Institute's **Robots-in-Residence program**, where female scientists programmed the humanoid robot NAO to interact with visitors at events in Prague. This hands-on experience deepened public engagement with AI and robotics.

4. Women in Tech: The Gender Algorithm, held on 12 April 2023, created space for an open discussion about the gender gap in digital technologies and its impact on education, career choices, and industry diversity. Organized by CIIRC CTU in collaboration with the French Embassy, Institut Français de Prague, and La French Tech Prague, it brought together experts, policymakers, and business leaders to address the challenges women face in tech and explore ways to increase their representation.

With more than 40 participants, the event featured two key panel discussions. The first focused on education, highlighting how stereotypes shape career decisions and why women remain underrepresented in STEM. The second panel explored workplace inclusion, investment opportunities for female-led startups, and strategies to support women in the tech industry.

The event was open to the public, both in person and online, ensuring broad participation. Attendees had the opportunity to engage with leading voices in the field, discuss key obstacles to gender diversity, and learn from successful initiatives in academia and industry. By raising awareness and fostering dialogue, it contributed to the ongoing effort to promote diversity in STEM and drive meaningful change in the tech sector.

5. Science communication through online tools - website & social media

CIIRC CTU employs a cross-channel communication strategy, leveraging its website and social media to maximize outreach and engagement. The website serves as the central hub, offering comprehensive information for industrial partners, academics, policymakers, and the public. Regular updates, including interviews and popularization articles, ensure that scientific insights are accessible beyond expert circles. Content published on the website often inspires media coverage, further amplifying scientific dissemination.

To enhance impact, CIIRC CTU interconnects website content with its social media platforms, adapting messaging to fit each channel's unique audience and strengths. Institutional profiles on LinkedIn, Facebook, X, and YouTube, alongside specialized profiles for initiatives like the National Centre for Industry 4.0, RICAIP, and the Center of the City of the Future, extend the institute's reach.

A key component of this strategy is live-streaming and recording events. Whenever possible, events are streamed on YouTube and the website, allowing real-time interaction. Recorded sessions are archived in extensive YouTube playlists, ensuring long-term accessibility. The CIIRC YouTube channel, with nearly 4,000 subscribers and 150 videos, features lectures, workshops, and the "Engineering a Truly Intelligent Future" series, reinforcing CIIRC CTU's commitment to sharing research with diverse audiences.

6. Media presence of leading researchers

CIIRC also leverages the prominence of its researchers to disseminate scientific knowledge. These appearances not only highlight individual achievements but also serve to make complex scientific concepts more accessible to the public. Through these combined efforts, CIIRC effectively utilizes its online presence and the expertise of its scientists to engage with the public and promote understanding of scientific advancements.

Vladimír Mařík actively engaged in media discussions on Industry 4.0 and the importance of collaboration between academia and industry and underscored the critical role of integrating academic research with industrial practices to drive technological advancement and economic growth.

Tomáš Mikolov, a leading figure in artificial intelligence was frequently featured in podcasts and large scale interviews where he discussed topics like the role of AI in society and its future implications.

Jan Šedivý emerged as a prominent voice in media discussions on AI and chatbots. His insights elucidated complex AI topics, contributing to public understanding and informed discourse.

Zdeněk Hanzálek actively engaged in media discussions on autonomous driving. For example, he presented the "Slalom use case with automated sports car" at the Autoware Center of Excellence seminar in June 2023.

Radek Škoda, a nuclear scientist gained media attention for developing the Teplator - a small modular heavy-water reactor designed exclusively for heat production. His innovative approach has sparked both interest and debate within the energy sector.

7. Open-Door Days

Since 2019, Open Days at CIIRC CTU, organized with NCI4.0, have promoted Industry 4.0 technologies, bridging academia and industry. These events provide firsthand experience with cutting-edge digitalization, fostering collaboration between researchers, businesses, and students.

In 2019, two editions introduced Industry 4.0 applications in Czech manufacturing, featuring guest speakers from academia, business, and government. During the 2020 and 2021 pandemic lockdowns, on-site events were replaced with online workshops and professional streams.

The 2022 Open Day, part of **RICAIP Days**, marked the reopening of the Testbed for Industry 4.0 with expert workshops, guided tours, and presentations. The 2023 Open Day, integrated into **Industry AI Days**, celebrated CIIRC's 10th anniversary. The program included interactive demos, roundtables, and AI-focused sessions, attracting 400+ participants.

A highlight was the "**AI Open Day 2023: Trustworthy AI - Humans vs. Algorithms**", featuring live-streamed discussions with European AI Networks of Excellence (NoEs) and AI-driven demonstrations. The event explored AI ethics, transparency, and societal impact, reinforcing CIIRC's role in shaping responsible AI development and promoting Industry 4.0 advancements.

8. National Summit of Industry

Between 2019 and 2023, in collaboration with NCI4.0, CIIRC CTU organized the "National Summit of Industry" as an **annual high-level platform for discussions on the digital transformation of the Czech industry**. The event brought together policymakers, industry leaders, and academics, featuring panel discussions, keynote speeches, and case studies on Industry 4.0, AI, and automation. Key topics included digital adoption, workforce upskilling, sustainability, cybersecurity, and industrial resilience, fostering an environment for innovation and economic growth. Through these summits, CIIRC CTU and NCI4.0 **shaped the future of the Czech industry, driving collaboration and technological advancement**.

The 2019 summit established the foundation, addressing digital transformation roadmaps, public-private partnerships, and research-driven innovation. The 2020 edition explored sustainable manufacturing, the circular economy, and AI-driven resource optimization. After a Covid break in 2021, the 2022 summit focused on accelerating digital adoption, improving competitiveness, and aligning education with industry needs.

The 2023 edition, held on May 30, was part of Industry-AI Days, celebrating CIIRC CTU's 10th anniversary. It focused on funding, legislation, and technological diffusion, attracting distinguished speakers from the Czech Republic and abroad. Every summit attracted 170+ participants from among prominent figures in industry, politics, innovation and media.

9. MSV Brno - International Engineering Fair

NCI 4.0 and CIIRC CTU actively coordinated a joint exhibition at the International Engineering Fair (MSV) in Brno, promoting Industry 4.0 technologies and fostering collaboration between academia, industry, students, and the general public.

In October 2022, NCI4.0 launched its first joint booth with partners such as T-Mobile, RICAIP Centre, and Česká spořitelna under the "**Technological Island**" concept, highlighting modern manufacturing solutions. The exhibit was part of the MSV TOUR, featuring guided visits to significant displays. A live-streamed "Digi Stage" program included moderated discussions with industry leaders on 5G implementation, digital infrastructures, and industrial resilience. Companies like Kvados shared insights into Industry 4.0 adoption challenges and opportunities.

At MSV 2023 (October 10–13), NCI4.0 partnered with CIIRC CTU's RICAIP Testbed, Siemens, T-Mobile, Česká spořitelna, DEL, SICK, and EIT Manufacturing to present "**Successful Company of the 21st Century**". This 200-square-meter exhibit featured modular production systems, energy monitoring, industrial 5G networks, and virtual reality-simulated production lines.

The exhibitions garnered significant media attention, enhancing public awareness of digitalization and innovative industrial solutions, reinforcing NCI4.0's and CIIRC CTU's role in shaping the Czech Republic's industrial future.

10. The Inovacast podcast series

This format was launched in January 2022 through NCI4.0, aiming to popularise Industry 4.0 by featuring interviews with innovative leaders shaping this sector. Professionally moderated, the podcast comprises 40 engaging episodes released biweekly and recorded as personal interviews with 23 speakers. The series delved into the perspectives of Czech industry professionals, exploring their views on current trends and future directions in Industry 4.0, innovations and emerging technologies. The podcast covers a wide array of topics, including digital transformation, automation, and the integration of advanced technologies in manufacturing, providing listeners with valuable insights into the evolving industrial landscape.

By making complex technological topics accessible, Inovacast played an important role in popularizing R&D&I. It served as a bridge between the professional community and the general public, fostering a broader understanding of modern technologies and contributing to

a more informed and innovation-driven society. The series is still available on platforms like Spotify and YouTube, ensuring wide accessibility.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

CIIRC CTU highly values the feedback and recommendations provided by the evaluation board in the previous evaluation period. The institute has carefully analyzed and systematically implemented these recommendations, integrating them into both short-term actions and long-term strategic planning. The recommendations were treated with great attention and served as a foundation for further institutional improvement. Given that CIIRC CTU received an excellent evaluation, the recommendations primarily addressed the detailed presentation of research outcomes rather than major structural issues. In response, the current evaluation period maximized the allocated space to comprehensively present all relevant results. However, due to space limitations, some achievements, awards, collaborations, and activities could not be included, despite their significance.

Applied Research Projects (Sections 3.2 – 3.4)

“Difficult to say too much about applied and contract research income other than keeping up the good work. Perhaps licensing income could be looked at again. It just seems that with so much research going on there should be more licensing money obtainable.”

The SW licensing is still a quite difficult task in the Czech conditions. We were successful just in 3 cases up to now. For example, the license negotiation with Wienerberger (re in 3.5) required vast legal support and involvement of the CEO of Wienerberger in Vienna. In the end the license has brought approx. 6.5 mil. CZK in 2024/2025. Other licenses were acquired by TRIX Connections, s.r.o. and have brought around 0.5 mil CZK up-to-now. We do continue in our efforts.

Applied Research Results (Sections 3.5 – 3.6)

“It would have been nice to see 5 returns in section 3.6 in the first instance. Given the research projects ongoing, we felt that there would be 2 further projects that would qualify and indeed there were. Clearly it would be good to make sure there are 5 ready for the next assessment. Industrial collaboration was evident.”

CIIRC CTU continues to play a crucial role in applied research and technology transfer. This was particularly evident during the COVID-19 pandemic, where its research teams, pre-existing technology transfer ecosystem, and commitment to societal benefit played key roles in rapid response initiatives. Details on transfer activities can be found in sections 3.4 and 3.5 of the current evaluation.

There was no problem filling the list of 5 returns. Moreover, CIIRC concentrates on delivering customized services, especially to SMEs, in the area of AI and Industry 4.0 deployment, which has been accelerated thanks to the tools and financial aid provided by the EDIH and TEF/AI-MATTERS schemes since 2023.

Cooperation with the Non-Academic Environment and Technology Transfer (Sections 3.7 – 3.9)

“It would be nice to see a range of examples of successful implementation in section 3.9”

CIIRC CTU has significantly strengthened its role as a national and international leader in industry collaboration through its transfer centers:

- **Centre for Industry 4.0**
- **Centre for Construction 4.0**
- **Centre of the City of the Future**

These centers connect academia, government, municipalities, industry, and business sectors to foster a robust innovative ecosystem. The centers maintain financial sustainability and leverage cutting-edge infrastructure at CIIRC, including:

- **RICAIP Testbed Prague** (cooperating with other testbeds such as RICAIP Testbed Brno and CPIT TL3 at Technical University of Ostrava and tenths of other labs through projects such as AI-MATTERS, AIRISE etc.)
- **RICAIP Centre of Excellence**, which connects Czech testbeds with German research facilities (DFKI and ZeMA).

SMEs, municipalities, and corporations can access European Digital Innovation Hubs (EDIHs), TEF-AI Matters, EIT Manufacturing, and other programs, further enhancing collaboration. Additionally, CIIRC CTU continues to conduct collaborative research and contract-based cooperation with industrial partners both in the Czech Republic and abroad. Currently a list of successful implementations is full.

Recognition by the Scientific Community (Sections 3.10 – 3.11)

“Very high standard achieved in this section. Good to see that eventually all the slots were filled.”

CIIRC CTU researchers have received numerous prestigious recognitions as described in detail in section 3.2. CIIRC CTU researchers actively contribute to international scientific journals, serve on editorial boards, and are frequently invited as keynote speakers at leading conferences and institutions. The institute also hosts distinguished guest lectures at its premises.

To summarize: After 5 years, there are not enough slots for listing all the high-quality awards and achievements.

Popularisation of R&D&I (Section 3.12)

“Whilst events involving the unit have been very well orchestrated, media reports and appearances (TV/radio/magazines/newspapers) were initially absent from the submission, which was a great shame. For the unit such output means better awareness by the public (incl. politicians) of the research being performed by the unit. Additionally, it is important to have other activities such as open days for the public to visit, meeting the staff etc. This is useful for attracting young scholars from schools and high schools and can be an effective tool to gain appropriate young professionals.”

In response to the previous evaluation, we would like to emphasize that CIIRC CTU has always prioritized engagement with a wide range of audiences, including the general public, policymakers, and future scholars. Over the past period, we have significantly expanded our media presence across TV, radio, newspapers, and online platforms, ensuring that our research and innovations reach broader audiences beyond academia and industry. Researchers actively participate in public discussions, media interviews, and outreach programs, providing insights into emerging technologies such as artificial intelligence. Throughout 2019 – 2023 there were published almost 7000 articles in the media about CIIRC CTU, its activities and research.

Additionally, we have actively organized open days, public lectures, and outreach activities aimed at inspiring young talent and fostering interest in cutting-edge research. These efforts are not new; they were already in place during the last reporting period. Moving forward, we remain committed to making our outreach efforts even more visible and impactful, ensuring that our contributions to society are fully recognized.

Addressing Additional Recommendations

Student Engagement

CIIRC CTU actively involves students from an early stage in their academic journey. Several examples are described in detail in section 3.6, other include student involvement into research through their semestral, bachelor or master thesis at CIIRC labs.

Scientific Cooperation with European Institutions

CIIRC CTU has established itself as a key player in European research collaborations, actively participating in:

- European Networks of Excellence Centers in AI, Data and Robotics
- European research projects (Horizon 2020, ERC, etc.)

Further details are provided in sections 3.2 and 3.3 of the current report.

Interdisciplinary Activities

CIIRC CTU fosters interdisciplinary collaboration across research domains as was shown in sections 3.2 – 3.6. What was not mentioned is participation in **TAH (Technologies, Art, Humanities) Innovation Centre** since 2023. TAH plays a pivotal role in advancing interdisciplinary education and research in the Czech Republic.

PhD Program Development

A dedicated PhD program has been a long-term strategic goal of CIIRC CTU. In 2024, significant progress was achieved through collaboration with the **Faculty of Electrical Engineering of CTU**. CIIRC is now a **Training Department**, offering top-tier education and research opportunities in informatics, robotics, cybernetics, and bioengineering.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)
CIIRC web	all	https://www.ciirc.cvut.cz/

CIIRC research selected results	3.3, 3.4.,3.5	https://www.ciirc.cvut.cz/cs/recent-results/
CIIRC running projects	3.3	https://www.ciirc.cvut.cz/cs/research-education/projects/
CIIRC past projects	3.3	https://www.ciirc.cvut.cz/cs/research-education/past-projects/
CIIRC press releases	3.2. 3.6	https://www.ciirc.cvut.cz/cs/category/press-releases/
CIIRC multimedia	3.2, 3.6.	https://www.ciirc.cvut.cz/cs/category/multimedia/
CIIRC news	3.2, 3.6	https://www.ciirc.cvut.cz/cs/category/news/
CIIRC YouTube Channel	3.6	https://www.youtube.com/@ciircctu
CIIRC LinkedIn Profile	3.6	https://www.linkedin.com/company/ciirc
CIIRC Facebook Profile	3.6	https://www.facebook.com/ciircctu
CIIRC X Profile	3.6	https://x.com/CIIRCCTU

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED:

**Institute of experimental and applied physics,
Czech Technical University in Prague**

FORD: 1. Natural Sciences

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

IEAP CTU is a distinguished university research institute, dedicated to both fundamental and applied R&D&I in the realm of microworld physics. Our focus spans subatomic physics, particle physics, astrophysics, detector technologies and imaging in biology, zoology, preclinical research and material research. Recently, we have expanded our R&D&I efforts into space payloads and coordination polymers in chemistry.

Our research is built on reciprocal cooperation with esteemed international partners and collaborations, including ESA, CERN, underground laboratories, and KM3NeT. We place a strong emphasis on developing our research infrastructure to support these endeavours.

IEAP CTU is organized into five specialized departments:

Department of Electronics and Software

Department of Experimental Physics

Department of Applied Physics and Technology

Department of Theory and Modelling

Department of Administrative and Technical Services.

We pride ourselves on our successful recruitment of researchers from abroad and early career professionals. As of 2023, we had 32 foreign researchers out of a total of 80, and 24.1 FTE early career researchers out of a total of 47.68 FTE researchers.

IEAP CTU is committed to supporting the professional education of both Czech and foreign students through Master's and Ph.D. theses, as well as student summer schools. Although we do not have our

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

own study program, we host 15 students from various faculties of CTU and other universities, both domestic and international, who are working on their Master's and Ph.D. theses. Our institute is actively involved in organizing short-term international schools, such as the IEEE NPSS schools of sophisticated detectors and applications, and international conferences like MEDEX (**M**atrix **E**lements for the **D**ouble beta decay **E**Xperiments) and ANIMMA (**A**dvancements in **N**uclear **I**nstrumentation **M**easurement **M**ethods and their **A**pplications). Additionally, our staff is dedicated to lifelong learning initiatives. IEAP CTU maintains direct and intensive cooperation with industry, resulting in patents, licenses, and collaborative projects.

Table 3.1.1 - Staffing per FTE²

Academic/ Professional position	Total / Of which women					
	year 1	year 2	year 3	year 4	year 5	Total
Professor	1,85/0	2,05/0	2,45/0	2,0/0	1,35/0	9,7/0
Associate Professor	2,2/0	2,2/0	2,2/0	2,2/0	2,2/0	11/0
Assistant Professor	0/0	0/0	0/0	0/0	0/0	0/0
Assistant	0/0	0/0	0/0	0/0	0/0	0/0
R&D Personnel ³	6,1/0	5,6/0	5,6/0	4,6/0	2,5/0	24,4/0
Researchers in other categories ⁴	45,05/3,75	44,02/5,23	45,65/5,95	44,93/6,95	47,68/8,35	227,33/30,23
Technical and economic staff ⁵	11,60/8,15	11,13/8,97	10,8/8,95	15,07/8,65	15,17/7,85	63,77/ 42,57
Scientific, research and development staff involved in teaching activities	0/0	0/0	0/0	0/0	0/0	0,0/0,0
Early career researchers ⁶	33,6/3,0	29,1/3,9	25,6/5,9	25,4/5,8	24,1/6,2	137,8/24,7
Total ⁷	66,8/11,9	65,0/14,2	66,7/14,9	68,8/15,6	68,9/16,2	336,2/72,8

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the first year of the evaluation period (numbers of physical employees and personnel)⁸

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	0	0	1	0	0	0	4	0
Associate Professor	0	0	0	0	0	0	1	0	1	0	0	0
Assistant Professor	0	0	0	0	0	0	0	0	0	0	0	0
Assistant	0	0	0	0	0	0	0	0	0	0	0	0
R&D Personnel ⁹	1	0	1	0	1	0	1	0	3	0	1	0
Researchers in other categories ¹⁰	11	2	32	3	6	1	8	0	2	0	2	0
Technical and economic staff ¹¹	6	1	3	1	5	4	1	1	1	0	1	1
Scientific, research and development staff involved in teaching activities	0	0	0	0	0	0	0	0	0	0	0	0
Early career researcher ¹²	12	1	32	3	0	0	0	0	0	0	0	0
Total ¹³	18	3	36	4	12	5	12	1	7	0	8	1

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the last year of the evaluation period (numbers of physical employees and personnel)¹⁴

Academic/ professional position	Under 29 years		30-39 years old		40-49 years old		50-59 years old		60-69 years old		70 years and older	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	0	0	0	0	1	0	3	0
Associate Professor	0	0	0	0	0	0	1	0	1	0	0	0
Assistant Professor	0	0	0	0	0	0	0	0	0	0	0	0
Assistant	0	0	0	0	0	0	0	0	0	0	0	0

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

R&D Personnel ¹⁵	0	0	0	0	1	0	0	0	1	0	1	0
Researchers in other categories ¹⁶	11	5	24	5	12	1	12	0	2	0	4	0
Technical and economic staff ¹⁷	9	1	2	0	7	6	1	1	1	1	1	0
Scientific, research and development staff involved in teaching activities	0	0	0	0	0	0	0	0	0	0	0	0
Early career researcher ¹⁸	7	4	24	5	0	0	0	0	0	0	0	0
Total ¹⁹	20	6	26	5	20	7	14	1	6	1	9	0

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students

Type of study	year 1		year 2		year 3		year 4		year 5		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate	0	0	0	0	0	0	0	0	0	0	0	0
Master's ²⁰	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral	0	0	0	0	0	0	0	0	0	0	0	0
Lifelong Learning Courses	86	34	30	12	70	34	70	37	71	32	327	149
Total	86	34	30	12	70	34	70	37	71	32	327	149

Table 3.1.5 - Study programmes in Czech/English

Type of study programme	Total ²¹ / Of which professional study programmes											
	year 1		year 2		year 3		year 4		year 5		Total	
Undergraduate	0	0	0	0	0	0	0	0	0	0	0	0
Master's	0	0	0	0	0	0	0	0	0	0	0	0
Doctoral	0	0	0	0	0	0	0	0	0	0	0	0

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

Lifelong Learning courses	3 / 0	1 / 0	1 / 0	0 / 0	3 / 0	1 / 0	3 / 0	1 / 0	3 / 0	1 / 0	13 / 0	4 / 0
Total	3 / 0	1 / 0	1 / 0	0 / 0	3 / 0	1 / 0	3 / 0	1 / 0	3 / 0	1 / 0	13 / 0	4 / 0

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

R&D&I field	FORD	FORD share [%]	Predominant type of research	Total share of industry group [%]
1. Natural Sciences	1.1 Mathematics			78
	1.2 Computer and information sciences			
	1.3 Physical sciences	70	Balanced basic and applied research	
	1.4 Chemical sciences	3	Balanced basic and applied research	
	1.5 Earth and related environmental sciences	3	Balanced basic and applied research	
	1.6 Biological sciences	2	Balanced basic and applied research	
	1.7 Other natural sciences			
2. Engineering and Technology	2.1 Civil engineering			22
	2.2 Electrical engineering, Electronic engineering, Information engineering	18	Balanced basic and applied research	
	2.3 Mechanical engineering			
	2.4 Chemical engineering			
	2.5 Materials engineering	4	Balanced basic and applied research	
	2.6 Medical engineering			
	2.7 Environmental engineering			
	2.8 Environmental biotechnology			
	2.9 Industrial biotechnology			
	2.10 Nanotechnology			
	2.11 Other engineering and technologies			
3. Medical and Health Sciences	3.1 Basic medicine			
	3.2 Clinical medicine			
	3.3 Health sciences			
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries			
	4.2 Animal and Dairy science			

	4.3 Veterinary science			
	4.4 Other agricultural sciences			
5. Social Sciences	5.1 Psychology and cognitive sciences			
	5.2 Economics and Business			
	5.3 Education			
	5.4 Sociology			
	5.5 Law			
	5.6 Political science			
	5.7 Social and economic geography			
	5.8 Media and communications			
	5.9 Other social sciences			
6. Humanities and the Arts	6.1 History and Archaeology			
	6.2 Languages and Literature			
	6.3 Philosophy, Ethics and Religion			
	6.4 Arts (arts, history of arts, performing arts, music)			
	6.5 Other Humanities and the Arts			
Total		100 %	-	100 %

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the previous five-year period based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

IEAP CTU has garnered significant recognition through several prestigious awards. Notably, we have received the ESET Science Award, chaired by Nobel Prize winner Kip S. Thorne, the Glenn F. Knoll Radiation Award from IEEE NPSS, and a Paper Award from the Physical Society of Japan. Our PhD students have also achieved remarkable accolades: M. Macko and J. Dudák were honoured for the best PhD thesis, A. Babič received a prize for theory, and early career researcher S. Gohl was awarded for an outstanding space article. In addition to these achievements, five of our staff members serve as editors, including topic editors, for various journals. Furthermore, six staff members are actively involved in the regular evaluation of papers for high-impact journals, including Nature. It is noteworthy that two of our early career researchers, O. Veselska and V. Shefali, participate in these evaluations. At IEAP CTU, we prioritize the role of our staff as reviewers

of scientific articles over editorial positions. This approach is particularly beneficial for our early career researchers, as reviewing articles provides them with valuable opportunities for professional knowledge development.

Total number of invited lecturers of our staff at foreign institutions reached 69 and the number of contributions in proceedings (invited or awarded) is 6. It includes the institutions in the most important countries (USA, Germany, Switzerland, Japan, China, Italy, France or Australia).

IEAP CTU organizes regular lectures given by outside experts in the frame of IEEE NPSS organization. The number of lectures given by invited foreign scientists and other guests relevant to our R&D&I during the evaluation period is 39. The selected lectures include respected speakers from highly developed countries (USA, Germany, Switzerland, United Kingdom, France, Greece etc.). The lectures cover fundamental and applied subjects (dark matter, neutrino physics, particle physics, astroparticle physics, different experiments - ATLAS, KATRIN, CHIPS).

Staff members are also active in evaluation of the research projects or programme calls in national or EU level (Czech Science Foundation, GACR; Scientific Agency VEGA in Slovakia; Ministry of Education, Youth and Sports in Czechia; Ministry of Interior, Czechia; National Sustainability Program NPU II, Czechia; European Strategic Forum for Research Infrastructure, ESFRI). Staff member is also active in inner grant competition (SGS) at CTU (support mainly for PhD students). Instead of the above-described activities the IEAP staff members actively participated in different committees or collaboration boards on national or EU level. Examples are given here:

- I. Štekl, Representative of the Czech Republic in APPEC (Astroparticle Physics European Consortium), Appointed by Ministry of Education, Youth and Sports, Czech Republic
- I. Štekl, Representative of the Czech Republic in ESFRI Strategy Working Group for Energy (till 2022)
- S. Pospíšil and J. Hošek, members of the Committee for Cooperation with CERN
- S. Pospíšil and I. Štekl (deputy-chair), members of the Committee for Cooperation between the Czech Republic and JINR (appointed by the Ministry of Education, Youth and Sports of the Czech Republic)
- R. Hodák, member of the Institutional Board of the LEGEND experiment (<https://legend-exp.org/>)
- S. Pospíšil, elected member of the Joint Institute for Nuclear Research (JINR) Scientific Council (till 2022)
- M. Macko, Deputy physics coordinator, SuperNEMO collaboration
- V. Shefali obtained Royal Society of Chemistry membership
- I. Štekl, permanent representative of the plenipotentiary of CR in JINR (till 2022)
- I. Štekl, member of the Programme Advisory Committee for Nuclear Physics, JINR, (2015-2022)
- Y. Shitov, member of Institutional Board of the KM3NeT experiment
- I. Štekl, member of Institutional Board of the PICO experiment (<https://www.picoexperiment.com/>)
- S. Pospíšil, member of the MoEDAL (CERN) Collaboration Board, Convenor of the TMPX Subdetector Group
- A. Sopczak, Chair of the Nuclear and Plasma Sciences Chapter, Czechoslovakia Section IEEE
- M. Veselský, Spokesperson of the I581 experiment at the ISOLDE CERN facility
- V. Petousis, member of the Institutional Board of the ATLAS Roman Pots (CERN)
- B. Bergmann, Member of the Project Management Consortium of the Medipix collaborations (from 2020)
- S. Pospíšil, Member of the Committee nominated by the IEEE NPSS Radiation Instrumentation Technical Committee (RITC) for the evaluation of the applications for the 2021 Emilio Gatti Radiation

Instrumentation Technical Achievement Award, Early Career Award and Glenn Knoll Outstanding Achievement Award.

- I. Štekl and R. Hodák, IEAP team and deputy team leader for NP03 - Platform for Developing Neutrino Detectors at CERN Neutrino Platform
- M. Veselský and R. Hodák, IEAP team and deputy team leader for ISOLDE at CERN.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the award	Awarding institution
Fedor Šimkovic	ESET Science Award - Outstanding Personality of Slovak Science 2020	ESET company, International Committee (chair Kip S. Thorne, Nobel prize winner, 2017)
Fedor Šimkovic	Distinguished Scientists under the Chinese Academy of Science, President's International Fellowship Initiative, 2021	Chinese Academy of Science, President's International Fellowship Initiative
Fedor Šimkovic	Second prize of JINR Dubna for theory (series of articles "Neutrino mass, double-beta decay and nuclear structure"), 2020	JINR Scientific Council, Joint Institute for Nuclear Research (JINR), international intergovernmental institution
Yuta Orikasa	Outstanding Paper Award, 2022	Physical Society of Japan
Stanislav Pospíšil	The Glenn F. Knoll Radiation Instrumentation Outstanding Achievement Award for contributions to the development and application of pixelated radiation detectors in medical, high-energy and space science, 2020	IEEE Nuclear & Plasma Sciences Society
Miroslav Macko	Dean's award for Best PhD. thesis 2019 (The thesis "SuperNEMO Experiment: Study of Systematic Uncertainties of Track Reconstruction and Energy Calibration. Evaluation of Sensitivity to $0\nu\beta\beta$ with Emission of Majoron for ^{82}Se was prepared under co-supervision of Ivan Štekl, IEAP CTU, and Dr. Fabrice Piquemal, CENBG, Université de Bordeaux.)	Faculty of Mathematics, Physics and Informatics, Comenius University in Bratislava, Slovakia
Andrej Babič (PhD student CTU, 2023 successfully defended PhD)	Second prize of JINR Dubna for theory (series of articles "Neutrino mass, double-beta decay and nuclear structure"), 2020	JINR Scientific Council, Joint Institute for Nuclear Research (JINR), international intergovernmental institution
Jan Dudák	Best dissertation "Energy Sensitive X-ray radiography and Tomography Optimized for Small Animal Imaging", 2019	Engineering in Medicine and Biology Group (EMB), Czechoslovak section, IEEE
Stefan Gohl	The Outstanding Paper Award for Young Scientists – Scientific Commission C, 2021	Committee on Space Research https://cosparhq.cnes.fr/
Adam Smetana	Second prize of JINR Dubna for theory (series of articles "Neutrino mass, double-beta decay and nuclear structure"), 2020	JINR Scientific Council, Joint Institute for Nuclear Research (JINR), international intergovernmental institution

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of scientific journal, ISSN
Stanislav Pospíšil	Review Editor for Radiation Detectors and Imaging, Frontiers in Physics, ISSN 2296-424X
Hugo Natal Da Luz	Topic editor and Associate Editor, Frontiers in Detector Science and Technology, section Detectors Apparatus and Methods, Advancements and Applications in Neutron Detection and Spectrometry ISSN 2813-8031 Reviewer in Journal of Instrumentation, ISSN 1748-0221 (4x), Nuclear instruments & methods in Physics Research, ISSN 0029-554X (2x), IEEE Transactions on Nuclear Science, ISSN 1558-1578 (4x).
Fedor Šimkovic	Editorial Board, Atoms, ISSN 2218-2004
Christer Fröjd	Editor, Journal of Instrumentation, ISSN: 1748-0221
Vlasios Petousis	Editor, Universe, special issue Exotic Scenarios for Compact Astrophysical Objects, ISSN ISSN 2218-1997
R. Hodák, S. Pospíšil, I. Štekl et al. (in total 10 editors and 12 editors, respectively)	Advancements in Nuclear Instrumentation Measurement Methods and their Applications, EPJ Web of Conferences, 2021. vol. 253, and 2023 vol. 288. ISSN 2100-014X
Yuta Orikasa (reviewer)	Nuclear Physics B, ISSN 0550-3213 (2x); Progress of Theoretical and Experimental Physics, ISSN 2050-3911 (5x); Physical Review D, ISSN 2470-0029 (9x); International Journal of Modern Physics A, ISSN 0217-751X (2x)
Jun Terasaki (reviewer)	Physical Review Letters, ISSN 0031-9007 (3x); Physical Review C, ISSN 2469-9985 (4x); Nature, ISSN 0028-0836 (1x); Chinese Physics, ISSN 1741-4199 (2x); European Physical Journal Plus, ISSN 2190-5444 (1x)
Daniel Vavřík (reviewer)	Nature communication, ISSN 2041-1723; Nuclear instruments & methods in Physics Research, ISSN 0029-554X; Tomography of materials and structures, ISSN 2949-673X
Oleksandra Veselska (reviewer)	Dalton Transactions, ISSN 1477-9234 (3x); Materials, ISSN 1996-1944 (2x); Chemical Communications, ISSN 1359-7345 (1x); Chemistry of Materials, ISSN 1520-5002 (1x); Inorganics, ISSN 2304-6740 (1x); Journal of Industrial and Engineering Chemistry, ISSN 1226-086X (1x); Crystals, ISSN 2073-4352 (1x); International Journal of Molecular Sciences, ISSN 1422-0067 (1x)
Shefali Vaidya (reviewer)	Dalton Transactions, ISSN 1477-9234

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Invited lecture title	Name of host institution, or name of conference or event	Year
Benedikt Bergmann	Timepix detectors in space: From radiation monitoring in low earth orbit to astroparticle physics	International workshop of radiation imaging detectors (IWORID) 2022, Italy (200 participants)	2022
Benedikt Bergmann	European Space Projects with Timepix	20 th Anniversary Symposium on Medipix and Timepix, CERN, Switzerland (150 participants)	2019

Rastislav Hodak	Czech participation in the Underground Laboratory LSM	2nd French-Czech « BARRANDE » Nuclear Research Workshop", April 24-26, 2019, Honfleur, Normandie, France https://barrandewks2019.sciencesconf.org/	2019
Veronika Palusova (IEAP staff and PhD student at University of Bordeaux)	Neutron background simulations for the SuperNEMO experiment	GDR Deep Underground Physics plenary meeting, Paris, France; https://indico.in2p3.fr/event/25051/	2021
Lukas Fajt (early career researcher)	Neutrino and Dark Matter Detection	Invited lecture at ANIMMA 2021 conference, 20.6.2021, Prague, CR (296 participants)	2021
Ekaterina Rukhadze Medunová	Fluorescence measurements of optical active materials in response to liquid argon scintillation	German Physical Society, Munich, Germany	2019
Andre Sopczak	Overview of ATLAS forward proton detectors in Run-2 and outlook for Run-3 analyses	30th International Workshop on Deep-Inelastic Scattering and Related Subjects (DIS2023). Michigan State University, USA	2023
Fedor Šimkovic	Neutrino telescope in Lake Baikal: Present and Future	ICRC2019, 36th International Cosmic Ray Conference, Madison, Wisconsin, USA	2019
Fedor Šimkovic	Massive neutrinos in nuclear processes	RIKEN, Tokyo, Japan	2019
Stanislav Pospíšil	Journey with pixel detectors in the world of physics	2020 IEEE NSS-MIC, Boston, USA	2020

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

Name, surname and title(s) of the lecturer	Lecturer's employer at the time of the lecture	Invited lecture title	Year
Christian Bohm	University of Stockholm	Overview of TileCal, the ATLAS hadron calorimeter	2019
Aldo Bonasera	Texas A&M University; LNS-INFN	Nuclear Physics Using Lasers	2019
Lucie Tvrzníková	Lawrence Livermore National Laboratory, USA	Rare event searches: looking for dark matter and new neutrino physics	2019
Lutz Schimpf	Karlsruhe Institute of Technologie, Germany	KATRIN First neutrino mass result	2019
Jennifer Thomas	University College London	CHIPS and the new deal	2020
Xin Wu	University of Geneva	Particles in Space: Sciences and Instruments	2021
Lukáš Gráf	University of California	Beyond the Standard Model with Double Beta Decays	2022
Maxim Titov	CEA Saclay, Irfu, France	Gaseous Detector Technologies: from the RD51 to the DRD1 Collaboration	2023

Stefan Ritt	Paul Scherrer Institute, Switzerland	Particle Physics at PSI, Switzerland	2023
Charalampos Moustakidis	Aristotle University of Thessaloniki	The multi-messenger nuclear physics and astrophysics of neutron stars	2023

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

Name, surname and title(s) of the evaluated unit's staff member	Name of the research project/programme call	Name of the contracting authority/guarantor of the project/programme call	Year
Benedikt Bergmann	Evaluation Panel 203 - Nuclear and Particle Physics, Astronomy and Astrophysics	Czech Science Foundation (GACR)	2023-2027
Karel Smolek	VEGA Commission for Mathematical Sciences, Computer and Information Sciences, and Physical Sciences	Scientific Grant Agency of the Ministry of Education, Science, Research and Sports of the Slovak Republic and the Slovak Academy of Sciences (VEGA)	2019
Karel Smolek	Evaluation panel to assess the implementation of development concepts and to profile the capacities of research organizations	Ministry of the Interior of the Czech Republic	2023
Martin Veselský	Evaluation Panel 203 - Nuclear and Particle Physics, Astronomy and Astrophysics	Czech Science Foundation (GACR)	2023
Miroslav Macko	Programme INTER – TRANSFER	Ministry of Education, Youth and Sports of the Czech Republic	2023
Ivan Štekl	National Sustainability Program NPU II (chair of Evaluation Board): 1) LQ1603, Research for SUSEN, budget in 2019 = 181 592 770 CZK, budget in 2020 = 216 032 262 CZK.	Ministry of Education, Youths and Sports of the Czech Republic	2019, 2020
Ivan Štekl	National Sustainability Program NPU II (chair of Evaluation Board): LQ1606, ELI: Extreme Light Infrastructure, budget in 2019 = 101 528 055 CZK, budget in 2020 = 380 521 945 CZK.	Ministry of Education, Youths and Sports of the Czech Republic	2019, 2020
Alan Owens	ESA Technical Evaluation Boards	European Space Agency	2019 -2023
Ivan Štekl	Monitoring of ESFRI Roadmap projects in Energy (e.g. MYRRHA – Multi-purpose hybrid Research Reactor for High-tech Applications)	Representative of the Czech Republic in ESFRI Strategy working group for Energy, appointed by Ministry of Education, Youth and Sports, Czech Republic	2019 - 2020
Karel Smolek	Student Grant Competition	Czech Technical University in Prague	2019 - 2023

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the evaluation period²³. This should be done from the full list in annex tables (Table 3.3.1-3.3.2)²⁴, regarding the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in a listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

In the period of 2018-2023 IEAP CTU received 21 projects as a main applicant and 19 projects as a co-applicant. IEAP also solved 4 contract research projects.

1) Engineering applications of microworld physics (2018-2022): interdisciplinary R&D&I (experimental subatomic physics; progressive detection techniques; astroparticle and neutrino physics; applications in radiobiology, biomedicine and radioecology; X-ray and neutron radiography and tomography; proton and hadron therapy; robotics systems for radiation safety; influence of radiation on electronics; environmental radioactivity monitoring). Team composition: leader IEAP CTU, the Faculty of Biomedical Engineering CTU, the Faculty of Transportation Sciences CTU, the Czech Institute of Informatics, Robotics and Cybernetics CTU, the National Radiation Protection Institute, 3rd Faculty of Medicine Charles University, Faculty of electrical engineering of University of West Bohemia and the Institute of Theoretical and Applied Mechanics, Academy of Sciences CR. Total budget = 196 mil. CZK (7.8 mil. EUR). All planned results were successfully obtained. The project is in phase of sustainability (till 2032).

2) Center for the support of the population in case of actual or suspected occurrence of extraordinary nuclear and radiation events, VJ01010116 (2021-2025): The project supports preparedness of CR for response to a nuclear accident. Research focuses on behaviour of the population in risk of panic (using the analogy of COVID pandemic and radiation emergency), esp. on coping risks and on identification of mechanisms eliminating fear development and propagation. Mathematical methods are being developed for early detection of a dangerous phenomenon in a media environment. Involvement of "citizen science" measurements of radiation for alleviation is studied. A radiation detector was developed and numbering 1000 distributed among individuals and institutions incl. training in data processing and interpretation. The project will strengthen the contact of a crisis management with self-governments allowing it even during communication failure. Team = IEAP CTU, the National Radiation Protection Institute, Institute of Sociology Academy of Sciences CR, The Institute for Postgraduate Medical Education. Total budget = 57 783 000 CZK (2.311 mil. EUR).

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

3) Laboratoire Souterrain de Modane – participation of the Czech Republic (2016-2019, 2020-2022, 2023-2026): LSM-CZ is included in the Roadmap of the Large Research Infrastructures of the Czech Republic. LRI LSM-CZ organizes and supports cooperation with the Laboratoire Souterrain de Modane (LSM), which is the deepest underground laboratory in Europe. LSM is a multidisciplinary platform for fundamental experiments requiring an ultra-low radioactive background in particle, astroparticle and nuclear physics, biology or medicine. LSM supports applied R&D, e.g. in detector technologies. Other specialized scientific fields have been significantly involved in the activities of LSM, e.g. research of ultra-sensitive detection methods of radionuclides in the environment (to increase safety of nuclear objects), radiobiology (examination of the behaviour of cells in conditions of extremely low level of ionizing radiation), climatology or radioecology. LRI LSM-CZ also includes auxiliary infrastructure in the Czech Republic (CR). This solution is very financially effective and strengthens the reciprocal international cooperation. The objective of the LRI LSM-CZ is to enable access of Czech and international users to LSM by supporting the development, construction, maintenance and operation of scientific apparatuses and technological equipment located in the LSM, to support further development and use of the home infrastructure in the CR related to the activities within the LSM, to support the involvement of the Czech institutions in the most up-to-date research directions with an emphasis on reciprocity, training early stage experts and students, to support involvement of the Czech industrial companies in the delivery of progressive technologies and fulfilment of our institutions commitment to the individual LSM experiments. The obtained results are of different types, e.g. users' publications, results of technological R&D, student qualification theses, patents, industrial designs or functional samples, organizing conferences and summer schools or recruiting new experts for science and applied research in the CR.

4) Radiation Monitor System in a Package (RMSIP, ESA supported project, 2021-2025): IEAP CTU is the prime contractor with BD Sensors as subcontractor. Total budget = 12 000 kCZK (480 kEUR), budget of IEAP CTU = 6 250 kCZK (250 kEUR). The objective of the RMSIP activity is to design, develop and test a general-purpose radiation monitor with small size, easy interfacing and low unit cost that is capable of energy spectroscopy and particle identification. Such a miniaturized radiation detector will be beneficial for all ESA and commercial missions, providing a reliable real-time monitoring of the radiation environment at specific spacecraft locations. This can be useful for alerts in case of very intensive radiation fluxes (e.g. during solar storms) to take countermeasures to protect sensitive parts. Within this project we developed the radiation monitor HardPix which was launched into Earth orbit in 2023 and 2025 for SWIMMR project and is planned for other missions and projects like ERSa described in this evaluation. HardPix detector is currently our backbone instrument for scientific and commercial space missions, including planned exploration of the lunar surface.

5) Development of a demonstrator for the Penetrating Particle Analyser Technology (EC supported project, 2020-2023): participants University of Geneva, INFN, IEAP CTU. Budget of IEAP CTU = 12 992 kCZK (512,5 kEUR).

PAN is an instrument designed to precisely measure and monitor the flux, composition, and direction of highly penetrating particles (>100 MeV/nucleon) in deep space and interplanetary missions with an energy resolution better than 10% for nuclei from H to Fe at 1 GeV/n. The detector, limited to about 20 kg in mass and 20W in power consumption, is based on the magnetic spectrometer detection principle, and exploits the advantages provided by the integration of ultra-thin microstrip

silicon detectors, hybrid silicon pixel detectors and silicon photomultipliers. To demonstrate the concept of the PAN instrument a smaller version of the baseline instrument, Mini-PAN, was developed within this project. The contribution of IEAP CTU was the design, development and manufacturing of the hybrid silicon pixel layers responsible for particle localization and identification.

6) Center of Advanced Nuclear Technology II (Technological Agency CR, 2023-2028): main applicant Faculty of electrical engineering of University of West Bohemia, in total 23 institutions (IEAP CTU is involved in 3 task groups). 1) Support in operation of existing nuclear technologies (NT) (shorter downtime; cutting production and operating costs; operation automation; fuel types; higher efficiency). 2) Involvement in R&D and building of new NT (new reactors; new technologies in the entire fuel cycle; new fuels; increasing efficiency). 3) New business challenges (new markets, new export opportunities). 4) Increasing nuclear and radiation safety in CR (safety technologies and procedures; lowering radiation burden on personnel). 5) Concentration of unique resources of leading Czech R&D centres founded mainly with support of European Regional Development Fund (Operational Programme Research and Development for Innovation) 6) Creation of new human resources in NT (support of talented researchers, new study programs). 7) Support of the government and SUJB (knowledge transfer, qualified human resources).

7) Research infrastructure for experiments at CERN (Ministry of Education, Youth and Sports, 2016-2022, 2023-2026) - The large research infrastructure CERN-CZ organizes and supports the participation of universities and research institutions from the Czech Republic (CR) in the international laboratory CERN. The aim of CERN-CZ is to support the development, construction, maintenance and operation of scientific facilities in CERN experiments with Czech participation. This includes the local infrastructure and laboratories in the CR, which are necessary for the research, development and production of these detectors, and computing tools for large scale data processing. The project supports following activities of the institute: experiments ATLAS, MoEDAL-MAPP, AEgIS, activities at the ISOLDE facility, and within the Neutrino Platform.

8) The experiment IS581 "(d,p)-transfer induced fission of heavy radioactive beams" (Grant Agency CR, 2021-2023): IEAP CTU is the only applicant. The experiment was approved by the INTC (ISOLDE and n-ToF Experiments Committee). Its main goal is direct measurement of fission barrier height of heavy fissile radioactive beams delivered by HIE-ISOLDE facility using an active target ACTAR-TPC in inverse kinematics. The fission barrier heights of heavy fissile nuclei away from the line of beta-stability are practically unknown. The knowledge of fission rates (and thus fission barriers) of unstable heavy nuclei is of high importance for understanding of r-process nucleosynthesis in neutron star mergers (such as the recently observed gravitational wave event GW170817) as recently stated in the NuPECC Long range plan from 2017. The knowledge of fission barriers of unstable heavy nuclei can be also implemented in applications in nuclear energy. The experiment IS581 provides an opportunity to obtain a unique result of general interest using the recently commissioned HIE-ISOLDE facility.

9) European Radiation Sensors Array (ERSA, contract research for Space Application Services, Belgium, 2022-2025), Contract price 4 750 kCZK (190 kEUR). The ESA human spaceflight experiment to fly farthest from Earth now has a name: ERSA (European Radiation Sensors Array). Destined for the Gateway, an international outpost in lunar orbit, ERSA will monitor radiation and return vital

data. By monitoring radiation, the experiment will help researchers gain a complete understanding of cosmic and solar rays in unexplored areas as the orbital outpost is assembled around the Moon. It's hardware will actively monitor radiation at all times and return data for scientists from participating countries to consult. Developed by the European Space Agency (ESA), ERSA will fly on the outside of Gateway to study the solar wind and radiation from deep space. Equipped with five instruments, ERSA will measure energetic particles from the Sun, galactic cosmic rays, neutrons, ions, and magnetic fields, and provide data about the physics of radiation in the solar system. Two HardPix units, developed by IEAP CTU within the RMSIP project, are one of the five instruments. The contract is for the delivery of these two HardPix units to SpaceApps, the ERSA integrator.

10) Space Weather Instrumentation, Measurement, Modelling and Risk (SWIMMR, contract research for D-Orbit, Italy, 2022-2023), Contract price 2 700 kCZK (90 kGBP). SWIMMR is a £20 million, four-year programme that will improve the UK's capabilities for space weather monitoring and prediction. There will be an emphasis on space radiation, which can affect aircraft systems, changes in the upper atmosphere, affecting communications, and surges in the current in power grids and other ground-level systems. SWIMMR will develop and deploy new instruments, models and services to support the UK space weather community and the Met Office Space Weather Operations Centre. This programme will significantly add to the UK's capability to predict and mitigate the hazards of space weather, as well as providing a basis for wider international collaboration over the four-year lifetime of the proposal and beyond. The contract was for the delivery of the HardPix radiation detector to D-Orbit, who provides satellite services for SWIMMR. HardPix was launched into Earth orbit onboard D-Orbit ION satellite in June 2023.

Table 3.3.1 Projects supported by public funds

In the role of beneficiary						
Provider ²⁵	Project name	Support (in thousands CZK/EUR) ²⁶				
		year 1	year 2	year 3	year 4	year 5
ESF through MEYS	Engineering applications of microworld physics (2017–2022)	60508 kCZK / 2386903 €	31032 kCZK / 1224142 €	32032 kCZK / 1263590 €	34033 kCZK / 1342525 €	
MEYS	Van de Graaff Accelerator - A Source of Tunable Monoenergetic Neutrons and Light Ions (2016–2019)	3804 kCZK / 150059 €				
ESF through MEYS	Van de Graaff Accelerator - a Tunable Source of Monoenergetic	6752 kCZK / 266351 €	1565 kCZK / 61736 €			

²⁵ If the provider is from abroad, please indicate the provider's country of origin in brackets. For the determination of the country of origin of the provider, the place of residence of the provider is decisive.

²⁶ Indicate the total amount expressed in thousands of CZK and the conversion of the total amount into Euro.

	Neutrons and Light Ions (2017–2019)					
MEYS	Van de Graaff Accelerator - A source of Tunable Monoenergetic Neutrons and light Ions (2020–2022)		4440 kCZK / 175148 €	4261 kCZK / 168087 €	4332 kCZK / 170888 €	
MEYS	Laboratoire Souterrain de Modane – participation of the Czech Republic (2016–2019)	7240 kCZK / 285602 €				
ESF through MEYS	Underground laboratory LSM - Czech participation to European-level research (2017–2019)	6609 kCZK / 260710 €				
MEYS	Laboratoire Souterrain de Modane – participation of the Czech Republic (2020–2022)		9628 kCZK / 379803 €	9176 kCZK / 361972 €	8994 kCZK / 354793 €	
MEYS	Laboratoire Souterrain de Modane – participation of the Czech Republic (2023–2026)					6240 kCZK / 246154 €
ESA	Timepix based Miniaturised Radiation Monitor - MIRAM	4624 kCZK / 182406 €	4539 kCZK / 179 053 €			
ESA	Radiation Monitor System in a Package - HITPIX			535 kCZK / 21105€	6272 kCZK / 247416 €	2989 kCZK / 117909 €
ESA	Radiation Environment Monitor for Energetic Cosmic rays - REMEC				2321 kCZK / 91559 €	3848 kCZK / 151795 €
GA CR	Development of algorithms for X-ray all-sky monitoring with Lobster Eye optics and Timepix detector. (2018–2020)	2521 kCZK / 99448 €	2568 kCZK / 101302 €			
GA CR	Measurement of anomalies in angular correlation			4554 kCZK / 179645 €	4446 kCZK / 175385 €	4326 kCZK / 170651 €

	of electron and positron internally produced in excited ^8Be and ^4He (2021–2023)					
GA CR	Experiment IS581 "(d,p)-transfer induced fission of heavy radioactive beams" (2021–2023)			1901 kCZK / 74990 €	1972 kCZK / 77791 €	2111 kCZK / 83274 €
GA CR	Particle identification in high-energy physics experiments and space with advanced detection systems (2023–2027)					3640 kCZK / 143590 €
MEYS	A Novel Non He-3 based Dual Neutron Gamma Sensor (2017–2019)	3611 kCZK / 142446 €				
Ministry Interior CR	Center for the support of the population in case of actual or suspected occurrence of extraordinary nuclear and radiation events (2021–2025)			13843 kCZK / 546075 €	16096 kCZK / 634951 €	10343 kCZK / 408008 €
Visegrad funds	Visegrad Region High-Energy-Physics Prospects in Theory and Experiment - V4HEP					134 kCZK / 5286 €
MEYS	Radon adsorption in porous materials (2022–2023)				72 kCZK / 2840 €	72 kCZK / 2840 €
MEYS	Impact of lattice defects on nuclear recoil based energy deposition in cryogenic CaWO_4 calorimeters (2023–2024)					45 kCZK / 1775 €
MEYS	SiC Timepix detector (2023 - 2025)					60 kCZK / 2367 €
Total		95669 kCZK / 3773925 €	53772 kCZK / 2121184 €	66302 kCZK / 2615464 €	78538 kCZK / 3098148 €	33808 kCZK / 133649 €
In the role of another participant						

Provider ²⁷	Project name	Support (in thousands CZK/EUR)				
		year 1	year 2	year 3	year 4	year 5
Min Cult CR	Mobile device devoted to imaging and analysis of the layered paintings and polychromy of the works of old art (2018–2022)	1433 kCZK / 56529 €	1454 kCZK / 57357 €	1551 kCZK / 61183 €	1339 kCZK / 52821 €	
Min Cult CR	Methods for consolidation of brittle porous beeswax seals (2023–2027)					791 kCZK / 31203 €
Min Ind Trade CR	Material and technological research of scintillation detectors (2018–2020)	986 kCZK / 38895 €	989 kCZK / 38895 €			
MEYS	PRINT3D CONTACTS (2017 - 2020)	684 kCZK / 26982 €	233 kCZK (9191 €			
MEYS	Cooperation of the Czech Republic with JINR Dubna in the theoretical and nuclear physics and application of nuclear methods in other fields (2018–2022)	299 kCZK / 11795 €	299 kCZK / 11795 €	319 kCZK / 12584 €	323 kCZK / 12742 €	
Min Int CR	Detector of the radioactive contamination in wounds (2019–2022)	1382 kCZK / 54517 €	3002 kCZK / 118422 €	2416 kCZK / 95306 €	1809 kCZK / 71361 €	
Min Int CR	Radiation Monitoring Network for institutions and schools to assure early awareness and enhancing safety of citizens (RAMESIS) (2015–2019)	587 kCZK / 23156 €				
TA CR	Centre for Advanced Nuclear Technologies (CANUT) (2012–2019)	3651 kCZK / 144024 €				

²⁷ Ibid.

TA CR	Radiation and nuclear safety technologies development center: RANUS - TD (2012–2019)	3870 kCZK / 152663 €				
TA CR	Study of variant technical solutions for deep disposal of radioactive waste (2023–2025)					725 kCZK / 28600 €
EC	Innovative Photodetector Module for advanced Hybrid “Magnetic Resonance Imaging/Positron Emission Tomography” Scanners for Nuclear Medicine (2023–2027)					227 kCZK / 8966 €
EC	Development of a demonstrator for the Penetrating Particle Analyser (PAN) technology (2020–2022)		3883 kCZK / 153176 €	3771 kCZK / 148758 €	3861 kCZK / 152308 €	1477 kCZK / 58258 €
EC	Measurement and Instrumentation for Cleaning and Decommissioning Operations (2019–2021)	571 kCZK / 22508 €	3013 kCZK / 118847 €	2421 kCZK / 95484 €	2107 kCZK / 83124 €	342 kCZK / 13511 €
TA CR	Center of Advanced Nuclear Technology - CANUT (PB2 + PB4)	138 kCZK / 5444 €				
MEYS	HRAward (Development of capacity for strategic research management at CTU in Prague)	609 kCZK / 24024 €	528 kCZK / 20828 €	333 kCZK / 13136 €	278 kCZK / 10966 €	
TA CR	Center of Advanced Nuclear Technologies II					4950 kCZK / 195266 €
MEYS	Research infrastructure for experiments at CERN	2335 kCZK / 92110 €				
MEYS	Research infrastructure for experiments at CERN		2680 kCZK / 105712 €	2525 kCZK / 99606 €	2441 kCZK / 96292 €	

MEYS	Research infrastructure for experiments at CERN					2435 kCZK / 96055 €
Total		16545 kCZK / 652647 €	16081 kCZK / 634241 €	13336 kCZK / 526057 €	12158 kCZK / 479614 €	10947 kCZK / 431859 €

Table 3.3.2 - Contract research activities

Client ²⁸	Activity name	Revenue (in thousands CZK/EUR)				
		year 1	year 2	year 3	year 4	year 5
University of Houston	University of Houston - research services - Tlustos	0	0	332 kCZK / 13097 €	0	0
ESA	EL3PRO - Lunar surface prospecting mobile payload package pre-phase A study (principal investigator is OHB System AG)	0	0	0	148 kCZK / 5838 €	212 kCZK / 8363 €
ESA	ERSA - Delivery of the HardPix for the ESA Radiation Sensor Array (principal investigator is Space Applications Services NV/SA)	0	0	0	2345 kCZK / 92505 €	0
D-ORBIT	SWIMMR - HardPix Instrument	0	0	0	0	2291 kCZK / 90375 €
Total				332 kCZK / 13097 €	2493 kCZK / 98343 €	2503 kCZK / 98738 €

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the evaluated period, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁹, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

IEAP CTU maintains a balanced focus between fundamental and applied research. We recognize the importance of achieving results that positively impact society and facilitating their transfer to industrial partners. During the reporting period, our staff successfully prepared four patents (one in

²⁸ If the client is from abroad, indicate in brackets the country of origin of the client.

²⁹ See Terms definition.

the USA, two in the EU, and one in the Czech Republic), developed six prototypes, created eleven software packages, and produced one utility model and thirty-five functional samples.

The practical applications of our results span a wide range of fields, including space, preclinical research, healthcare, dosimetry, radioactivity suppression, accelerator technologies, art, and the detection of various types of radioactivity. These selected examples have already demonstrated measurable economic impact. Regarding gender dimension and sustainability, we are committed to fostering an inclusive and sustainable research environment. Since 2021, CTU has implemented a Gender Equality Plan, ensuring that the gender dimension is considered in research and institutional activities. The results contribute to sustainability by promoting inclusivity and equal opportunities in scientific and research progress (see Supporting documents).

Selected results (all closely connected to projects undertaken by IEAP CTU staff during the evaluated period) have also positively impacted the institute's budget:

1) Jakůbek, J.; Thilo, M.; Campbell, M. A single layer 3D tracking semiconductor detector, European Patent Office. Patent EP2758806: The result is based on cooperation between IEAP CTU, CERN and technological company ADVACAM (spin-off company of IEAP CTU, according to Ernst&Young the best Technological company 2021 in the Czech Republic). Broad impact of the result: space, imaging in biomedicine, material research, art.

Short description: The present invention relates to a pixel detector, comprising a semiconductor sensor layer, in which charges can be generated upon interaction with particles to be detected. The semiconductor layer defines an X-Y-plane and has a thickness extending in Z-direction. The detector further comprises a read-out electronics layer. The time difference information is indicative of a difference in the Z-components of the locations of charge generations in the corresponding neighbouring sensor volumes caused by a particle trajectory that is inclined with respect to the X-Y-plane.

2) Krejčí, F.; Jakůbek, J. Method of phase gradient radiography and arrangement of an imaging system for application of the method, European Patent Office. Patent EP2978377: The result is based on direct cooperation between IEAP CTU, and technological company ADVACAM (spin-off company of IEAP CTU, Technological company 2021 in Czech Republic). Broad impact of the result: imaging in biomedicine, material research, art.

Short description: The invention deals with a radiation imaging method including steps of generation of at least one radiation microbeam by a radiation source, radiation penetration through the examined object and its caption by a detector consisting of a system of pixels, while the difference between the position of a non-refracted microbeam detected without the examined object and the position of a refracted microbeam detected with the examined object defines refraction angle in a particular point of the examined object expressing the size of local gradient of refractive index corresponding to the phase gradient image (PGI) of the examined object.

3) Pospíšil, S.; Leroy, C., Method of refining positional resolution of a positron source in positron emission tomography, Czechia. Patent CZ 308094: The result is based on direct cooperation between IEAP CTU, and University of Montreal. Realization of this idea has an important impact on medicine (cancer treatment, precise definition of positron annihilation). In 2024 USA patent was accepted.

Short description: The method of refining the determination of the positron source in an object studied by the PET method consists of the following steps: An object containing a source of positrons, which annihilate mainly through the production of pairs of annihilation photons, is placed

in a system of n positional and energy sensitive gamma detectors formed of detection elements in which the photons can interact. The times and coordinates of the interaction points and energy E_1 and E_2 of the interacting photons of the detection elements concerned are determined and transmitted by the interface to the control and evaluation computer, in which the coincidence events registered by the detection elements x are assigned to individual pairs of annihilation photons. Both photon pairs with energy from 507 keV to 513 keV and pairs of annihilation photons with Doppler shifted energy outside this interval are recorded. The greater these shifts, the more likely it is that the annihilation occurred during flight closer to the place where the positron was born, which refines the determination of the positron source distribution in the study object.

4) Mamedov, F.; Štekl, I.; Smolek, K.; Hůlka, J.; Fojtík, P.; Čermáková, E., A system for creating and maintaining a radon-free space and a clean room without aerosols, Utility Model CZ32873: The developed system includes clean room with reduced amount of aerosols (e.g. ISO 5) and highly suppressed concentration of radon and its daughter products. The system was developed by IEAP CTU and NRPI (National Radiation Protection Institute). System has a broad range of applications e.g. in biology and medicine (DNA and cells in Zero Dose environment), electronics (production of chips in radon free environment) and detection technologies (production of detectors in Zero Dose environment). Two such systems already exist (underground laboratory, National Radiation Protection Institute). Technology transfer was performed by two companies - ATEKO (<https://www.ateko.cz/en/>) and CRAC (<https://www.crac.cz/en/>).

5) Slaviček, T.; Fojtík, P.; Biskup, B.; Macko, M.; Waheed, F.; Mašek, P.; Rovenská, V.; Malátová, I. et al., Detector of radioactive contamination of wounds and injuries, Functional Sample: The system was developed by IEAP CTU and National Radiation Protection Institute (located here). It is a unique system in the world.

Short description: Equipment intended for the qualitative and quantitative determination of radioactive contamination of a wound, which arose because of mechanical damage to the skin, and which is the route of entry of the radionuclide into the organism. This situation thus leads to a dose from internal radiation in the victim persons. The wound detector is designed to directly measure the contamination of the wound and its surroundings. Its outputs serve to i) identification or to find a wound in the affected person; ii) identification of radionuclides in the wound; iii) characterization of the wound; iv) determining the activity of a radionuclide or a mixture of radionuclides in the wound. The wound detector serves to meet the requirements of ISO 20031 [ISO 2020] regarding direct measurement in the morning. Such measurement is desirable from the point of view of early estimation of potential internal irradiation of the affected person and possible accelerated medical intervention. The functional sample of the wound detector covers the alternatives of possible radioactive contamination in the sense i) various types of ionizing radiation emitted by the contaminant; ii) the presence of surface contamination; iii) places of first contact with the affected person (dosimetry or medical workplace). The system includes: Positioning bed · Collaborative robot · CZT detector with amplifier and signal digitization · Pixel detector · Digital camera · Microprobe with YAP:Ce scintillation detector · HPGe detector for measuring systemic activity · HPGe detector portable to a medical facility.

6) Malich, M.; Petro, M.; Janeček, J.; Smetana, A.; Holík, M.; Bergmann, B.; Gohl, S.; Granja, C. et al., MIRAM - Miniaturized Radiation Monitor for Space. Functional Sample: Miniaturized Radiation Monitor for Space, developed in cooperation with ESA (European Space Agency). The MIRAM - with two detection layers, based on the Timepix3 detector and Silicon diodes. The data is directly

processed on Orbit, because MIRAM also contains on-board Data Processing. This allows MIRAM to significantly reduce the amount of data sent to the Ground Station. The monitor was already purchased by Telecommunication Satellite Company.

7) Vavřík, D.; Žemlička, J., Laboratory RTG profilometer devoted for non-destructive inspection of layered structure utilizing sharp edge planar beam, Functional Sample: The result is based on direct cooperation between IEAP CTU and Institute of Theoretical and Applied Mechanics (ITAM AS CR). RTG profilometer targets the inspection of a layered structure deposited onto a massive substrate. The investigated object is irradiated by a planar, sharp X-ray beam passing over the surface at an acute angle. The scattered and XRF photons are recorded by a pinhole camera equipped with a semiconductor pixelated detector. Measurement of the layer thicknesses with micrometric precision is obtained by analysing changes in the signal produced at the sharp edge of the X-ray beam. The device primarily targets the investigation of medieval wooden panel paintings based on polychromy but it can be more general. It enables X-ray measurements, fluorescence imaging, creation of digitized 3D models, meets the functional and economic conditions of small-scale production. Advacam leverages this expertise to develop cutting-edge imaging solutions and its subsidiary InSightART now continues the innovative work initiated by the IEAP CTU, applying it specifically to the art world.

8) Rukhadze, E.; Hodák, R.; Štekl, I.; Hůlka, J.; Rulík, P.; Hýža, M., Automatic system of changing and measurements samples for HPGe detectors in very low radiation background. Functional Sample: The sophisticated system for automatic changing and measurements of low activity samples (up to 15 samples in the tray) with ultra-low background HPGe detectors was developed in direct cooperation between IEAP CTU, National Radiation Protection Institute (NRPI) and company NUVIA (<https://www.nuvia.com>). The system was constructed by NUVIA (Czech branch of French company Soletanche) based on technical proposal and in close cooperation with NRPI and IEAP CTU. The equipment was successfully tested by NRPI and IEAP CTU. It operates HPGe detectors placed in 30 cm shielding of low activity Pb incl. Suppression of the radon concentration below 100 mBq/m³. It substantially increased the efficiency of measurement (24/7/365 regime). At present, it is used in environmental measurements.

9) Jakůbek, J., Detector of ionizing radiation enabling a coherent digital image, United States of America. Patent US10168437: A detector of ionizing radiation, e.g. x-ray radiation, allowing the creation of a continuous digital image of a scanned object. The detection surface is formed by a mosaic of detector segments arranged in a matrix and consists of a sensor layer arranged on a chip reader with the formation of tiers to engage an adjacent detector segment. The sensor layer is active over its entire area, and the matrix is provided with a means for positioning the detector segments to define their mutual lateral clearance less than the size of one pixel. The positioning means preferably comprises a carrier of rows. The resulting detection surface is active over its entire area and allows for the direct creation of continuous digital image without dead zones. Licence fee = 82 749 EURO.

10) Owens, A. Semiconductor Radiation Detectors, Boca Raton: CRC Press, 2019. Series in Sensors. ISBN 9781138070745, Monography: This comprehensive book grew out of the author's previous publication, "Compound Semiconductor Radiation Detectors" (2012). It is completely updated and expanded. Bringing together material scattered across many disciplines, the book provides readers with a consolidated source of information on the properties of a wide range of semiconductors; their growth, characterization and the fabrication of radiation sensors with emphasis on the X- and

gamma-ray regimes. It explores the promise and limitations of both the traditional and new generation of semiconductors and discusses where the future in semiconductor development and radiation detection may lie. The purpose of this book is two-fold; firstly, to serve as a textbook for those new to the field of semiconductors and radiation detection and measurement, and secondly as a reference book for established researchers working in related disciplines within physics and engineering.

Table 3.4.1 - Overview of research results in the period under evaluation

Type of result ³⁰	Year of application	Name
Patent US10168437, USA	2019	Detector of ionizing radiation enabling a coherent digital image
Patent EP2758806, European Patent Office	2019	A single layer 3D tracking semiconductor detector
Patent CZ 308094, Czech Republic	2019	Method of refining positional resolution of a positron source in positron emission tomography
Patent EP2978377, European Patent Office	2021	Method of phase gradient radiography and arrangement of an imaging system for application of the method
Prototype	2022	An innovative photodetection system for positron emission tomography
Prototype	2022	Updated uProbe concept
Prototype	2021	Robotic system with Timepix type detectors
Prototype	2020	USB & Ethernet Embedded Readout Interface for Timepix3 – Katherine Readout for Timepix3
Prototype	2019	Dual Ethernet Embedded Readout Interface for Timepix3 – Katherine Readout for Timepix3 (Telescope Edition)
Prototype	2019	Ethernet Embedded Readout Interface for Timepix2 – Katherine Readout for Timepix2
Software	2022	Waveform analyzer for multichannel detection system
Software	2022	Coincidence pre-evaluator for multi-detection system experiments
Software	2021	StratiScan. Position control of the X-ray profilometer software
Software	2021	Plugin for control a network of Timepix3
Software	2021	Timepix3 calibration plugin
Software	2020	MIRAM data evaluation and preprocessing toolkit
Software	2020	J-PIX data acquisition toolkit
Software	2020	Online plugin for Timepix3 measurements displaying acquired data for presentation purposes
Software	2020	FITPix hardware library based on the parallel software architecture
Software	2020	ATLAS-TPX3 DAQ
Software	2019	ATLAS-TPX(3) luminosity evaluator
Utility Model CZ32873	2019	A system for creating and maintaining a radon-free space and a clean room without aerosols
Functional sample	2022	X-ray camera with variable focal length
Functional sample	2022	A freezer for vacuum chambers
Functional sample	2022	Nested neutron spectrometer system
Functional sample	2022	Radon-absorption testing setup

³⁰ Specify the specific type of result. Add rows as needed.

Functional sample	2022	Triangular holder for three Timepix3 detectors for use in vacuum chambers
Functional sample	2022	Optical signal readout from the high-voltage VdG accelerator terminal
Functional sample	2022	Programmable power supply to drive ion-beam-deflection dipole magnets
Functional sample	2022	Detector of radioactive contamination of wounds and injuries
Functional sample	2021	Ionization chamber with a set of changeable targets
Functional sample	2021	New set of solid deuterium targets
Functional sample	2021	System of accelerator cooling-water flow measurement
Functional sample	2021	N-type HPGe detector system
Functional sample	2021	Laboratory apparatus for humidity and Li-content measurement of sand samples
Functional sample	2021	Position sensitive Multiwire Proportional Counter with delay-line readout
Functional sample	2021	Time Projection Chamber operating with SAMPA front-end
Functional sample	2021	Optical remotely controlled accelerator-beam monitor with beam electric-current measurement
Functional sample	2021	3D profilometer camera using a Timepix hybrid pixel detector with a CdTe sensor
Functional sample	2020	Timepix3 Quad Chipboard
Functional sample	2020	SF6 Insulation-Gas System for Venerable HVE AN2500 Van de Graaff Accelerator
Functional sample	2020	Support System for Stabilization of the Exact Position of Accelerator Ion Guide
Functional sample	2020	MIRAM - Miniaturized Radiation Monitor for Space
Functional sample	2020	1nA and 1μA Precision Current Source for Calibration Purposes
Functional sample	2020	1nA-Resolution Direct-Current Meter and Integrator Operating in Wide Range of 1 nA – 100 μA
Functional sample	2020	Nanocomposite scintillator polystyrene - nano ZnO(Ga)
Functional sample	2020	Polyethylene naphthalate detector
Functional sample	2020	Polystyrene based detector without stabilizers
Functional sample	2020	Automatic system of changing and measurements samples for HPGe detectors in very low radiation background
Functional sample	2020	Sensitive compact Rn detector
Functional sample	2020	Ultra-low background HPGe detector IDEFIX
Functional sample	2019	Demonstrational monitoring network
Functional sample	2019	Neutron sensitive gamma ray spectrometer
Functional sample	2019	Pixelated gamma ray spectrometer
Functional sample	2019	Laboratory RTG profilometer devoted for non-destructive inspection of layered structure utilizing sharp edge planar beam
Functional sample	2019	Detector of reactor antineutrinos
Functional sample	2019	3D profilometer camera using Timepix hybrid pixel detector with Si sensor

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)³¹, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).³²

Additionally, the evaluated unit shall briefly comment on the funds received during the evaluation period from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

Self-assessment:

IEAP CTU has established a clear and stable system for transferring research results into practical applications. This system begins with the evaluation of novelty to determine the potential for patent application. We employ a part-time patent specialist to ensure high-quality review and effective economic solutions. The initial step involves applying for a patent in Czechia (effective economic solution and high quality of reviewing), followed by a nine-month period to decide on further applications in the USA or EU. The second step in our process is identifying potential users of our practical results. Our experience shows that direct cooperation with companies through common projects or activities is an effective way to meet the R&D&I needs of the market. This approach guarantees that our research aligns with customer demands. Our strategy also includes presenting our results on an international level through conferences, PR activities, articles in refereed journals, and international collaborations.

Users of our results can be divided into two groups:

- 1) long-term users of our results: ADVACAM, NUVIA, ATEKO (Czech technological companies), XIE (company, Germany), CERN (international institution)
- 2) new users of our results: SINTEF (Norway), KROMEK (UK, technological company), Siemens (Germany), Innovative Physics Limited (UK), JINR (an international institute, after 2022 the contact stops), CEA, CNRS (both research institutions, France), Institute of Electrical and Electronics Engineers (USA), STFC/UKR (UK), universities – Charles University, University of Chemistry and Technology, University of West Bohemia (all Czechia), University of Andres Bello (Chile), Marseille University (France).

Based on the above given lists several groups of users could be distinguished: i) Czech technological companies; ii) technological companies from abroad; iii) international institutions (e.g. CERN); iv) research institutions (e.g. CEA, CNRS, STFC); and v) universities in Czechia or abroad.

³¹ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

³² If the commercialisation of R&D&I results is carried out in this way.

The effectiveness and commercialization of R&D&I could be in our case proved by 5 selected examples (based on the Table 3.4.1):

a) services of the research infrastructure (accelerator VdG) for customers (Innovative Physics, Siemens) – it supports the attractiveness of VdG and proves the effort for regular improvement of the accelerator and equipment installed around it.

b) licence fee (CERN, ADVACAM, University of west Bohemia, Jablotron) – the payment is based on the licence agreements signed between IEAP CTU and partners. Also, it shows the necessity to actively participate in Medipix/Timepix collaboration (IEAP CTU is among founding institutions of this collaboration).

c) delivery of sensitive Rn detectors (University of Andres Bello, Chile; CNRS) – nice example of successful technology development in home institutions and PR on international conferences.

d) delivery of educational kit with pixel detector (JINR, Marseille University, ELECTRI, STFC/UKRI) – successful story of transfer of R&D&I into teaching process. IEAP CTU supports activities of secondary teachers of physics and close cooperation with winners of national competitions in physics (summer practices). In such frames different tasks with pixel detectors in detection of different types of radioactivity were developed, including videos or textbooks.

e) contractual research based on our know-how (measurements of scintillation detectors, Monte Carlo simulations, measurement with micro-CT, delivery of specialized PCB, dedicated steel structure for detector SuperNEMO located underground).

The total amount of IEAP CTU income from the above-mentioned activities reached 295 545 EURO in the evaluated period. The whole income was used as additional support for our R&D&I (improvement of home infrastructure, new equipment, better conditions for early career researchers, extension of international cooperation etc.).

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

Type of revenue	Revenue (in thousands CZK/EUR)				
	year 1	year 2	year 3	year 4	year 5
Licence fee for educational kit MX-10, JABLOTRON company	25 kCZK/ 986 €	55 kCZK/ 2170 €	0	0	0
Licence fee based on Licence agreement, CERN	0	263 kCZK/ 10375 €	0	179 kCZK/ 7061 €	0
Licence fee, Licence agreement No. 350013-003, ADVACAM company, PIXELMAN software	329 kCZK/ 12978 €	276 kCZK/ 10888 €	659 kCZK / 25996 €	579 kCZK /22840 €	837 kCZK/ 33018 €
Licence fee, Licence agreement No. 350010/2014, University of West Bohemia	0	3 kCZK/ 118 €	0	0	0
Contract research, tests of scintillating detectors, NUVIA company	0	109 kCZK / 4300 €	0	0	0
Delivery of interface for TPX3, JINR Dubna	131 kCZK / 5168 €	0	0	0	0

R&D service, SINTEF (Norway)	0	0	0	74 kCZK / 2919 €	0
Licence fee for Timepix3 chipboard, KROMEK company (UK)	0	0	0	0	693 kCZK / 27337 €
Sensitive Rn detector, Universidad Andres Bello, Chile	0	0	199 kCZK / 7850 €	0	0
Monte Carlo simulation for antiradon factory, ATEKO company	0	105 kCZK / 4142 €	60 kCZK / 2367 €	0	0
R&D services, SINTEF (Norway)	0	75 kCZK / 2960 €	76 kCZK / 2998 €	0	0
Measurement and computational reconstruction of calcite crystals on micro-CT systems, Charles University	0	0	60 kCZK / 2367 €	60 kCZK / 2367 €	0
Micro-CT measurements and 3D reconstruction of historical artifacts, University of Chemistry and Technology, Prague	0	0	0	52 kCZK / 2051 €	134 kCZK / 5286 €
Educational kit with pixel detector, JINR Dubna	0	0	100 kCZK / 3945 €	0	0
USB Interface and PCB Canpix, X-RAY Imaging Europe (Germany)	0	131 kCZK / 5168 €	0	155 kCZK / 6114 €	195 kCZK / 7692 €
VdG neutron beam time, SIEMENS company	12 kCZK / 473 €	0	0	0	0
Sensitive Rn detector, CNRS (France)	0	133 kCZK / 5247 €	129 kCZK / 5089 €	730 kCZK / 28797 €	144 kCZK / 5680 €
Project of the steel support structure, CNRS (France)					
VdG neutron beam time, Innovative Physics Ltd (UK)	0	60 kCZK / 2367 €	0	0	0
Service (test of valves), DENSO Manufacturing	0	35 kCZK / 1381 €	0	0	0
Educational kit with pixel detector, Marseille Université (France)	0	0	0	209 kCZK / 8245 €	0
Service (PCB repair), CEA (France)	0	0	0	25 kCZK / 986 €	9 kCZK / 355 €
Katherine TPX interface, KROMEK company (UK)	0	0	0	0	147 kCZK / 5799 €
Educational kit with pixel detector, Institute of Electrical and Electronics Engineers (USA)	0	0	0	0	86 kCZK / 3393 €
Educational kit with pixel detector, STFC/UKRI (UK)	0	0	0	0	159 kCZK / 6272 €
Total	497 kCZK / 19605 €	1245 kCZK / 49116 €	1283 kCZK / 50612 €	2063 kCZK / 81380 €	2404 kCZK / 94832 €

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the evaluated period and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

The staff at IEAP CTU is committed to popularizing our research achievements and engaging with the public. We do this through various channels, including popularization articles, TV and radio interviews, educational videos featuring pixel detectors, and excursions to our research infrastructure, such as VdG accelerator. We also place significant emphasis on working with high school students. Through various popularization and educational events, we initiate cooperation with talented high school students, particularly winners of national physics competitions. We offer these students long-term summer internships at IEAP CTU, which often continue into their university studies and can eventually develop into employment relationships. Additionally, IEAP CTU organizes regular public visits under the theme "Science and Art." We transformed our institute's walls into an art exhibition space, showcasing paintings and other artworks. For example, in 2021, we held two such events, each attracting around 40 attendees. These events highlight the connections between modern scientific research in mathematics, physics life sciences and the world of art, presenting these relationships to the public.

Examples of popularization events and communication with public:

1) Regular lecture cycles at the University of the Third Age. The courses Secrets of the Microworld and Laws of the Microworld focus on the basics of nuclear and particle physics, the theory of relativity, and the principles of quantum mechanics. The lectures are presented in a format accessible to non-professionals from the public (usually 30–40 participants per each one-semester course). [See Lectures of the University of the Third Age in the Supporting Documents.]

2) Cooperation with secondary school teachers and students. Every year in July, IEAP organizes seminars for winners of the national round of Physics Olympiads. Interested talented high school students are then offered a long-term summer internship at the institute and involvement in ongoing research projects. This often leads to long-term cooperation and participants continue to work with the institute even after they enter university. IEAP staff participates in the organization of high school students' competitions in physics (e.g. Physics Olympiad, Secondary School Professional Activity). In this context, every year, IEAP organises 2-day seminars for teachers of Czech secondary and primary schools dedicated to the detection of radioactivity using (in the institute developed) pixel detectors MX-10 and MiniPIX EDU, respectively. A book with relevant laboratory tasks was written. IEAP CTU also supported textbooks for secondary school students, e.g. V. Wagner, V. Vícha and Z. Janout (both IEAP), The Boundaries of the Mendeleev's Periodic Table (or how to produce and study elements heavier than ever), Union of Czech Mathematicians and Physicists, Astra Print Hradec Králové, 2019.

3) In 2022, on the twentieth anniversary, the IEAP Open Day was held in IEAP. Approximately 50 interested members of the public visited the IEAP laboratories and learned about the research conducted at the institute.

4) Exhibition in National Gallery – “In Depth and on the Surface” (2022-2023) - The exhibition presents the results of an interdisciplinary project for the applications of apparatus using semiconductor pixel detectors that will advance the possibilities of research methods for works of ancient art. Representatives of the natural, technical and humanities sciences from three specialized departments (Institute of Theoretical and Applied Mechanics of the Czech Academy of Sciences, IEAP CTU and the National Gallery Prague) collaborated on the project. [See web page In Depth and on the Surface of the National Gallery in the Supporting Documents.]

5) Particle Prague 2022 - the event organized by Prague’s research institutes and universities offered high school students the opportunity to enter the world of particle physics. During their week-long stay in Prague, participating students had the opportunity to visit laboratories dealing with particle and nuclear physics, talk to experts, and try out the work of a physicist in mini projects. IEAP CTU actively participates and offers practical measurements with pixel educational kit and tasks in the VdG accelerator.

6) TV and radio interview in Czech Republic:

a) Interview of Robert Filgas in radio Czech Radio about IEAP Space program - September 2023 [See Interview of Robert Filgas in the Supporting Documents.]

b) S. Pospisil's speech at the Czech Television, Studio ČT24, on the use of technologies from CERN (24.5.2019). [See Interview of Stanislav Pospíšil at the Czech Television in the Supporting Documents.]

c) A. Owens' speech at the Czech Television, Studio ČT24, on the activities of IEAP at Space (5.6.2023). [See Interview of Alan Owens at the Czech Television in the Supporting Documents.]

d) I. Štekl's interview in the Czech Television, Studio ČT24 (25.7.2018)

[See Interview of Ivan Štekl at the Czech Television in 2018 in the Supporting Documents.]

e) I. Štekl's interview in the Czech Television, Studio ČT24 (24.6.2021)

[See Interview of Ivan Štekl at the Czech Television in 2021 in the Supporting Documents.]

7) Interviews abroad and on internet media:

a) Interview published in Slovakia in a newspaper or a journal: SME - 3x, Denník N - 3x, Hospodárske noviny - 3x, Denník Plus; in a TV: TA3, RTVS; in a radio: STVR - 3x; in a podcast: Týždeň - 2x; in a festivals and events for public - 2x.

b) Interview of IAESTE student Catalina Lesmes Ramirez of EAFIT University, Medellin, Columbia, about her study stay in IEAP CTU - 2019. The student is now a PhD student of CTU and an employee of IEAP. [See Interview IAESTE student in the Supporting Documents.]

c) ATLAS video briefing and press release, September 2023, ATLAS, CERN. Santu Mondal explained the first observation of the production of top quark pairs in proton-lead ion collisions on behalf of ATLAS collaboration. [See Video of Santu Mondal in the Supporting Documents.]

8) PR activity in radiation:

a) Project CzechRad (2019-2025): The project supports the preparedness of CR for response to a nuclear accident. Research focuses on behaviour of the population in risk of panic (using the analogy of COVID pandemic and radiation emergency), esp. on coping risks and on identification of

mechanisms eliminating fear development and propagation. Mathematical methods were developed for early detection of a dangerous phenomenon in a media environment. Involvement of "citizen science" measurements of radiation for alleviation were studied. Radiation detectors were developed and numbering 1000 distributed among individuals and institutions incl. training in data processing and interpretation. The project strengthened the contact of a crisis management with self-governments allowing it even during communication failure. [See web page CzechRad in the Supporting Documents.]

b) Project RAMESIS (Radiation Monitoring Network for institutions and schools to assure early awareness and enhancing safety of citizens); 2015-2019: Radiation monitoring system was implemented at selected institutions and schools. Training and informational materials for understanding radiation problems were prepared. [See web page RAMESIS in the Supporting Documents.]

9) Examples of articles in professional popularization journals and popularization talks:

a) 2023, Žemlička, J.: Art under the detailed view, *Pražská technika*. 2023, 28-31. ISSN 1213-5348.

b) 2022, Štekl, I.; Hůlka, J.; Fojtík, P., Today's Priority - World Events Warn, *TecniCall*. 2022, 22-23. ISSN 1805-1030.

c) 2023, Žemlička, J., In depth and on the surface, Science outreach lecture, Prague, The world of engineering (University of the third age), CTU. 2023-10-11.

d) 2022, Interview I. Štekl and S. Pospíšil, 20 very successful years of the Institute of Technical and Experimental Physics of the Czech Technical University, *Technický týdeník*, print run 9000 copies

e) Institute of Experimental and Applied Physics, CTU in Prague, journal *Vesmír*, 5/2021. Presentation of IEAP CTU.

f) 2023, Bergmann, B., Timepix in particle and nuclear physics – from big machines and tabletop experiments. [Science outreach lecture] Praha: Single-Photon Detection - Imaging the Unseen Workshop, ADVACAM s.r.o.. 2023-05-22.

g) 2022, Palušová, V.; Macko, M., Possibilities of cooperation on the SuperNEMO neutrino experiment [Science outreach lecture] FNSPE CTU in Prague: Science on Department of Physical Electronics, SPIE Student Chapter CTU in Prague. 2022-11-23.

10) Historical documents for nuclear and particle physics:

IEAP CTU initiated activity to capture the disappearing world of the beginnings of nuclear and particle physics in Czechia and Slovakia. The Institute of Contemporary History, Academy of Sciences (ICH AS CR) in cooperation with IEAP CTU organized a seminar Czechoslovak nuclear and particle physics: between JINR and CERN. Based on this activity, the book „Czechoslovak nuclear and particle physics: between JINR and CERN“ was published, author E. Těšínská (ICH AS CR). It includes personal accounts of the Czech and Slovak experts of their cooperation with JINR and CERN (551 pages). The book was published in cooperation with ICH AS CR and IEAP CTU.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

Recommendations from last evaluation are shortened.

1) Items 3.2, 3.3 and 3.4:

“The institute must apply for international projects based on their expertise in detecting and monitoring systems. It aims to focus on smart detecting systems and achieve the title of the centre of excellence in detecting & monitoring systems. Keep working in collaboration with companies. IEAP contributed to 29 projects. The total budget has been limited below 7.5 M EUR. The total amount of revenues from contract research has been limited to less than 300,000 EUR, which is considered small. Revenues from non-public sources have been limited to below 200,000 EUR.”

Response: Total staff number was increased from 84 to 95 (68,9 FTE, 47,68 FTE for researchers, 24,1 FTE early career researchers), while number of staff from abroad was increased from 24 to 32. It supports the attractiveness of IEAP CTU for young people and researchers from abroad. Number of projects was increased to 40 (21 IEAP as a beneficiary and 19 as another participant). The total budget was substantially increased (from 8 M€ to 17,6 M€).

IAEP CTU as a main beneficiary obtained the project “Engineering applications of microworld physics” financed as an Operation Programme Research, Development and Education with interdisciplinary R&D&I (experimental subatomic physics; progressive detection techniques; astroparticle and neutrino physics; applications in radiobiology, biomedicine and radioecology; X-ray and neutron radiography and tomography; proton and hadron therapy; robotics systems for radiation safety; influence of radiation on electronics; environmental radioactivity monitoring). Total budget was 7.8 M€. All results were successfully obtained. The project is in phase of sustainability (till 2032).

IEAP CTU concentrated effort to apply international projects in detecting systems and was successful with 3 space projects (Radiation Monitor system in a Package, ERSA, and PAN) financed by ESA and EU.

2) “Try to develop integrated prototypes, which may attract the interest of local and foreign companies in the field of sensors, detectors and monitoring systems. Try to organize international conferences in the field of sensors, detectors and monitoring systems.”

Response: IEAP CTU substantially increased the number of application results, from 22 results in the previous period to 58 (4 patents, 13 software, 6 prototypes, 1 utility model, 34 functional samples). IEAP CTU with partners organized big international conference ANIMMA 2021 “Advancements in Nuclear Instrumentation Measurement Methods and their Applications” (296 participants) in Prague under the auspices of the Ministry of Industry and Trade of the Czech Republic represented by Karel HAVLÍČEK, Deputy Prime Minister. IEAP CTU regularly organizes a conference (MEDEX’19, MEDEX’22, MEDEX’23), which serves as an example of extending our activities in neutrino physics and dark matter searches.

3) “Choose an emblematic product/project which is within the capacities and know-how of your scientists and engineers in the field of detectors. Collaborate with an international patent office from the US or related to the US, under a beneficial contract.”

Response: Our effort was concentrated in this direction to develop a sophisticated detection unit for broad applications in space called HardPix. It was financed by company D-Orbit (UK) in the frame of the Swimmer project. We signed an agreement with a US located patent expert to help us with the process in the USA (in 2024 we were able to obtain a US patent of authors S. Pospíšil and C. Leroy).

4) “Awards - Keep working on this correct track. Emphasis in emblematic products with unique characteristics will bring higher awards.
Recognition by the international community - Keep working in the same track, bearing in mind the smart specialization in well-chosen devices.
Popularization - Keep working in the same track, with emphasis on smart products delivered by your own research work.”

Response: IEAP CTU staff continued in all activities connected with recognition in the international community and popularization. We received 3 prestigious awards (ESET Science Award, Glenn Radiation Award IEEE NPSS, Physical society Japan), we have members of editorial boards and several of us actively participate as referees of journals with high impact factor (including Nature), number of invited lectures of IEAP CTU staff in abroad was 69 and 39 invited speakers had lecture in IEAP CTU. What is important is that in such activities also early career researchers participate. IEAP CTU has representatives on EU level, e.g. APPEC or ESFRI.

5) OVERALL ASSESSMENT

“The institute is working on the right track. Apart from that, deepening in the physics and the materials of the products developed by the Institute, will gain scientific knowledge and international recognition.

Apart from that, choosing a few emblematic projects based on the know-how gained at the Institute and developing them, will provide further international recognition. As an example, concerning space PhD technology, the monitoring and selection of space junk is important and could be such an emblematic flagship.

Then, the collaboration with a high-class international patent agency, based on paying after the product exploitation can result in a success story on exploitation. The Institute has the potential of a success story in detecting systems.

Finally, the Institute deserves the ability of awarding its own PhD works, with the proper collaboration with related Faculties, choosing proper methods for this, such as a chair in the Faculty.”

Response: IEAP CTU followed carefully the recommendation concerning deepening in physics – more effort was given to fundamental physics (neutrino physics, dark matter, theory of weak interactions, direct participation in deep underground laboratories, nuclear physics on ISOLDE at CERN). By the same way we followed recommendations concerning space technologies as a possibility to reach further international recognition – more effort was given to develop sophisticated detection units for space financed by ESA as well as by companies (in total, 8 projects).

Concerning our own PhD activities, it was decided to postpone the application and concentrate on the support of research students at the Bc., Master’s and Ph.D. levels. IEAP CTU financially supports students during their research activities in the institute. Under supervision or co-supervision of IEAP CTU staff 20 Bc. students, 21 Master’s students and 11 PhD students successfully defended their theses.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)
Gender Quality Plan	3.4	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20240410-gender-equality-plan-2021.pdf

		https://www.cvut.cz/en/hr-award-hrs4r
Lectures of the University of the Third Age	3.6	https://drive.google.com/drive/folders/15w00nBmuOc-AR-JCBqKVV3K0m49KSP1V?usp=drive_link
In Depth and on the Surface - web page of the National Gallery	3.6	https://www.ngprague.cz/udalost/3513/v-hloubce-a-po-povrc/5847
RAMESIS	3.6	https://www.suro.cz/aplikace/czechrad-wiki/index.php/Ramesis-archiv
CzechRad	3.6	https://www.suro.cz/aplikace/czechrad-wiki
Interview with IAESTE student	3.6	https://www.eafit.edu.co/noticias/estudiantes/2019/estudiante-de-ing-matematica-destacada-en-organizacion-europea-de-la-investigacion-nuclear
Interview with Robert Filgas	3.6	https://radiozurnal.rozhlas.cz/magazin-experiment-cesi-dobyvaji-vesmir-predstavujeme-ambiciozni-tuzemske-9064133
Video of Santu Mondal	3.6	https://videos.cern.ch/record/2298651
Interview of Stanislav Pospíšil at the Czech Television	3.6	https://www.ceskatelevize.cz/porady/10101491767-studio-ct24/219411058060524/
Interview of Alan Owens at the Czech Television	3.6	https://www.ceskatelevize.cz/porady/10101491767-studio-ct24/223411058290605/
Interview of Ivan Štekl at the Czech Television in 2018	3.6	https://www.ceskatelevize.cz/porady/10101491767-studio-ct24/218411058060725/
Interview of Ivan Štekl at the Czech Television in 2021	3.6	https://www.ceskatelevize.cz/porady/10101491767-studio-ct24/221411058320624/
Interview of Ivan Štekl and Stanislav Pospíšil in Technický týdeník	3.6	https://www.technickytydenik.cz/rubriky/archiv/20-velmi-uspesnych-let-ustavu-technicke-a-experimentalni-fyziky-cvut_56644.html
Information about IEAP CTU in the journal Vesmír	3.6	https://vesmir.cz/cz/casopis/archiv-casopisu/2021/cislo-5/ustav-technicke-experimentalni-fyziky-cvut-praze.html

SELF-EVALUATION REPORT FOR MODULES 4 AND 5

HIGHER EDUCATION INSTITUTION NAME: Czech Technical University in Prague

COMPANY REGISTRATION NUMBER (CRN): 68407700

MODULE 4 – VIABILITY

ORGANISATION AND MANAGEMENT OF R&D&I

4.1 Organisation and management of R&D&I

The HEI will briefly describe its organisational structure¹ and describe the R&D&I management system including the role of the HEI's central management, the management of faculties, and the HEI's institutes in organizing and managing R&D&I. It should also describe the role and structure of the technical and economic apparatus.

Maximum 1000 words.

Self-assessment:

The CTU consists of 8 faculties, 6 university institutes (referred to here as 'Institutes'), and the rector's office. One of the Institutes – the Institute of Physical Education and Sports – does not have research in its mission. Therefore, it does not appear in this document and is not evaluated. The Faculty of Architecture, standing somewhere between technology and the arts, is included in this evaluation, although most of the faculty's architectonic results are not scientific per se.

The management of the university is governed by the law and by the Statute of CTU, approved by the Ministry of Education, Youth and Sports.

The Rector's Office is responsible for contacts and contracts with the 'outside world'. It also provides information, guidance, and best practices to the faculties and institutes, and carries out internal auditing and control activities. Some big projects, which generally advance the university as a whole, are managed within the Rector's Office.

The faculties are, by law and by the Statute, responsible for the scientific research conducted within their labs, institutes, and departments. The faculty statutes specify the internal structures and the rules of operation within the faculties, under which the Dean's Offices support and control the research within their faculty. This system allows the structures to reflect the broad scope of CTU and the fact that the scientific outputs of each of the four oldest CTU faculties are sufficient to exceed the scientific outputs of most universities in this country. The high degree of independence of the faculties is justified by the significance of their work.

Seven faculties and four institutes are located in Prague, while the Faculty of Biomedical Engineering has its campus in Kladno and the UCEEB has its premises in Buštěhrad. The economic and administrative apparatus is spread between the centre (rector's office), faculties and institutes. The golden rule for centralization is effectivity and availability.

¹ A graphical representation of the organisational structure will be provided as an annex.

R&D&I QUALITY MANAGEMENT AND SUPPORT SYSTEM

4.2 System of support for a quality R&D&I environment and incentive measures for quality science

The HEI will briefly describe the systemic incentive measures/tools to support quality R&D&I (if applicable). For each measure/tool described, an example will be provided to illustrate the effectiveness of the measure/tool in practice (e.g. number of projects supported by internal grants, statistics on the use of advisory systems, number of newly established research teams, etc.). The description will pay particular attention to:

- A system of support for attracting national and international projects of projects.
- A system for project consultancy/management/administrative support.
- Science management (e.g., personnel and financial capacity for R&D&I transfer, personnel and financial capacity of the project acquisition support system, science managers, data analysts, business and innovation advisors, etc.).
- The existence of internal funding schemes.
- Strategy/opportunities for establishing new research teams (including international ones) and supporting them within the HEI (e.g. sharing of R&D&I equipment, laboratory and information facilities, administrative support, etc.).
- Support system for students and early career researchers².
- a system to support excellent science (e.g. support for excellent scientists, research teams, PhD students, collaborations, infrastructure, etc.).
- A system of support for interdisciplinary research and collaboration within the HEIs.
- The concept of providing conditions for the emergence of new, high quality research directions/topics, especially those with application potential.

Maximum 300 words per point.

Self-assessment:

Prior to submission, the [ANLUPA](#) system pushes information on grant calls to prospective applicants. ANLUPA was jointly created by CTU and the University of Chemistry and Technology Prague and has been licensed to over 40 research organizations in the Czech Republic. The user interface is now fully bilingual (eg., Czech and English). Our scientists are aware of grant calls.

Some parts of a grant application are prepared by the Rector's Office. Additional information and certificates are sent to the respective grant agencies where and when required. The Rectors office also runs seminars for prospective grant applicants.

There is an increasing number of national grant calls allowing for a limited number of applications from one institution. In such a case the rector's office coordinates prospective applicants and selects the topics which covered according to CTU priorities.

During the execution of the project, we provide advice (accounting, reporting) as well as tools to keep track of finances, reports, etc.

After the project, a help with audits is provided.

My future project would be ... is a set of meetings started in 2024. It has a form of meetings (last Friday each month), where scientists describe their results and ideas for future projects. Each project is discussed by experienced grantees from CTU, and improvements are suggested. Some of the project ideas are selected for (external) expert advice and financial support. Using this setup, we

² Student grants, support for PhD students, postdocs and early career scientists.

aim at obtaining prestigious grants such as ERC as well as removing barriers between individual faculties and institutes.

Doctoral as well as Master's degree students may apply for student grants within the frame of [CTU Student Grant Competition](#). Applications get reviewed, and based on the quality, approximately 100 million CZK (close to EUR 4M) are granted to the applicants. We have built an in-house web application, supporting project submission, evaluation, management, final reporting and evaluation. The application is bilingual (Czech and English). There are five Sectoral Evaluation Boards: *Civil Engineering and Architecture*, *Mechanical Engineering*, *Electrical Engineering*, *and Informatics*, *Natural Sciences* and *Economics and Management* (the latter also includes History). About five million crowns are granted yearly to support organization of student scientific conferences as well. This setup provides early-stage researchers with a possibility to get acquainted with all steps in grants, on a small scale. That helps to increase their odds in 'real world external' grant competitions.

Developing international partnerships is an important part of the CTU Strategy for International cooperation in R&D. We are part of the [C.E.L.S.A.](#) and [CROWDHELIX](#) networks, both aiming at future international scientific projects. Based on mutual agreements with foreign universities, small kick-off grants are provided to start mutual scientific cooperation. As an example falling within this evaluation period, CTU has signed a pair of such agreements with NTUST and NTU (Taiwan, 2020 and 2023). This kicked off a growing cooperation and within 2024 it resulted in a set of cooperation agreements, now involving not only universities, but official authorities and main industry bodies (TSMS,

Rector prizes for excellent results are awarded each year (the Best Scientific Result, the Best Publication, the Best Technology Transfer to Industry, the Best PhD Thesis, the Best Book and the Best PhD Supervisor). Up to 2023, CTU scientists have received extra money based on publications in IF journals. This focus has shifted to reward lower number of outstanding results. At the moment, rewards are given to: a) most cited b) achievers of highest FWCI and c) authors of "highly cited" papers according to the web of science. As an incentive for young researchers, a) and b) is evaluated and awarded separately for scientists under and over 35 years.

CTU supports horizontal cooperation. All the researchers are encouraged to start a new research topic, forming groups from different departments and cooperating with external scientists (on organisations) except for some rogue countries. (Czech Republic is the country of highest academic freedom in today's world). At the same time, CTU management both at the levels of the Rector and Deans actively looks for excellent scientists willing to champion in starting and further developing research in new areas of strategic importance.

4.3 Quality control system for R&D&I environment

The HEI will briefly describe the system of internal and external evaluation of research units, including the following aspects:

- Internal and external evaluation of R&D&I quality: This includes the evaluation of R&D&I by the HEI's authorities, the evaluation of research teams (if such a system exists), and the involvement of international scientific councils or other independent advisory bodies in quality control and of R&D&I management.
- The ethical aspects of research: This includes adherence to ethical principles and good scientific practice, compliance with related legislation (codes of ethics, ombudspersons, ethics committees and ethics hotlines, and systems for reporting whistleblowing and ethical misconduct).

The HEI shall demonstrate the functioning of the quality control systems in the R&D&I environment by examples (e.g., brief information on the evaluations carried out and their results, specific examples of the use of whistleblowing or the handling of ethical violations, etc.).

Maximum 500 words plus 200 words for each example described (max. five).

Self-assessment:

Quality control system is supervised by several bodies.

Internal Evaluation Board (IEB).

The competence of the Internal Evaluation Board is determined by the Act on Higher Education Institutions, the Statute of the CTU and its internal regulations, in particular the rules of the CTU quality assurance and internal evaluation system, the CTU Accreditation Regulations and the Statute of the Internal Evaluation Board of the CTU. IEB

- approves the proposal of regulations concerning the quality-ensuring system of the educational, creative, and related activities and of the internal quality evaluation of the educational, creative, and related activities of the public higher education institution that were submitted by the Vice-Chair of the Internal Evaluation Board prior to the public higher education institution's submission to the Academic Senate;
- is in charge of the course of the internal evaluation of the educational, creative, and related activities of the public higher education institutional process;
- processes the reports from the internal evaluation of the quality of the educational, creative, and related activities of the public higher education institution, and in addition to these reports;
- also continuously maintains records regarding the internal evaluation of the quality of the educational, creative, and other related activities of the public higher education institution;
- within the scope established by the public higher education statute, executes other necessary activities.

The Scientific Council

The tasks of the CTU Scientific Council include negotiating the Long-Term Strategic Plan, approving study programmes and exercising competence in the procedure for the appointment of professor and in the habilitation procedure. Members of the Scientific Council are distinguished representatives of the fields of specialization in which the University conducts its teaching, scientific, research, and development, artistic and other creative activities. Besides decisions on the above mentioned topics, it also offers expert advice to the rector.

On top of these two bodies required and defined by the law, CTU has an [International Advisory Board](#) (IAB), an advisory board of CTU in order to provide the opinion on principal directions of scientific and educational programmes and activities, research programmes

Finally,, quality control is performed by the executive bodies, e.g., Rector, Deans and Scientific Councils of individual Faculties.

The [Code of Ethics](#) and the [Ethics commission](#) stipulate and enforce high ethics standards for all members of academia. This duo is completed by the [Committee for Ethics in Research](#). The consent of the latter is required prior to any research possessing sensitive aspects (involving personal data, experimenting with animals, biohazards, some parts of AI). This main trio is complemented by a number of committees at the level of faculties and institutes.

As an example, a committee set by the rector each year checks, whether the data on scientific results within our internal information system correspond to reality. The committee has last year found one professor who had systematically entered incorrect data for multiple publications resulting in an unfair increase of his remuneration as well as in an unfair increase of money for his department and faculty. He is no more working for CTU.

4.4 Sustainability and resilience of R&D&I

The HEI will describe the arrangements for sustainability and increasing the resilience of R&D&I, if such a system exists, and provide examples of its implementation. These include:

- The sustainable development concept (strategy, objectives, plans, and implementation).
- Social responsibility strategy.
- A knowledge transfer system, if it is established at central level.³
- The third role, the transfer of R&D&I results to society and interaction with local actors.
- The concept of research data management (data collection, access and sharing of data, use of the information obtained for R&D&I management, responsibility for data files, archiving and backup of data).
- Ethics and personal data protection.
- Intellectual property protection.
- Ensuring institutional resilience (resistance to foreign influence, cyber security, risk prevention, prevention of misuse of R&D&I and knowledge transfer results, a system to prevent or mitigate the negative impacts of R&D&I and knowledge transfer in society).
- Digitisation and the use of smart technologies.
- The institutional strategy for Open Science 2.0/Open Access (if one exists), including information on the operation of the institutional repository or similar tools.
- A system for training undergraduate and postgraduate students as well as staff in the field of intellectual property protection and technology transfer.

The HEI will demonstrate the effectiveness of its procedures by examples (e.g., the number of people trained in intellectual property protection and technology transfer, data on the usage of Open Access repositories, handling of risk incidents, etc.).

Maximum 300 words per point.

Self-assessment:

[CTU Sustainable Development Strategy](#) sets the goals within fifteen areas. Fulfilment of these goals is secured by the [CTU sustainable development office](#) in concert with CTU management. Besides strategies and offices, sustainability is incorporated in CTU education so that the future generations

³ If the knowledge transfer system is decentralised to the unit level, the HEI shall describe how the system works.

of engineers are not only familiar with overarching documents but understand key ideas and have a broad sense of technical attainability. Admittedly, students are one of the driving forces in changing habits to produce less waste, use more recycling and upcycling.

The third university role has many forms. The University of Third Age brings new knowledge to senior citizens. The Children University runs week-long courses for schoolchildren during summer vacations, with labs and a mock graduation ceremony at the end. CTU is active in spreading information to public. Interactive webpages concentrate the information on CTU and its research potential in a straightforward way enabling general public to interact with our scientists. Besides others, our people have made a great deal of work during the SARS-COV19 pandemic. Corovent, a new type of a crowdfunded lung ventilator has been developed and deployed within weeks (and it has got a US FDA certification on top of the domestic one), a number of shields has been assembled within our premises, we manufactured and supplied disinfection to needy places, our robot has been deployed at Bulovka hospital to handle blood tests and much more.

IP protection is an important part of research at CTU. At the end of 2024, CTU held 213 patents (by far the largest number in our country, well more than other institutions and companies - Skoda Auto, a subsidy of Volkswagen, held the second place with 141 patents). CTU has a patent office, offering full service for inventors. CTU License fund helps to meet costs of patent fees. New inventions are reported by the inventors directly from their desks using our in-house information system (EZOP).

The technology transfer system at the Czech Technical University (CTU) is designed to foster innovation, promote the commercialization of research results, and support collaboration between academia, industry, and government entities. This system plays a crucial role in transforming scientific discoveries into practical applications that benefit society and drive economic growth.

A key institutional body in this system is the Department of Technology Transfer and Fundraising, which operates within the Section of the Vice-Rector for Strategy and Development. This department oversees CTU's technology transfer activities, ensuring that innovative research is effectively protected, commercialized, and translated into real-world applications. It provides strategic guidance and facilitates cooperation between researchers and industry partners. Intellectual property (IP) rights are managed by a specialized Patent Service Center.

Supporting the department's mission is CTU TECH s.r.o., the university's technology transfer office (TTOC). CTU TECH is responsible for establishing spin-off companies to bring research innovations to the market. It serves as a bridge between academic research and industry, ensuring that scientific discoveries contribute to technological advancement and economic development.

The CTU Incubator plays a crucial role in nurturing start-ups and spin-offs. It provides mentoring, networking opportunities, access to investors, and co-working spaces to help early-stage ventures scale successfully. Through this incubator, researchers and students can transform their ideas into viable business models with expert support.

The CTU Commercialization Strategy serves as a roadmap for bringing university innovations to market. It focuses on identifying high-potential research projects, securing funding, and streamlining technology transfer processes. The strategy emphasizes long-term collaborations with businesses, entrepreneurship among researchers, and maximizing the societal and economic impact of CTU's research.

Together, the Department of Technology Transfer and Fundraising, CTU TECH s.r.o., the CTU Incubator, and the Commercialization Strategy form a comprehensive ecosystem for technology transfer. By ensuring the effective commercialization of research, CTU strengthens the connection between academic excellence and industrial innovation, driving progress in multiple sectors.

CTU has an experienced Director of Security. We work consistently with important partners from appropriate offices to increase resilience, security and cybersecurity and to minimize unwanted foreign influence. We spend adequate funds on it. Internal regulations govern handling sensitive information while maintaining full academic liberty. Security includes personal data protection.

CTU is continuously improving its information system, such as digital data repository, internal information system on scientific results (V3S), accounting and much more. The information system proved to be extremely useful during SARS-COV19 lockdowns, enabling most of the business done from home offices.

Research data management receives adequate attention. Research covers various areas. There is no “one size fits all” solution. CTU is not focused on strict universal rules for all. Instead, we adhere to customized Data Management Plans (DMP) and Data Stewardship.

Our [Data Stewardship Wizard](#) (DSW) originally started as part of the ELIXIR CZ infrastructure services provided by the Czech Technical University (CTU). Over time, it has evolved into a widely recognized and adopted tool for data management. A major milestone in its development was its adoption by the entire [European ELIXIR](#) infrastructure, which led to DSW being awarded the ELIXIR Recommended Interoperability Service status. This designation underscores DSW’s importance as a standardized, reliable, and widely accepted tool across European research institutions. Further cementing its impact, DSW is among the tools recommended by the European Commission and national funders for creating high-quality DMPs. Its structured approach helps researchers meet funding requirements while ensuring best practices in data management.

DSW has achieved global user base. The cloud-based service operated by ELIXIR currently has approximately 6,500 registered users. Many additional users rely on on-premises installations, as DSW is open-source. While the exact number of these users cannot be counted, numerous institutional installations exist across Europe and worldwide.

Another key indicator of DSW’s success is its commercial uptake. Several companies have developed commercial versions based on the open-source framework, demonstrating its value beyond academia and research. This commercial interest contributes to its sustainability, continuous improvement, and long-term innovation.

CTU runs an institutional repository (Dspace). The number of monthly accesses increases year by year, and generally gets bigger each winter, scoring 4 380 921 accesses, 3 031 288 full document views and 6 010 696 document searches last December.

Depending on the study program, students may have the obligation to pass a course in IP protection. Others may subscribe to the course voluntarily. CTU patent office has organized a number of courses, including online ones. Our records show 1416 as the total number of people trained in IP protection within the evaluation period. This number does not include external training (some of our employees have successfully passed official two-year courses of the Czech patent office, we employ patent attorneys as well).

PERSONNEL POLICY

4.5 Structure of human resources

The HEI shall describe the current state, age structure, degree of internationalization and development trends of the staff involved in R&D&I, along with their distribution by a job title and gender for the evaluated period as detailed in annex tables (Tables 4.5.1 to 4.5.3) (including the provision of technical and economic facilities).

Maximum 1000 words.

Self-assessment:

CTU has been successful in maintaining healthy proportion between various levels of scientific personnel as well as the age structure. Within the academic year 2023/2024 there has been a slowdown in new professorships, fortunately there has been enough elevations to the grade of associate professorship, resulting in a pool of candidates for further promotion. Finally this resulted in a wave of new professorships, we are happy that the Scientific board has booked off all the meetings in 2025.

We witness a slow increase in the number of women. Starting at the assistant level, giving a hope to increase the number of female professors in 10 years.

The number of foreign nationals has grown by 30%, while the percentage of foreign nationals varies substantially between Faculties and Institutes. However the increase is noticeable, we aim continuing this increase in future years.

4.5.1 Staff involved in R&D&I of the university (FTE) in the period under review

Academic/professional position	Total year 1	Of which women [%]	Of which foreign [%] ⁴	Total year 5	Of which women [%]	Of which foreign [%]
Professor	184,0	8,6	1,3	191,6	9,5	1,2
Associate Professor	318,0	12,6	0,6	312,5	11,5	0,7
Assistant Professor	743,9	22,6	3,3	669,4	23,9	3,9
Assistant	68,5	23,7	3,4	67,0	24,7	3,2
R&D Personnel ⁵	581,4	40,9	3,4	570,6	36,4	5,4
Researchers in other categories ⁶	743,3	17,9	18,6	878,7	18,9	24,4
Technical and economic staff ⁷	62,6	24,6	10,6	35,0	27,7	9,7
Early career researcher ⁸	947,6	18,7	14,0	808,4	20,9	22,2

⁴ Researchers with Slovak citizenship are not considered foreign.

⁵ The category "Other scientific, research and development personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁶ The category "Researchers not falling under other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁷ Who participates in the management and support of R&D&I in the institution.

⁸ See Definition of Terms in Methodology HEI2025+.

Scientific, research and development staff involved in teaching activities	1369,6	18,4	2,4	1288,0	18,5	2,6
Total number of foreign nationals	237	48	237	324	71	324

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, research and development staff, scientific staff not falling into other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Note: The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

4.5.2 Percentage of HEI's staff involved in R&D&I, categorized by age structure, job title, and gender in the first year of the evaluation period (number of physical employees and staff)

Academic/professional position	Under 29 years [%]		30-39 years [%]		40-49 years [%]		50-59 years [%]		60-69 years [%]		70 years and over [%]	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	15	2	15	0	31	3	40	4
Associate Professor	0	0	6	0	36	3	16	3	20	4	22	2
Assistant Professor	1	0	35	6	38	8	12	4	10	4	3	1
Assistant	32	5	42	13	15	2	8	2	1	0	2	0
Early career researcher ⁹	34	8	66	13	0	0	0	0	0	0	0	0
R&D Personnel ¹⁰	24	8	26	7	22	9	14	8	10	5	5	1
Researchers in other categories ¹¹	35	8	42	8	13	2	5	0	3	0	2	0
Technical and economic staff ¹²	32	6	34	5	17	5	9	3	6	1	3	0
Scientific, research and development staff involved in teaching activities	4	1	25	4	32	5	13	3	14	4	13	1

Note: The total number of employees/workers as of 31.12. of the calendar year in question is to be given, irrespective of the proportion of full-time equivalents, but only in an employment relationship, i.e. not including persons working parttime agreements. Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

4.5.3 Percentage of HEI's staff involved in R&D&I, categorized by age structure, job title, and gender in the last year of the evaluation period (number of physical employees and staff)

Academic/professional position	Under 29 years [%]	30-39 years [%]	40-49 years [%]	50-59 years [%]	60-69 years [%]	70 years and over [%]

⁹ See Definition of Terms in Methodology HEI2025+.

¹⁰ The category "Other scientific, research and development personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹¹ The category "Researchers not falling under other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹² Who participates in the management and support of R&D&I in the institution.

	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Professor	0	0	0	0	12	2	20	1	26	2	42	4
Associate Professor	0	0	4	0	35	3	21	2	19	4	22	3
Assistant Professor	0	0	19	4	47	9	18	5	11	5	5	1
Assistant	5	2	58	12	26	6	6	2	3	1	2	0
Early career researcher ¹³	36	7	64	14	0	0	0	0	0	0	0	0
R&D personnel ¹⁴	26	7	26	7	20	9	14	6	8	4	6	2
Researchers in other categories ¹⁵	32	6	39	9	19	3	5	1	2	0	2	0
Technical and economic staff ¹⁶	33	12	21	2	23	2	12	6	10	4	2	0
Scientific, research and development staff involved in teaching activities	1	0	16	3	37	6	18	3	14	4	14	2

Note: The total number of employees/workers as of 31.12. of the calendar year in question is to be given, irrespective of the proportion of full-time equivalents, but only in an employment relationship, i.e. not including persons working parttime agreements. Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹³ See definitions in Methodology HEI2025+.

¹⁴ The category "Other scientific, research and development personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁵ The category "Researchers not falling under other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁶ Who participates in the management and support of R&D&I in the institution.

4.6 Academic and Research Careers

The HEI will briefly describe the central system for HR recruitment, placing particular emphasis on recruitment from outside the HEI, especially from abroad, as well as system of career development of academic and research staff, if such system exists. Information will be provided on:

- Career development rules and legislation related to the recruitment and career development of domestic and foreign employees (e.g. Career Code, HR Award, OTMR policy, etc.).
- International tenders.
- The process of new employee adaptation and mentoring.
- Transparent distribution of institutional time, attitudes towards chaining of contracts and senior academic positions.
- Rules for filling senior positions in the context of R&D&I.
- The rules and support system of sabbaticals.
- Measures for the return of workers after a stay in an external workplace, including a foreign workplace.
- Arrangements for workers to return after maternity/parental leave or other career breaks (e.g. caring for family members).
- Other relevant information at HEI discretion.

The HEI shall provide a reference to an existing career code or similar document (if one exists). The HEI shall describe the effectiveness of the systems used with examples (e.g. a model example of the adaptation process, a specific anonymised example of an academic's career path, statistics on the return after maternity/parental leave or career breaks before and after the implementation of the measures, etc.).

Maximum 300 words per point.

Self-assessment:

CTU received HR Excellence in Research Award in 2019 and it strives for its renewal in 2025. For this occasion, we have updated the following documents and regulations: [OTM-R Strategy](#), [Revised Action Plan HRS4R](#), [Internal Review and Equal opportunities plan](#)

The career rules are given in the [Career Guide](#) which is an internal regulation of the university.

All opened position for academic staff are announced in English on the Euraxess portal (<https://euraxess.ec.europa.eu/>) and the Czech version is announced on the University webpage. In addition, other hiring services and/or advertisements may be used.

The new employee adaptation and mentoring process is already being introduced for postdocs in the CROP project. Newcomers will be supported by the Welcome office, which should be open in the new premises in 2025, but it is already operational within HR offices.

Chaining of contracts is limited by law, which we strictly adhere to.

Senior positions in the context of R&D&I are filled according to the [Code of competitive selection procedure at the CTU in Prague](#)

The [CTU Statute](#) and [Rules of Habilitation Proceedings and Proceedings to Appoint Professors of CTU](#) are other transparent regulations for promotion process

Half-year paid sabbatical each 7 years is granted by the law and supported by the [Career Guide](#), which requires international experience from academic staff. At the same time, CTU regulations guarantee that salaries be paid during sabbaticals. The staff is encouraged to use this opportunity. However, the mobility is still limited (barriers discussed within 4.8).

Parental leave is subtracted from the performance evaluation periods relevant to habilitation and appointment procedures for a professor.

CTU is the second-best Czech University as far as salary level (after Masaryk University, Brno).

CTU operates a campus short- and full-time daycare and an elementary school that are used extensively by early-career researchers (and their children).

4.7 Gender equality measures

The HEI will briefly describe the measures relating to the application of gender equality in the areas required for assessment criteria 4.5, 4.6, with an emphasis on:

- Gender equality in recruitment and career development.
- Legislation and documents regulating gender equality (e.g. Gender Equality Plan, Action Plans, strategic documents for equality, including links to overarching strategies, etc.).
- The filling of leadership positions (including gender balance in leadership positions, see Table 4.7.1).
- Nominations to professional bodies.
- Evaluation and remuneration.
- Measures to reconcile the work and family life of researchers (flexible working hours, flexible forms of work, maternity/parental leave management, facilitating child/dependent care, age management in relation to gender).
- Measures to eliminate negative workplace behaviour such as mobbing and sexual harassment.

The HEI shall provide evidence of the examples from practice (e.g. use of flexible working hours, dealing with cases of mobbing or sexual harassment, compliance with the principles of gender equality in HEI professional bodies, etc.).

Maximum 300 words per point.

Self-assessment:

CTU strives to be a place where students and all employees find a nice place to work. This includes proper care for gender equality.

The CTU Gender Equality plan has been reworked into an Equality Plan (the first has been valid until the end of 2024, the latter has been prepared to come into effect on January 1, 2025). This is accompanied by [Code of competitive selection procedure at the CTU in Prague, Equal opportunities plan](#)

Flexible working hours and flexible forms of work are enforced directly by Higher Education Act 111/1998 Col., e.g., Academic staff members are free to set up their working hours provided that they appear at the lectures taught by them. On top of that, CTU management at all levels optimizes lecture schedules to ease the burden of teachers caring for children or other family members, as long as the availability of rooms and labs allows. Administration, on the other hand, should be available within office hours.

Heads of departments are selected according to the [Code of competitive selection procedure at the CTU in Prague](#) Procedures for appointing Scientific boards, vice-deans and vice-rectors are given by law, while the deans and rectors are elected by the Academic senates. Members of the senates are then elected by all members of the academia according to the Statute(s) and Rules for election (details can be found in [CTU Internal regulations](#)). The rector and the deans may serve for a maximum of two consecutive terms.

There is a great deal of inertia, and despite measures that have been taken, there remains a considerable imbalance between the number of women and men working in R&D&I within technical areas. We have achieved an increase in the number of female students at CTU. However, improving the gender structure of the university staff participation in R&D&I is a long-term undertaking, and balance seems not be achieved within the foreseeable future. As an important starting point, we have balanced the top management: Out of the eight appointed members of the top management of the university (e.g., Vice-Chancellors, Chancellor, and Quaestor), there are currently four women.

Negative workplace behaviour such as mobbing or sexual harassment, is not tolerated. Care is paid to provide enough possibilities for reporting of such misconducts, be it surveys, e-mail addresses for reporting, ombudspersons, trade unions, and members of executive or elected bodies (deans, members of senates).

4.7.1 Gender balance in management positions

Senior staff	Year 1		Year 5	
	Men	Women	Men	Women
Rector	1	0	1	0
Vice-Chancellor	3	3	3	3
Dean ¹⁷	8	0	8	0
Academic Senate	35	10	33	9
Scientific/Artistic/Academic Council	37	3	41	4
Quaestor	1	0	1	0
Board of Directors	11	1	11	1

Note: If one person holds more than one of these positions within the HEI, he/she will be counted in each.

4.8 Mobility of academic and research staff (including sectoral and inter-sectoral mobility)

The HEI shall describe in a concise and structured manner its strategies and objectives for the mobility of academic and research staff (including PhD students), with particular emphasis on mobility related to the development of excellent science and interdisciplinary (intersectoral) mobility. The HEI shall identify potential barriers to mobility, including gender-based barriers. The HEI shall provide information on long-term stays abroad by its own academic staff or, conversely, by foreign staff at the HEI being evaluated.¹⁸

The achievement of the set objectives will be demonstrated by the HEI by describing specific examples of mobility or by brief statistics on mobility during the period under evaluation.

Maximum 500 words plus 200 words for each example given (max. five examples with a specific description of the relevance of mobility to the stated objectives).

Self-assessment:

The support of academic, research, and scientific staff mobility, including postdoctoral researchers and Ph.D. students, has long been one of the strategic priorities of the Czech Technical University in Prague (CTU). In addition to grants and research projects, mobility is actively supported through the Erasmus+ program and the Strategic Management Support Program (PPSŘ), specifically through the "PhD Mobility" and "Staff Mobility" projects.

¹⁷ or other head of a relevant work unit of a higher education institution under Section 22(1) of the Higher Education Act performing R&D&I activities, regardless of the designation.

¹⁸ Long-term mobility means an uninterrupted period of more than three months.

The general objectives for academic, research, and scientific staff mobility, including postdoctoral researchers and Ph.D. students are:

- Enhancing research excellence (facilitate international and interdisciplinary collaboration to strengthen research quality, innovation, and knowledge exchange).
- Supporting career development (provide opportunities for academic, research, and scientific staff to gain new skills, expand their professional networks, and advance their careers).
- Promoting intersectoral and international collaboration (encourage mobility between academia, industry, and research institutions to foster innovation and applied research).
- Improving teaching and learning practices (enable academic staff to gain insights into different educational methodologies, curricula, and best practices from partner institutions).
- strengthening institutional partnerships (develop and maintain strategic international collaborations that enhance institutional reputation and global engagement).
- Overcoming mobility barriers (address administrative, financial, and logistical challenges to ensure equal access to mobility opportunities for all staff, regardless of gender, family status, or other factors).
- Fostering knowledge transfer (support the dissemination of research findings and expertise between institutions, benefiting both the sending and receiving institutions).

One of the most pressing barriers to participation in mobility programs, both for outgoing and incoming staff, includes difficulties related to the interruption of teaching and academic duties at the home university. There are also other aspects including:

- Administrative and bureaucratic challenges (complicated visa processes, work permits, and other regulatory hurdles for international mobility).
- Tax and financial complications (issues related to tax obligations and social security contributions, which can be confusing for staff moving between countries).
- Relocation of family members (the need to relocate family members, including finding appropriate housing and ensuring their own professional or educational opportunities).
- Language barriers (lack of proficiency in English or in the language of the host institution or country).
- Cultural adjustment and integration (concerns about cultural differences, adjustment to new academic environments, or feeling isolated in a foreign country can be significant barriers).
- Gender-specific barriers (including concerns about safety, discrimination, or biases in certain cultural or institutional settings in some foreigner institutions; for women researchers, especially those with caregiving responsibilities, there can be added challenges related to family support and work-life balance).
- Impact on Career Progress (concerns that mobility may delay progress in research projects or academic publishing or disrupt teaching careers).
- Health and safety concerns (potential health risks, especially in light of global health concerns (e.g., the COVID-19 pandemic), or the lack of adequate healthcare coverage during international mobility).

CTU has established a selection methodology for each mobility program and project, ensuring a transparent and structured approach. Furthermore, software tools are available to support administrative processes, including data collection and reporting. Compliance with strategic objectives and the fulfilment of mobility goals are overseen by the respective program coordinator or a designated contact person at the home department, providing individual support to participants.

CTU has various examples of successfully completed mobilities that highlight the importance of this activity for academic, research, and scientific staff, including postdoctoral researchers and PhD students. These mobilities contribute to diverse objectives:

- Dr. J. Zemánek (Fulbright Scholarship, MIT, USA): supports research excellence and career development at a globally recognized university.
- Ing. Marek Pátý, Ph.D. (von Karman Institute, Belgium): enhances interdisciplinary collaboration in fluid dynamics research.
- Assoc. Prof. Marek Pruszyński, Ph.D. (IAEA Research Program): promotes intersectoral collaboration between academia and the nuclear energy sector.
- Jan Špale (Fulbright Doctoral Fellowship, USA): encourages PhD student mobility and engagement in cutting-edge research.
- Vera Obradovic (Incoming Postdoctoral Fellow, Innovation in AI Research, CTU): demonstrates institutional attractiveness for international researchers.

RESEARCH INFRASTRUCTURE

4.9 Research infrastructure

The HEI will describe the system for acquiring/optimizing expensive instruments and equipment, as well as refurbishing outdated expensive instruments. The HEI will also briefly present the internal organisation of the research infrastructure (including technology, expensive instruments, and instrumentation)¹⁹. The HEI will describe the system of sharing (including external research entities) of instruments and instrumentation, including expensive instruments and instrumentation units, referred to as 'core facilities' (if such a system exists). The HEI will demonstrate the effectiveness of the systems with examples (e.g., specific instruments acquired/optimised and their relevance to the achievement of research objectives, examples of sharing of expensive instruments and instrumentation, statistics on sharing of expensive instruments and instrumentation, etc.). The HEI will briefly comment on the data in Table 4.9.1.

The HEI shall also indicate whether it hosts large research infrastructure projects. The name and a brief description will be provided.

Maximum 500 words plus 200 words for each example given (max. five examples).

Self-assessment:

CTU hosts or participates in a considerable number of Large Research Infrastructures. These can be divided into in situ facilities (two fission reactors and a tokamak, the Van de Graaff particle accelerator) and the participation of Czech teams in major international research facilities ([CERN](#)).

¹⁹ The definition of research infrastructure is set out in the Framework for State Aid for Research, Development and Innovation (2014/C 198/01) and Commission Regulation (EU) No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in accordance with Articles 107 and 108 of the Treaty.

[Brookhaven National Laboratory](#), [FAIR Darmstadt](#), [Laboratoire Souterrain de Modane](#), [Fermilab](#)). A systematic approach to key operational factors, which determines their sustainability, covers:

- 1) a long-term human resources development strategy;
- 2) long-term multi-source financial support; and
- 3) systematic building of a portfolio of users (both national and international).

In the case of in situ facilities, these factors are complemented by regular upgrades of the technology, which are crucial for the long-term safe, secure, and effective operation, especially in the case of nuclear research installations.

Within the evaluation period, the [Testbed for Industry 4.0](#) at CIIRC CTU has grown into a research infrastructure of European Importance.

4.9.1 Summary of expenditure/costs on research infrastructure and equipment for the period under review (including related non-investment and personnel costs).

Costs/expenses in thous. CZK/EUR/year	Year 1	Year 2	Year 3	Year 4	Year 5	Total value of assets ²⁰
Costs/expenses related to the acquisition of small fixed assets for R&D&I	45719/1804	43407/1712	40048/6215	46517/3481	43936/1733	219627/8664
Cost of repairs and maintenance of equipment	4809/190	6953/274	6215/245	3481/137	2754/109	24212/955
Acquisition of tangible (DH) and intangible (DN) assets for R&D&I (investments)						
Of which software	471/19	0/0	0/0	1587/63		2058/81
Of which other intangible fixed assets	0/0	0/0	0/0	0/0	0/0	0/0
Of which land, buildings and structures	0/0	0/0	0/0	0/0	0/0	0/0
Other intangible fixed assets (machinery, apparatus, equipment, etc.	46256/3836	0/0	174/7	0/0	97/4	46527/1835
Total infrastructure spending in years ²¹	97255/3836	50360/1987	46437/1832	51585/2035	46787/1846	292424/11535

²⁰ Enter the sum of the row.

²¹ Enter the sum of the column.

FINANCES

4.10 Budget and structure of financial resources

The HEI shall provide and comment on an overview of the total R&D&I budget in the period evaluated, broken down by organisational units of the evaluated HEI and by source of funds (Table 4.10.1). The HEI shall also comment on the shares of total costs/outputs covered by public and non-public sources by type of R&D&I for the period under evaluation as shown in Table 4.10.2.

As complementary data, the university will provide an overview of prestigious research projects obtained during the evaluated period (ERC²², MSCA²³, HHMI²⁴, HFSP²⁵, NSF²⁶, Horizon Europe²⁷, NIH²⁸, Wellcome Trust²⁹, EDF³⁰, OP JAK³¹, OP TAK³², NPO³³, GA ČR³⁴, TA ČR³⁵ etc.). Include information on the amount of funding received and whether the HEI were principal investigator or co-investigator in Tables 4.10.3, 4.10.4 and 4.10.5.³⁶

In addition, the HEI will describe in more detail up to five of the most important projects from the list of prestigious individual projects abroad (ERC, MSCA, HHMI, HFSP, NSF, etc.), providing basic information at the HEI's discretion and regardless of the funder: title, field of expertise, agency, amount of funding, other project participants, and other relevant information as appropriate.

A maximum of 500 words plus 200 for each example of a prestigious international individual project given.

Self-assessment:

We have witnessed dynamic changes in Europe during the last five years. The increase in the funds available for research from Czech domestic sources was much slower than the increase in the prices of goods and energy. Although we would be much happier to receive more funding, the situation is not critical at CTU.

This is a result of the strong will, experience, and expert level of our scientists. As an illustration, within 2024 the sum of money distributed by the Grant Agency of the Czech Republic decreased by

²² The European Research Council (ERC) is part of the 'Excellent Science' pillar of Horizon Europe. The ERC funds cutting-edge research by supporting individual Principal Investigators and their research teams.

²³ Marie Skłodowska-Curie Action (MSCA) is part of the "Excellent Science" pillar of Horizon Europe and is also aimed at supporting young researchers, including PhD students.

²⁴ Howard Hughes Medical Institute - a non-profit organization in the USA significantly supporting international biomedical research.

²⁵ Human Frontier Science Program - an international programme to support research, particularly in the natural sciences and computer science.

²⁶ National Science Foundation (USA).

²⁷ Horizon Europe - the EU's 9th Framework Programme for research and innovation, running from 2021-2027.

²⁸ National Institutes of Health (NIH) - an agency under the United States Department of Health and Human Services. NHI is a major player in project support for biomedical research.

²⁹ major UK private foundation supporting mainly biomedical research.

³⁰ European Defence Fund.

³¹ Operational Programme Jan Ámos Komenský - Priority 1 - Research and Development - multiannual programme under the Ministry of Education, Youth and Sports. Within the framework of the OP JAK it is possible to draw financial resources from the European Structural and Investment Funds (ESIF) in the period 2021-2027.

³² Operational Programme Technologies and Applications for Competitiveness. The European Regional Development Fund (ERDF) is available in the period 2021-2027 to co-finance business projects in the areas of research, development and innovation, digitalisation and digital infrastructure, business development, smart and sustainable energy and the circular economy.

³³ National Recovery Plan - under Pillar 5 - Research, Development and Innovation of the National Recovery Plan, the Recovery and Resilience Facility (RRF) is available for the period 2022-2026.

³⁴ Grant Agency of the Czech Republic.

³⁵ Technology Agency of the Czech Republic.

³⁶ The military and the police HEIs, as parts of the organisational unit of the state, are treated specifically in terms of the possibility to participate in the projects.

17 million CZK, CTU increased its share by 30 million CZK. Similarly, the total support through the Technologic Agency of the Czech Republic has decreased by 37 million CZK while CTU share increased by 45 million CZK.

Most of the science carried out at CTU is funded from public sources, e.g., by the Ministry of Education, by other ministries, and by Czech and foreign grant agencies. However, parts of the CTU are quite successful in attracting private money on contracts, close to the 20% limit imposed by GBER. This may soon become a limitation to further development and cooperation with industry.

More than half of the income for science came from project funding. The ratio of project funding to institutional funding is increasing over time. CTU is happy to be able to attract grant money. However, dependence on this source of funding involves potential instability and uncertainty, as most grant projects last for three years only. The overall structure of Czech science funding makes the system difficult to manage.

Prestigious international projects:

Human-Compatible Artificial Intelligence with Guarantees – funded by the European Commission under the Horizon Europe programme, with the Czech Technical University (CTU) as coordinator and the Faculty of Electrical Engineering (FEE) allocated a budget of EUR 2.5 million in the evaluated period – is a major initiative focused on the ethical development of artificial intelligence (AI). Within this framework, the project addresses fairness in AI by designing explainable and transparent algorithms to enhance both their functionality and user understanding.

The project integrates expertise from computer and data sciences, control theory, optimization, ethics, and law to develop AI systems that are not only technically robust but also aligned with ethical standards. To validate its methodologies, the project includes three key case studies:

1. Fair Evaluation in Recruitment – Developing AI tools that eliminate biases in hiring processes.
2. Gender Equality in Advertising – Ensuring AI-driven marketing strategies do not reinforce gender bias.
3. Fairness in Financial Services – Preventing discrimination in banking and credit assessments.

The project consortium consists of eight organizations across five countries, including Imperial College London, Technion, Athena Research Center, and the National and Kapodistrian University of Athens, and industry partners (IBM Research, Workable and Date.io) that contribute practical insights and data. Led by Jakub Mareček from FEE CTU, the project aims to set new standards for fairness in AI, ensuring trust, transparency, and ethical alignment in its applications.

CLARA (Centre for Artificial Intelligence and Quantum Computing in System Brain Research) is a Horizon Europe – Teaming for Excellence project with a total budget of €43 million. It aims to establish a groundbreaking interdisciplinary centre of excellence, the first of its kind in Central and Eastern Europe, dedicated to developing a new generation of advanced applications that leverage artificial intelligence, computational modelling, and quantum computing.

The project specifically aims to advance research on neurodegenerative diseases, particularly Alzheimer's, by harnessing large-scale multidimensional biological and clinical data processed through powerful supercomputers and quantum methods. Coordinated by the International Neurodegenerative Disorders Research Centre (INDRC), the consortium comprises prominent Czech institutions, including the Czech Institute of Informatics, Robotics and Cybernetics (CIIRC CTU), VSB – Technical University of Ostrava, and the International Clinical Research Centre (ICRC), along with

leading European organizations such as the Paris Brain Institute and the Leibniz Supercomputing Centre (LRZ). Research on artificial intelligence will be conducted in collaboration with the Paris Research Artificial Intelligence Institute-School of AI (PRAIRIE-PSAI).

CLARA aims to develop a flexible and transparent research and innovation infrastructure that fosters collaboration across scientific domains and institutions, serving as a model for other research centres.

FRONTIER (Federated Foundational Models for Embodied Perception) is an ERC Advanced grant led by Dr. Josef Sivic at the Czech Institute of Informatics, Robotics and Cybernetics (CIIRC CTU), with a budget of €2,5 million. The project aims to develop a new generation of large-scale neural models that enable machines to learn and interact effectively within a dynamic 3D world.

Current models excel at recognizing static 2D images, but struggle with real-world interactions. FRONTIER addresses this challenge by creating innovative architectures that integrate large-scale neural networks with learnable, differentiable physical simulations, thereby enhancing generalization across tasks, situations, and environments. The most ambitious goal is to develop new methods to allow sharing and accumulating learning experiences across different systems, thereby achieving new levels of scale, accuracy, and robustness not achievable by learning in any individual system alone.

Advancements in these areas could significantly impact our everyday lives, as well as science and commerce, with safer cars that learn from each other, intelligent production lines that collaboratively adapt to new workflows, or a new generation of smart assistive robots that automatically learn new skills from the Internet.

[PoliRuralPlus](#) extends and enriches the achievements of its predecessor, the PoliRural, by delving deeper into the complexities of rural and urban interconnectivity. It deploys a sophisticated suite of digital tools, including Artificial Intelligence, Geographic Information Systems, Internet of Things, and advanced data analytics. The project's core mission is to tackle prevalent issues such as administrative fragmentation, inequality, and inefficiencies in public service coordination, fostering an environment of enhanced cooperation and equal opportunities across rural and urban divides. Central to PoliRuralPlus are nine pilot projects that serve as proving grounds for an EU-wide integrated approach to territorial planning and action foresight. PoliRuralPlus ambitiously expands its scope to include the urban dimension, thus embracing a broader perspective on development. The CTU is the coordinator of a consortium consisting of twenty institutions.

OWIN6G (MSCA-DN, 2MEUR) Coordinator: CTU (FEE)

Partners: Northumbria University, Fraunhofer Heinrich Hertz Institute, École Centrale Méditerranée, MaxLinear Hispania, Universitat de Valencia, Eblana Photonics, Instituto de Telecomunicações, Harokopio University

The OWIN6G consortium brings together top researchers and research teams from all over Europe to establish a MSCA Doctoral Network in the subject of future 6G wireless sensor network technologies. It is the first Doctoral Network dedicated to training new generation of doctoral candidates in the field of wireless sensor networks for the Internet of Things/Internet of Everything as part of the 6G and beyond focusing on novel sensors, solar cells for energy

harvesting and optical detection, and hybrid RF-optical wireless technologies, and the application of machine learning to improve

adoption, optimization, and security aspects in sensor networks. OWIN6G combines various disciplines to achieve its ambitious research and training goals, developing a structured European training network for early-stage researchers. Through the collaborative research involving ten individual projects addressing specific challenges and applications, OWIN6G makes a significant contribution to the fundamental scientific understanding, technical know-how, and innovation of the future hybrid optical/RF sensor network.

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4.10.1 Total budget of the HEI

Name of the HEI unit	Total budget in thous. CZK/EUR		Percentage of public funding in the Czech Republic	Share of public funding from abroad in %	Percentage of funding from other sources
Faculty of Civil Engineering	2 274 374	89 719	81,21%	6,35%	12,45%
Faculty of Mechanical Engineering	2 397 340	94 570	91,10%	0,24%	8,65%
Faculty of Electrical Engineering	3 662 968	144 496	83,95%	4,74%	11,32%
Faculty of Nuclear Sciences and Physical Engineering	1 694 338	66 838	93,41%	4,11%	2,48%
Faculty of Architecture	162 560	6 413	91,82%	3,08%	5,10%
Faculty of Transportation Sciences	711 621	28 072	66,73%	1,02%	32,25%
Faculty of Biomedical Engineering	402 579	15 881	95,30%	0,07%	4,63%
Faculty of Information Technologies	392 419	15 480	72,74%	26,70%	0,56%
Klokner Institute	517 103	20 399	29,96%	0,00%	70,04%
Masaryk Institute of Advanced Studies	65 904	2 600	100,00%	0,00%	0,00%
Institute of Experimental and Applied Physics	474 339	18 712	92,44%	6,24%	1,33%
University Centre for Energy Efficient Buildings	690 000	27 219	73,29%	4,47%	22,24%
Czech Institute of Informatics, Robotics and Cybernetics	1 935 333	76 345	80,16%	11,80%	8,04%

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4.10.2 Share [%] of total costs/outputs by type of R&D&I paid from public and non-public sources

	Year 1	Year 2	Year 3	Year 4	Year 4	Total
Basic research	9,4%	9,8%	9,5%	9,5%	8,7%	10,2%
Applied Research	28,2%	31,3%	27,8%	26,6%	26,0%	30,0%
Experimental development and innovation	62,4%	58,9%	62,6%	63,9%	65,3%	59,8%
Total	100%	100%	100%	100%	100%	100%

Note: For definitions see Definition of Terms in Methodology HEI2025+.

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4.10.3 Projects supported by a foreign provider

In the role of beneficiary							
Provider / Investor	Programme/Grant Scheme	Project name	Support (in thousands CZK/EUR)				
			Year 1	Year 2	Year 3	Year 4	Year 5
EC	COST - projekty přímo podpořené ze zahraničí	COST RenewPV workshop (2024–2024)					50 kKč / 1985 €
EC	COST - projekty přímo podpořené ze zahraničí	CA19111 - European Network on Future Generation Optical Wireless Communication Technologies (2022–2022)			45 kKč / 1765 €		
EC	COST - projekty přímo podpořené ze zahraničí	Opportunistic Precipitation Sensing Network (2021–2025)				2259 kKč / 89130 €	2971 kKč / 117209 €
EC	Digital Europe Programme	EDIH Czech Technical University in Prague (2023–2025)				25505 kKč / 1006134 €	14635 kKč / 577330 €
EC	Erasmus+	Ethical Engineer: Integrating teaching ethics in artificial intelligence and robotics into Engineering Education (2023–2026)				146 kKč / 5773 €	692 kKč / 27299 €
EC	Erasmus+	Techniques, Heritage, Territories of Industry (TPTI) (2022–2027)			149 kKč / 5889 €	72 kKč / 2853 €	113 kKč / 4474 €
EC	Horizon Europe	Algorithms and Game Comonads (2024–2026)					2707 kKč / 106781 €
EC	Horizon Europe	Event Driven Active Vision for Object Perception (2024–2026)					991 kKč / 39073 €
EC	Horizon Europe	Fostering Sustainable, Balanced, Equitable, Place-based and Inclusive Development of Rural-Urban Communities' Using Specific Spatial Enhanced Attractiveness Mapping ToolBox (2024–2026)					138372 kKč / 5458459 €
EC	Horizon Europe	Sensorbees are ENhanced Self-ORganizing Bio-hybrids for Ecological and Environmental Surveillance (2023–2028)					15708 kKč / 619640 €
EC	Horizon Europe	Optical and Wireless Sensors Networks for 6G Scenarios (2023–2027)				26287 kKč / 1036966 €	6050 kKč / 238656 €
EC	Horizon Europe	2nd training school COST project CA19111 (2022–2022)			49 kKč / 1935 €		
EC	Horizon Europe	Federated foundational models for embodied perception (2024–2028)					9467 kKč / 373463 €
EC	Horizon Europe	Reproducible Data Analysis for All (2024–2025)					1794 kKč /

							70768 €
EC	Horizon Europe	Human-Compatible Artificial Intelligence with Guarantees (2022–2026)			52477 kKč / 207010 8 €	5702 k Kč / 224922 €	6157 k Kč / 242898 €
EC	Horizon Europe	AUTOMATED SOLUTIONS FOR SUSTAINABLE AND CIRCULAR CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT (2022–2025)			51687 kKč / 203893 4 €	5372 k Kč / 211904 €	39935 kKč / 157535 0 €
EC	Horizon 2020	Strengthening of existing masonry buildings (2020–2022)				1255 k Kč / 49492 €	
EC	Horizon 2020	AUGMENTED COOPERATION IN EDUCATION AND TRAINING IN NUCLEAR AND RADIOCHEMISTRY (2020–2023)		1117 k Kč / 44055 €	7055 k Kč / 278297 €	2142 k Kč / 84487 €	8698 k Kč / 343118 €
EC	Horizon 2020	PRE-DISposal management of radioactive waste (2020–2024)		343 kKč č / 13524 €	331 kKč č / 13044 €	654 kKč č / 25796 €	164 kKč č / 6477 €
EC	Horizon 2020	Research and Innovation Centre on Advanced Industrial Production – Phase 2 (2019–2025)	17922 kKč / 706979 €	40687 kKč / 160499 5 €	50191 kKč / 197992 3 €	64212 kKč / 253301 1 €	18228 kKč / 719048 €
EC	Horizon 2020	Artificial Intelligence for Large-Scale Computer-Assisted Reasoning (2015–2020)	8114 k Kč / 320092 €	0 kKč / 0 €			
EC	Interreg CENTRAL EUROPE	NIRIN - New Ideas for Using Railway Infrastructure (2019–2021)		0 kKč / 0 €	54 kKč / 2122 €		
ESA	Programy ESA	Radiation Environment Monitor for Energetic Cosmic rays (2022–2023)			0 kKč / 0 €	0 kKč / 0 €	3642 k Kč / 143665 €
Intl Visegrad Fund	Projekty Mezinárodního visegrádského fondu	Reconstruction of dynamic visual stimuli from fMRI data (2023–2024)				0 kKč / 0 €	38 kKč / 1493 €
Intl Visegrad Fund	Projekty Mezinárodního visegrádského fondu	Mental state classification and prediction using fMRI and EEG (2021–2022)			71 kKč / 2820 €		
(other foreign provider)	European Institute of Innovation & Technology	Young Manufacturing Leaders (2022–2022)		137 kKč č / 5406 €	439 kKč č / 17305 €	369 kKč č / 14540 €	125 kKč č / 4927 €
(other foreign provider)	IAEA Vienna	Scientific and Education Activities on the GOLEM Tokamak in the Framework of the IAEA CRP (2018–2022)		126 kKč č / 4972 €		118 kKč č / 4674 €	
(other foreign provider)	IAEA Vienna	Testing of Advanced Cladding Materials and Code Benchmarking (2020–2025)			117 kKč č / 4597 €	15 kKč / 592 €	22 kKč / 882 €

(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Radon adsorption of Cu-imidazole-based metal-organic frameworks (2024–2024)					152 kKč / 6002 €
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Critical Heat Flux On Accident Tolerant Fuels under Reactor Typical Conditions (2024–2025)					125 kKč / 4943 €
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Participation of CTU students and staff at quantum computing hackathon by IBM Quantum Hub at National Taiwan University (2023–2023)				245 kKč / 9664 €	147 kKč / 5785 €
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	INDICATE - natIoNal buiLdIng ICa dATa accELerator (2023–2024)				4370 kKč / 172398 €	1845 kKč / 72788 €
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Enhancing capacities for technology transfer and technology uptake in the field of ICT (2024–2026)					4416 kKč / 174188 €
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Expert assistance to economic and regulatory questions arising from the district heating sector transformation in Czechia (2022–2023)				347 kKč / 13676 €	
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Life-cycle global warming potential of buildings (2022–2022)			458 kKč / 18074 €	393 kKč / 15487 €	
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Policy, regulatory, economic and technology framework for low-carbon transformation of the Czech district heating sector (2021–2022)			360 kKč / 14185 €		
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Cir4Con - Strengthening Circular Construction Practices (2021–2024)				6675 kKč / 263328 €	10142 kKč / 400083 €
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Game Theory for Adversarial Machine Learning (2020–2021)			1150 kKč / 45365 €		
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Energy Efficiency Network – a cross-border energy consultant training (2020–2022)			1960 kKč / 77302 €	925 kKč / 36505 €	
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Using deep reinforcement learning to simulate security analyst (2018–2021)			1449 kKč / 57172 €		
EC	COST - projekty přímo podpořené ze zahraničí	COST RenewPV workshop (2024–2024)					50 kKč / 1985 €
EC	COST - projekty přímo podpořené ze zahraničí	CA19111 - European Network on Future Generation Optical Wireless Communication Technologies (2022–2022)			45 kKč / 1765 €		

EC	COST - projekty přímo podpořené ze zahraničí	Opportunistic Precipitation Sensing Network (2021–2025)				2259 k Kč / 89130 €	2971 k Kč / 117209 €
EC	Digital Europe Programme	EDIH Czech Technical University in Prague (2023–2025)				25505 kKč / 100613 4 €	14635 kKč / 577330 €
EC	Erasmus+	Ethical Engineer: Integrating teaching ethics in artificial intelligence and robotics into Engineering Education (2023–2026)				146 kKč / 5773 €	692 kKč / 27299 €
EC	Erasmus+	Techniques, Heritage, Territories of Industry (TPTI) (2022–2027)			149 kKč / 5889 €	72 kKč / 2853 €	113 kKč / 4474 €
EC	Horizon Europe	Algorithms and Game Comonads (2024–2026)					2707 k Kč / 106781 €
EC	Horizon Europe	Event Driven Active Vision for Object Perception (2024–2026)					991 kKč / 39073 €
EC	Horizon Europe	Fostering Sustainable, Balanced, Equitable, Place-based and Inclusive Development of Rural-Urban Communities' Using Specific Spatial Enhanced Attractiveness Mapping ToolBox (2024–2026)					138372 kKč / 545845 9 €
EC	Horizon Europe	Sensorbees are ENhanced Self-ORganizing Bio-hybrids for Ecological and Environmental Surveillance (2023–2028)					15708 kKč / 619640 €
EC	Horizon Europe	Optical and Wireless Sensors Networks for 6G Scenarios (2023–2027)				26287 kKč / 103696 6 €	6050 k Kč / 238656 €
EC	Horizon Europe	2nd training school COST project CA19111 (2022–2022)			49 kKč / 1935 €		
EC	Horizon Europe	Federated foundational models for embodied perception (2024–2028)					9467 k Kč / 373463 €
EC	Horizon Europe	Reproducible Data Analysis for All (2024–2025)					1794 k Kč / 70768 €
EC	Horizon Europe	Human-Compatible Artificial Intelligence with Guarantees (2022–2026)			52477 kKč / 207010 8 €	5702 k Kč / 224922 €	6157 k Kč / 242898 €
EC	Horizon Europe	AUTOMATED SOLUTIONS FOR SUSTAINABLE AND CIRCULAR CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT (2022–2025)			51687 kKč / 203893 4 €	5372 k Kč / 211904 €	39935 kKč / 157535 0 €
EC	Horizon 2020	Strengthening of existing masonry buildings (2020–2022)				1255 k Kč /	

						49492 €	
EC	Horizon 2020	AUGMENTED COOPERATION IN EDUCATION AND TRAINING IN NUCLEAR AND RADIOCHEMISTRY (2020–2023)		1117 k Kč / 44055 €	7055 k Kč / 278297 €	2142 k Kč / 84487 €	8698 k Kč / 343118 €
EC	Horizon 2020	PRE-DISposal management of radioactive waste (2020–2024)		343 kK č / 13524 €	331 kK č / 13044 €	654 kK č / 25796 €	164 kK č / 6477 €
EC	Horizon 2020	Research and Innovation Centre on Advanced Industrial Production – Phase 2 (2019–2025)	17922 kKč / 706979 €	40687 kKč / 160499 5 €	50191 kKč / 197992 3 €	64212 kKč / 253301 1 €	18228 kKč / 719048 €
Total							
In the role of another participant							
Provider Investor	Programme/Grant Scheme	Project name	Support (in thousands CZK/EUR)				
			Year 1	Year 2	Year 3	Year 4	Year 5
EC	Connecting Europe Facility	eSignForStudy (2021–2022)		11 kKč / 434 €	366 kK č / 14420 €		
EC	Connecting Europe Facility	Central European Digital Media Observatory (2021–2024)		504 kK č / 19862 €	2100 k Kč / 82832 €	2307 k Kč / 91008 €	244 kK č / 9641 €
EC	Connecting Europe Facility	Improvement of NAPs through the exploitation of traffic LOD DATEX II (2019–2022)	428 kK č / 16874 €	322 kK č / 12697 €	607 kK č / 23946 €	25 kKč / 984 €	
EC	Connecting Europe Facility	Programme Support Action (PSA) for the maintenance, adaptation and further development of a European ITS Framework Architecture for Intelligent Transport Services (ITS). (2017–2021)	787 kK č / 31046 €	1802 k Kč / 71068 €			
EC	Connecting Europe Facility	C-ROADS Czech Republic (2016–2021)	4138 k Kč / 163224 €	502 kK č / 19814 €	1210 k Kč / - 47732 €		
EC	Digital Europe Programme	Central European Digital Media Observatory 2.0 (2024–2026)					662 kK č / 26134 €
EC	Digital Europe Programme	AI MANufacturing Testing and experimenTation network For EuRoPean industrieS (2023–2027)				2124 k Kč / 83778 €	4221 k Kč / 166500 €
EC	Digital Europe Programme	Czech National Quantum Communication Infrastructure (2023–2026)					3 kKč / 130 €
EC	Digital Europe Programme	DigiQ (2022–2026)			7 kKč / 285 €	217 kK č / 8557 €	446 kK č / 17584 €
EC	Horizon Europe	Towards reliable and safe GFR (2024–2028)					209 kK č / 8233 €

EC	Horizon Europe	Sustainable production of Cellulose-based products and additives to be used in SMEs and rural areas (2021–2026)					5 kKč / 186 €
EC	Horizon Europe	Green Intelligent Affordable New Transport Solutions (2024–2027)					879 kKč / 34674 €
EC	Horizon Europe	AI-Enabled Data Lifecycles Optimization and Data Spaces Integration for Increased Efficiency and Interoperability (2024–2027)					494 kKč / 19469 €
EC	Horizon Europe	Co-creating people-centric sustainable neighbourhoods through urban regeneration (2023–2027)				216 kKč / 8540 €	1636 kKč / 64529 €
EC	Horizon Europe	Trustworthy Planning and Scheduling with Learning and Explanations (2023–2026)				1732 kKč / 68315 €	3691 kKč / 145602 €
EC	Horizon Europe	Efficient exploratiOn of Climate dAta Locally (2024–2027)					273 kKč / 10777 €
EC	Horizon Europe	EUROPEAN PHOTONIC QUANTUM COMPUTER (2024–2026)					1129 kKč / 44550 €
EC	Horizon Europe	Open Science Plan-Track-Assess Pathways (2024–2027)					715 kKč / 28213 €
EC	Horizon Europe	Nature-Based Solutions integration to Local Urban Critical Infrastructures Protection for a Climate Resilient Society (2023–2026)				584 kKč / 23032 €	2289 kKč / 90304 €
EC	Horizon Europe	A Hybrid Cognitive Architecture for Deep Understanding (2023–2026)				1102 kKč / 43478 €	3369 kKč / 132904 €
EC	Horizon Europe	Tensor modEliNg, geOmetRy and optimiSation (2023–2025)					1292 kKč / 50948 €
EC	Horizon Europe	THE EUROPEAN LIVING LAB ON DESIGNING SUSTAINABLE URBAN MOBILITY TOWARDS CLIMATE NEUTRAL CITIES (2023–2026)				861 kKč / 33959 €	1663 kKč / 65607 €
EC	Horizon Europe	InnovAtive DeMonstrator for hyBrid-Electric Regional Application (2023–2026)				1975 kKč / 77925 €	2215 kKč / 87363 €
EC	Horizon Europe	Innovation in Supercritical CO2 Power generation systems (2023–2026)				185 kKč / 7292 €	1548 kKč / 61083 €
EC	Horizon Europe	Boosting the uptake of circular integrated solutions in construction value chains (2023–2027)				1070 kKč /	1990 kKč /

						42204 €	78516 €
EC	Horizon Europe	COOrdinating and Piloting actions towards ERA-hubs as inTer- and intra-regional Ecosystems for knowledge production (2023–2025)				274 kK č / 10814 €	1711 k Kč / 67489 €
EC	Horizon Europe	COMBATTING DIET RELATED NON-COMMUNICABLE DISEASE THROUGH ENHANCED SURVEILLANCE (2022–2026)			3 kKč / 133 €	3469 k Kč / 136858 €	4515 k Kč / 178097 €
EC	Horizon Europe	Accelerate poSitive Clean ENergy Districts (2023–2027)				1236 k Kč / 48738 €	1798 k Kč / 70935 €
EC	Horizon Europe	A Global as well as Local Flexibility Marketplace to Demonstrate Grid Balancing Mechanisms through Crosssectoral Interconnected and Integrated Energy Ecosystems enabling Automatic Flexibility Trading (2023–2026)				2275 k Kč / 89748 €	3047 k Kč / 120199 €
EC	Horizon Europe	Acoustic and Thermal Retrofit of Office Building Stock in EU (2022–2026)			25 kKč / 976 €	205 kK č / 8074 €	1014 k Kč / 39983 €
EC	Horizon Europe	Innovative Photodetector Module for advanced Hybrid “Magnetic Resonance Imaging/Positron Emission Tomography” Scanners for Nuclear Medicine (2023–2027)				227 kK č / 8966 €	575 kK č / 22672 €
EC	Horizon Europe	Building European Nuclear Competence through continuous Advanced and Structured Education and Training Actions (2022–2026)			55 kKč / 2157 €	432 kK č / 17027 €	500 kK č / 19739 €
EC	Horizon Europe	FUEL RECYCLE AND EXPERIMENTALLY DEMONSTRATED MANUFACTURING OF ADVANCED NUCLEAR SOLUTIONS FOR SAFETY (2022–2026)			99 kKč / 3891 €	342 kK č / 13489 €	709 kK č / 27952 €
EC	Horizon Europe	New European Bauhaus STAvangeR (2022–2025)			104 kK č / 4102 €	442 kK č / 17446 €	531 kK č / 20959 €
EC	Horizon Europe	The Central Bohemia Mobility Programme for Excellence in Research, Innovation and Technology (2022–2027)					719 kK č / 28343 €
EC	Horizon Europe	European Robotics and AI Network (2022–2026)			114 kK č / 4494 €	854 kK č / 33705 €	559 kK č / 22056 €
EC	Horizon Europe	Creating Actionable Futures (2022–2025)			477 kK č / 18802 €	922 kK č / 36362 €	2129 k Kč / 83977 €
EC	Horizon 2020	The Integrator-centric approach for realising innovative energy efficient buildings in (2021–2026)			1435 k Kč / 56620 €	4252 k Kč / 167744 €	3180 k Kč / 125459 €

EC	Horizon 2020	Connect and align ELIXIR Nodes to deliver sustainable FAIR life-science data management services' (2021–2024)		708 kK č / 27910 €	530 kK č / 20919 €	- 292 kK č / - 11533 €	177 kK č / 6995 €
EC	Horizon 2020	BoostEuroTeQ: strengthening institutional transformations for responsible engineering education in Europe (2021–2024)		302 kK č / 11894 €	1460 k Kč / 57591 €	1857 k Kč / 73263 €	1169 k Kč / 46098 €
EC	Horizon 2020	Climate Positive Circular Communities (2022–2026)			2399 k Kč / 94620 €	12896 kKč / 508703 €	8064 k Kč / 318090 €
EC	Horizon 2020	Development of an efficient steganalysis framework for uncovering hidden data in digital media (2021–2024)		600 kK č / 23653 €	1433 k Kč / 56537 €	885 kK č / 34929 €	601 kK č / 23705 €
EC	Horizon 2020	Transforming Unsustainable management of soils in key agricultural systems in EU and China. Developing an integrated platform of alternatives to reverse soil degradation (2021–2026)		631 kK č / 24910 €	3543 k Kč / 139761 €	4072 k Kč / 160627 €	4397 k Kč / 173446 €
EC	Horizon 2020	RoboRoyale: ROBOtic Replicants for Optimizing the Yield by Augmenting Living Ecosystems (2021–2026)		17 kKč / 665 €	1123 k Kč / 44304 €	3300 k Kč / 130160 €	3389 k Kč / 133679 €
EC	Horizon 2020	MSCA-RISE-2020 - Research and Innovation Staff Exchange (2021–2025)			464 kK č / 18317 €	19 kKč / 768 €	
EC	Horizon 2020	An experimentally-validated multi-scale materials, process and device modeling & design platform enabling non-expert access to open innovation in the organic and large area electronics industry (2021–2024)		1318 k Kč / 51991 €	1449 k Kč / 57145 €	2625 k Kč / 103538 €	2387 k Kč / 94166 €
EC	Horizon 2020	Smart freight TranspOrt and logistics Research Methodologies (2021–2023)		1486 k Kč / 58611 €	1993 k Kč / 78610 €	1257 k Kč / 49568 €	678 kK č / 26735 €
EC	Horizon 2020	Constructionskills project on EE with Circular Construction Skills as a Driver (2021–2024)		124 kK č / 4892 €	642 kK č / 25336 €	400 kK č / 15790 €	19 kKč / 737 €
EC	Horizon 2020	AI on-demand platform for regional interoperable Digital Innovation Hubs Network (2021–2023)		555 kK č / 21909 €	1573 k Kč / 62050 €	1426 k Kč / 56246 €	79 kKč / 3112 €
EC	Horizon 2020	Macro and Microplastic in Agricultural Soil Systems (2020–2024)		271 kK č / 10679 €	1534 k Kč / 60500 €	1044 k Kč / 41176 €	2325 k Kč / 91702 €
EC	Horizon 2020	PLUG-AND-USE RENOVATION WITH ADAPTABLE LIGHTWEIGHT SYSTEMS (2020–2024)	131 kK č / 5157 €	4742 k Kč / 187054 €	3516 k Kč / 138695 €	3702 k Kč / 146021 €	2579 k Kč / 101749 €
EC	Horizon 2020	NEW MOBILITY DATA AND SOLUTIONS TOOLKIT (2021–2023)		1692 k Kč /	1667 k Kč /	575 kK č /	

				66733 €	65753 €	22673 €	
EC	Horizon 2020	GaN for Advanced Power Applications (2021–2023)			1026 k Kč / 40476 €	990 kK č / 39072 €	2357 k Kč / 92980 €
EC	Horizon 2020	Scintillating Porous Architectures for Radioactive gas detection (2020–2024)	129 kK č / 5078 €	1992 k Kč / 78561 €	2572 k Kč / 101444 €	1615 k Kč / 63707 €	1943 k Kč / 76662 €
EC	Horizon 2020	New metrological methods for biofuel materials analysis (2020–2023)	404 kK č / 15956 €	324 kK č / 12787 €	385 kK č / 15198 €	185 kK č / 7300 €	
EC	Horizon 2020	DIH-World - Accelerating deployment and maturity of DIHs for the benefit of Digitisation of European SMEs (2020–2023)		569 kK č / 22442 €	699 kK č / 27592 €	291 kK č / 11466 €	2 kKč / 72 €
EC	Horizon 2020	Foundations of Trustworthy AI - Integrating Reasoning, Learning and Optimization (2020–2023)				1184 k Kč / 46719 €	1201 k Kč / 47369 €
EC	Horizon 2020	European Learning and Intelligent Systems Excellence (2020–2024)	255 kK č / 10042 €	1177 k Kč / 46421 €	1155 k Kč / 45575 €	2225 k Kč / 87772 €	7235 k Kč / 285416 €
EC	Horizon 2020	Value and Impact through Synergy, Interaction and coOperation of Networks of Centres of Excellence in AI (2020–2023)	381 kK č / 15020 €	1389 k Kč / 54805 €	1200 k Kč / 47329 €	1590 k Kč / 62732 €	1686 k Kč / 66523 €
EC	Horizon 2020	Safety of GFR through innovative materials, technologies and processes (2020–2024)	163 kK č / 6446 €	745 kK č / 29389 €	1729 k Kč / 68206 €	1105 k Kč / 43579 €	862 kK č / 33985 €
EC	Horizon 2020	Socially Pertinent Robots in Gerontological Healthcare (2020–2024)	1282 k Kč / 50568 €	2064 k Kč / 81430 €	2140 k Kč / 84420 €	6709 k Kč / 264654 €	3859 k Kč / 152232 €
EC	Horizon 2020	Big data processing and Artificial Intelligence at the Network Edge (2020–2023)	346 kK č / 13659 €	829 kK č / 32719 €	914 kK č / 36066 €	17 kKč / 665 €	
EC	Horizon 2020	Towards effective radiation protection based on improved scientific evidence and social considerations - focus on radon and NORM (2020–2024)	147 kK č / 5815 €	1016 k Kč / 40090 €	2365 k Kč / 93278 €	267 kK č / 10547 €	1021 k Kč / 40265 €
EC	Horizon 2020	AERIAL COgnitive integrated multi-task Robotic system with Extended operation range and safety (2020–2023)	2488 k Kč / 98154 €	4271 k Kč / 168471 €	4416 k Kč / 174183 €	1780 k Kč / 70211 €	
EC	Horizon 2020	Towards Improved Assessment of Safety Performance for LTO of Nuclear Civil Engineering Structures (2020–2024)	455 kK č / 17962 €	1562 k Kč / 61610 €	2687 k Kč / 106003 €	1698 k Kč / 66970 €	754 kK č / 29760 €
EC	Horizon 2020	Digital transformation in RIS (2020–2020)	450 kK č /	3 kKč / 123 €			

			17741 €				
EC	Horizon 2020	ACHIEVING WIDER UPTAKE OF WATER-SMART SOLUTIONS (WIDER UPTAKE) (2020–2024)	1340 k Kč / 52858 €	3245 k Kč / 127993 €	5442 k Kč / 214687 €	4999 k Kč / 197215 €	2797 k Kč / 110347 €
EC	Horizon 2020	Development of a demonstrator for the Penetrating Particle Analyser (PAN) technology (2020–2022)	3883 k Kč / 153194 €	3771 k Kč / 148758 €	3861 k Kč / 152317 €	1426 k Kč / 56234 €	1492 k Kč / - 58875 €
EC	Horizon 2020	Sustainable energy Positive and zero cARbon Communities (2019–2024)	2168 k Kč / 85531 €	2223 k Kč / 87701 €	927 kKč / 36573 €	2128 k Kč / 83932 €	3351 k Kč / 132184 €
EC	Horizon 2020	Highly advanced modular integration of insulation, energising and storage systems for non-residential buildings (2019–2023)	1020 k Kč / 40244 €	2934 k Kč / 115757 €	1322 k Kč / 52167 €	3475 k Kč / 137081 €	1764 k Kč / 69586 €
EC	Horizon 2020	LIFT European Network of Learning Factories (2020–2020)	231 kKč / 9119 €	3 kKč / 99 €			
EC	Horizon 2020	Network for Empowering People in Added-Value Manufacturing Systems and Technologies – Regional Innovation Scheme (2020–2020)	1774 k Kč / 69994 €	15 kKč / 583 €			
EC	Horizon 2020	Learning through manufacturing challenges (2020–2020)	1641 k Kč / 64739 €	13 kKč / 505 €			
EC	Horizon 2020	Citizen Scientists Investigating Cookies and App GDPR compliance (2020–2023)		1177 k Kč / 46440 €	1376 k Kč / 54281 €	554 kKč / 21859 €	87 kKč / 3428 €
EC	Horizon 2020	Integrated Activities for the High Energy Astrophysics Domain (2020–2024)	533 kKč / 21019 €	580 kKč / 22893 €	704 kKč / 27765 €	920 kKč / 36304 €	1685 k Kč / 66470 €
EC	Horizon 2020	An AR cloud and digital twins solution for industry and construction 4.0 (2019–2022)	1990 k Kč / 78517 €	2701 k Kč / 106537 €	4038 k Kč / 159294 €		
EC	Horizon 2020	Measurement and Instrumentation for Cleaning and Decommissioning Operations (2019–2021)	3013 k Kč / 118847 €	2421 k Kč / 95484 €	2107 k Kč / 83124 €	342 kKč / 13511 €	0 kKč / 0 €
EC	Horizon 2020	You can also reduce emissions (2019–2022)	807 kKč / 31844 €	768 kKč / 30287 €	411 kKč / 16225 €		
EC	Horizon 2020	City Air Remote Emission Sensing (2019–2022)	227 kKč / 8938 €	353 kKč / 13907 €	386 kKč / 15231 €	194 kKč / 7668 €	
EC	Horizon 2020	Dementia: Intersectoral Strategy for Training and Innovation Network for Current Technology (2019–2023)		1536 k Kč /	1041 k Kč /	280 kKč /	

				60587 €	41059 €	11065 €	
EC	Horizon 2020	European Nuclear Experimental Educational Platform (ENEEP) (2019–2022)	1405 k Kč / 55421 €	2599 k Kč / 102528 €	2220 k Kč / 87577 €		849 kK č / 33503 €
EC	Horizon 2020	Thermal-aware Resource Management for Modern Computing Platforms in the Next Generation of Aircraft (2019–2021)	2492 k Kč / 98305 €	4591 k Kč / 181098 €	572 kK č / 22566 €		
EC	Horizon 2020	Left atrial appendage electrical Isolation via bio-photon optical confirmation to treat persistent atrial fibrillation (2019–2022)	502 kK č / 19815 €	350 kK č / 13820 €	167 kK č / 6583 €		
EC	Horizon 2020	Arrowhead tools (2019–2022)	809 kK č / 31925 €	843 kK č / 33242 €	830 kK č / 32754 €		
EC	Horizon 2020	European Joint Programme on Radioactive Waste Management (2019–2024)	3141 k Kč / 123924 €	5298 k Kč / 208979 €	6452 k Kč / 254507 €	9860 k Kč / 388958 €	7680 k Kč / 302942 €
EC	Horizon 2020	Soil Hydrology research platform underpinning innovation to manage water scarcity in European and Chinese cropping systems (2018–2022)	2925 k Kč / 115374 €	2789 k Kč / 110016 €	4196 k Kč / 165508 €	0 kKč / 0 €	
EC	Horizon 2020	Setting up national qualification and training scheme for craftsmen in the Czech Republic and developing the further offer of training courses in Slovakia, Austria and Bulgaria (2018–2020)	126 kK č / 4966 €	930 kK č / 36696 €	265 kK č / 10438 €		
EC	Horizon 2020	European Training Network on Visible light based Interoperability and Networking (2017–2021)	3724 k Kč / 146903 €	565 kK č / 22276 €			
EC	Horizon 2020	TURBOMachinery RETrofits enabling FLEXible back-up capacity for the transition of the European energy system (2017–2020)	1355 k Kč / 53459 €				
EC	Horizon 2020	A Modular European Education and Training Concept In Nuclear and RadioChemistry (2017–2020)	3506 k Kč / 138315 €				
EC	Horizon 2020	GEN IV Integrated Oxide fuels recycling strategies (2017–2021)	445 kK č / 17569 €	315 kK č / 12420 €	-23 kKč / - 909 €		
EC	Horizon 2020	Bentonite Mechanical Evolution (2017–2022)	2230 k Kč / 87953 €	732 kK č / 28892 €	564 kK č / 22259 €		
EC	Horizon 2020	SOLUTION - Solid lubrication for emerging engineering applications (2017–2021)	2476 k Kč / 97658 €	85 kKč / 3336 €		-26 kKč / - 1022 €	

EC	Horizon 2020	Multi-scale Composite Material Selection Platform with a Seamless Integration of Material Models and Multidisciplinary Design Framework (2017–2020)	1877 k Kč / 74044 €	529 kK č / 20881 €			
EC	Horizon 2020	Safe human-robot interaction in logistic applications for highly flexible warehouses (2016–2020)	2738 k Kč / 107990 €	851 kK č / 33552 €			
EC	Interreg CENTRAL EUROPE 2021-2027	Microwave imaging technology transfer to innovate the medical sector (2024–2026)					814 kK č / 32099 €
EC	Interreg CENTRAL EUROPE 2021-2027	Digital transformation of long-term care facilities for older people (2023–2026)				865 kK č / 34120 €	992 kK č / 39123 €
EC	Justice Programme	Judicial And Police Cooperation Preventing Radicalisation Towards Terrorism (2019–2021)	549 kK č / 21655 €	396 kK č / 15614 €	247 kK č / 9747 €		
EC	Justice Programme	Strategic AssessmentT for LAW and Police Cooperation (2018–2021)	382 kK č / 15069 €	359 kK č / 14153 €			
EC	Justice Programme	Judicial Strategy Against all Forms of Violent Extremism in Prison (2018–2020)	687 kK č / 27103 €				
EC	LIFE Programme 2021-2027	Development of Training Schemes with Application of Virtual Reality towards Implementation of Decarbonized New and Existing Buildings (2024–2027)					269 kK č / 10613 €
EC	LIFE Programme 2021-2027	Zelená strukturální síť pro adaptaci zemědělské krajiny (2024–2030)					582 kK č / 22950 €
EC	LIFE Programme 2021-2027	Build up Skills (BUS) initiative in CZ and SK - Rebooting the National qualification platforms and Roadmaps towards implementation of nearly Zero Energy Buildings and support for Renovation Wave (2022–2024)			210 kK č / 8299 €	854 kK č / 33671 €	216 kK č / 8510 €
EC	LIFE Programme 2021-2027	Certification of clean energy SMEs (2022–2025)			78 kKč / 3095 €	1796 k Kč / 70862 €	2102 k Kč / 82918 €
EC	Programy a fondy Evropské unie (nevědecké) - projekty podpořené ze zahraničí	Young Manufacturing Leaders (2020–2020)	441 kK č / 17388 €				
EC	Projekty rámcových programů EU	Design of steel portal frames made of web tapered members with and without openings at normal temperature and fire conditions (2024–2027)					423 kK č / 16689 €
EC	Projekty rámcových programů EU	Implementation of activities described in the Roadmap to Fusion during Horizon Europe through a joint programme of the members of the EUROfusion consortium (2021–2025)		96 kKč / 3798 €	1010 k Kč /	834 kK č /	773 kK č /

					39831 €	32910 €	30493 €
EC	Projekty rámcových programů EU	Accompanying measure for Dissemination, Valorisation and Collaborative Exploitation of circularity of constructional steel products (2023–2025)				134 kK č / 5273 €	408 kK č / 16084 €
EC	Projekty rámcových programů EU	DNS4EU and European DNS Shield (2023–2025)				1553 k Kč / 61279 €	1392 k Kč / 54912 €
EC	Projekty rámcových programů EU	Fire and Seismic performances of Hybrid fire WALLs in case of single-storey industrial and commercial steel buildings (2021–2024)		136 kK č / 5380 €	494 kK č / 19488 €	376 kK č / 14824 €	410 kK č / 16185 €
EC	The European Defence Fund	Novel energy and propulsion systems for air dominance (2023–2025)				1093 k Kč / 43111 €	1258 k Kč / 49631 €
ESA	Programy ESA	IR Polarization Camera and Acousto-Optic Tuneable Filter for Hyperspectral Imaging Development for LWIR Applications - Phase 1 (2023–2025)				257 kK č / 10148 €	3087 k Kč / 121780 €
ESA	Programy ESA	Support for Galileo/EGNOS Performance Monitoring Activities (2023–2025)				132 kK č / 5220 €	269 kK č / 10592 €
(other foreign provider)	Česko-německá spolupráce (vědecká) - projekty přímo podpořené ze zahraničí	Ekologické transformátorové oleje - alternativní izolační kapaliny (2017–2020)	126 kK č / 4967 €				
(other foreign provider)	European Institute of Innovation & Technology	Young Manufacturing Leaders for Industry 5.0 (2024–2025)					186 kK č / 7339 €
(other foreign provider)	European Institute of Innovation & Technology	Education programs development in RIS countries (2021–2022)		636 kK č / 25087 €	996 kK č / 39287 €		
(other foreign provider)	European Institute of Innovation & Technology	EIT Manufacturing RIS hubs (2023–2024)				1223 k Kč / 48258 €	1165 k Kč / 45970 €
(other foreign provider)	European Institute of Innovation & Technology	ROS-based Education of Advanced Motion Planning and Control II (2023–2023)				1752 k Kč / 69123 €	8 kKč / 326 €
(other foreign provider)	European Institute of Innovation & Technology	Telemotive Xtended Reality - Augmented Training and Guidance (2022–2022)			598 kK č / 23593 €		
(other foreign provider)	European Institute of Innovation & Technology	RoboTwin - motion imitating robotics (2023–2023)				815 kK č / 32139 €	10 kKč / 393 €

(other foreign provider)	European Institute of Innovation & Technology	Multi-layer Connected Factories with hybrid conventional and digital components (2023–2024)				1055 k Kč / 41599 €	22 kKč / 864 €
(other foreign provider)	European Institute of Innovation & Technology	AI for weaving KPIs monitoring and prediction (2023–2024)				2400 k Kč / 94690 €	
(other foreign provider)	European Institute of Innovation & Technology	Intelligent Pedestrian Assistant to Everyone. (2022–2022)			1044 k Kč / 41167 €		
(other foreign provider)	European Institute of Innovation & Technology	Transformation, Acceleration, Networking, Development, Education and Mentoring + (2021–2023)		615 kKč / 24245 €	1111 k Kč / 43837 €	333 kKč / 13131 €	
(other foreign provider)	European Institute of Innovation & Technology	ROS-based Education of Advanced Motion Planning and Control (2022–2022)			1597 k Kč / 62991 €		
(other foreign provider)	European Institute of Innovation & Technology	Green Manufacturing: Demonstrating technologies to fight Climate Change (2022–2022)			1024 k Kč / 40381 €		
(other foreign provider)	European Institute of Innovation & Technology	Multi-layer Connected Factories with hybrid conventional and digital components (2022–2022)			1010 k Kč / 39831 €		
(other foreign provider)	European Institute of Innovation & Technology	Demand-driven additive manufacturing upskilling in RIS countries (2022–2022)			1340 k Kč / 52842 €		
(other foreign provider)	European Institute of Innovation & Technology	Learning Factories for Digital Transformation of SMEs II (2022–2022)			893 kKč / 35226 €		
(other foreign provider)	European Institute of Innovation & Technology	Smart Educational Framework for DIGitalization (2022–2022)			809 kKč / 31896 €		
(other foreign provider)	European Institute of Innovation & Technology	MaaS components assessment and system planning for cooperative value creation (2020–2020)	2975 k Kč / 117369 €				
(other foreign provider)	Programy sdružení EURAMET	Towards a true 8-digit digitiser (2023–2026)				126 kKč / 4959 €	321 kKč / 12672 €
(other foreign provider)	Programy sdružení EURAMET	Metrology for multi-scale monitoring of soil moisture (2022–2025)			24 kKč / 960 €	659 kKč / 26000 €	474 kKč / 18714 €
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Soil erosion in Austria - from mean to extreme (2021–2024)			32 kKč / 1262 €	32 kKč / 1262 €	110 kKč / 4336 €

(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Influence of the specimen geometry on quality of temperature measurement during dynamic loading (2021–2021)		114 kKč / 4484 €	0 kKč / 2 €		
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Cognitive production based on intelligent Energy, Quality and Maintenance Management (2021–2022)		183 kKč / 7224 €	723 kKč / 28505 €		
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Smartphone app for customized COVID protective respirator mask (2020–2020)	83 kKč / 3287 €	1 kKč / 55 €			
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Simulation Enhanced/Enabled Nuggets for Learning and Mastering Manufacturing for Lightweighting (2021–2022)		929 kKč / 36641 €	309 kKč / 12207 €	0 kKč / 0 €	
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Shaping the Next Generation of manufacturing professionals II (2021–2021)		718 kKč / 28319 €	836 kKč / 32994 €	576 kKč / 22739 €	0 kKč / 0 €
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Network for Empowering People in Added-Value Manufacturing Systems and Technologies – Phase II (2021–2021)		631 kKč / 24878 €			
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	Learning through manufacturing challenges II (2021–2021)		642 kKč / 25306 €			
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	AI for Manufacturing SMEs and Student (2021–2021)		1470 kKč / 58007 €			
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	RIS Industry 4.0 Hubs (2021–2021)		954 kKč / 37651 €			
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	EIT Manufacturing RIS hubs (2020–2022)	1823 kKč / 71903 €	1383 kKč / 54568 €	1385 kKč / 54638 €		
(other foreign provider)	Projekty podpořené ze zahraničí (pracovní kód k dodatečnému upřesnění)	H2AC4schools – Závody saských a českých škol PrOJETÍ světa elektromobility s vodíkem (2017–2021)	486 kKč / 19184 €	3 kKč / 130 €	480 kKč / 18927 €		
(other foreign provider)	Projekty v rámci přímé spolupráce se zahraničními institucemi z EU	Remote Control of Robot in Inter-connected 5G Testbeds in Prague and Munich (2022–2023)				341 kKč / 13442 €	
(other foreign provider)	Projekty v rámci přímé spolupráce se zahraničními institucemi z EU	Connection of the two 5G testbeds in Prague and Munich (2022–2022)			186 kKč / 7320 €		
(other foreign provider)	Projekty v rámci přímé spolupráce se zahraničními institucemi z EU	EGNOS Service Performance Monitoring Support (2020–2022)		74 kKč / 2937 €	382 kKč / 15085 €	0 kKč / 0 €	0 kKč / 0 €

(other foreign provider)	Projekty v rámci přímé spolupráce se zahraničními institucemi z EU	KnowDrift: Knowledge-Driven Industrial Robotics for Flexible Production (2017–2020)	29 kKč / 1147 €	22 kKč / 858 €			
(other foreign provider)	Projekty vědeckého charakteru (mimoprog. a mimo bilaterální dohody) řešené v přímé spolupráci se zahr. institucí mimo EU (přímo podpořené ze zahr.)	Flexible and Resilient Autonomus Systems (2018–2023)	1771 kKč / 69842 €	2238 kKč / 88272 €	4728 kKč / 186492 €	3253 kKč / 128305 €	
(other foreign provider)	Projekty vědeckého charakteru (mimoprog. a mimo bilaterální dohody) řešené v přímé spolupráci se zahr. institucí mimo EU (přímo podpořené ze zahr.)	Climate investment capacity (CIC): climate finance dynamics&structure for financing the 2030 targets (2018–2021)	1316 kKč / 51904 €	420 kKč / 16551 €			
EC	Connecting Europe Facility	eSignForStudy (2021–2022)		11 kKč / 434 €	366 kKč / 14420 €		
EC	Connecting Europe Facility	Central European Digital Media Observatory (2021–2024)		504 kKč / 19862 €	2100 kKč / 82832 €	2307 kKč / 91008 €	244 kKč / 9641 €
EC	Connecting Europe Facility	Improvement of NAPs through the exploitation of traffic LOD DATEX II (2019–2022)	428 kKč / 16874 €	322 kKč / 12697 €	607 kKč / 23946 €	25 kKč / 984 €	
EC	Connecting Europe Facility	Programme Support Action (PSA) for the maintenance, adaptation and further development of a European ITS Framework Architecture for Intelligent Transport Services (ITS). (2017–2021)	787 kKč / 31046 €	1802 kKč / 71068 €			
EC	Connecting Europe Facility	C-ROADS Czech Republic (2016–2021)	4138 kKč / 163224 €	502 kKč / 19814 €	- 1210 kKč / - 47732 €		
EC	Digital Europe Programme	Central European Digital Media Observatory 2.0 (2024–2026)					662 kKč / 26134 €
EC	Digital Europe Programme	AI MANufacturing Testing and experimenTation network For EuRopean industrieS (2023–2027)				2124 kKč / 83778 €	4221 kKč / 166500 €
EC	Digital Europe Programme	Czech National Quantum Communication Infrastructure (2023–2026)					3 kKč / 130 €
EC	Digital Europe Programme	DigiQ (2022–2026)			7 kKč / 285 €	217 kKč / 8557 €	446 kKč /

							17584 €
EC	Horizon Europe	Towards reliable and safe GFR (2024–2028)					209 kK č / 8233 €
EC	Horizon Europe	Sustainable production of Cellulose-based products and additives to be used in SMEs and rural areas (2021–2026)					5 kKč / 186 €
EC	Horizon Europe	Green Intelligent Affordable New Transport Solutions (2024–2027)					879 kK č / 34674 €
EC	Horizon Europe	AI-Enabled Data Lifecycles Optimization and Data Spaces Integration for Increased Efficiency and Interoperability (2024–2027)					494 kK č / 19469 €
EC	Horizon Europe	Co-creating people-centric sustainable neighbourhoods through urban regeneration (2023–2027)				216 kK č / 8540 €	1636 k Kč / 64529 €
EC	Horizon Europe	Trustworthy Planning and Scheduling with Learning and Explanations (2023–2026)				1732 k Kč / 68315 €	3691 k Kč / 145602 €
EC	Horizon Europe	Efficient exploratiOn of Climate dAta Locally (2024–2027)					273 kK č / 10777 €
EC	Horizon Europe	EUROPEAN PHOTONIC QUANTUM COMPUTER (2024–2026)					1129 k Kč / 44550 €
EC	Horizon Europe	Open Science Plan-Track-Assess Pathways (2024–2027)					715 kK č / 28213 €
EC	Horizon Europe	Nature-Based Solutions integration to Local Urban Critical Infrastructures Protection for a Climate Resilient Society (2023–2026)				584 kK č / 23032 €	2289 k Kč / 90304 €
EC	Horizon Europe	A Hybrid Cognitive Architecture for Deep Understanding (2023–2026)				1102 k Kč / 43478 €	3369 k Kč / 132904 €
EC	Horizon Europe	Tensor modElinG, geOMetRy and optimiSation (2023–2025)					1292 k Kč / 50948 €
EC	Horizon Europe	THE EUROPEAN LIVING LAB ON DESIGNING SUSTAINABLE URBAN MOBILITY TOWARDS CLIMATE NEUTRAL CITIES (2023–2026)				861 kK č / 33959 €	1663 k Kč / 65607 €
EC	Horizon Europe	InnovAtive DeMonstrator for hyBrid-Electric Regional Application (2023–2026)				1975 k Kč / 77925 €	2215 k Kč / 87363 €

EC	Horizon Europe	Innovation in Supercritical CO ₂ Power generation systems (2023–2026)				185 kKč / 7292 €	1548 kKč / 61083 €
EC	Horizon Europe	Boosting the uptake of circular integrated solutions in construction value chains (2023–2027)				1070 kKč / 42204 €	1990 kKč / 78516 €
EC	Horizon Europe	COOrdinating and Piloting actions towards ERA-hubs as inTer- and intra-regional Ecosystems for knowledge production (2023–2025)				274 kKč / 10814 €	1711 kKč / 67489 €
EC	Horizon Europe	COMBATting DIET RELATED NON-COMMUNICABLE DISEASE THROUGH ENHANCED SURVEILLANCE (2022–2026)			3 kKč / 133 €	3469 kKč / 136858 €	4515 kKč / 178097 €
EC	Horizon Europe	Accelerate poSitive Clean ENergy Districts (2023–2027)				1236 kKč / 48738 €	1798 kKč / 70935 €
EC	Horizon Europe	A Global as well as Local Flexibility Marketplace to Demonstrate Grid Balancing Mechanisms through Crosssectoral Interconnected and Integrated Energy Ecosystems enabling Automatic Flexibility Trading (2023–2026)				2275 kKč / 89748 €	3047 kKč / 120199 €
EC	Horizon Europe	Acoustic and Thermal Retrofit of Office Building Stock in EU (2022–2026)			25 kKč / 976 €	205 kKč / 8074 €	1014 kKč / 39983 €
EC	Horizon Europe	Innovative Photodetector Module for advanced Hybrid “Magnetic Resonance Imaging/Positron Emission Tomography” Scanners for Nuclear Medicine (2023–2027)				227 kKč / 8966 €	575 kKč / 22672 €
EC	Horizon Europe	Building European Nuclear Competence through continuous Advanced and Structured Education and Training Actions (2022–2026)			55 kKč / 2157 €	432 kKč / 17027 €	500 kKč / 19739 €
EC	Horizon Europe	FUEL RECYCLE AND EXPERIMENTALLY DEMONSTRATED MANUFACTURING OF ADVANCED NUCLEAR SOLUTIONS FOR SAFETY (2022–2026)			99 kKč / 3891 €	342 kKč / 13489 €	709 kKč / 27952 €
EC	Horizon Europe	New European Bauhaus STAvangeR (2022–2025)			104 kKč / 4102 €	442 kKč / 17446 €	531 kKč / 20959 €
EC	Horizon Europe	The Central Bohemia Mobility Programme for Excellence in Research, Innovation and Technology (2022–2027)					719 kKč / 28343 €
EC	Horizon Europe	European Robotics and AI Network (2022–2026)			114 kKč / 4494 €	854 kKč / 33705 €	559 kKč / 22056 €
EC	Horizon Europe	Creating Actionable Futures (2022–2025)			477 kKč /	922 kKč /	2129 kKč /

					18802 €	36362 €	83977 €
EC	Horizon 2020	The Integrator-centric approach for realising innovative energy efficient buildings in (2021–2026)			1435 k Kč / 56620 €	4252 k Kč / 167744 €	3180 k Kč / 125459 €
EC	Horizon 2020	Connect and align ELIXIR Nodes to deliver sustainable FAIR life-science data management services' (2021–2024)		708 kK č / 27910 €	530 kK č / 20919 €	- 292 kK č / - 11533 €	177 kK č / 6995 €
EC	Horizon 2020	BoostEuroTeQ: strengthening institutional transformations for responsible engineering education in Europe (2021–2024)		302 kK č / 11894 €	1460 k Kč / 57591 €	1857 k Kč / 73263 €	1169 k Kč / 46098 €
EC	Horizon 2020	Climate Positive Circular Communities (2022–2026)			2399 k Kč / 94620 €	12896 kKč / 508703 €	8064 k Kč / 318090 €
EC	Horizon 2020	Development of an efficient steganalysis framework for uncovering hidden data in digital media (2021–2024)		600 kK č / 23653 €	1433 k Kč / 56537 €	885 kK č / 34929 €	601 kK č / 23705 €
EC	Horizon 2020	Transforming Unsustainable management of soils in key agricultural systems in EU and China. Developing an integrated platform of alternatives to reverse soil degradation (2021–2026)		631 kK č / 24910 €	3543 k Kč / 139761 €	4072 k Kč / 160627 €	4397 k Kč / 173446 €
EC	Horizon 2020	RoboRoyale: ROBOTic Replicants for Optimizing the Yield by Augmenting Living Ecosystems (2021–2026)		17 kKč / 665 €	1123 k Kč / 44304 €	3300 k Kč / 130160 €	3389 k Kč / 133679 €
EC	Horizon 2020	MSCA-RISE-2020 - Research and Innovation Staff Exchange (2021–2025)			464 kK č / 18317 €	19 kKč / 768 €	
EC	Horizon 2020	An experimentally-validated multi-scale materials, process and device modeling & design platform enabling non-expert access to open innovation in the organic and large area electronics industry (2021–2024)		1318 k Kč / 51991 €	1449 k Kč / 57145 €	2625 k Kč / 103538 €	2387 k Kč / 94166 €
EC	Horizon 2020	Smart freight TranspOrt and logistics Research Methodologies (2021–2023)		1486 k Kč / 58611 €	1993 k Kč / 78610 €	1257 k Kč / 49568 €	678 kK č / 26735 €
EC	Horizon 2020	Constructionskills project on EE with Circular Construction Skills as a Driver (2021–2024)		124 kK č / 4892 €	642 kK č / 25336 €	400 kK č / 15790 €	19 kKč / 737 €
EC	Horizon 2020	AI on-demand platform for regional interoperable Digital Innovation Hubs Network (2021–2023)		555 kK č / 21909 €	1573 k Kč / 62050 €	1426 k Kč / 56246 €	79 kKč / 3112 €
Total							

Note: For co-sponsorship projects, please only indicate the amount of funding for the evaluated HEI.

4.10.4 Projects supported by the Czech provider

In the role of beneficiary

Provider / Investor	Programme/Grant Scheme	Project name	Support (in thousands CZK/EUR)				
			Year 1	Year 2	Year 3	Year 4	Year 5
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Development of tools for increasing the visual quality of the virtual environment for interactive simulations by scanning the real environment (2021–2022)	14652 kKč / 577988 €	227 kKč / 8955 €	13539 kKč / 534083 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Assessment of the implementation of eyetracking technology for an interactive vehicle simulator at the FTS CTU Děčín (2021–2022)	14652 kKč / 577988 €	227 kKč / 8955 €	13539 kKč / 534083 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Strengthening and development of research at Czech Technical University in Prague with the use of research infrastructure VR?1 Training Reactor for research activities (2020–2022)	3900 kKč / 153846 €	1996 kKč / 78738 €	704 kKč / 27771 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Risk management and safety of complex technological facilities (2017–2022)	276 kKč / 10888 €	60 kKč / 2367 €	1 kKč / 39 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Research and Innovation Centre on Advanced Industrial Production (2019–2023)	622196 kKč / 24544221 €	223087 kKč / 8800276 €	8498 kKč / 335227 €	0 kKč / 0 €	
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Engineering applications of microworld physics (2017–2022)	31032 kKč / 1224142 €	32032 kKč / 1263590 €	34033 kKč / 134252 5 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Machine Tools and Precision Engineering (2019–2022)	18000 kKč / 710059 €	18000 kKč / 710059 €	3852 kKč / 151953 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Novel nanostructures for engineering applications enabled by emerging techniques supported by advanced simulations (2018–2022)	16427 kKč / 648008 €	17320 kKč / 683235 €	5094 kKč / 200947 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Cluster 4.0 - Methodology of System Integration (2018–2023)	20687 kKč / 816055 €	23291 kKč / 918777 €	7675 kKč / 302761 €		

ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Advanced Testing of Automotive Radars (2018–2020)	3925 kKč / 154832 €				
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Research Center for Informatics (2017–2023)	120282 kKč / 4744852 €	172805 kKč / 6816765 €	85140 kKč / 335858 0 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Brookhaven National Laboratory - participation of the Czech Republic (2017–2020)	1688 kKč / 66588 €				
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	High Temperature Plasma and Fusion Technology Laboratory PlasmaLab@CTU (2017–2022)	3908 kKč / 154162 €	3908 kKč / 154162 €	3903 kKč / 153964 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Strengthening and development of research at Czech Technical University in Prague with the use of research infrastructure VR?1 Training Reactor for research activities (2017–2020)	3668 kKč / 144694 €	2659 kKč / 104892 €			
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Research centre for low-carbon energy technologies (2018–2022)	50000 kKč / 1972387 €	57198 kKč / 2256331 €	39952 kKč / 157601 6 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Center of Advanced Aerospace Technology (2016–2022)	97385 kKč / 3841617 €	153726 kKč / 6064142 €	0 kKč / 0 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Center for advanced applied science (2018–2023)	107645 kKč / 4246351 €	140484 kKč / 5541775 €	90390 kKč / 356568 0 €	23766 kKč / 937515 €	
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Intelligent Machine Perception (2016–2023)	23000 kKč / 907298 €	25458 kKč / 1004260 €	10071 kKč / 397278 €		

ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Robotics 4 Industry 4.0 (2016–2023)	21592 kKč / 851755 €	27857 kKč / 1098895 €	16946 kKč / 668481 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Centre of Advanced Photovoltaics (2017–2023)	34278 kKč / 1352189 €	10211 kKč / 402801 €	20905 kKč / 824655 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Big Code: Scalable Analysis of Massive Code Bases (2019–2022)	12000 kKč / 473373 €	11693 kKč / 461262 €			
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Artificial Intelligence and Reasoning (2017–2023)	21088 kKč / 831874 €	36590 kKč / 1443393 €	8502 kKč / 335385 €		
ESF through Min Edu Youth Sports CR	Programme Johannes Amos Comenius	Modernisation of the WCZV large research infrastructure - The VR-1 Nuclear Experimental Hub (2024–2026)					4230 kKč / 166864 €
ESF through Min Edu Youth Sports CR	Programme Johannes Amos Comenius	Luminosity detector for large research infrastructure BNL-CZ (2024–2026)					2365 kKč / 93294 €
ESF through Min Edu Youth Sports CR	Programme Johannes Amos Comenius	Robotics and advanced industrial production (2024–2028)					139591 kKč / 5506548 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Air handling unit with thermoelectric heating and cooling (2018–2020)	6197 kKč / 244458 €	9460 kKč / 373176 €			
ESF through Prague Municipality	Operational Program Prague - Pole of Growth Czech Republic	Concept Prague - Personal health systems (2018–2020)	906 kKč / 35740 €				
ESF through Prague Municipality	Operational Program Prague - Pole of Growth Czech Republic	Universal driving simulator for public transit drivers (2019–2022)	15073 kKč / 594596 €	4197 kKč / 165562 €			
ESF through Prague Municipality	Operational Program Prague - Pole of Growth Czech Republic	Technology for eHealth on CTU (2019–2021)	8179 kKč / 322643 €	2532 kKč / 99882 €			
ESF through Prague Municipality	Operational Program Prague - Pole of Growth Czech Republic	NeuroTechnology to Improve Quality of Life and Prevention of Cyberbullying in the Society 4.0 (2019–2021)	11240 kKč / 443393 €	6557 kKč / 258659 €			

ESF through Prague Municipality	Operational Program Prague - Pole of Growth Czech Republic	CTU FEE - Smart solutions for Prague (2019–2021)	9929 kKč / 391677 €	5027 kKč / 198304 €			
ESF through Prague Municipality	Operational Program Prague - Pole of Growth Czech Republic	CTU - Information for Prague (2019–2021)	5581 kKč / 220158 €	2892 kKč / 114083 €			
ESF through Prague Municipality	Operational Program Prague - Pole of Growth Czech Republic	Concepts of the Building faculty of CTU for Prague 2017 (2018–2020)	6291 kKč / 248166 €				
ESF through Prague Municipality	Operational Program Prague - Pole of Growth Czech Republic	ČVUT FEL - ICT for Prague (2018–2020)	6041 kKč / 238304 €				
ESF through Prague Municipality	Operational Program Prague - Pole of Growth Czech Republic	CTU FEL - Knowledge for Prague (2017–2020)	619 kKč / 24418 €				
ESF through Prague Municipality	Operational Program Prague - Pole of Growth Czech Republic	GLOMODO - Global traffic model of the City of Prague (2018–2020)	752 kKč / 29665 €				
GA CR	Grantové projekty excelence v základním výzkumu EXPRO	(summary)	16750 kKč / 660750 €	22530 kKč / 888757 €	21887 kKč / 863393 €	34376 kKč / 135605 €	27886 kKč / 110003 €
GA CR	International projects	(summary)	3123 kKč / 123195 €	4496 kKč / 177357 €	4902 kKč / 193373 €	4818 kKč / 190059 €	2170 kKč / 85602 €
GA CR	Junior Grants	(summary)	22810 kKč / 899803 €	13584 kKč / 535858 €	10510 kKč / 414596 €	0 kKč / 0 €	
GA CR	JUNIOR STAR	(summary)		4646 kKč / 183274 €	13222 kKč / 521578 €	28346 kKč / 111818 €	34864 kKč / 137530 €
GA CR	"LA granty"	(summary)	668 kKč / 26351 €	4582 kKč / 180750 €	10992 kKč / 433609 €	14095 kKč / 556016 €	15214 kKč / 600158 €
GA CR	POSTDOC INDIVIDUAL FELLOWSHIP	(summary)		0 kKč / 0 €	446 kKč / 17594 €	1338 kKč / 52781 €	1259 kKč / 49665 €
GA CR	Standard projects	(summary)	127503 kKč / 5029704 €	129532 kKč / 5109744 €	140264 kKč / 553309 €	142254 kKč / 561159 €	164126 kKč / 647439 €
Min Agr CR	Program aplikovaného výzkumu ZEMĚ	(summary)	3353 kKč / 132268 €	3358 kKč / 132465 €	3266 kKč / 128836 €		

Min Cult CR	Programme for the Support of Applied Research and Exp. Development of National and Cultural Identity for the Years 2016-2022 (in short, "NAKI II")	(summary)	63631 kKč / 2510099 €	42558 kKč / 1678817 €	40435 kKč / 159506 9 €		
Min Cult CR	Projects of the Ministry of Culture not included in the CEP	(summary)				455 kKč / 17939 €	660 kKč / 26036 €
Min Cult CR	The NAKI III program - program to support applied research in the field of national and cultural identity for the years 2023 to 2030	(summary)				24498 kKč / 966391 €	27409 kKč / 108122 3 €
Min Def CR	Ambitions - support for the development of areas where armed forces are achieving significant results within NATO and the EU	(summary)				3314 kKč / 130730 €	3314 kKč / 130730 €
Min Def CR	Development of Armed Forces of Czech republic	(summary)	412 kKč / 16252 €				
Min Edu Youth Sports CR	Czech-Bavarian cooperation in R and D	(summary)	325 kKč / 12821 €				
Min Edu Youth Sports CR	ERC CZ	(summary)	11819 kKč / 466233 €	14810 kKč / 584221 €	9791 kKč / 386233 €	7959 kKč / 313964 €	14528 kKč / 573097 €
Min Edu Youth Sports CR	INTER-EXCELLENCE	(summary)	32086 kKč / 1265720 €	31084 kKč / 1226193 €	19312 kKč / 761815 €	7386 kKč / 291361 €	3766 kKč / 148560 €
Min Edu Youth Sports CR	INTER-EXCELLENCE II	(summary)			1398 kKč / 55148 €	5756 kKč / 227061 €	18955 kKč / 747732 €
Min Edu Youth Sports CR	Large RDI infrastructures projects	(summary)	26196 kKč / 1033373 €	25937 kKč / 1023156 €	28256 kKč / 111463 5 €	32492 kKč / 128173 6 €	27635 kKč / 109013 8 €
Min Edu Youth Sports CR	National Programme for Sustainability I	(summary)	17321 kKč / 683274 €				
Min Edu Youth Sports CR	Program pro financování projektů mnohostranné vědeckotechnické spolupráce v Podunajském regionu	(summary)	40 kKč / 1578 €	104 kKč / 4103 €	104 kKč / 4103 €	123 kKč / 4852 €	250 kKč / 9862 €

Min Fin CR	Norské fondy	(summary)			146 kK č / 5744 €	110 kK č / 4349 €	
Min Health CR	Applied Health Research Support Program for 2024-2030	(summary)					6657 k Kč / 262604 €
Min Health CR	Program na podporu zdravotnického aplikovaného výzkumu na léta 2020 - 2026	(summary)	2967 kKč / 117041 €	5274 kKč / 208047 €	8773 k Kč / 346075 €	15924 kKč / 628166 €	16818 kKč / 663432 €
Min Health CR	Programme to support medical applied research and development in 2015 to 2022	(summary)	5723 kKč / 225759 €	3027 kKč / 119408 €	2300 k Kč / 90730 €	0 kKč / 0 €	
Min Ind Trade CR	Projects of the Ministry of Industry and Trade not included in the CEP	(summary)			2217 k Kč / 87448 €		
Min Int CR	Open Calls for Security Research 2023-2029 (OPSEC)	(summary)				20811 kKč / 820947 €	22702 kKč / 895542 €
Min Int CR	Program bezpečnostního výzkumu ČR 2021-2026: vývoj, testování a evaluace nových bezpečnostních technologií (SECTECH)	(summary)			2785 k Kč / 109862 €	2532 k Kč / 99882 €	12363 kKč / 487692 €
Min Int CR	Program bezpečnostního výzkumu pro potřeby státu 2016 - 2021 (BV III/2 ? VZ)	(summary)	2656 kKč / 104773 €	1756 kKč / 69270 €			
Min Int CR	Security Research Programme of the Czech Republic in the years 2015-2022	(summary)	19588 kKč / 772702 €	14426 kKč / 569073 €	8995 k Kč / 354832 €		
Min Int CR	Strategická podpora rozvoje bezpečnostního výzkumu ČR 2019 - 2025 (IMPAKT 1)	(summary)		13843 kKč / 546075 €	25541 kKč / 100753 5 €	20648 kKč / 814517 €	20429 kKč / 805878 €
TA CR	KAPPA funding programme for applied research, experimental development and innovation	(summary)		5396 kKč / 212860 €	26926 kKč / 106217 0 €	25257 kKč / 996331 €	9339 k Kč / 368402 €
TA CR	National Centres of Competence: Support programme for applied research, experimental	(summary)	229591 kKč / 9056844 €	130390 k Kč / 5143590 €	72227 kKč / 284919 1 €	336002 kKč / 132545 17 €	396609 kKč / 156453 25 €

	development and innovation						
TA CR	Program aplikovaného výzkumu, experimentálního vývoje a inovací GAMA 2	(summary)	3524 kKč / 139014 €	16704 kKč / 658935 €	8292 kKč / 327101 €		
TA CR	Program aplikovaného výzkumu, experimentálního vývoje a inovací v oblasti životního prostředí - Prostředí pro život	(summary)	5076 kKč / 200237 €	11168 kKč / 440552 €	12365 kKč / 487771 €	13705 kKč / 540631 €	10527 kKč / 415266 €
TA CR	Program na podporu aplikovaného výzkumu a inovací SIGMA	(summary)				752 kKč / 29665 €	9535 kKč / 376134 €
TA CR	Program na podporu aplikovaného výzkumu a inovací v oblasti dopravy – DOPRAVA 2030	(summary)					11158 kKč / 440158 €
TA CR	Program na podporu aplikovaného výzkumu, experimentálního vývoje a inovací v oblasti dopravy - DOPRAVA 2020+	(summary)	17864 kKč / 704694 €	50604 kKč / 1996213 €	83045 kKč / 327593 €	101955 kKč / 402189 €	75567 kKč / 298094 €
TA CR	Program na podporu aplikovaného výzkumu ZÉTA	(summary)	45305 kKč / 1787179 €	45755 kKč / 1804931 €	14708 kKč / 580197 €		
TA CR	Program veřejných zakázek v aplikovaném výzkumu a inovacích pro potřeby státní správy BETA2	(summary)	7252 kKč / 286075 €	6965 kKč / 274753 €	9969 kKč / 393254 €	20801 kKč / 820552 €	16107 kKč / 635385 €
TA CR	Programme for funding of applied research, experimental development, and innovation THETA 2	(summary)					21481 kKč / 847377 €
TA CR	Programme of applied research and experimental development EPSILON	(summary)	21484 kKč / 847495 €	11580 kKč / 456805 €	5166 kKč / 203787 €	6714 kKč / 264852 €	6931 kKč / 273412 €
TA CR	Programme of applied research and experimental development in social sciences and humanities ETA	(summary)	18281 kKč / 721144 €	16173 kKč / 637988 €	15898 kKč / 627140 €	7819 kKč / 308442 €	

TA CR	Programme of applied research and experimental development THETA	(summary)	44296 kKč / 1747377 €	47861 kKč / 1888008 €	56575 kKč / 223175 €	62201 kKč / 245368 €	60310 kKč / 237909 €
TA CR	TREND	(summary)	4496 kKč / 177357 €	8557 kKč / 337554 €	8715 kKč / 343787 €	8534 kKč / 336647 €	
(a CR region)	Inovační vouchery	Centrum lázeňského výzkumu (2024–2027)					390 kKč / 15390 €
Total							
In the role of another participant							
Provider / Investor	Programme/Grant Scheme	Project name	Support (in thousands CZK/EUR)				
			Year 1	Year 2	Year 3	Year 4	Year 5
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	IKAP 2 - Innovation in education (2021–2023)		365 kKč / 14403 €	3720 kKč / 146765 €	9814 kKč / 387141 €	-8 kKč / -306 €
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Facility for Antiproton and Ion Research - participation of the Czech Republic - OP II. (2020–2022)	0 kKč / 0 €	0 kKč / 0 €	1914 kKč / 75503 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Smart City - Smart Region - Smart Community (2018–2022)	4956 kKč / 195503 €	4956 kKč / 195503 €	4956 kKč / 195503 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	3D Print in civil engineering and architecture (2018–2022)	4420 kKč / 174359 €	4318 kKč / 170335 €	648 kKč / 25562 €		
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Facility for Antiproton and Ion Research - participation of the Czech Republic - OP (2017–2021)	38 kKč / 1509 €	351 kKč / 13866 €			
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	Ultra-trace isotope research in social and environmental studies using accelerator mass spectrometry (2017–2022)	5454 kKč / 215148 €	5511 kKč / 217396 €	4837 kKč / 190809 €	0 kKč / 0 €	
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and	Research Center of Cosmic Rays and Radiation Events in the Atmosphere (2016–2023)	0 kKč / 0 €	25087 kKč / 989625 €	0 kKč / 0 €		

	Education – Structural Funds EU						
ESF through Min Edu Youth Sports CR	Programme Johannes Amos Comenius	Innovative laser and scintillation materials for modern applications (2024–2028)					6000 k Kč / 236686 €
ESF through Min Edu Youth Sports CR	Programme Johannes Amos Comenius	Investice pro VI CERN-CZ (2024–2026)					1400 k Kč / 55227 €
ESF through Min Edu Youth Sports CR	Programme Johannes Amos Comenius	Facility for Antiproton and Ion Research - participation of the Czech Republic - OP III. (2024–2026)					3700 k Kč / 145957 €
ESF through Min Edu Youth Sports CR	Programme Johannes Amos Comenius	Ferroic Multifunctionalities (2024–2028)					20000 kKč / 788955 €
ESF through Min Edu Youth Sports CR	Programme Johannes Amos Comenius	Sensors and Detectors for Future Information Society (2024–2028)					6000 k Kč / 236686 €
ESF through Min Edu Youth Sports CR	Programme Johannes Amos Comenius	Brain Dynamics (2024–2028)					10000 kKč / 394477 €
ESF through Min Edu Youth Sports CR	Programme Johannes Amos Comenius	Fundamental constituents of matter through frontier technologies (2024–2028)					12000 kKč / 473373 €
ESF through Min Edu Youth Sports CR	Programme Johannes Amos Comenius	Energy conversion and storage (2024–2027)					12998 kKč / 512736 €
ESF through Min Edu Youth Sports CR	Programme Johannes Amos Comenius	Mechanical engineering of biological and bio-inspired systems (2023–2028)				0 kKč / 0 €	3000 k Kč / 118343 €
ESF through Min Edu Youth Sports CR	Research Programme of the Research Fund for Coal and Steel (RFCS)	Mitigation of the risk of progressive collapse in steel and composite building frames under exceptional events (2020–2021)	13 kKč / 526 €	299 kKč / 11798 €	464 kKč / 18295 €		
ESF through Min Edu Youth Sports CR	Research Programme of the Research Fund for Coal and Steel (RFCS)	Valorisation of knowledge for FREE from DAMage steel connections (2020–2021)	72 kKč / 2822 €	577 kKč / 22781 €	143 kKč / 5654 €	222 kKč / 8769 €	
ESF through Min Edu Youth Sports CR	Research Programme of the Research Fund for Coal and Steel (RFCS)	Steel cladding systems for stabilization of steel buildings in fire (2017–2020)	354 kKč / 13950 €	-442 kKč / 17440 €			
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Mobile protective barriers suitable for urban areas for protection enhancement of soft targets against vehicle ramming attack (2021–2023)		510 kKč / 20118 €	987 kKč / 38935 €	1014 k Kč / 40000 €	

ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Research and development of methods for control and monitoring of stress of prestressed structures (2021–2024)		0 kKč / 0 €	0 kKč / 0 €	0 kKč / 0 €	2361 k Kč / 93136 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Diagnostics and automatic tuning of controller parameters for industrial use in buildings (2021–2023)		0 kKč / 0 €	0 kKč / 0 €	5891 k Kč / 232387 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Microcogeneration from non-standard solid biofuels (2021–2023)		0 kKč / 0 €	0 kKč / 0 €	3821 k Kč / 150730 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Research and development of UHPC application for main structural elements of civil engineering structures in traffic (2021–2023)		0 kKč / 0 €	1276 k Kč / 50335 €	5212 k Kč / 205602 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Variable Valve Actuation for Heavy Duty Diesel Engines (2021–2024)		0 kKč / 0 €	1324 k Kč / 52229 €	4927 k Kč / 194359 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Milling center prototype with an inprocess monitoring and tool lifetime prediction (2021–2023)		0 kKč / 0 €	0 kKč / 0 €	314 kKč č / 12387 €	3914 k Kč / 154398 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Development of a robotic workplace for packaging goods (2020–2023)		0 kKč / 0 €	0 kKč / 0 €	1265 k Kč / 49901 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Development of complete software for design optimization and assessment of roof and ceiling structures. (2022–2023)			0 kKč / 0 €	1455 k Kč / 57396 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Energetically effective covering 2: Lamination cover with flexibly bound motion and telescopic covering with fluid support (2021–2023)		0 kKč / 0 €	1368 k Kč / 53964 €	2759 k Kč / 108836 €	0 kKč / 0 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Research and development of radio communication in IoT for industrial automation and smart metering (2021–2023)		0 kKč / 0 €	1405 k Kč / 55424 €	2230 k Kč / 87968 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Equipment for obtaining water from the environment of desert air (2021–2023)		0 kKč / 0 €	0 kKč / 0 €	3410 k Kč / 134517 €	7416 k Kč / 292544 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Verification of the prototype production of the protective deformation block (2021–2023)		0 kKč / 0 €	0 kKč / 0 €	5624 k Kč / 221854 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	New generation of universal cylindrical grinders of BUB series (2021–2023)		0 kKč / 0 €	456 kKč č / 17988 €	6056 k Kč / 238895 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Automated wear determination of machine tool during variable process conditions (2021–2023)		0 kKč / 0 €	0 kKč / 0 €	4471 k Kč / 176371 €	

ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Integrated spa information system with support for eHealth and telemedicine processes (2021–2023)		0 kKč / 0 €	6695 k Kč / 264103 €	0 kKč / 0 €	11380 kKč / 448915 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Healthy diet - Healthy pregnancy (2021–2023)			0 kKč / 0 €	1268 k Kč / 50020 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Linear hydraulic actuators for demanding applications (2021–2023)		0 kKč / 0 €	1510 k Kč / 59566 €	4521 k Kč / 178343 €	298 kKč / 11755 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Ground Radar Interferometry for ensuring the critical energy infrastructure of the Czech Republic (2020–2022)	0 kKč / 0 €	1056 kKč / 41657 €	0 kKč / 0 €	2944 k Kč / 116134 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	New generation of lighting with safety features (2021–2023)		0 kKč / 0 €	1951 k Kč / 76963 €	0 kKč / 0 €	2374 k Kč / 93649 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	RESEARCH OF THE INFLUENCE OF USED COMPONENTS ON THE LED CHIP IN THE FRAMEWORK OF THE DEVELOPMENT OF A NEW LED MODULE, INTENDED FOR DEMANDING APPLICATIONS IN THE CHEMICAL INDUSTRY (–)	0 kKč / 0 €	0 kKč / 0 €	3558 k Kč / 140355 €		
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Wireless sensors for diagnostics of inaccessible parts of building structures (2021–2023)		0 kKč / 0 €	5284 k Kč / 208442 €	6607 k Kč / 260631 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	TEPLATOR (2021–2023)		0 kKč / 0 €	1608 k Kč / 63432 €	0 kKč / 0 €	4306 k Kč / 169862 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	interGraces - Platform for integration of IoT components into SOA systems (2021–2023)		0 kKč / 0 €	2317 k Kč / 91400 €	3053 k Kč / 120434 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Modular heating and hot water preparation system (2021–2023)		0 kKč / 0 €	750 kKč / 29586 €	799 kKč / 31519 €	1216 k Kč / 47968 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	R&D of II. generation of intelligent roof "EMETEC" (2020–2023)		0 kKč / 0 €	5581 k Kč / 220158 €	2273 k Kč / 89665 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Wall-building ventilation system (2021–2023)		0 kKč / 0 €	1321 k Kč / 52110 €	2542 k Kč / 100276 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Advanced sensor for monitoring steel structures (2021–2023)		0 kKč / 0 €	239 kKč / 9428 €	4871 k Kč / 192150 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise	Recycling technology of construction and demolition waste for zero-waste system (2021–2023)		0 kKč / 0 €	2370 k Kč /	3002 k Kč /	

	and Innovation for Competitiveness				93491 €	118422 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Multifunctional compact source of heat and cold (2021–2023)		0 kKč / 0 €	1960 k Kč / 77318 €	0 kKč / 0 €	1017 k Kč / 40118 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Facade system with integrated heat exchanger (2021–2023)		0 kKč / 0 €	2571 k Kč / 101420 €	1618 k Kč / 63826 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Healthy window (2021–2023)		0 kKč / 0 €	3662 k Kč / 144458 €	0 kKč / 0 €	7716 k Kč / 304379 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Inferential sensing of concentration/viscosity of abrasive slurries (2021–2023)		0 kKč / 0 €	1663 k Kč / 65602 €	719 kKč / 28363 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Pressure monitoring of wheelchair seating system (2021–2023)		0 kKč / 0 €	1659 k Kč / 65444 €	1511 k Kč / 59606 €	2933 k Kč / 115700 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Production management software in the context of Industry 4.0 (2021–2023)		301 kKč / 11885 €	2350 k Kč / 92684 €	4575 k Kč / 180459 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Open dispatching system with principles of business intelligence and semantic data description (2021–2023)		0 kKč / 0 €	4401 k Kč / 173609 €	1522 k Kč / 60039 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Predictive control and diagnostics of district heating systems (2021–2023)		0 kKč / 0 €	2223 k Kč / 87692 €	1432 k Kč / 56489 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	The new generation of universal center lathes of the FLEXI series (2021–2023)		0 kKč / 0 €	3191 k Kč / 125878 €	0 kKč / 0 €	4742 k Kč / 187061 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	SMART Hestego - Parameterization of new products and automation of the process of development, design and introduction into production (2021–2023)		0 kKč / 0 €	2678 k Kč / 105641 €	2313 k Kč / 91243 €	2794 k Kč / 110217 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Development of an automatic device for high-capacity scanning of surfaces by digital radiography (2021–2023)		325 kKč / 12821 €	518 kKč / 20434 €	599 kKč / 23629 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Telerehabilitation system for the support of patients in distance care (2021–2023)		0 kKč / 0 €	584 kKč / 23037 €	2628 k Kč / 103669 €	961 kKč / 37909 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Advanced shading systems for buildings (2021–2023)		0 kKč / 0 €	3422 k Kč / 134990 €	3628 k Kč / 143116 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise	Vývoj prototypu transpondéru pro bezpilotní letadla a SW USSP (2022–2023)			651 kKč / č /		

	and Innovation for Competitiveness				25679 €		
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Development of high performance electric propulsion unit for CS-23 class aircraft (2021–2023)		0 kKč / 0 €	1340 k Kč / 52860 €	7921 k Kč / 312465 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Composite materials for the production of tempered paving elements with the ability to degrade NOx (2020–2023)		0 kKč / 0 €	1117 k Kč / 44063 €	506 kKč / 19961 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Connected Motor Starter (2021–2023)		0 kKč / 0 €	377 kKč / 14872 €	5621 k Kč / 221736 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Extension of telemedicine technology for care of patients with diabetes mellitus (2020–2022)	285 kKč / 11236 €	1060 kKč / 41832 €	574 kKč / 22642 €		- 603 kKč / - 23770 €
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Fully automatic hot water boiler for biomass (2020–2022)	0 kKč / 0 €	1455 kKč / 57396 €	1684 k Kč / 66430 €	3675 k Kč / 144970 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Univerzální bezpečnostní platforma pro budovy, infrastrukturu a průmysl (2020–2022)	595 kKč / 23461 €	1572 kKč / 62009 €	1487 k Kč / 58673 €	-44 kKč / - 1745 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Safety analysis of collaborative robots applications (2020–2022)	20 kKč / 786 €	781 kKč / 30824 €	960 kKč / 37857 €	-9 kKč / -338 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Fascia lubrication and regeneration by hyaluronan (2020–2022)	0 kKč / 0 €	667 kKč / 26312 €	796 kKč / 31400 €	1422 k Kč / 56095 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Development of Hybrid Drive System for the Aerospace Industry (2020–2022)	0 kKč / 0 €	1162 kKč / 45838 €	1191 k Kč / 46982 €	2733 k Kč / 107811 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Innovative charging station with GaN transistors (2019–2022)	0 kKč / 0 €	1326 kKč / 52308 €	1435 k Kč / 56607 €	2292 k Kč / 90414 €	
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Systems of database (2018–2021)	0 kKč / 0 €	2302 kKč / 90809 €	1053 k Kč / 41538 €		
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Development of the energy-efficient heat recovery (2018–2020)	472 kKč / 18619 €	1080 kKč / 42604 €			
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Development optalmo endoscope (2017–2020)	4387 kKč / 173057 €	0 kKč / 0 €	581 kKč / 22919 €		

ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Research and development of a mobile condensing mini-power plant based on CHP and RES sources with built-in heat and electricity accumulation supplemented by intelligent control system (2017–2020)	6864 kKč / 270769 €				
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	DEVELOPMENT OF CONTINUAL BRAZING FURNACE WITH COMBINED DISPLACEMENTS OF PRODUCTS AND INTEGRATED ENERGY CENTER (2018–2020)	14072 kKč / 555108 €	3496 kKč / 137909 €			
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Development of new technologies firing lightweight ceramic aggregate (2017–2020)	1404 kKč / 55385 €				
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Protection against electric arc and prevention of fire ignition (2015–2020)	3126 kKč / 123314 €				
ESF through Min Ind Trade CR	Operational Programme Enterprise and Innovation for Competitiveness	Autonomous power stations (2015–2020)	648 kKč / 25562 €				
ESF through Min Ind Trade CR	Programme Technologies and Application for Competitiveness	Informační systém pro pokročilou analýzu dat o léčbě pacientů s vzácnými onemocněními (2024–2026)					354 kKč / 13969 €
ESF through Min Ind Trade CR	Programme Technologies and Application for Competitiveness	AID: Výzkum a vývoj řešení pro optimální stanovování kódů a indikací zdravotní péče (2023–2026)					117 kKč / 4626 €
ESF through Prague Municipality	Operational Program Prague - Pole of Growth Czech Republic	Enjoyable Neuro Inspect (2021–2023)		335 kKč / 13199 €	1382 kKč / 54514 €	- 1344 kKč / - 53014 €	
GA CR	Grantové projekty excelence v základním výzkumu EXPRO	(summary)				578 kKč / 22801 €	1080 kKč / 42604 €
GA CR	International projects	(summary)	1042 kKč / 41105 €	1078 kKč / 42525 €			1391 kKč / 54872 €
GA CR	"LA granty"	(summary)	3270 kKč / 128994 €	3457 kKč / 136371 €	1355 kKč / 53452 €	4850 kKč / 191321 €	8693 kKč / 342919 €
GA CR	Standard projects	(summary)	23191 kKč / 914832 €	20790 kKč / 820118 €	21060 kKč / 830769 €	26179 kKč / 103270 €	30486 kKč / 120260 €
Min Agr CR	Applied „ZEMĚ II“ research Program of the Ministry of Agriculture for the period of 2024 – 2032	(summary)					1200 kKč / 47337 €
Min Agr CR	Program aplikovaného výzkumu ZEMĚ	(summary)	1928 kKč / 76055 €	2619 kKč / 103314 €	3165 kKč /	3177 kKč /	3111 kKč /

					124852 €	125325 €	122722 €
Min Cult CR	Applied research and development of national and cultural identity Programme (in short, "NAKI")	(summary)	1845 kKč / 72781 €				
Min Cult CR	Programme for the Support of Applied Research and Exp. Development of National and Cultural Identity for the Years 2016-2022 (in short, "NAKI II")	(summary)	9985 kKč / 393886 €	8962 kKč / 353531 €	7222 k Kč / 284892 €		
Min Cult CR	The NAKI III program - program to support applied research in the field of national and cultural identity for the years 2023 to 2030	(summary)				9818 k Kč / 387298 €	11253 kKč / 443905 €
Min Edu Youth Sports CR	EUREKA CZ	(summary)	233 kKč / 9191 €				
Min Edu Youth Sports CR	Eurostars	(summary)	1200 kKč / 47337 €	1192 kKč / 47022 €	200 kKč / 7890 €		
Min Edu Youth Sports CR	INTER-EXCELLENCE	(summary)	8205 kKč / 323669 €	7998 kKč / 315503 €	4684 k Kč / 184773 €		
Min Edu Youth Sports CR	INTER-EXCELLENCE II	(summary)					1350 k Kč / 53254 €
Min Edu Youth Sports CR	Joint Technology Initiative ECSEL	(summary)	2205 kKč / 86982 €	3034 kKč / 119684 €	3170 k Kč / 125049 €	202 kKč / 7968 €	
Min Edu Youth Sports CR	Large RDI infrastructures projects	(summary)	22377 kKč / 882722 €	22500 kKč / 887574 €	21861 kKč / 862367 €	22409 kKč / 883984 €	19272 kKč / 760237 €
Min Edu Youth Sports CR	Macro-regional cooperation in research, development and innovation	(summary)	1888 kKč / 74477 €				
Min Edu Youth Sports CR	Program pro financování projektů mnohostranné vědeckotechnické spolupráce v Podunajském regionu	(summary)	0 kKč / 0 €	20 kKč / 789 €	20 kKč / 789 €		
Min Edu Youth Sports CR	Programme supporting excellent research in priority	(summary)			947 kKč /	3983 k Kč /	5912 k Kč /

	areas of public interest in the health sector - EXCELES				37357 €	157120 €	233215 €
Min Fin CR	Norské fondy	(summary)			758 kKč / 29892 €	1696 kKč / 66916 €	327 kKč / 12890 €
Min Health CR	Applied Health Research Support Program for 2024-2030	(summary)					5530 kKč / 218146 €
Min Health CR	Program na podporu zdravotnického aplikovaného výzkumu na léta 2020 - 2026	(summary)	2243 kKč / 88481 €	4505 kKč / 177712 €	5012 kKč / 197712 €	6334 kKč / 249862 €	3479 kKč / 137239 €
Min Health CR	Programme to support medical applied research and development in 2015 to 2022	(summary)	9380 kKč / 370020 €	6951 kKč / 274201 €	5276 kKč / 208126 €	615 kKč / 24260 €	
Min Ind Trade CR	Projects of the Ministry of Industry and Trade not included in the CEP	(summary)			293 kKč / 11565 €	503 kKč / 19826 €	1147 kKč / 45265 €
Min Ind Trade CR	TRIO	(summary)	96525 kKč / 3807692 €	53000 kKč / 2090730 €	24992 kKč / 985878 €		
Min Int CR	Open Calls for Security Research 2023-2029 (OPSEC)	(summary)				10888 kKč / 429507 €	11123 kKč / 438777 €
Min Int CR	Program bezpečnostního výzkumu ČR 2021-2026: vývoj, testování a evaluace nových bezpečnostních technologií (SECTECH)	(summary)			7583 kKč / 299132 €	7451 kKč / 293925 €	
Min Int CR	Program bezpečnostního výzkumu pro potřeby státu 2016 - 2021 (BV III/2 ? VZ)	(summary)	609 kKč / 24024 €	401 kKč / 15819 €			
Min Int CR	Security Research Programme of the Czech Republic in the years 2015-2022	(summary)	12790 kKč / 504536 €	7772 kKč / 306588 €	7119 kKč / 280828 €		
Min Int CR	Strategická podpora rozvoje bezpečnostního výzkumu ČR 2019 - 2025 (IMPAKT 1)	(summary)		6160 kKč / 242998 €	23027 kKč / 908363 €	23921 kKč / 943629 €	25626 kKč / 101088 €
TA CR	KAPPA funding programme for applied research,	(summary)		0 kKč / 0 €	2452 kKč / 0 €	0 kKč / 0 €	

	experimental development and innovation				96726 €		
TA CR	National Centres of Competence: Support programme for applied research, experimental development and innovation	(summary)	73721 kkč / 2908126 €	39072 kkč / 1541302 €	17245 kkč / 680276 €	77712 kkč / 306555 3 €	84609 kkč / 333764 2 €
TA CR	Program aplikovaného výzkumu, experimentálního vývoje a inovací v oblasti životního prostředí - Prostředí pro život	(summary)	4597 kkč / 181341 €	9251 kkč / 364931 €	11796 kkč / 465325 €	9399 k Kč / 370769 €	14316 kkč / 564734 €
TA CR	Program na podporu aplikovaného výzkumu a inovací SIGMA	(summary)				316 kkč / 12465 €	4355 k Kč / 171795 €
TA CR	Program na podporu aplikovaného výzkumu a inovací v oblasti dopravy – DOPRAVA 2030	(summary)					3937 k Kč / 155306 €
TA CR	Program na podporu aplikovaného výzkumu, experimentálního vývoje a inovací v oblasti dopravy - DOPRAVA 2020+	(summary)	3419 kkč / 134872 €	9952 kkč / 392584 €	30046 kkč / 118524 7 €	39551 kkč / 156019 7 €	29997 kkč / 118331 4 €
TA CR	Program na podporu aplikovaného výzkumu ZÉTA	(summary)	4254 kkč / 167811 €	1096 kkč / 43235 €			
TA CR	Program podpory aplikovaného výzkumu, experimentálního vývoje a inovací DELTA 2	(summary)	3330 kkč / 131361 €	6283 kkč / 247850 €	17924 kkč / 707061 €	21129 kkč / 833491 €	29530 kkč / 116489 2 €
TA CR	Program veřejných zakázek v aplikovaném výzkumu a inovacích pro potřeby státní správy BETA2	(summary)		333 kkč / 13136 €	1680 k Kč / 66272 €	1127 k Kč / 44458 €	1659 k Kč / 65444 €
TA CR	Programme for funding of applied research, experimental development, and innovation THETA 2	(summary)					3472 k Kč / 136963 €
TA CR	Programme for the support of collaboration in	(summary)	334 kkč / 13176 €	237 kkč / 9349 €			

	applied research and experimental development through joint projects and technological innovation agencies DELTA						
TA CR	Programme of applied research and experimental development EPSILON	(summary)	82746 kKč / 3264142 €	46876 kKč / 1849152 €	12518 kKč / 493807 €	3908 kKč / 154162 €	2299 kKč / 90690 €
TA CR	Programme of applied research and experimental development in social sciences and humanities ETA	(summary)	9942 kKč / 392189 €	15531 kKč / 612663 €	15014 kKč / 592268 €	9824 kKč / 387535 €	
TA CR	Programme of applied research and experimental development THETA	(summary)	28128 kKč / 1109586 €	33472 kKč / 1320394 €	37338 kKč / 147289 9 €	53402 kKč / 210658 8 €	43920 kKč / 173254 4 €
TA CR	TREND	(summary)	38077 kKč / 1502051 €	103031 kKč / 4064339 €	114219 kKč / 450568 0 €	140831 kKč / 555546 4 €	146183 kKč / 576658 8 €
ESF through Min Edu Youth Sports CR	Operational Programme – Research, Development and Education – Structural Funds EU	IKAP 2 - Innovation in education (2021–2023)		365 kKč / 14403 €	3720 kKč / 146765 €	9814 kKč / 387141 €	-8 kKč / -306 €
Total							

Note: Please summary list GA CR, TA CR and other departmental projects. For co-sponsor projects, please indicate the financial volumes for the HEI. Projects financed from EU structural funds and focused exclusively on R&D&I (e.g. OP JAK, OP TAK, NPO) and projects financed from regional sources focused exclusively on R&D&I list individually. For co-sponsoring projects, please indicate the financial volumes for the evaluated HEI only.

4.10.5 Projects supported from non-public sources

In the role of beneficiary (the role of “another participant” is undefined for non-public money)					
Provider / Investor	Support (in thousands CZK/EUR)				
	Year 1	Year 2	Year 3	Year 4	Year 5
Škoda Auto a.s.	10943 kKč / 431667 €	17861 kKč / 704585 €	25891 kKč / 1021349 €	31799 kKč / 1254389 €	20495 kKč / 808496 €
TSK Praha a.s.	15404 kKč / 607649 €	28632 kKč / 1129474 €	22365 kKč / 882257 €	17966 kKč / 708733 €	18915 kKč / 746168 €
Valeo	16664 kKč / 657373 €	15793 kKč / 623016 €	13754 kKč / 542565 €	15477 kKč / 610538 €	16418 kKč / 647649 €
DEL a.s.			4825 kKč / 190328 €	30493 kKč / 1202893 €	
Technology Innovation Institute Abu Dhabi	79 kKč / 3124 €	2031 kKč / 80125 €	2125 kKč / 83845 €	30172 kKč / 1190233 €	
Pontex s.r.o.	1973 kKč / 77832 €	15690 kKč / 618941 €	1615 kKč / 63712 €	3972 kKč / 156673 €	5600 kKč / 220903 €
CETIN Praha	3298 kKč / 130099 €	2802 kKč / 110517 €	3862 kKč / 152363 €	3031 kKč / 119565 €	4177 kKč / 164773 €

Czech CRRC Science and Technology Development s.r.o.	3135 kKč / 123681 €	2582 kKč / 101838 €	2667 kKč / 105211 €	3828 kKč / 151006 €	1572 kKč / 62003 €
Metrostav a.s.	3661 kKč / 144414 €	3217 kKč / 126891 €	1568 kKč / 61840 €	385 kKč / 15181 €	4786 kKč / 188806 €
GEOSAN GROUP a.s.	3279 kKč / 129349 €	1581 kKč / 62363 €	680 kKč / 26817 €	6055 kKč / 238848 €	375 kKč / 14793 €
ČEZ	1215 kKč / 47933 €	2647 kKč / 104414 €	3633 kKč / 143327 €	1749 kKč / 69010 €	2582 kKč / 101835 €
EB Services s.r.o.	1123 kKč / 44300 €	3003 kKč / 118462 €	4095 kKč / 161538 €	2354 kKč / 92860 €	
EATON	2040 kKč / 80473 €	2050 kKč / 80868 €	2107 kKč / 83126 €	2060 kKč / 81262 €	2000 kKč / 78895 €
České radiokomunikace	169 kKč / 6678 €		4766 kKč / 187998 €	5142 kKč / 202850 €	
Inset s.r.o.	8232 kKč / 324733 €	442 kKč / 17434 €	422 kKč / 16661 €	19 kKč / 748 €	139 kKč / 5482 €
Sorbenta NT s.r.o.		2509 kKč / 98970 €	2347 kKč / 92592 €	1834 kKč / 72357 €	
Carl Zeiss	150 kKč / 5917 €	837 kKč / 33028 €	1646 kKč / 64947 €	2538 kKč / 100117 €	1420 kKč / 56032 €
Dopravní podnik hl. m. Prahy	2595 kKč / 102354 €	337 kKč / 13294 €	305 kKč / 12018 €	2676 kKč / 105555 €	269 kKč / 10603 €
Adobe	139 kKč / 5471 €		1807 kKč / 71299 €	2036 kKč / 80311 €	2145 kKč / 84612 €
Rockwell Automation	1200 kKč / 47337 €	1200 kKč / 47337 €	1200 kKč / 47337 €	1200 kKč / 47337 €	1200 kKč / 47337 €
(other customers)	137372 kKč / 5418997 €	156479 kKč / 6172752 €	180887 kKč / 7135563 €	170521 kKč / 6726683 €	154124 kKč / 6079844 €
Total	212671 kKč / 8389381 €	259693 kKč / 10244306 €	282569 kKč / 11146693 €	335308 kKč / 13227149 €	236217 kKč / 9318229 €

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Note: Indicate, for example, sponsorship donations, resources generated from other own economic activities, foreign subsidy programmes of private entities.

4.11 Rules for the use of institutional support for the LCDRO

The HEI will describe the strategy and rules for the use of institutional support for the LCDRO in the management of institutionally supported research activities (e.g., prioritisation of research topics by the HEI according to individual needs, internal grant agencies, incentive tools, support for excellent science) and the method for distribution of institutional support to individual departments/research teams for the period under review. The impact on the management of institutionally supported research activities will be described by the HEI using specific examples (e.g. distribution of institutional support in the evaluation period depending on the evaluation results, examples of supported excellent science projects, etc.).

Maximum 500 words plus 200 words for each example given (max. five examples).

Self-assessment:

CTU is gradually moving from the old approach “allocating money to the Faculties and Institutes as it comes from the government” to a better targeted allocation. The gradual and predictable process aims at changing habits and makes accommodation possible for all parts of the university. The process is scheduled for 2020-2025.

At the beginning of the period under review, all money was allocated to the faculties and institutes on the basis of the evaluation of the Research and Development Council of the Government of the Czech Republic, with the exception of the money awarded for the Rector's Research Awards (approx. CZK 1M).

At the end of the evaluated period (2024), the old rules have affected the distribution of funds between faculties and institutes by 17.6%, the majority already being distributed according to the new rules, e.g., following the share of papers with IF (53%), citations (22%), results scored '1' or '2' within national evaluation (*module 1*, 10%), applied research results (8%), international patents (5%) and revenues from IP licensing (2%).

In 2020, the CTU *Future Fund (FF)* was established, enabling the rector to sponsor a variety of activities:

- The CTU Global Postdoc Initiative, aimed at attracting young talented scientists, offered two-year postdoctoral positions to fresh PhDs from abroad. Within the first round, 36 young scientists stayed with us, so far resulting in 79 papers in IF journals. The second global call for post-doctorands has been launched in 2024.
- Support available to teams that applied for grants and obtained excellent evaluation but no funding. The support prevented dissolving research groups, allowed teams to continue research, and reapply. While this initiative was ineffective in its first two years, it finally proved effective. Of the twelve groups supported in 2024, four have received grants starting in 2025 and together secured funds more than five times exceeding the money spent on support.
- Increase in doctoral stipends. These funds were distributed according to the number of Ph.D. students, the number of successful Ph.D. defences and the number of successful defences within five years of study. This was first introduced in 2024. Within the same year, the number of successful PhD defences doubled against 2023 (295 vs 148).
- Support of faculty-institute measures aimed at excellence, such as opening new positions to attract experts from abroad. Money is released on a request and provided that the Faculty or Institute doubles the money from its own budget.

NATIONAL AND INTERNATIONAL COOPERATION

4.12 Important collaborations in R&D&I

The HEI will describe specific cases of R&D&I collaboration at the national level (maximum five examples) and the international level (maximum five examples), including examples of concrete results and impacts in the field of R&D&I beneficial for the HEI.

Maximum 300 words per example.

Self-assessment:

Collaboration with CERN Three faculties and institutes of the Czech Technical University in Prague (FNSPE, IEAP, FME) actively collaborate with CERN, the world's leading laboratory for particle physics, in cutting-edge experiments that push the frontiers of scientific knowledge and technological innovation. This cooperation is facilitated by the CERN-CZ Large Research Infrastructure (LRI) project, which enables the participation of CTU and other Czech universities and institutes in key CERN experiments. Through this project, the faculty contributes to groundbreaking research, strengthening its expertise and fostering scientific excellence.

While we have strong participation in a variety of other smaller experiments at CERN (such as DIRAC), our primary focus lies in the ATLAS and ALICE experiments, two of the large experiments at

CERN's Large Hadron Collider (LHC). These experiments explore the fundamental building blocks of matter and the forces that govern the universe, pushing the boundaries of modern physics.

CTU's contributions span both hardware development and data analysis. Our teams play a crucial role in designing, constructing, and upgrading detector subcomponents and also ensuring their smooth operation.

Beyond scientific advancements, CERN provides invaluable opportunities for students and researchers, fostering collaboration with leading international experts, allowing our PhD students to perform experiments to answer questions at the frontier of knowledge, and equipping the next generation of physicists and engineers with world-class expertise.

By engaging in CERN's research programs, CTU gains access to a unique scientific and technological ecosystem that drives innovation and discovery. This collaboration not only enhances the university's global standing but also provides invaluable experience for students and researchers, preparing them to tackle complex challenges in particle physics and beyond.

Participation in **Brookhaven National Laboratory** – Czech Republic's participation (BNL-CZ)

CTU Prague, via our faculty, is hosting the large research infrastructure BNL-CZ, which supports the involvement of Czech research, engineering, and education institutions and facilitates their access to one of the world's leading research facilities, Brookhaven National Laboratory. BNL-CZ has been on the Roadmap of Large Research Infrastructures since 2016. BNL is a single-site operating research infrastructure, founded in 1947, with a primary focus on nuclear and particle physics research. The main facility at BNL is the RHIC accelerator, which is uniquely positioned to study strongly interacting QCD matter at high temperatures, as well as to map the QCD phase diagram and search for its critical point. It also allows for detailed studies of cold QCD matter properties and the origin of proton spin, thanks to the unique capability of colliding polarized proton beams.

CTU's teams are actively involved in two international experimental collaborations based at BNL: STAR and ePIC. The STAR collaboration includes 75 institutions from 14 countries, while the ePIC collaboration consists of 173 institutions from 25 countries. We play an important role in these collaborations. For example, Jana Bielcikova has served as the chair of the STAR collaboration council for the past four years, and Barbara Trzeciak is currently the Deputy Physics Analysis Coordinator, responsible for the entire physics program of the STAR collaboration. In the ePIC collaboration, Jaroslav Adam leads the development of detector subsystems as a co-convenor of the ePIC far-backward detectors group.

As part of STAR and ePIC, we collaborate with many world-leading universities and research groups, with the most intensive collaborations being with Yale University, Lawrence Berkeley National Laboratory, and Ohio State University.

Among CTU FEE industrial cooperations, long term one with **Toyota Motor Europe** headed by prof. J. Matas stands out in many ways. First, it is already a long term one, starting in 2003. Since 2016, i.e. in the last 10 years, the project's total income has been above 5 million euro, almost all covering personnel costs. The focus of the collaboration has changed overtime, from computer vision research related to assistive driving to general AI and machine learning research motivated by wide range of current and future Toyota activities, including robotics, smart cities and autonomous vehicles. Mostly, the activities fall in the basic research rubric; the typical outcome of a TME-supported activity is a paper at a major conference or a patent, typically both. The patents are co-owned by Toyota and CTU.

An example of a national cooperation that has started, flourished and brought fruits exactly within the evaluation period:

Cooperation of CTU CIIRC with **E.nest Energy** (the company which owns and operates the “Energy nest” hybrid powerplant ; E.nest Energy is the member of the Decci group, which builds and operates several other solar, hydro and wind powerplants):

1) Feasibility phase (2020)

We developed a simplified technical model of expected technologies (generators, battery) and provided several simulations to find an optimal set of technologies for provision of Ancillary Services (AnS) in expected power and range of types (FCR, aFRR and mFRR up to 30 MW). We set basic parameters of the powerplant and our deliveries became a base for the basic design and selection of key technologies, above all the aeroderivative turbines.

2) R&D phase (2022 - 2023)

The project was supported by the Technology agency of the Czech Republic (TACR) and developed:

- a) the complex model (digital twin) of the hybrid powerplant for detailed simulation of control of technology by developed algorithms. The twin contains:
 - a precise model of the controlled technologies, including state model of the turbines which drive the generators,
 - a market emulator,
 - an observer for analytical evaluation of the algorithm functionality.
- b) the advanced algorithm for the operation planning and real time control of the hybrid powerplant providing (AnS). The algorithm is able to cope with an uncertainty given by intermittent nature of AnS activation und guaranties compliance with quality criteria embedded in the TSO grid code under any circumstances (any AnS requirement and any state of the technologies)

The project provided a few hundreds of simulations to prove technical and economical feasibility of proposed solution.

3) Implementation phase (2023 - 2024)

The prototype of the algorithm has been industrialised on commercial basis. Our team has developed and handed over a docker container which contains an application called SWC. The container is physically hosted by a Siemens control system. The SWC application successfully passed the certification tests and is the only application which controls the powerplant and AnS provision since mid of July 2024.

As a result: Unique control algorithm, fully developed at CTU CIIRC, completely controls “Energy nest” hybrid powerplant 32 MW in Vraňany.

CTU started to build up an **ecosystem for aviation and space technologies** based on ground turboprop engines and flying turboprop engines. CTU has had to boost its research and teaching competencies in order to develop the highly-specialized professional capacities and competencies necessary for the overall development of aviation and space activities in the Czech Republic. This was enabled by a collaborative agreement with CTU-FME which gave GE Aviation Czech access to the testing infrastructure of the ground testbed (dynamometric, core, propeller) and the flying test bed at FME for the new generation of turboprop engines. The test cells were built using EU structural funds in a program in which FEE, FNPE of CTU and FME TU Brno also participate.

This substantial investment and effort finally pays off, materializing in a brand new class of motors. The Catalyst engine, produced by Avio Aero and GE Aviation, which was set up by the Faculty of

Mechanical Engineering of the Czech Technical University in Prague, has achieved an extraordinary international success. After a tender process and an extensive phase of technical and economic analysis, Airbus Defense and Space chose the Eurodrone unmanned aerial system with the Catalyst engine. The engine obtained US FAA certification.

Center for Advanced Applied Sciences (CAAS) The Center for Advanced Applied Sciences (CAAS) project established a common university platform integrating research works in physics, mathematics, chemistry, engineering for nuclear technology, material science, photonics, detector technology and several other progressive fields, based on grounds of versatility and wide coverage of natural science research fields available at the Czech Technical University in Prague. The fusion of existing excellent teams from six faculties of CTU and one partner institute from the Czech Academy of Science formed a strong basis for a continuous development of research, which generated a new quality due to the offered long term cooperation, information exchange in “overcritical” teams working in cutting edge research areas with high importance, relevance and discovery potential. The project significantly contributed to all the aspects needed to boost the research infrastructure.

The project allowed to significantly extend the experimental equipment at several of the faculties making them internationally competitive in their respective fields. A number of unique instruments was acquired to elevate the quality of research facilities to a higher level.

The project allowed the integration of several teams into European networks. Apart of the particle physics community the dynamically evolving cooperation in quantum technology should be listed. The CAAS facilitated the integration into Europe wide educational and technological networks like DigiQ or the European communication infrastructure paving the way to novel research and education in this field. For instance, the new Master’s study program Quantum informatics was built on the platform of the CAAS created teams and upgrading several others.

Finally, and probably most important is the significant contribution of CAAS to the rejuvenation and increase of competence of the staff of the faculties at all the levels. The project boosted internationalization of the teams and increased their international visibility.

STUDIES

4.13 Doctoral studies

The HEI will briefly describe the organisation of the doctoral studies (if there are any doctoral study programmes³⁷). HEI will comment on:

- Structure and organization of studies.
- A system of cooperation between PhD students and their supervisors.
- Basic statistics (including drop-out rate, student workload, etc.).
- Information on promotion and recruitment schemes.
- Cooperation within doctoral studies (e.g., Czech Academy of Sciences, application sphere, building open study programmes for foreign nationals and creating international networks of study programmes, "joint degree", "cotutelle", etc.).
- Student care system (e.g. counselling, wellbeing care, career guidance).
- A system for tracking the future careers of graduates³⁸.
- Other relevant data, such as the existence of a doctoral school, basic soft skills courses, etc. at the discretion of the HEI.

The HEI shall support this with appropriate examples (e.g. a model example of doctoral student cooperation with their supervisor, statistics on collaboration within doctoral studies, specific examples within doctoral studies, statistics on the use of student care systems, etc.).

Maximum 300 words per point.

Self-assessment:

All eight Faculties and the Klokner Institute host doctoral programs. Most doctoral programs are accredited for four years of study; a few three-year programs were hosted by the Faculty of Transportation Sciences. The CTU Study and Examination Rules form the legal backbone for all study programmes. Basically, the first two years are intended to get fully acquainted with the state-of-the-art, get additional knowledge using available courses. For the rest of the study, doctoral students behave fully as young scientists, performing research and publishing results with their supervisors. At the end, each doctoral student should submit and defend his doctoral thesis. Such a thesis may be defended in a form of a collection of scientific papers with a short preface.

Our programs are open to any nationality, except when an embargo prevents us from accepting citizens of certain rogue states. Supervisors and Ph.D. support administration have sufficient command of English. We switch to English whenever an English-speaking colleague appears (applies anywhere except for Bachelor's courses).

There are currently 1556 PhD students enrolled in a total of 82 Ph.D. programs at CTU. The number of Ph.D. study programs was abundant by the end of 2024. This was temporarily inevitable due to a transition period forced by a change in the Act on Higher Education. This change required all programs to be re-accredited. Temporarily, what was in fact the same study program mostly counted as four accredited programmes: the old program running in Czech, the old program running in English, the new Czech program, and the new English program. The transition was completed at the end of 2024, when the old programmes have ended.

Most Institutes of the Czech Academy of Sciences (CAS) are located within Prague. CTU makes use of this advantage and has an umbrella agreement on joint Ph.D. Education with CAS (since 1998). Institutes of the Academy working in areas relevant to CTU study programs take part in our Ph.D. programmes based on agreements between Faculties and CAS Institutes. Access to CAS staff and

³⁷ If the HEI does not organise any doctoral programme, it will explicitly state this information in the self-evaluation report.

³⁸ The HEI will list the top five highest ranked graduates in academia, the private sector, and public administration over the past five years.

facilities, and to the whole cluster of top-class facilities and institutions in Prague, adds to the experience of studying in a PhD program at CTU.

[Information and Advisory Centre](#) helps students at all levels, including doctoral. Besides counselling and career services, it provides access to psychologic support in several languages..

Many dissertation topics are created in response to the direct needs of industry, while others are more focused on basic research. In particular, Ph.D. study programmes at the Faculty of Nuclear Sciences and Physical Engineering are often based on pure science, focusing on high energy physics, theoretical informatics and mathematical physics.

Soft skills courses are offered to Ph.D. students by their faculties. Since 2015, the Rector's Office in cooperation with the National Technical Library has run a course on Scientific Writing, in the winter semester and also in the summer semester. Since 2017, this course is available to Ph.D. students from neighbouring universities and Institutes of the Academy of Sciences, who have made use of this opportunity.

PhD students are seen as early-career Researchers. They are embedded within the research groups of their supervisors, where they can inherit good research habits from their supervisors.

A model example: Tomas Hodan completed his Ph.D. in 2021, in "Artificial Intelligence and Biocybernetics". He had obtained his Master's degree at VUT Brno, Czech Republic. He chose a Ph.D. at CTU, under the supervision of [J. Matas](#), on the recommendation of Robby T. Tan, who supervised Tomas during ERASMUS at Utrecht university, Netherlands, who knew of the [excellence of CTU in computer vision](#). Hodan's Ph.D. significantly contributed to the problem of recognition and 3D localization of rigid objects from RGB or RGB-D images (color images with depth). Tomas focused on challenging objects with symmetries and textureless objects, which are common in industrial applications. The key innovation is representing object surfaces as a set of compact fragments and using a neural network-based pixel-to-fragment matching method. The code for the method is publicly available at cmp.felk.cvut.cz/epos.

Tomas's results were published in top-tier conferences, including Conference on Computer Vision and Pattern Recognition – a CORE A* conference that, according to [Google Scholar Metrics](#), is the second most influential scientific medium after Nature. During an internship at Microsoft Research in Seattle, Tomáš developed a system for synthesizing photorealistic training images, which is now widely used by modern 3D localization methods. The PhD work of T. Hodan is highly cited, with increasing impact, see e.g., [Google Scholar](#).

The field of 3D localization lacked evaluation methodologies. To address this, Tomas created the BOP benchmark, which has become an internationally recognized standard. The BOP benchmark includes datasets, task definitions, metrics, and an online evaluation system hosted by CTU (bop.felk.cvut.cz). Tomas has led the effort in organizing workshops on 3D object localization, held at top-tier conferences starting with Int. Conf. on Computer Vision in 2017; the series is running, and the BOP workshop has happened in conjunction with a major conference every year since.

A successful PhD of this kind requires full focus and dedication, economic support, and supervisor's attention. PhD students in the lab of J. Matas is economically comfortable, with a total income well above the national average income. The supervisor's attention to a particular student ranges from 1 hour a week, say in a period of reading background literature or when implementing a complex method, to 2-3 hours per day or more, typically during preparation of a paper or when issues with the investigated methodology or experimental results arise.

Tomas Hodans is currently working at Meta Reality Labs, Zurich, and collaborates with CTU on the BOP project and workshop series.

While the CTU faculties track alumni careers and satisfaction with their study experience and outcome, CTU has not a specific system for tracking future careers. There is an overarching alumni club, while individual faculties track their alumni.

Certainly, CTU graduates have served society in a lot of high-ranked positions, in between 2020-2024 including:

Academia:

- Roman Hvězda, director, Eli Beamlines (one of European Great Infrastructures)
- Miroslav Chomát, director, Institute of Thermomechanics of the Czech Academy of Sciences
- Tomáš Chráska, director, Institute of Plasma Physics of the Czech Academy of Sciences
- Petr Cintula, director, Institute of Computer Science of the Czech Academy of Sciences
- Ondřej Svoboda, director, Institute of Nuclear Physics of the Czech Academy of Sciences

Private:

- Dimitar Filev, Henry Ford Technical Fellow. This appointment is the most prestigious technical leadership position in the [Ford Motor Company](#)
- Dalibor Dědek, founder and CEO, [Jabltron](#)
- Ondřej Vlček, CEO, [AVAST](#) (since 2022 Gen Digital)
- Martin Hošek, founder, Executive VP and CTO, [Persimmon Technologies](#)
- Lukáš Brchl, founder and CEO, [Dronetag](#) (listed in Forbes 30 under 30)

Public administration:

- Marketa Pekarova-Adamova, Chair, Chamber of Deputies, the lower house of the Parliament of the Czech Republic. (by constitution, the 3-rd person in Czech Republic)
- Dana Drábová, Chair, State office for nuclear safety.
- Petr Konvalinka, Chairman, Technology agency of the Czech Republic
- Josef Kratochvíl, President, Industrial property office of the Czech Republic
- Karel Večeře, Director, Czech Office for Surveying, Mapping and Cadastre

IMPLEMENTATION OF RECOMMENDATIONS

4.14 Implementation of the recommendations in Module 4

The HEI will briefly describe how it has implemented the recommendations for Module 4 from the previous evaluation period, if applicable.

Maximum 1000 words

Self-assessment:

All the recommendations have been considered and used to further improve CTU.

Thanks to the recommendations, CTU has changed its Study and Examination code and shortened the maximum duration of a doctoral study from 7 to 6 years. This amendment is applicable to students enrolled after December 31, 2020. The number of Ph.D. defences has already begun its increase.

The second major recommendation addressed habilitation procedures. Accepting that, the Quantified criteria CTU in Prague for habilitation proceedings have been amended to allow excellent candidates to apply earlier in their careers.

Funds have been allocated from the CTU Future Fund in to ease implementation of recommendation at Faculties. Cooperation between Faculties and Institutes in the frame of PhD study programs has been improved in order to unleash the potential of all excellent supervisors for PhD students.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 4

Document name	No. criteria	Location (link in HTML)
ANLUPA	4.2	https://www.anlupa.cz/
CTU Student Grant Competition	4.2	https://sgs.cvut.cz/
C.E.L.S.A.	4.2	https://celsalliance.eu/
CROWDHELIX	4.2	https://crowdhelix.com/
Internal Evaluation Board	4.3	https://www.cvut.cz/en/ieb/internal-evaluation-board
The Scientific Council	4.3	https://www.cvut.cz/en/ctu-scientific-council
International Advisory Board	4.3	https://www.cvut.cz/en/international-advisory-board
Code of Ethics	4.3	https://www.cvut.cz/sites/default/files/content/74c76d2e-7f4d-4cb1-ac28-b0765c7f88f2/en/20230628-code-of-ethics-of-ctu.pdf
Ethics commission	4.3	https://www.cvut.cz/en/ethics-commission
Committee for Ethics in Research	4.3	https://www.cvut.cz/en/committee-for-ethics-in-research-of-the-ctu-sc
CTU Sustainable Development Strategy	4.4	https://udrzitelnost.cvut.cz/strategie/
CTU sustainable development office	4.4	https://www.cvut.cz/en/sustainability
Data Stewardship Wizard	4.4	https://ds-wizard.org/
European ELIXIR	4.4	https://elixir-europe.org/
OTM-R Strategy	4.6	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20250131-otm-r-strategy-2024.pdf
Revised Action Plan HRS4R	4.6	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20250131-revised-action-plan-hrs4r-2024.pdf
Internal Review	4.6	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20250131-internal-review-2024.pdf

Equal opportunities plan	4.6	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20250131-equal-opportunities-plan-2025-2029.pdf
Career Guide	4.6	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20201216-career-guide-2021.pdf
https://euraxess.ec.europa.eu/	4.6	https://euraxess.ec.europa.eu/
Code of competitive selection procedure at the CTU in Prague	4.7	https://www.cvut.cz/sites/default/files/content/74c76d2e-7f4d-4cb1-ac28-b0765c7f88f2/en/20240613-code-of-competitive-selection-procedure-at-the-ctu-in-prague.pdf
CTU Statute	4.7	https://www.cvut.cz/sites/default/files/content/74c76d2e-7f4d-4cb1-ac28-b0765c7f88f2/en/20241216-13th-full-text-of-the-statute-of-the-czech-technical-university-in-prague.pdf
Rules of Habilitation Proceedings and Proceedings to Appoint Professors of CTU	4.7	https://www.cvut.cz/sites/default/files/content/74c76d2e-7f4d-4cb1-ac28-b0765c7f88f2/en/20240613-1st-full-text-of-the-rules-of-habilitation-proceedings-and-proceedings-to-appoint.pdf
Career Guide	4.7	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20201216-career-guide-2021.pdf
Code of competitive selection procedure at the CTU in Prague	4.7	https://www.cvut.cz/sites/default/files/content/74c76d2e-7f4d-4cb1-ac28-b0765c7f88f2/en/20240613-code-of-competitive-selection-procedure-at-the-ctu-in-prague.pdf
Equal opportunities plan	4.7	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20250131-equal-opportunities-plan-2025-2029.pdf
Code of competitive selection procedure at the CTU in Prague	4.7	https://www.cvut.cz/sites/default/files/content/74c76d2e-7f4d-4cb1-ac28-b0765c7f88f2/en/20240613-code-of-competitive-selection-procedure-at-the-ctu-in-prague.pdf
CTU Internal regulations	4.7	https://www.cvut.cz/en/internal-ctu-regulations
CERN	4.9	http://home.cern/
Brookhaven National Laboratory	4.9	http://www.bnl.gov/
FAIR Darmstadt	4.9	http://fair-center.eu/
Laboratoire Souterrain de Modane	4.9	http://www-lsm.in2p3.fr/
Fermilab	4.9	https://www.fnal.gov/
Testbed for Industry 4.0	4.9	https://www.ciirc.cvut.cz/teams-labs/testbed/

Human-Compatible Artificial Intelligence with Guarantees	4.10	https://humancompatible.org/
PoliRuralPlus	4.10	https://www.poliruralplus.eu/about/consortium/
Information and Advisory Centre	4.13	https://cips-new.is.cvut.cz/
J. Matas	4.13	https://scholar.google.com/citations?user=EJCNY6QAAAAJ&hl=en&oi=ao
excellence of CTU in computer vision	4.13	https://csrankings.org/
cmp.felk.cvut.cz/epos	4.13	http://cmp.felk.cvut.cz/epos
Google Scholar Metrics	4.13	https://scholar.google.com/citations?view_op=metrics_intro&hl=en
Google Scholar	4.13	https://scholar.google.com/citations?user=GD_VE9oAAAAJ&hl=en&oi=ao
bop.felk.cvut.cz	4.13	http://bop.felk.cvut.cz/
Ford Motor Company	4.13	https://www.ford.com/
Jablotron	4.13	https://www.jablotron.com/en
AVAST	4.13	https://www.avast.com/en-us/index
Persimmon Technologies	4.13	https://persimmontech.com/
Dronetag	4.13	https://dronetag.com/

MODULE 5 - STRATEGY AND POLICIES

5.1 Mission and vision of the evaluated institution in R&D&I

The HEI will briefly describe its mission and vision with emphasis on R&D&I in general and its R&D&I capacities in the implemented R&D&I fields³⁹ (Tables 5.1.1 and 5.1.2). In particular, the HEI's vision covers the following five-year period and must relate to the strategic objectives of the Provider, the National Policy on Research, Development, and Innovation of the Czech Republic 2021+, the Gender Equality Strategy 2021-2030, and other higher national and supranational strategic documents in the field of R&D&I (Table 5.1.3). The HEI shall complement the description with active references to its Strategic plan for the teaching, scholarly, scientific, research, development, artistic, and other creative activities of the higher education institution (regarding the results and recommendations from the previous evaluation period, if the evaluated HEI participated in it). The HEI shall describe how the vision and mission were implemented during the evaluation period.

Maximum 2000 words.

Self-assessment: *(Direct citation from Strategy of CTU 2021+)*

Mission: Czech Technical University¹ meets the criteria for international excellence and competitiveness in education, science, technology and innovation. It has been building a university that relies on data, is open and looks into the future. It encourages curiosity and smart solutions, follows trends, addresses challenges and responds to societal demand for professional retraining. It

³⁹ For so-called R&D&I capacities, see Definition of Terms in Methodology HEI2025+.

acts in accordance with the code of ethics in a strong social context, cherishes truth-based values, and promotes internationalization, diversity, inclusion and equal treatment. It disseminates scientific knowledge uniquely and comprehensively on an interdisciplinary basis, at home and abroad. Its strategic goal is to maintain in the long term internationally recognized excellence in education, science, technology, innovation and application that contributes to the betterment of society.

CTU aspires to remain a recognized centre of excellence with international visibility, whose erudite, inspiring and ethical approach to education, science and innovation continues the tradition of Czech technical university learning, of which it is the historical standard-bearer. Through the application of expertise, scientific knowledge and international cooperation, CTU will contribute to solving new problems and challenges. Support for its students, researchers and other employees and cooperation with domestic and foreign partners will facilitate CTU's engagement in the society-wide advancement of knowledge and education and their use in practice.

Vision: CTU will maintain and solidify the hitherto acquired leading position of a research university with the attributes of an international centre of excellence in the fields of science, innovation and education. As an important centre of technological progress, it will partake in improving technological literacy and enhancing technical knowledge and curiosity. It will promote digital skills and innovation by engaging in societal challenges and strive to become one of the world's leaders in education, science and research. It will become a globally appealing academic organization that will attract internationally recognized experts in a variety of fields.

CTU will continue to be an engaging organization providing a friendly and open environment for its students, academicians and employees, both domestic and foreign. It will guarantee quality teaching based on research and innovative approaches and observe the need for ongoing technological progress and digitization. It will disseminate knowledge gained through interdisciplinary cooperation amongst partners within and outside of the university. It will endeavour to win awards in international competitions and shape its image on the basis of research featured in internationally recognized scientific journals. It will openly share knowledge through its strategic partnerships, students, graduates and researchers and through the participation of top experts in international conferences and on professional scientific panels.

5.1.1 R&D&I capacities of HEI in the year of evaluation

Field of Research	FORD	FORD share [%]	Predominant type of research	Total share of field of reaserch [%]
1. Natural Sciences	1.1 Mathematics	4,4	Basic research	36,26
	1.2 Computer and information sciences	15,43	Balanced basic and applied research	
	1.3 Physical sciences	12,2	Balanced basic and applied research	
	1.4 Chemical sciences	1,46	Balanced basic and applied research	
	1.5 Earth and related environmental sciences	1,82	Balanced basic and applied research	
	1.6 Biological sciences	0,51	Balanced basic and applied research	
	1.7 Other natural sciences	0,44	Basic research	

2. Engineering and Technology	2.1 Civil engineering	17,52	Balanced basic and applied research	54,53
	2.2 Electrical engineering, Electronic engineering, Information engineering	12,1	Balanced basic and applied research	
	2.3 Mechanical engineering	10,89	Balanced basic and applied research	
	2.4 Chemical engineering	0,41	Basic research	
	2.5 Materials engineering	6,48	Balanced basic and applied research	
	2.6 Medical engineering	2,76	Balanced basic and applied research	
	2.7 Environmental engineering	2,17	Balanced basic and applied research	
	2.8 Environmental biotechnology	0,07	Balanced basic and applied research	
	2.9 Industrial biotechnology	0,05	Balanced basic and applied research	
	2.10 Nanotechnology	0,5	Balanced basic and applied research	
	2.11 Other engineering and technologies	1,58	Balanced basic and applied research	
3. Medical and Health Sciences	3.1 Basic medicine	0,21	Balanced basic and applied research	2,60
	3.2 Clinical medicine	1,35	Balanced basic and applied research	
	3.3 Health sciences	0,59	Balanced basic and applied research	
	3.4 Medical biotechnology	0,3	Balanced basic and applied research	
	3.5 Other medical sciences	0,15	Basic research	
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries	0,32	Balanced basic and applied research	0,32
	4.2 Animal and Dairy science	0	Zvolte položku.	
	4.3 Veterinary science	0	Zvolte položku.	
	4.4 Other agricultural sciences	0	Zvolte položku.	
5. Social Sciences	5.1 Psychology and cognitive sciences	0,39	Balanced basic and applied research	3,69
	5.2 Economics and Business	1,22	Balanced basic and applied research	
	5.3 Education	0,82	Balanced basic and applied research	

	5.4 Sociology	0,06	Balanced basic and applied research	
	5.5 Law	0,36	Balanced basic and applied research	
	5.6 Political science	0,14	Balanced basic and applied research	
	5.7 Social and economic geography	0,43	Balanced basic and applied research	
	5.8 Media and communications	0,07	Balanced basic and applied research	
	5.9 Other social sciences	0,2	Balanced basic and applied research	
6. Humanities and the Arts	6.1 History and Archaeology	0,27	Balanced basic and applied research	2,61
	6.2 Languages and Literature	0,09	Balanced basic and applied research	
	6.3 Philosophy, Ethics and Religion	0,21	Balanced basic and applied research	
	6.4 Arts (arts, history of arts, performing arts, music)	1,56	Balanced basic and applied research	
	6.5 Other Humanities and the Arts	0,48	Balanced basic and applied research	
Total		100 %	-	100 %

5.1.2 Target R&D&I capacities of HEI for the next five-year period

Field of Research	FORD	FORD share [%]	Predominant type of research	Total share of field of reaserch [%]
1. Natural Sciences	1.1 Mathematics	4,80	Basic research	37,63
	1.2 Computer and information sciences	16,50	Balanced basic and applied research	
	1.3 Physical sciences	13,00	Balanced basic and applied research	
	1.4 Chemical sciences	1,43	Balanced basic and applied research	
	1.5 Earth and related environmental sciences	1,90	Balanced basic and applied research	
	1.6 Biological sciences	0,00	Zvolte položku.	
	1.7 Other natural sciences	0,00	Zvolte položku.	
2. Engineering and Technology	2.1 Civil engineering	18,00	Balanced basic and applied research	55,81

	2.2 Electrical engineering, Electronic engineering, Information engineering	13,00	Balanced basic and applied research	
	2.3 Mechanical engineering	11,00	Balanced basic and applied research	
	2.4 Chemical engineering	0,31	Basic research	
	2.5 Materials engineering	7,00	Balanced basic and applied research	
	2.6 Medical engineering	3,00	Balanced basic and applied research	
	2.7 Environmental engineering	3,00	Balanced basic and applied research	
	2.8 Environmental biotechnology	0,00	Balanced basic and applied research	
	2.9 Industrial biotechnology	0,00	Zvolte položku.	
	2.10 Nanotechnology	0,50	Balanced basic and applied research	
	2.11 Other engineering and technologies	0,00	Zvolte položku.	
3. Medical and Health Sciences	3.1 Basic medicine	0,21	Balanced basic and applied research	2,36
	3.2 Clinical medicine	1,35	Balanced basic and applied research	
	3.3 Health sciences	0,50	Balanced basic and applied research	
	3.4 Medical biotechnology	0,30	Balanced basic and applied research	
	3.5 Other medical sciences	0,00	Basic research	
4. Agricultural and veterinary sciences	4.1 Agriculture, Forestry, and Fisheries	0,00	Zvolte položku.	00
	4.2 Animal and Dairy science	0,00	Zvolte položku.	
	4.3 Veterinary science	0,00	Zvolte položku.	
	4.4 Other agricultural sciences	0,00	Zvolte položku.	
5. Social Sciences	5.1 Psychology and cognitive sciences	0,00	Zvolte položku.	2,2
	5.2 Economics and Business	0,00	Zvolte položku.	
	5.3 Education	1,20	Balanced basic and applied research	
	5.4 Sociology	0,90	Balanced basic and applied research	
	5.5 Law	0,00	Zvolte položku.	
	5.6 Political science	0,00	Zvolte položku.	
	5.7 Social and economic geography	0,00	Zvolte položku.	
	5.8 Media and communications	0,00	Zvolte položku.	
	5.9 Other social sciences	0,10	Balanced basic and applied research	

6. Humanities and the Arts	6.1 History and Archaeology	0,00	Zvolte položku.	2,00
	6.2 Languages and Literature	0,10	Balanced basic and applied research	
	6.3 Philosophy, Ethics and Religion	0,00	Zvolte položku.	
	6.4 Arts (arts, history of arts, performing arts, music)	0,00	Zvolte položku.	
	6.5 Other Humanities and the Arts	1,50	Balanced basic and applied research	
Total		100 %	-	100 %

5.1.3 Relation to the strategic objectives of the provider and strategic documents in the field of R&D&I

Strategic document	Follow-up
The Strategic Plan of the Ministry for Higher Education for the period from 2021	Strategy of CTU 2021+
Strategy for the internationalisation of higher education for the period from 2021	
INNOVATION STRATEGY OF THE CZECH REPUBLIC 2019-2030. THE COUNTRY FOR THE FUTURE	Commercialization and fundraising strategy at CTU 2023-2030
European Chips Act & National Semiconductor Strategy CZ	TSRI Joint Research Project, Advanced Chip Design Research Centre

5.2 Research and development objectives

The HEI will describe its intentions and goals for the next five-year period. The objectives in the field of research development, innovation, and knowledge transfer as well as the objectives in the field of cooperation with public administration, entrepreneurs, and non-profit organisations will be described in relation to the mission, vision and disciplinary capacities of the HEI. Furthermore, the objectives for the development of the HEI as a research organisation will be described, in the areas of human potential development, institutional resilience, the implementation of open science and adherence to the principles of ethics, scientific integrity, and good practice, and their interrelationship with R&D&I objectives. The objectives described must be consistent with the Strategic plan for the teaching, scholarly, scientific, research, development, artistic and other creative activities of the higher education institution.

Maximum 2000 words.

Self-assessment:

For 2025, CTU has marked these Research and development objectives (direct citation, agreed by the Academic Senate in December 2024):

Support excellence and social relevance of research in 2025 by:

- leveraging further opportunities for CTU's participation in the international EuroTeQ project.
- supporting excellent research centers, research quality, and international competitiveness through PR activities and marketing.

- c. continuing the implementation of the Robotics and Advanced Industrial Production project (OP JAK) and the Intelligent Language Processing in Professional Applications project (OP JAK).
- d. implementing measures recommended by the IEP based on the current evaluation results, which will take place in the first half of 2025.
- e. striving to obtain further prestigious international grants, particularly within Horizon Europe, and engaging in global challenges in the areas of digitalization, artificial intelligence, robotics, cybernetics, quantum technology, and nanotechnology.
- f. continuing to deepen cooperation with prestigious research organizations.
- g. continuing to support the commercialization of research results and technology transfer to practice.
- h. continuing to fulfil the goals of the CTU Commercialization and Fundraising Strategy 2023–2030 through these activities: mapping the competencies of individual departments and approaching leading Czech (especially "family") companies with offers of research and development cooperation to create valuable intellectual property that will be further subject to commercialization, and presenting the positive contributions of technologies developed at CTU to reduce the environmental impact of industry and their contribution to sustainable development goals.
- i. supporting and developing the publication skills of students and young scientists through courses and mentoring.
- j. *(within the frame of habilitation procedures)*, the table of quantified criteria will be amended, tightening the requirements for recognition by the scientific community, especially regarding citation scoring, which should be based more on normalized, field-specific citation indicators (CNCI, FWCI) than on simple citation counts.
- k. amend the table of quantified criteria used in habilitation and professorship appointment procedures, taking explicitely into account the journal level (e.g., by quartile).

The Strategic plan for the teaching, scholarly, scientific, research, development, artistic and other creative activities of the Czech Technical University – Strategic plan 2021+ - is guiding CTU development for five years. We have built a strong fundament and CTU is on right track.

Within last five years, we have achieved significant improvement and/or started strategic international collaborations in many disciplines such as AI, Quantum technologies, Aircraft, Assistive technologies as well as Chip design. It is for sure that these will remain among important topics for the next five-year period, (increasing research capacities in respective areas accordingly). However, tuning of accents, milestones and measures is up to the new Rector, to be elected fall 2025, with his or her new programme and team.

At this point in its long history we may soon find Europe as well as Czech Technical University sailing over troubled waters. We are investing into improving our ability to get through, including necessary investment into security. We understand that flexibility, including the ability to make decisions at the lowest level of management, will be crucial in next years, and that European strategic documents including CTU Strategy 2021+ may have to become rewritten. Our reaction will be smart and swift.

5.3 Institutional tools and measures for the implementation of the research and development strategy

The HEI will describe its institutional and strategic tools (e.g., strategic management tools, tools created to support the implementation of research objectives, legal and organisational norms in relation to R&D&I support, etc.) that are designed to fulfil the research and development objectives for the next five-year period (Table 5.3.1), with an emphasis on:

- Supporting quality R&D&I.
- Excellent science.
- Innovative environment and increasing the international or disciplinary competitiveness of the HEI's research activities.
- Development of human potential.
- Institutional resilience.
- Adherence to ethical principles, scientific integrity and good practice in R&D&I.

Maximum 2000 words.

Self-assessment:

Further improvement of the university's performance and its ability to respond to society's needs strongly depends on two factors in particular: the quality of scientists who associate their careers with the university, and the conditions at CTU for their work.

CTU has transparent rules for the selection of new employees, which mean equal opportunities for all, and a working environment that allows for free and demanding discussion and continuous improvement. The Ethical Code and the Ethics Committee, which ensures its compliance, guarantee a high ethical standard. The information system enables comparisons between scientists and teams, and transparent control.

These systems, rules and environments are and will be continuously adapted to new challenges so that work at CTU brings benefits to society and members of the academic community.

CTU will increase its involvement in international research teams and organizations.

CTU has established standards and processes in the area of security and resilience. It will continue to devote the necessary effort and resources to this area and will cooperate with the relevant state authorities.

5.3.1 Institutional tools and measures for the implementation of the research and development strategy

Name of instrument/measure	Description of the tool/measure	Implementation status	Year
CTU Future Fund	Share of LCDRO money kept centrally to foster University-wide objectives.	Implemented	2020
My future project would be ...	Shaping future projects of prospective excellent researchers with the help of experts	Implemented	2024 pilot
Code of Ethics (and Ethics commission)	Rules and a body that decides on violations	Implemented	2018
Open (internationally), OTM-R, equal opportunity hiring process	A set of documents: OTM-R Strategy , Revised Action Plan HRS4R , Internal Review and Equal opportunities plan .	Implemented	2022

		Code of competitive selection procedure at the CTU in Prague		
LCDRO Money allocation to Faculties/Institutes according to new rules		Gradual transition from RIV points to new rules fostering excellence	Implemented, agreed by the Senate 2021, the process to last till the end of 2025	2025
Update of criteria for habilitation and professorship		Imposing more motivating (eg. harder) limits on prospective (associated) professors.	Not-implemented	2025
Global Post-doc Initiative		Call for a two-year postdoctoral job at CTU, under supervision of an excellent scientist.	Implemented	2024
EuroTeQ		The European University EuroTeQ	Implemented	2020
Commercialization and fundraising strategy		Commercialization and fundraising strategy at CTU 2023-2030	Implemented	2023

5.4 Implementation of the recommendations in Module 5

The HEI will briefly describe how it has implemented the recommendations for Module 5 from the previous evaluation period, if applicable.

Maximum 1000 words

Self-assessment:

During Evaluation 2020, several valuable recommendations have been addressed to CTU and the MEYS.

IEP indicated that most of our doctoral students take too long to obtain the degree. Based on that, the CTU Study and Examination Code has been amended and the maximum study time has been shortened by one full year.

Internal regulations have been kept up to date, carefully reviewed, and amended as necessary. Sixty-one amendments to the existing Internal CTU Regulations, as well as eight new ones, have passed through the Senate and registered by MEYS.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 5

Document name	No. criteria	Location (link in HTML)
The Strategic Plan of the Ministry for Higher Education for the period from 2021	5.1.3	https://msmt.gov.cz/uploads/odbor_30/DH/SZ/strategi_c_plan_2021_.pdf
Strategy for the internationalisation of higher education for the period from 2021	5.1.3	https://msmt.gov.cz/uploads/odbor_30/DH/SZ/internationalisation_strategy_2021_.pdf
Strategy of CTU 2021+	5.1.3	https://www.cvut.cz/sites/default/files/content/8b6ab1e1-c0aa-4b1c-a90a-f06eab2d7b7f/en/20210426-strategy-of-ctu-2021.pdf

Commercialization and fundraising strategy at CTU 2023-2030	5.1.3	https://www.cvut.cz/sites/default/files/content/8b6ab1e1-c0aa-4b1c-a90a-f06eab2d7b7f/en/20241122-commercialization-and-fundraising-strategy-at-ctu-2023-2030.pdf
INNOVATION STRATEGY OF THE CZECH REPUBLIC 2019-2030. THE COUNTRY FOR THE FUTURE	5.1.3	https://mpo.gov.cz/en/guidepost/for-the-media/press-releases/the-country-for-the-future--the-government-has-approved-a-programme-to-help-companies-innovate--246389/
National Semiconductor Strategy CZ	5.1.3	https://mpo.gov.cz/assets/cz/prumysl/zpracovatelsky-prumysl/2024/12/National-Semiconductor-Strategy-CZ.docx
European Chips Act	5.1.3	https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-chips-act_en
OTM-R Strategy	5.3.1	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20250131-otm-r-strategy-2024.pdf
Revised Action Plan HRS4R	5.3.1	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20250131-revised-action-plan-hrs4r-2024.pdf
Internal Review	5.3.1	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20250131-internal-review-2024.pdf
Equal opportunities plan	5.3.1	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20250131-equal-opportunities-plan-2025-2029.pdf
Code of competitive selection procedure at the CTU in Prague	5.3.1	https://www.cvut.cz/sites/default/files/content/74c76d2e-7f4d-4cb1-ac28-b0765c7f88f2/en/20240613-code-of-competitive-selection-procedure-at-the-ctu-in-prague.pdf
EuroTeQ	5.3.1	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20250131-internal-review-2024.pdf
Commercialization and fundraising strategy at CTU 2023-2030	5.3.1	https://www.cvut.cz/sites/default/files/content/bc7aa86f-5423-498a-8b1d-a576bc0be306/en/20250131-equal-opportunities-plan-2025-2029.pdf