SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: Faculty of Textile 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:

Faculty of Textile Engineering Technical University of Liberec (FT) is a unique institution in the Czech Republic with a rich history and tradition. Its focus combines technological research, artistic creation, and an environmentally responsible approach. FT is a pioneer in areas such as nanotechnologies, the development of advanced materials, sustainability in textile production, and design focused on the modern needs of society.

Mission and vision of the faculty

- **Mission:** To provide high level of education, to conduct research and development with a direct social impact, and to support ecological and technological innovations in the textile industry. FT strives to educate experts who will be able to face current and future challenges in their professional practice.
- **Vision:** To become a recognised international centre of excellence in textile engineering and innovation. FT plans to expand cooperation with industrial and academic partners on a global level and contribute to solving current challenges such as sustainability, the circular economy, and the integration of technology into everyday life.

Self-reflection of the social contribution of the faculty

FT has long-term significant social contribution, which is reflected in various areas. FT contributes to the development of the textile industry, improving the quality of life and protecting the environment. Key contributions of FT include:

1. **Healthcare:** Development of nanofiber textiles and medical materials, such as protective masks, antibacterial clothing, and biodegradable implants.
2. **Ecology:** Innovation in the field of textile waste recycling, development of ecological materials, and application of textile structures in wastewater treatment.

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

3. **Safety:** Smart textiles improving protection and safety, for example in transport (reflective materials), industry (protective clothing), and crisis situations (protection against CBRN agents).
4. **Art and design:** FT connects creativity and technology, which brings unique results in the fields of fashion design, textile art, and exhibition projects.

A significant contribution is FT's role as a leader in the field of nanofibers, which is reflected in applications in healthcare (e.g., medical textiles), ecology (removal of waste substances), and safety technologies (protective clothing).
FT also participates in educational activities that connect science with the public. It organises events such as Researcher's Night, workshops, excursions and lectures, raising awareness of current themes in textile research.

Distribution of research activities according to the type of research
FT performs a wide range of research activities, which can be divided into three basic types:

1. **Basic research**: Aimed at understanding the physical, chemical, and mechanical properties of textile materials. This research forms the basis for advanced applications.
2. **Applied research**: Development of technologies and materials with the aim of immediate use in industrial practice, for example smart textiles, medical and protective materials.
3. **Experimental development:** Putting innovations into practice in the form of pilot projects, prototypes, and cooperation with industrial partners. These developments are focused on specific applications, such as the production of ecological textiles or special composites.

FT focuses on strategic areas of research: advanced materials, innovative products, advanced technologies, nanomaterials and nanotechnologies, metrology and quality assessment, artistic creative activity.
Branch capacities are mainly focused on outputs in FORD group 2. Engineering and Technology 85% (Materials engineering 63% and Nano-technology 115%). Due to the wide applicability of textiles, the research results are also represented in FORD group 1. Natural Sciences 13% (mainly Chemical Sciences 8% – this is due to research in the field of fibres and final treatments). Another area of application of hi-tech fibre structures leads the research FORD group 3. Medical and Health Sciences 2%.

Organisational structure of the faculty
FT consists of the following specialised departments that cover key areas of textile engineering and design:

- **Department of Design:** Focuses on textile and clothing design, connecting creativity and technology.
- **Department of Textile Evaluation:** Specialises in testing and analysing the properties of textile materials.
- **Department of Materials Engineering**: Research of advanced materials, including finishing and composites.
- **Department of Nonwovens and Nanofibrous Materials:** Leader in research into nonwovens and nanofibrous technologies and structures.
- **Department of Clothing**: Deals with the development and production of clothing and smart products with regard to their functionality.
- **Department of Technologies and Structures:** Focuses on technologies for the production of both clothing and technical textiles, their innovation and the development of highly functional textile applications

The management of FT consists of the Dean and Vice-Deans responsible for research, education, and development. Administrative and organisational support is provided by the Office of the Dean, which

ensures the efficient running of FT, communication with partners and students, and project coordination. This structure enables FT to respond flexibly to challenges and opportunities in the field of textile industry and innovation.

FT staff consists of more than 100 academic workers who actively connect teaching with research. FT implements nine accredited study programmes in Czech and six in English at the Bachelor's, Master's and doctoral level. In the period under evaluation, FT had approximately 3400 students, which proves its significant educational capacity.

Long-term objectives of the faculty

1. Strengthen international cooperation in the field of research and education, especially in projects financed by EU programmes.
2. Increase the commercialisation of R&D results and expand cooperation with industrial partners.
3. Develop sustainable and ecological solutions in the textile industry that contribute to the circular economy.
4. Support innovative approaches in education connecting technological knowledge with creativity.

FT is aware of its dual role in education: on the one hand, it is responsible for the quality training of experts for light industry, on the other hand, it fulfils the role of a university workplace responsible for the highest education of a person in the general sense of the word.

FT has long been regarded as a key institution for the development of the textile industry and as an innovator responding to current challenges. By combining scientific research, practical applications, and a sustainable approach, FT contributes to positive changes in society and industry.

Table 3.1.1 - Staffing per FTE[2]

Academic/ Professional position	Total / Of which women					
	2019	2020	2021	2022	2023	Total
Professor	5,61/0,00	5,94/0,00	5,50/0,00	5,25/0,00	5,10/0,00	27,40/0,00
Associate Professor	11,75/4,13	11,05/4,46	14,68/4,9	11,84/5,00	12,29/5,43	61,61/23,92
Assistant Professor	29,30/21,98	28,62/23,37	30,48/24,65	31,74/25,34	27,78/21,54	147,92/116,88
Assistant	21,26/16,88	20,77/16,62	19,85/15,83	17,92/13,42	18,46/13,44	98,26/76,19
R&D Personnel[3]	1,64/1,05	20,71/11,7	19,23/12,56	18,75/11,00	18,92/11,15	79,25/47,46
Researchers in other categories[4]	5,85/2,00	4,16/2,16	5,31/3,73	4,17/2,49	4,48/2,75	23,97/13,13

[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]	38,98/25,33	19,58/16,44	19,4/16,52	20,67/17,49	18,73/16,14	117,36/91,72
Scientific, research and development staff involved in teaching activities						
Early career researchers[6]	1,1/0,00	2,10/1,10		0,58/0,38	1,52/0,00	5,30/1,48
Total[7]	115,49/71,37	112,93/75,85	114,45/78,19	110,92/75,12	107,28/70,45	561,07/370,98

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			1		2						5	
Associate Professor					2		5	*3*	2	*2*	2	
Assistant Professor			9	5	15	*13*	2	*2*	4	*3*		
Assistant			7	5	7	*7*	6	*5*	1	*1*	1	
R&D Personnel[9]	2	*2*			1							
Researchers in other categories[10]	1	*1*	5	3								
Technical and economic staff[11]	1	*1*	5	3	13	*10*	6	*6*	7	*4*	2	1
Scientific, research and development staff involved in teaching activities			1	1								
Early career researcher[12]												

[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+.

Total[13]	4	*4*	28	17	40	*30*	19	*16*	14	*10*	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 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							1		2		4	
Associate Professor			1	1	3		3	*2*	5	*3*	2	
Assistant Professor			3		18	*15*	8	*8*	1	*1*		
Assistant	1		5	2	7	*6*	5	*5*	3	*2*		
R&D Personnel[15]	4	*4*	5	4	2		5	*3*	2	*1*	3	1
Researchers in other categories[16]			4	1	1	*1*						
Technical and economic staff[17]			1	1	5	*4*	7	*7*	2	*2*		
Scientific, research and development staff involved in teaching activities												
Early career researcher[18]			2									
Total[19]	5	*4*	21	9	36	*26*	29	*25*	15	*9*	9	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

[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.

Type of study	2019		2020		2021		2022		2023		Total	
	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women	Total	Women
Undergraduate	526	387	502	344	471	352	470	359	456	343	2425	1785
Master's[20]	166	122	166	130	141	101	122	82	129	89	724	524
Doctoral	67	27	60	26	58	30	61	30	45	21	291	134
Lifelong Learning Courses											0	0
Total	759	536	728	500	670	483	653	471	630	453	3440	2443

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	4/2	0/0	4/2	0/0	4/2	0/0	4/2	0/0	4/2	0/0	20/10	0/0
Master's	2/1	0/0	2/1	0/0	3/1	0/0	3/2	0/0	3/2	0/0	13/7	0/0
Doctoral	2/1	0/0	2/1	0/0	2/1	0/0	2/1	0/0	2/2	0/0	10/6	0/0
Lifelong Learning courses	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Total	8/4	0/0	8/4	0/0	9/4	0/0	9/5	0/0	9/6	0/0	43/23	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	0	Applied Research	13
	1.2 Computer and information sciences	0	Applied Research	
	1.3 Physical sciences	2	Applied Research	
	1.4 Chemical sciences	8	Applied Research	
	1.5 Earth and related environmental sciences	1	Applied Research	
	1.6 Biological sciences	1	Applied Research	
	1.7 Other natural sciences	1	Applied Research	
2. Engineering and Technology	2.1 Civil engineering	1	Applied Research	85
	2.2 Electrical engineering, Electronic engineering, Information engineering	3	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.

	2.3 Mechanical engineering	2	Balanced basic and applied research	
	2.4 Chemical engineering	2	Balanced basic and applied research	
	2.5 Materials engineering	63	Balanced basic and applied research	
	2.6 Medical engineering	1	Balanced basic and applied research	
	2.7 Environmental engineering	1	Balanced basic and applied research	
	2.8 Environmental biotechnology	0	Zvolte položku.	
	2.9 Industrial biotechnology	0	Zvolte položku.	
	2.10 Nanotechnology	11	Balanced basic and applied research	
	2.11 Other engineering and technologies	1	Balanced basic and applied research	
3. Medical and Health Sciences	3.1 Basic medicine	1	Applied Research	2
	3.2 Clinical medicine	0	Zvolte položku.	
	3.3 Health sciences	1	Applied Research	
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	0	Zvolte položku.	0
	5.2 Economics and Business	0	Zvolte položku.	
	5.3 Education	0	Zvolte položku.	
	5.4 Sociology	0	Zvolte položku.	
	5.5 Law	0	Zvolte položku.	
	5.6 Political science	0	Zvolte položku.	
	5.7 Social and economic geography	0	Zvolte položku.	
	5.8 Media and communications	0	Zvolte položku.	
	5.9 Other social sciences	0	Zvolte položku.	
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	0	Zvolte položku.	
	Total	100 %	-	100 %

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

FT is a full member of the International Association of Textile Faculties (AUTEX). The FT representative is a member of the committee for the revision of the accreditation of the joint study programme of the Autex association, the so-called WE-Team NMSP "Textile Engineering" accredited in Ghent, Belgium. As a member of the Textile - Clothing - Leather Association (ATOK), it participates in European Apparel and Textile Confederation (EURATEX) meetings. FT participates in activities with the EU "European Technology Platform – Fibers Textiles Clothing". FT has been accepted into the New European Bauhaus.

All FT study programmes are accredited by the European Federation of National Engineering Associations (FEANI). The professional organisation "The Textile Institute Manchester" accredits the study programmes BSP "Textile", NMSP "Textile Engineering" and DSP "Textile Engineering" until 2026.

FT detailed evaluation of the results in international rankings through the analytical tool InCites from Clarivate (https://incites.clarivate.com) based on the citations of publications indexed on (WoS). 2019-2023, TUL in the Materials Science – Textiles research subfield, ranked 20th compared to other (approximately 3978) world organisations (of which 32.0% of documents in Q1 and 45.1% in Q2 according to JIF).

Individual and other prestigious R&D awards

FT monitors important awards won by both its staff and students.

Employee awards highlight their lifelong contribution to textile research and education at an international level. Among the most important are the Order of Laurel awarded by Prof. RNDr. Oldřich Jirsák, CSc., for his essential contribution in the field of science and research, and the honorary title of Doctor honoris causa for prof. Ing. Luboš Hese, DrSc., from the National Institute of Technology in Jalandhar. The younger generation is represented by Mohanapriya. Venkataraman, M.Tech., M.F.Tech., Ph.D.

Student awards testify to their talent, creativity, and ability to compete on prestigious international platforms. For example, Ing. Jakub Erben, Ph.D., won 1st place in the international Théophile Legrand Textile Innovation Award competition, and his scientific achievements were also recognised by the Minister of Education, Youth and Sports of the Czech Republic.

The Werner von Siemens Award (2022) (1st place for the best diploma thesis) was won by Senta Müllerová and Ing. Markéta Klíčová. The Werner von Siemens (WvS) award returned to the Technical University of Liberec after ten years. The diploma thesis from the University of Liberec was awarded after 17 long years, and for the first time ever, a female scientific couple was awarded.

Exceptional results were also achieved by BSP Design students. Ondřej Kábele won the Stanislav Libensky Award, Josefína Váchová, awarded for her glass design in the Master of Crystal competition.

Participation of academic staff in the editorial boards of international scientific journals

Materials Science – Textiles is one of the Web of Science research subfields in which FT is active and is pivotal for the faculty in the area of R&D. In the Journal Citation Reports for the year 2023, 30 specialist journals are indexed in the Materials Science – Textiles subfield. In eight journals, FT is represented on the editorial board (according to JIF 2×Q1 2×Q2 1×Q3 1×Q4 2×N/A), i.e., FT is represented by academic staff on the editorial boards of prestigious international textile journals, which cover the entire breadth of the textile field. Since 1994, FT has been a co-publisher of the specialist journal Vlákna a textil (Slovakia), ISSN: 1335-0617 (http://vat.ft.tul.cz), indexed in the SCOPUS database (https://www.scopus.com/sourceid/17198). Table 3.2.2 shows the involvement of academics of different age categories.

Elected memberships in professional societies

The membership of FT academic staff in professional societies includes several important functions and involvements that support the FT's international prestige and contribute to its involvement in R&DI. A summary of the most important memberships follows:

1. International and European organisations:
    - FEANI (European Federation of National Engineering Associations): Prof. Jiří Militký holds the position of President of the Czech Monitoring Committee in Brussels.
    - Textile Bioengineering and Informatics Society: Prof. Jiří Militký is the Vice-Chairman of the International Executive Committee
2. National involvement:
    - CLUTEX – klastr technické textilie o.s.: Ing. Gabriela Krupincová works as a member of the administrative committee.
    - Czech Technology Platform for Textiles (ČTPT): Prof. Zdeněk Kůs is a member of the administrative committee.
3. Specialised professional organisations:
    - Membership in organisations focussing on colour and lighting and such as CIE (Commission Internationale de l'Eclairage), where doc. Michal Vik holds various positions.

The most important invited lectures of academic staff abroad

The most significant can be considered the long-term work of prof. Jakub Wienera and doc. Dr. Ing. Dana Křemenáková teaching a course at MSP WETEAM Textile Engineering Ghent University, Belgium (more in table 3.2.3, where younger colleagues are more represented).

The most important lectures by foreign scientists and other guests

In the period under evaluation, 31 invited lectures by foreign experts took place. The examples in Table 3.2.4 represent both the geographic and thematic breadth of professional contacts.

Involvement in the evaluation of national or European project/programme calls is lower. The reason is the specific focus of FT: research activities target specific areas that may have lower representation in European priorities, which may affect the relevance of project proposals to the challenges. Prioritisation of national projects: the historically close cooperation with Czech industry has led to a preference for calls focused on applied research with a direct impact on the national level.

Other services to the scientific community

Art exhibition activity: FT guarantees the activity of the university Gallery N (Czech and foreign works and the presentation of well-known authors and student works. Employees of the Department of Design participate as exhibitors in other exhibition, competition, or presentation activities, (e.g. 21 in the Czech Republic and 10 abroad per year)

Organisation of seminars, webinars, summer schools, and conferences (see chapter 3.7 FT traditionally organises international conferences (International Conference STRUTEX – 23rd year) and summer schools (e.g., Fabric patterning – 6th year) and seminars or webinars focused on textiles (e.g., in cooperation with Thai and Indian institutions).

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
Employees		
Oldřich JIRSÁK, prof. RNDr. CSc.	Order of Laurel for lifelong contribution in the field of science and research (2019)	Chamber of Commerce of the Czech Republic
Luboš HES, prof. Ing. DrSc., Dr.h.c	Doctor honoris causa form NITJ (2019)	National Institute of Technology in Jalandhar
Mohanapriya. VENKATARAMAN, M.Tech., M.F.Tech., Ph.D.	Outstanding presentation award (2020)	The Textile Bioengineering and Informatics Society (TBIS)
Students		
Jakub ERBEN, Ing. Ph.D.	1st Prize of The International Théophile Legrand Textile Innovation Award (2019)	Théophile Legrand Foundation
Jakub ERBEN, Ing. Ph.D.	Award for extraordinary results in scientific activity (2022)	Minister of Education, Youth and Sports
Senta MULLEROVÁ	1st Place for Best Thesis 2021 Werner von Siemens Prize (2022) Incorporation of Antibiotics into Biodegradable Nanofibrous Layers for New Medical Applications	Siemens, s. r. o.
Markéta KLÍČOVÁ, Ing.	1st Place for Best Thesis 2021 Werner von Siemens Prize (2022) Incorporation of Antibiotics into Biodegradable Nanofibrous Layers for New Medical Applications	Siemens, s. r. o.
Ondřej KÁBELE	1st place, Stanislav Libensky Award (2023)	Stanislav Libensky Award
Anežka KOTKOVÁ	Good student design, Award of the Dean of the Faculty of Design and Art Ladislav Sutnar, Award for Ecology (2023)	National Award for Student Design 2023
Josefína VÁCHOVÁ	Master of Crystal Competition and Exhibition 1st place (2023)	Museum of Glass and Jewellery in Jablonec n. N

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
Luboš HES, prof. Ing. DrSc., Dr. h. c.	Editorial Board *Journal of Industrial Textiles*, ISSN: 1528-0837 (WoS, Materials Science – Textiles, Q1, JIF RANK 7/30), https://journals.sagepub.com/editorial-board/JIT
Luboš HES, prof. Ing. DrSc., Dr. h. c..	Editorial Advisory Board *Textile Research Journal*, ISSN: 0040-5157, (WoS, Materials Science – Textiles, Q2, JIF RANK 13/30) https://journals.sagepub.com/editorial-board/TRJ
Jiří MILITKÝ, prof. Ing. CSc.	Scientific Board, *Fibers and Textiles in Eastern Europe*, ISSN 2300-7354 (WoS, Materials Science – Textiles, Q3, JIF RANK 20/30), http://www.fibtex.lodz.pl/en4,scientific_board.html
Petra KOMÁRKOVÁ, Ing. Ph.D.	International Editorial Board, *Tekstilec,*

	ISSN 0351-3386 (WoS, Materials Science – Textiles, Q3, JIF RANK 20/30), http://www.tekstilec.si/?page_id=14&lang=en
Maroš TUNÁK, doc. Ing. Ph.D.	Editor in Chief, *Vlákna a textil*, ISSN: 1335-0617, SCOPUS http://vat.ft.tul.cz/Office/office.html
Adnan Ahmed MAZARI, Ing. Ph.D.	Editorial Board Member, *Industria Textila*, ISSN 1222-5347 (WoS, Materials Science – Textiles, Q3, JIF RANK 17/30), http://revistaindustriatextila.ro/editorialboard.html
Pavla TĚŠINOVÁ, Ing. Ph.D.	Editorial Advisory Board Textile & Leather Review ISSN 2623-6281, SCOPUS https://www.tlr-journal.com/editorial-board/
Blanka TOMKOVÁ, Ing. Ph.D.	Editorial Board Member, *Journal of Testing and Evaluation* ISSN 0090-3973 (WoS, Materials Science – Characterisation and Testing, Q4, JIF RANK 31/38), https://www.astm.org/journal-of-testing-and-evaluation.html#editorial-board
Lukáš ČAPEK, doc. Ing. Ph.D.	Associate Editor, *Journal of Engineered Fibers and Fabrics*, ISSN 1558-9250, (WoS, Materials Science – Textiles, Q1, JIF RANK 7/30), https://journals.sagepub.com/editorial-board/JEF
Mohanapriya VENKATARAMAN, M.Tech., M.F.Tech., Ph.D	Associate Editor *Journal of Fiber Bioengineering and Informatics*, ISSN 1940-8676, SCOPUS https://www.global-sci.org/jfbi

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
Jakub WIENER, prof. Ing. Ph.D.	"Dyeing of textiles, printing, textile chemistry, finishing of textiles", teaching of course in MSP WETEAM Textile Engineering	Ghent University, Belgium within the activities of the Autex association	2019 2020 2021 2022 2023
Dana KŘEMENÁKOVÁ, doc. Dr. Ing.	"Nanotechnology in textile branch: Basic of nanotechnology, Nanophysics, Nanoparticles, Nanofluids, Nanostructures" teaching of course in MSP WETEAM Textile Engineering	Ghent University, Belgium within the activities of the Autex association	2020 2021 2022 2023
Luboš HES, prof. Ing. DrSc., Dr. h. c.	"Principles of Clothing Comfort"	ITB Dresen	2019
Jiří MILITKÝ, prof. Ing. CSc.	Characterisation and Ultimate Strength of Hybrid Glass Tapes.	14th Textile Bioenginnering and Informatics Symposium (TBIS)	2021
Luboš HES, prof. Ing. DrSc., Dr. h. c.	The Effect of Surface Structure of Cotton Knits on Their Water Vapour Permeability, Effusivity and Thermal Resistance	International Conference on Sustainability in Technical Textiles ICTS 2021. Bannari Amman Institute of Technology in South India. Indie	2021
Michal VIK, prof. Ing. Ph.D.	Series of lectures on Lighting Engineering within Programa de Pós-Graduação em Engenharia Elétrica (Online)	UFSM (Federal University of Santa Maria) in Brazil	2021

Mohanapriya VENKATARAMAN, M.Tech., M.F.Tech., Ph.D	Keynote medal lecture (Online): Application of Porous Activated Carbon Structures for Deactivation of SARS-CoV-2 - Outstanding Reviewer Award	15th Textile Bioenginnering and Informatics Symposium (TBIS), Liberec, Czech Republic	2022
Mohanapriya VENKATARAMAN, M.Tech., M.F.Tech., Ph.D	Keynote speaker (Online): Fly Ash Fillers and Impact Resistance of Expoxy matrices	The 2nd China-CEECs Symposium on Advanced Fiber Material, China	2022
Mohanapriya VENKATARAMAN, M.Tech., M.F.Tech., Ph.D	Keynote medal lecture (Online): Advanced Fibrous Structures for Enhanced Thermal Insulation	16th Textile Bioenginnering and Informatics Symposium (TBIS), Poznan, Poland	2023
Mohanapriya VENKATARAMAN, M.Tech., M.F.Tech., Ph.D	Invited speaker (In-person): Recent Research in Textile Material Engineering Invited speaker (In-person): Multilayered Fibrous Structures for High- Performance Thermal Application	Wuhan Textile University, China 2023 International Conference on the Cooperation and Integration of Industry, Education, Research, and Application, Zhejiang Sci-Tech University, Hangzhou, China	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
Alan GONCA, res. assist. Dr.	Usak University, Türkiye	Nonwovens and Recycling in Textiles, Novel approaches in management of solid textile wastes, Alternative usage areas for sustainable recycled textile structures	2019
Klara KOSTAJNŠEK, doc. dr.	University of Ljubljana, Slovenia	Weaving on a laboratory scale, planning new woven products development	2019
Javed SHEIKH, assoc. Prof. Dr.	Indian Institute of Technology New Delhi, Indie	Sustainable Textile Chemical Processing, Natural Dyeing, Eco-Friendly Functionalisation Of Textile Materials	2019
Carmen VISCONTREe, assoc. Prof. Dr.	Bergamo University, Italy	Advanced and Specialised Textile Processing – Mechanical	2020
Sofien Ben LTOUFA, prof. Dr.	University Monastir, Tunesia	Heat and Mass transfer in real conditions of its use	2020
Yordanka ANGELOVAa, PhD	University Gabrovo, Bulgaria	Advanced and Specialised Textile Processing – Knitting	2020
Alain BOURMAUD, Dr. Hab.	University of South Brittany, Dupuy de Lôme Research Institute (IRDL)	Multi-scale impact of flax fibres specificity on textile preforms and biocomposite properties	2022
Yiska GOLDFELD, assoc. prof.	Faculty of Civil and Environmental Engineering TECHNION – Israel Institute of Technology	Smart self-sensory Textile Reinforced Concrete Structures - Achievements & Challenges	2022
Monica GOMEZ, prof.	Science Faculty, Universidad Nacional de Ingenieria, Lima, Peru	Textiles functionalised with metal oxides	2023
Hideo YASUNAGA, prof.	Kyoto Institute of Technology	Dyeing and functional finishing by using biobased materials	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
Roman KNÍŽEK, Ing. Ph.D.	Technological incubation	CzechInvest	2023
Veronika TUNÁKOVÁ, Doc. Ing. Ph.D.	CL - Programme to support applied research and innovation in the field of transport - TRANSPORT 2030 (2023 - 2030)	Technology Agency of the Czech Republic	2022 2023
Veronika TUNÁKOVÁ, Doc. Ing. Ph.D.	TM - DELTA 2 Applied Research, Experimental Development and Innovation Support Programme (2020 - 2025)	Technology Agency of the Czech Republic	2022 2023
Veronika TUNÁKOVÁ, Doc. Ing. Ph.D.	FW - TREND (2020 - 2027)	Technology Agency of the Czech Republic	2022 2023
Dana KŘEMENÁKOVÁ, doc. Dr. Ing.	MOBILITY programme Calls: Czech - Germany Czech -France Czech - Austria	Technology Agency of the Czech Republic	2020 2021 2022 2023
Jiří Militký,Prof. Ing. CSc.	Areas: #563 Materials Science and Engineering #372 Composite Material #420 Sustainability	Top Scholar at ScholarGPS	2022
Zdeněk KUS, prof. Dr. Ing.	Member of the Control Board	Technology Agency of the Czech Republic	2023
Zdeněk KUS, prof. Dr. Ing.	Member of the Presidium - Vice-Chairman	Technology Agency of the Czech Republic	2019 2020 2021 2022

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

research[22]) that it has implemented or participated in during the period of 2019–2023[23]. 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:

FT implements (mostly in cooperation with enterprises) applied research projects of various providers (most often the Ministry of Industry and Trade, the Technology Agency of the Czech Republic, the Ministry of Health, the Ministry of the Interior Ministry of Education, Youth and Sports). The projects presented here were selected in order to document the extent of applications of textile fibre formations, which corresponds to the social and knowledge contribution of FT. For each project, the R&D area implemented at FT, which the project represents, is indicated. Social relevance is demonstrated through the specific results (a complete overview in the appendix, tables 3.3.1 and 3.3.2 with regard to the achieved results or the application potential of the projects).

A) Projects supported by public funds – FT as the main beneficiary:

1. Hybrid materials for hierarchical structures (2018-2023, EF16_019/0000843)

The research involved the connection of textile engineering, materials research, and applied sciences, with interdisciplinary cooperation between TUL workplaces playing a key role. Another objective of the project was to connect research capacities across the Faculty of Textiles (FT), the Faculty of Mechanical Engineering (FME), and the Institute for Nanomaterials, Advanced Technologies and Innovations (CxI) in the development of hybrid materials with hierarchical structures. The results of the project contributed to the development of materials with unique mechanical, thermal, and biological properties, which are used, for example, in building composites, medical implants, or functionalised textiles. The project significantly strengthened the connection between basic and applied research at FT and contributed to its position as an excellent centre for materials research. The results also reflect FT's strategic objective, i.e., to support innovations with a high social and industrial impact.

2. R-DETI: Improving the quality of care for children suffering from dermatological troubles (2020–2022, TL04000150)

This project explored the social, ethical, and health aspects of caring for children suffering from dermatological troubles, with an emphasis on the development of functional textiles. The result was innovative clothing with antibacterial properties that improve comfort and hygiene. The project had a strong social impact, especially in the area of healthcare and childcare. Co-investigators: VÚB a.s., Charles University / Faculty of Medicine in Hradec Králové. The project involved cooperation with experts from the fields of medicine and social sciences, which ensured an interdisciplinary approach and the application of results in practice. R-DETI contributed to expanding the possibilities of

[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.

personalised care for children with special needs and strengthened the role of FT as a centre of innovation with a direct social impact. The project also raised awareness of the importance of connecting research and practical applications in the field of medical textiles.

3. Eco-clothing collection (2023 – 2026, TQ01000450)
The project focuses on the development of sustainable clothing products that combine innovative technologies, ecological materials, and timeless design. The aim is to create clothing with a minimal ecological footprint, which at the same time meet the requirements for functional, aesthetic and psychological comfort. The project supports the circular economy by using recycled and biodegradable materials. The resulting collection reflects the interdisciplinary collaboration between materials engineering and textile design. This project contributes to the fulfilment of FT's mission of innovation for sustainability and the transformation of the textile industry towards environmental responsibility. It connects scientific research with creative practice and represents an important step towards the development of sustainable fashion.

4. Prevention of intestinal anastomotic leakage (2020–2023, NU20J-08-00009)
The project focused on the development of nanofibrous biodegradable materials for the prevention of postoperative complications, especially intestinal anastomotic leakage and postoperative adhesions. The aim was to create innovative medical materials that improve the healing process and reduce the risk of complications in patients after surgical procedures. The research resulted in biodegradable layers with targeted drug release, which were tested in collaboration with clinical partners. The materials have demonstrated the ability to improve functional tissue regeneration and reduce post-operative infection rates, representing a significant benefit to healthcare. The project partner was Charles University Faculty of Medicine in Pilsen. The project emphasised the interdisciplinarity between textile engineering and biomedicine, thereby strengthening the ability of FT to transfer research results into practice in the field of health technology. The results also the strategy of FT, i.e., to support innovations with a direct impact on improving the quality of life of patients.

B) Projects supported by public funds - FT in the role of other participant
5. Smart textile against CBRN agents (2017–2020, VI20172020059)
The project focused on the development of smart textiles that provide protection against chemical, biological, radiological, and nuclear (CBRN) agents. The aim was to create materials with high barrier efficiency, long-term stability, and the ability to respond to specific hazards. The research led to the development of advanced nanocomposite textiles that were tested for resistance to a wide range of CBRN agents. The resulting materials have found application in protective clothing for emergency services, industrial workers, and other groups exposed to the risk of contact with dangerous substances. The project leader was Státní ústav jaderné, chemické a biologické ochrany, v.v.i. The project highlighted the importance of interdisciplinary collaboration between textile engineering, chemical research, and safety technologies. The results significantly contributed to strengthening the ability of FT to implement research with high social and industrial value and to respond to current security challenges.

6. Texderm – Textiles and clothing showing increased comfort intended for specific needs of children suffering from dermatological troubles (2017–2021, FV20287)
The project focused on the development of textiles and clothing intended for children with sensitive skin who need special care. The aim was to create materials with increased comfort and antibacterial properties that reduce skin irritation and improve the quality of life of users. Principal investigator: VÚB a.s., co-investigator Charles University Faculty of Medicine in Hradec Králové. FT contributed to the development of functional textiles, which were tested in terms of mechanical and health

properties. The project involved working with medical professionals to ensure that the resulting products met the specific needs of the target group. The project showed the potential of textile research in personalised healthcare and strengthened the role of FT in the field of textiles aimed at health and social needs.

7. VIDTEX – Smart textiles for increased safety in transport (2019–2022, FV40323)
The objective of the VIDTEX project was to increase the safety of road users through the development of smart textiles and clothing with reflective and luminescent properties. Principal investigator: VÚB a.s. FT focused on the development of advanced materials that ensure visibility under various lighting conditions. The project brought new materials with a long service life and high resistance to external influences. These materials have found application in clothing for pedestrians, cyclists, and workers in the transport sector. VIDTEX promoted the use of smart textiles in practice and contributed to greater road safety, demonstrating the practical benefit of FT research for society.

8. Complete removal of nitrogen and phosphorus from wastewater (2019–2022, TH04030390)
The project focused on the development of textile biomass carriers for efficient wastewater treatment, specifically on the removal of nitrogen and phosphorus. The result was textile structures that support biological treatment processes and increase treatment efficiency in industrial and municipal treatment plants. Principal investigator: Technical University of Liberec / Institute for Nanomaterials, Advanced Technologies and Innovations. FT played a key role in the development and optimisation of textile materials, which were successfully tested in real operation. The project contributed to expanding the possibilities of using textile materials outside of traditional areas, with an emphasis on environmental protection. The project underlined the applicability of FT research in ecological innovations and demonstrated FT's ability to respond to current environmental challenges.

9. Antifibrotic fibre material for reducing intraocular pressure in glaucoma (2023–2026, NU23-08-00586)
The project focuses on the development of an innovative fibre material designed to prevent fibrotisation and effectively reduce intraocular pressure in patients with glaucoma. The aim is to create a medical material that supports tissue regeneration, minimises post-operative complications, and improves the effectiveness of surgical interventions. Principal investigator: Charles University 3rd Faculty of Medicine. Research links textile engineering with medicine, with advanced fibre processing technologies and the application of biologically active substances playing a key role. Materials developed at FT are tested in collaboration with clinical partners to meet requirements for biocompatibility and functional properties. The project significantly contributes to the field of health innovations, especially ophthalmology, and strengthens the ability of FT to transfer research results into practice. It also contributes to the development of interdisciplinary solutions with a direct impact on improving the quality of life of glaucoma patients.

C) Contractual research
10. SaYu, a.s. Czech Republic – Development and innovation of a special absorbent layer
In the framework of the cooperation with SaYu, a.s., FT participated in the development of a special absorbent layer designed for innovative hygiene products. The aim was to create a material with high absorbency, fast absorption, and a long service life. FT conducted research focused on the optimisation of textile structures and properties, which led to a significant improvement in the utility

properties of the final products. The project brought a commercially applicable result that was successfully established on the market. This cooperation underlined the role of FT as a reliable partner in the field of contractual research and contributed to the practical application of innovations in the industrial sphere.

Evaluation of effectiveness and impacts
The selected projects represent the wide range of FT research activities with clear application potential. A key aspect is their interdisciplinarity and the ability to connect academic research with practice, whereby FT contributes to fulfilling its mission and solving societal challenges.

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	Sophisticated hybrid tapes for fabrication of composites (2017 – 2019, TJ01000292)	1058/41.7				
Minister of Education, Youth and Sports	Development and research of modified fabrics by nanoparticles for the protection of human health and electronic equipment (2019 – 2021, 8J19UA011)	89/3.5		89/3.5		
Minister of Education, Youth and Sports	Design of multi-layer micro/nano fibrous structures for air filters applications (2019 – 2021, 8JCH1064)	147/5.8				
Minister of Education, Youth and Sports	Hybrid materials for hierarchical structures, (EF16_019/0000843, 2018-2023) – FM, FT, CxI	16686/658.2	21000/828.4	14000/552.3	822/32.4	
Technology Agency of the Czech Republic	R-DETI Improving the quality of care for children suffering from dermatological troubles from the point of view of ethics, social and health care in times of		642/25.3	1655/65.3	1426/56.3	

[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.

	pandemic crises (2020 – 2022, TL04000150)					
MZO	Prevention of intestinal anastomotic leak and postoperative adhesions using nanofibrous biodegradable materials (2020 – 2023, NU20J-08-00009)		1316/51.9	2188/86.3	2194/86.5	1897/74,8
Grant Agency of the Czech Republic	Advanced structures for thermal insulation in extreme conditions (2021 – 2025, GM21-32510M)			2425/95.7	2497/98.5	2497/98,5
Technology Agency of the Czech Republic	Eco-clothing collection (2023 – 2026, TQ01000450)					1400/55,2
MEYS	Student Grant Competition (SGS)	5081/200.4	3948/155.7	3539/139.6	3637/143.5	3411/134,6
Total		23061/909,7	26906/1061.4	23896/942.6	10576/417.2	9205/363.1
In the role of another participant						
Provider[27]	Project name	Support (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
Ministry of Industry and Trade	MEDITEX - Research and development of new types of advanced textile materials with high potential for application in special textiles intended for health and aftercare. (2016- 2019. FV10098)	1421/56.2				
Ministry of the Interior	Smart textiles against CBRN substances (2017 – 2020. VI20172020059)	2401/94.9	2311/91.3			
Ministry of Industry and Trade	Hybrid security element (2016-2019. FV10356)	1025/40.5				
Ministry of Industry and Trade	Nanofiber covers for skin defects (2016-2019. FV10416)	1571/62.1				
Ministry of Industry and Trade	Special clothing and textile products with high utility properties	260/10.3				

[27] Ibid.

	based on a new generation of intelligent materials, which will increase the efficiency of health and social care for the elderly (2015 – 2020. EG15_019/0004528)					
Ministry of Industry and Trade	SeniorTex – smart modular clothing and special textile products with integrated electronic microsystems for improving the quality of health care for the aging population and disabled people (2016 – 2020. FV10111)	1491/58.9	984/38.9			
Ministry of Industry and Trade	Sky Paragliders a.s. – research and development of new technical fabric for air rescue systems (2015 – 2020. EG15_019/0004588)	1411/55.8	249/9.8			
Minister of Education, Youth and Sports	Wearable IoT (2017 – 2020. LTE217018)	259/10.2	172/6.8			
Technology Agency of the Czech Republic	SMARTTHERM – Intelligent thermoregulating fibres and functional coating of textiles based on heat-resistant encapsulated PCM (2019 – 2021. TF06000048)	730/28.9	750/29.6	740/29.2		
Ministry of Industry and Trade	Texderm – textiles and clothes with increased comfort for the specific needs of children suffering from dermatological troubles. (2017 – 2021. FV20287)	1034/40.9	1034/40.9	534/21.1		
Technology Agency of the Czech Republic	Heat exchangers with hollow polymer fibres for the automotive industry (2019 – 2022. TH04010031)	400/15.8	400/15.8	400/15.8	400/15.8	
Ministry of Industry and Trade	VIDTEX - Smart textiles and clothing with high utility properties to	252/10	1293/51.1	1212/47.9	1212/47.9	

	increase safety in transport. especially visibility (2019 – 2022. FV40323)					
Ministry of Industry and Trade	Processing of waste and recycled textile fibres (2019 – 2022. FV40025)	448/17.7	698/27.6	698/27.6	632/25	
Technology Agency of the Czech Republic	PROSYKO – Pro-Active System of Commercialisation at TU Liberec (TG01010117): CxI-FT sub-projects – TUL. FT	703/27.8	1138/45	1605/63.4	441/17.4	
Technology Agency of the Czech Republic	Complete removal of nitrogen and phosphorus from wastewater using purpose-made textile biomass carriers (2019 – 2022. TH04030390) – CxI. FT	265/10.5	232/9.2	228/9	104/4.1	
Grant Agency of the Czech Republic	Nanofibrous polymers with the functionality of restricted access materials for on-line chromatographic extractions of complex matrices (2020 – 2022. GA20-19297S)		1171/46.3	1171/46.3	1158/45.8	
Ministry of Industry and Trade	Textile structures combining protection against viruses and comfort (2021 – 2023. EG20_321/0024467)				715/28.3	1401/55.4
Technology Agency of the Czech Republic	MultiTex – Advanced smart textiles with multifunctional effects for improving the quality of professional and functional clothing in a risky environment (2021 – 2024. FW03010095)			1794/70.9	1798/71.1	1818/71.9
Ministry of the Interior	Modular multisensory professional clothing for risk management, health protection and safety of IRS members using artificial intelligence methods. (2022 – 2025. VJ02010031)				1977/78.1	1977/78.1
Technology Agency of	Research and development of special textiles for protection					1135/44.9

the Czech Republic	in emergency and crisis situations "TexPrevent". (2023 – 2026. FW06010021)					
Technology Agency of the Czech Republic	Nanofibrous extraction sorbents for chromatographic analyses. (2023 – 2026. FW06010698)					1371/54.2
Ministry of Health	Antifibrotic fibre material for reducing intraocular pressure in glaucoma. (2023 – 2026. NU23-08-00586)					982/38.8
Total		13671/540.4	10432/412.3	8382/331.3	8437/333.5	8684/343.2

Table 3.3.2 - Contract research activities

Client[28]	Activity name	Revenue (in thousands CZK/EUR)				
		2019	2020	2021	2022	2023
Večerník s.r.o Czech Republic	Verification of electromagnetic shielding efficiency, thermal reflection and transmittance in the IR region	660/26.1				
Sintex a.s. Czech Republic	Research, development and evaluation of extremely shielding textile structures for special applications	660/26.1				
Dekonta a.s. Czech Republic	Technical solutions for personal protective clothing using nanocomposite barrier materials against industrial and CBRN agents	200/7.9	550/21.7	309/12.2	310/12.3	
Pardam Nano4fibers s.r.o. Czech Republic	Development of biodegradable textiles using spunbond technology		100/4			
Riocath Research Institute, a.s. Czech Republic	Development of a mixture of suitable materials for the construction of a fibrous structure		49/1.9			
Procter & Gamble Service GmbH NĚMECKO	Production of non-woven textiles from staple fibres by needling process, optimisation of the process			150/5.9		
KOH-I-NOOR HARDTMUTH a.s. Czech Republic	Conversion of the limits of the colorimetric triangle to the CIELAB colorimetric system			47/1.9		

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

Healthy Apparel, Ltd. CANADA	Optimisation of spun-blown filter media				672.6	223/8.8
Procter & Gamble Service GmbH NĚMECKO	Campaing Nonwoven – parameter tests for machine settings				150/5.9	
Deva-FM s.r.o. Czech Republic	Development of a new suit for firefighters					490/19.4
SaYu, a.s. Czech Republic	Development and innovation of a special absorbent layer					890/35.2
CitiZen s.r.o. Czech Republic	Innovation of quick-drying swimwear					475/18.8
Faramugo, s.r.o. Czech Republic	The design of the construction of the hybrid jacket, including the cutting solution					490/19.4
Dimatex CS, s.r.o. Czech Republic	The development of a garden kitchen from recycled materials with an emphasis on sustainability					280/11.1
TykvaNet, s.r.o. Czech Republic	Design and development of prototypes of the so-called anti-flood bags					405/16
Direct Alpine, s.r.o. Czech Republic	Finding a suitable way to reuse non-functional products					490/19.4
Direct Alpine, s.r.o. Czech Republic	Finding suitable materials from recycled raw materials and developing a new hydrophobic treatment					100/4
Nil Textilie Czech Republic	Development of an ecological skin substitute					650/25.7
Grund a.s.	Development of the company's product recycling technology				438/17.3	
Jihočeský vědecký park	Development of a new highly absorbent knitted fabric for optimal moisture distribution with subsequent use for incontinence aids and menstrual panties				100/4	
TryMee Clothing s.r.o.	Verification of the influence of laundry detergent on the properties of textile functional materials				248/9.8	
benaSONET, s.r.o.	Evaluation of the properties of circular textile products					372/14.7
Total		1520/60.1	699/27.6	506/20	1313/51.9	4865/192.3

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 impacts[29], 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:

FT has a long-term focus on research with a practical overlap, which brings positive impacts for society, industry, and the environment. In the period under evaluation (2019–2023), FT implemented and supported several key research results that have either already found practical application or are headed for it in the near future. These results are based on implemented projects and collaborations (chapter 3.3) and were designed with regard to current societal challenges such as sustainability, technological innovation, and improving the quality of life.
The presented results include applications in the fields of healthcare, security, textile industry, and environmental protection. FT places emphasis on taking the gender dimension into account when creating inclusive and diversity solutions that reflect the needs of a wide range of users. A sustainable approach is an integral part of research projects, either through the use of environmentally friendly materials, recycling, or reducing negative environmental impacts.
In the period under evaluation (2019-2023), the following results of applied research are recorded in the authorship/co-authorship of FT employees:

- 30 patents (of which five are co-owned with another organisation / enterprise as a result of a joint project), in 14 cases these include international (4 EU, 2 China, 2 Spain, 2 Japan, 1 Poland, 1 Russia, 2 USA) and 16 national involvement. Evidence of interdisciplinary cooperation is that 48% of the originators are from FT, 48% are from other parts of TUL, and 4% are from other organisations;
- 40 utility models - 25 co-owned with an enterprise (the result of a joint project), 62% of the originators are from FT, 8.4% are from other parts of TUL, and 29.6% are from other organisations;
- Others include two verified technologies, five prototypes, and 43 functional samples

The following text provides an overview of the **10** most significant research results that contribute to solving societal needs and have real potential to improve the lives of individuals, support innovation in industry, and contribute to environmental protection. Each result is supplemented with specific examples of its use, target groups, and expected impacts.

A) Results claimed under co-ownership agreement

1. **Textile composite for the production of personal hygiene aids and a personal hygiene aid based on this composite (utility model, 2021)**

   A solution for the production of hygiene aids mainly for menstruating women or patients with incontinence. Unlike single-use hygiene products, which are often non-recyclable and waste that is difficult to decompose, the utility model makes it possible to create products that can be washed and therefore reused. This ensures comfort, reduces the burden on the environment (compared to disposable aids) and helps fight against menstrual poverty for women.
   The textile composite consists of a supporting and covering layer of fabric, between which a functional vapor-permeable membrane is inserted, which prevents the passage of water and which is laminated to the base layer. The covering layer of the functional composite is made of natural material, i.e., merino wool. This composite material with the trade name SAYUtech (and subsequently SAYUpro) was successfully applied by SAYU in the production of menstrual underwear. The underwear is made with the least possible impact on the environment with the responsible use of human resources and do not contain any harmful substances. The utility model was created based on consumer (societal) demand, and has been put into production and successfully sold, i.e., economically evaluated. The utility model is co-owned by TUL and SaYu s.r.o. The rights to use the result were granted to SaYu s.r.o. through the signed Cooperation Agreement. The contracting parties agreed that SaYu s.r.o. will provide TUL with a share of the use of intellectual property for each product sold for the production of which intellectual property will be used. Based on the company's accounting data, in the last quarter of 2021, approximately 6000 pieces were produced and sold, and in

[29] See Terms definition.

2022, approximately 11,000 pieces. In 2023, approximately 6000 products were sold by the end of August. The initial phase of expansion to Slovakia and Germany is underway.

B) The most significant results leading to application

2. **Textile-based composite material (utility model, 2023)**
   This is a composite with textile reinforcement, which is created by processing discarded textiles and clothing with the smallest possible need for their pre-sorting. The resulting material has a wide range of uses and contributes to solving issues with the reuse of textiles that would otherwise be landfilled or incinerated. The utility model is co-owned by TUL and Diakonie Broumov sociální družstvo based on a co-ownership agreement (2023), which states the percentage of annual turnover the manufacturer pays TUL. The material is in production, and payments are expected to be made in 2024.
3. **Textile composite containing feathers (utility model, 2023)**
   This is a composite material composed of textile, a nanofiber vapor-permeable but waterproof membrane, and feathers. The material concept is suitable for outdoor clothing and combines thermal insulation and waterproofing. The utility model is co-owned by TUL and OutdoorKWAK s.r.o. based on a co-ownership agreement (2023), which states the percentage of annual turnover the manufacturer pays TU. The material is in production, and payments are expected to be made in 2024.
4. **Textile biomass carrier (Utility model 2022); Technology for the complete removal of nitrogen and phosphorus from wastewater using purposefully produced textile biomass carriers (verified technology 2022)**
   Two results were created as part of interdisciplinary interfaculty research (project: TH04030390 – Complete removal of nitrogen and phosphorus from wastewater using purpose-made textile biomass carriers): utility model and verified technology. Pilot operation is underway in the wastewater treatment plant (WWTP) for the Dobrovíz commercial zone (Amazon WWTP). The pilot reactor models the degree of post-nitrification, i.e., the situation where most of the decomposable organic substances are removed, and also the concentration of NH4+-N is in mg/l. Pilot testing confirmed the use of the microfiber carrier for a WWTP. Negotiations are currently underway with TEBO on cooperation in the production of carriers and their supply to WWTPs.
5. **Flat textile, especially for thermal protection of seniors in winter (utility model 2019), Prototype clothing collection (Prototype, 2019)**
   The outputs were created in cooperation with VUB a.s. as part of the project EG15_019/0004528 – Special clothing and textile products with high utility properties based on a new generation of intelligent materials that will increase the efficiency of health and social care for the elderly. The knitwear is made of yarn, which consists of a mixture of modified polyester fibre with antibacterial effects with a small proportion of standard polyester fibre and modified viscose with a flat cross-section of fibres and a serrated surface. The reason for using modified polyester is its antibacterial properties, which add silver ions to the fibre. It is particularly effective against the Staphylococcus aureus and Klebsiella pneumoniae. The additive used ensures a permanent antimicrobial effect that does not affect the wearing or washing of finished products throughout their lifetime. These properties prevent the multiplication of bacteria in the fibre or on the fibres and therefore improve the hygiene of the products. The viscose fibre has been developed for maximum thermal comfort with improved moisture permeability. The intellectual property is co-owned (TUL/VUB a.s.) and negotiations are currently underway regarding the use with Clinitex s.r.o.
6. **Clothing with an emphasis on easy maintenance, especially for children suffering from dermatological troubles (Utility model, 2021), Flat textile in the form of knitwear, especially for dressing children suffering from dermatological troubles (utility model, 2021)**
   The outputs were created in cooperation with VUB a.s. as part of the project FV20287 – TEXDERM; Textiles and clothing showing increased comfort intended for specific needs of children suffering from dermatological troubles. Special flat textile in the form of knitwear for dressing children suffering from dermatological troubles is made from advanced functional textile materials, which form yarns from mixtures of micromodal and viscose fibres. The main and effective ingredient is a viscose fibre containing chitosan, which gives the produced textiles antibacterial properties, which represents for the user a limitation of the reproduction of microorganisms, prevents skin irritation and eliminates odour. Another component of the final product is micromodal fibre. A characteristic feature of micromodal fibre is a very fine, smooth texture and ability to absorb moisture. The fabric is made as a double-sided knit in a double-sided or ribbed knit. The technical solution of special clothing, especially for children suffering from dermatological troubles, is

aimed at easy maintenance of this clothing, made from advanced textile materials with a focus on sensory, ergonomic and physiological comfort of the target group of wearers of the clothing, that is, children with dermatitis to eliminate skin irritation. The intellectual property is co-owned (TUL/VUB a.s.) and negotiations are currently underway with the ethics committee of the Charles University Faculty of Medicine in Hradec Králové regarding the approval of clinical tests.

7. **Clothing with active and passive light signalling for unprotected road users (functional sample, 2021), Flat textile in the form of knitwear, especially for dressing children suffering from dermatological troubles (Utility model, 2021)**
   The output was created in cooperation with VUB a.s. as part of the project FV40323 – VIDTEX - Smart textiles and clothing with high utility properties to increase safety in transport, especially visibility. This garment has the potential to increase the protection of cyclists and pedestrians by increasing visibility. The intellectual property is co-owned (TUL/VUB a.s.) and the first samples are currently being produced to verify the marketing strategy. In the event of success on the market, the revenues for TUL are outlined in the project implementation agreement.

C) Research results with a long-term time horizon of application potential

8. **R&D outputs with a direct impact on the sustainability of production and products**
   In addition to sustainability being considered in all FT activities and projects, FT has several research directions that are directly focused on the sustainability of fibre-based production and products. Two outputs are mentioned here, for which a commercialisation partner is being sought.
   Patent: A method of producing concentrated organic fertilizer from raw sheep's wool, created as part of the project EF16_019/0000843 – Hybrid materials for hierarchical structures solves the processing of waste sheep's wool, which is still incinerated or landfilled and is currently being negotiated with a potential manufacturer.
   Utility model: Visual indicator of washing a textile product proposes a simple indicator that will allow retailers to quickly check if the returned product has/has not been washed when clothing products are returned, which is against the product return conditions and has the potential to reduce costs for retailers in unauthorised clothing returns. We are currently negotiating with potential users - clothing retailers.
9. **R&D outputs intended for protection against viral infection**
   In the period of the COVID-19 pandemic, research teams focused on R&D applications for protection against viral infection. Several solutions were created that are in the FT portfolio for commercialisation. Created as part of project VI20172020059 – Intelligent textiles against CBRN agents:
   - **Portable device for measuring high ozone concentrations (utility model, 2020).** Small and simple electrochemical detectors are currently commonly used to protect the health of workers who work for long periods of time in an environment with an increased probability of higher concentrations of ozone gas. Their disadvantage is their short service life. The result is offered for commercialisation through the university spinoff "The University Company TUL.
   - **Flat ozone generator (Patent, 2020)** The new solution includes a flat perforated supporting structure made of electrically non-conductive material, which is made of textile. The output is offered for commercialisation through the university spinoff "The University Company TUL.
   - **Mouth mask for children with skin diseases (utility model, 2020),** created as part of the project TL04000150 – R-DETI Improving the quality of care for children suffering from dermatological troubles from the point of view of ethics, social, and health care in times of pandemic crises and offers sophisticated multifunctional mouth masks for children suffering from dermatological troubles. We are currently negotiating with Clinitex a.s.
   - Several functional samples were created as part of the project EG20_321/0024467 – Textile structures combining protection against viruses and comfort: protective face mask, set of sweatshirt, elastic pants – clothes that, thanks to the material used, have very good physical-mechanical properties (abrasion resistance, strength...), meet the thermal and physiological comfort values for the 1st and 2nd clothing layers and are also equipped with a special VIRATEX ST/L antiviral treatment. The solutions have the potential to protect and ensure quality life in crisis situations.
10. **Nanofiber technologies and materials**
    Research in the field of nanofibrous materials and technologies, in which FT is a world leader, leads to outputs with a long-term time horizon, where already existing results have a great potential of impact on

improving the quality of life. Therefore, it is crucial for the entire university to protect outputs with international patents. The following were applied in the period under evaluation:

- **Method for producing polymeric nanofibers by electrospinning a polymer solution or melt, a spinning electrode for performing the method and a device for producing polymeric nanofibers equipped with at least one such spinning electrode** [EU] [ES] [RU] [US].
- **A linear fibre forming body having a coating of polymer nanofibers covering the supporting linear forming body constituting the core, a manufacturing method thereof, and a manufacturing apparatus** [JP] [US] [CN]

The patents are owned by TUL, the originators are from 3 faculties (FT, FS, FP), i.e. interdisciplinary collaboration. These patents are essential for the protection of unique know-how, which is further developed by teams of various TUL faculties both in materials applications and in technological devices.

For FT, the current development is represented, for example, by the following outputs:

- **Micro / nanofibrous scaffold for tissue engineering (Functional sample, 2019)** - specific structure of a mixture of meltblown micro and nanofibers in animal surgery, a promising at applications in medicine, e.g., in vitro testing of a thymic organoid.
- **Device for incorporating particles into a flat textile containing nanofibers (Functional sample, 2022) -** technology for incorporating particles into a flat textile containing nanofibers has a potential in medical applications.
- **Biodegradable composite nanofibrous layer with anti-adhesive treatment for the prevention of postoperative adhesions (Functional sample, 2023)** – research output from the project NU20J-08-00009 – Prevention of intestinal anastomotic leakage and postoperative adhesions using nanofibrous biodegradable materials, which is an ongoing research project, in vivo tests of the new structures on animal models are currently underway.

These results illustrate the practical impact of FT's research on society and industry, many of which involve sustainability, either by reducing waste, protecting health, or promoting green practices. In some cases, aspects of the gender dimension are also taken into account, especially in the field of health applications, where products are designed for a wide range of users regardless of gender.

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

Type of result[30]	Year of application	Name
Utility model	2021	Textile composite for the production of personal hygiene aids and a personal hygiene aid based on this composite
Utility model	2023	Textile-based composite material
Utility model	2023	Textile composite containing feathers
Utility model	2022	Textile biomass carrier
Verified technology	2022	Technology for the complete removal of nitrogen and phosphorus from wastewater using purposefully produced textile biomass carriers
Utility model	2019	Flat textile, especially for thermal protection of seniors in winter
Utility model	2021	Flat textile in the form of knitwear, especially for dressing children suffering from dermatological troubles 2021
Utility model	2021	Clothing with an emphasis on easy maintenance especially for children suffering from dermatological troubles 2021
Functional sample	2021	Clothing with active and passive light signalling for unprotected road users
Patent	2021	A method of producing concentrated organic fertilizer from raw sheep's wool
Utility model	2023	Visual indicator of washing a textile product
Utility model	2020	Portable device for measuring high ozone concentrations
Patent	2020	Surface ozone generator
Utility model	2022	Mouth mask for children with dermatological diseases
Functional sample	2023	VIRATEX-RO protective face mask

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

Functional sample	2023	Sports set of two-layer VIRATEX sweatshirt and VIRATEX sports tight elastic pants
Functional sample	2023	VIRATEX long-sleeved polo work shirt
Functional sample	2023	Device for measuring the penetration of virus-containing aerosols through an active layer or multilayer structure
Patent	2020	Method for producing polymeric nanofibers by electrospinning a polymer solution or melt, a spinning electrode for performing the method and a device for producing polymeric nanofibers equipped with at least one such spinning electrode [EU][ES] [RU] [US]
Patent	2020	A linear fibre forming body having a coating of polymer nanofibers covering the supporting linear forming body constituting the core, a manufacturing method thereof, and a manufacturing apparatus thereof [JP] [US] [CN]
Functional sample	2019	Micro/nanofibrous scaffold for tissue engineering
Functional sample	2022	Device for the incorporation of particles into a flat textile containing nanofibres
Functional sample	2023	Biodegradable composite nanofiber layer with anti-adhesive treatment for prevention of postoperative adhesions

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:

FT systematically supports the transfer of R&D results into practice through cooperation with industrial partners, public institutions, and the community sector and, of course, through teaching in accredited study programmes. The main aim is to ensure that research results find real use, contribute to the development of innovations, and respond to current social challenges.

[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.

FT has a clearly defined system for the transfer of results, which includes:

1. **Strategic partnerships with the application sphere**

FT systematically cooperates with industrial enterprises, public institutions, and non-profit organisations. This cooperation includes:

- Joint projects focused on applied R&D (e.g., development of smart textiles for security applications, or medical use).
- Contractual research and development, adapted to the needs of specific partners

2. **Support of the application of research through technology and know-how**

Direct application of research results through the production of experimental materials (e.g., meltblown textiles during the COVID-19 pandemic). Technology transfer in the form of the sale of licenses for innovations that are the result of research activities.

3. **Commercialisation of results** through**:**
   - University spinoff "The University Company TUL"
   - Student participation in the Student Business Club
   - Consulting services provided to enterprises.
4. **Finding and engaging new users**
5. **Innovation support system,** infrastructural and organisational support for the transfer of results includes:
   - Laboratories where direct development and verification of results takes place
   - Popularisation of R&D results, which increases awareness of the possibilities of their application
   - A system of services related to the transfer of technology to TUL (consultation and advice for creating contracts and negotiating contractual terms)
6. **Consideration of sustainability and the gender dimension**
   - FT emphasises sustainable development and inclusivity, which is reflected in the focus of results on ecological materials, the circular economy, and the wider applicability of innovations.

The most typical users of FT results

1. **Industrial enterprises – implementation of joint project** Example: joint projects with VUB a.s. (five projects of the Ministry of Industry and Trade for the period under evaluation)
2. **Industrial enterprises - works contracts** Example: SaYU a.s., the initial work contract grew into joint research that led to an R&D result applied under a co-ownership agreement.
3. **State Administration** Example: Liberec Region - as part of solving the crisis situation in the first wave of the COVID-19 pandemic, FT produced non-woven textiles, which it provided to the regional crisis staff, more than 40 km of material was produced.
4. **Research organisations** Example: 3rd Faculty of Medicine/ Charles University cooperation in implementing the project Antifibrotic Fibre Material for Reducing Intraocular Pressure in Glaucoma, (2023 – 2026, NU23-08-00586), the provider was the Ministry of Health
5. **Association of companies.** FT is actively involved in the creation of national strategies for the textile and clothing industry. FT is a member of the Association of the Textile-Clothing-Leather Industry (ATOK), Czech Technological Platform for Textiles (ČTPT), the Techniké Textilie Clutex o.s. cluster. It has cooperated with other members of these groups for a long time.

Searching for new users of results

FT actively searches for new users at the following events:

1. **Industrial trade fairs** (e.g., ITMA, ISPO, IDET)
2. **International conferences** (e.g., STRUTEX)
3. **Networking events** (e.g., CLUTEX o.s. committee for R&D, ATOK annual general meeting…)
4. **Popularisation events** (e.g., Mercedes Benz Fashion Week, press conference)

5. **Individual consultation with enterprises** (e.g., cooperation with OutdoorKWAK s.r.o. began on the basis of personal contacts between FT scientists and company employees)

Commercialisation of R&D results

FT actively commercialises and evaluates its research results through the procedures given below. This enables the effective transfer of results into practice and their application in the industrial environment, healthcare, and other areas.

- **Co-ownership of intellectual property** (Research results are often protected by utility models, patents, or functional samples, which are subsequently licensed to commercial partners. Co-ownership agreements with enterprises include, for example, a share of the revenue for each product sold or a percentage of the production turnover (e.g. SAYUtech menstrual underwear and textiles containing feathers for outdoor clothing from the company OutdoorKWAK a.s.)
- **Support of spin-off and start-up companies** (FT cooperates on technology transfer with a university spin-off company (e.g., ozone measuring device and ozone generator for disinfection)
- **Direct application of the results in industry** (pilot projects, such as the use of textile biomass carriers in wastewater treatment plants, demonstrate direct involvement in addressing specific technical issues. Another example involves the processing of discarded textiles into composite materials that find application in environmental applications.)

Professional consulting activity (FT provides consulting services to enterprises, which expands the possibilities of using R&D and supports effective application in practice).

Evaluation of effectiveness of the transfer of results and commercialisation:

As revenue from non-public sources (other than grants or contractual research), FT registers revenue from the following activities (in order of frequency): expert analyses, consultations, testing, donations to R&D and license fees. The sum of the funds obtained is constant and, in accordance with the FT development strategy, proportional to the size and capacity of the evaluated unit. The most significant benefit of this cooperation is the possibility of establishing new contacts with potential contractors of contractual research and subsequently planning joint projects (a full overview in concluded in the Appendix, Tab. 3.5.1). Although FT has been achieving significant results in research and innovation for a long time, the volume of revenue from the direct commercialisation of these results is relatively limited. This situation is mainly influenced by the preference of corporate partners to engage in joint research projects that are partially or fully financed from public sources. Joint projects allow partners to share the risks and costs associated with the development of innovations, while at the same time exploiting the synergies between academic research and the application sphere. However, these projects often do not provide FT with the possibility of direct economic evaluation of the results, which is reflected in the lower share of revenue from licenses or patent sales. Therefore, FT focuses on finding ways to improve the commercialisation of its results, for example by expanding the portfolio of protected results, targeted support of spin-off companies, and searching for partners who are ready to invest in the direct use of innovations on a commercial basis. This approach reflects not only the needs of industry, but also FT's strategic objective of achieving a greater evaluation of its research for sustainable development and further investments in R&DI.

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
Measurement, training, analysis, pattern design	2090/82.4	4692/185.1	1634/64.5	2385/94.1	2016/79.5

Donations (Gity a.s., Preciosa Foundation, Statutory City of Jablonec)	530/20.9	135/5.3	150/5.9	620/24.9	165/6.5
Licences				5/0.2	10/0.4
Measurement, training, analysis, pattern design	2090/82.4	4692/185.1	1634/64.5	2385/94.1	2016/79.5
Total	2620/103.4	4827/190.4	1784/70.4	3010/118.7	2191/86.4

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 strategy of FT is to focus its popularisation activities on the general public and potential students. Examples are given according to the type of promotion with an emphasis on the synergistic effect of these activities.

A) Presentation of R&D results in a popular form in various media

Successes in R&D are presented in the form of a "story" at press conferences, through the TUL press spokesperson and promotional department, and through social networks. Examples of interesting themes are given below.

1. *ITMA 2019 international trade fair in Barcelona*, presentation of equipment for the production of nanocomposite yarn. The presentation of the production line for alternating spinning is also an example of interdisciplinary cooperation within TUL with the faculties of mechanical engineering and natural sciences, humanities and pedagogy. (2019)
2. Ing. Markéta Klíčová and Ing. Jakub Erben were accepted for an *internship at Harvard* (Wyss Institute for Biologically Inspired Engineering at Harvard University) in 2020. They worked there on the development of organs on a chip with a nanofibrous membrane. FT benefited from further promotion from the information about their research, i.e., 11 independent articles on the website, one session in CRo Plus, and four articles in print media. The following articles can be regarded as the most interesting in terms of promotion: Jakub Erben - Award: Reflex weekly star, for scientific achievements, Markéta Klíčová - Forbes: 30 under 30, interview for Visegrad Female Leaders. (2019, 2020)
3. Presentation of *cooperation in crisis situations*. As part of the solution to the crisis situation in the first wave of the COVID-19 pandemic (16 March 2020, the Government of the Czech Republic declared a state of emergency and the obligation to wear face masks), FT produced non-woven textiles, which it provided to the regional crisis personnel, who dealt with sterilisation and distribution exclusively and preferentially to medical and other staff at this time of urgent operations. Production on laboratory equipment (meltblown) began in March 2020 and ended on 7 May 2020, more than 40 km of material were produced. FT also conducted an analysis answering questions about the quality of materials that are gradually flooding the market. (2020)
4. *In 2022*, six articles were published in the periodical Technicky tydeník, which dealt with presentations of professional themes solved by FT research teams, a presentation of student awards took place (Minister of Education Award - Jakub Erben, Verner von Siemens Award - Senta Müllerová, Ing. Jana Horáková), TV broadcast of the program Touring the Czech Republic of the Future, Friday 29 July 2022, 10:00 a.m., theme: FT cooperation with companies.
5. The reach and attractiveness of the themes can be shown in the evaluation *from 2023*, when FT was presented in various types of media 271 times (radio, television, print and online news), the total advertising value equivalent (AVE) of these themes was 48.68 million CZK. The themes covered by the media the most

were: Recycled Textile Board, Markéta Klíčová, advisor to the Minister; Nanofibrous Sorbents by Jakub Erben; TUL = cradle of nanofibers / celebrates 70 years; Student participation in MBPF 2023

B) Presentation of textile materials and structures in artistic work

6. *Organisation of exhibitions and presentations for the public (Gallery N, G3P)*. FT guarantees the activities of the university's Gallery N in Jablonec nad Nisou, where it prepares exhibitions entitled Personalities of the Artistic Platform, as well as its own creations by employees, student creations, and presentations of other activities (11 exhibitions per year). G3P (Third Floor Gallery) is a student project. The aim is to provide students with the experience of holding their own exhibition and to bring the work of the young generation closer to the public.
7. *Participation in exhibitions*: creations from the fields of design were applied by academic staff and students of BSP Design and NMSP Design – textiles, clothing, glass, jewellery at an average of 25 activities per year (in the Czech Republic and abroad). The most important are the fashion shows of student creations: *Mercedes Benz Fashion week* Prague *(2019, 2020, 2021, 2022, 2023)* and presentations at *Paris Design Week* (2022, 2023).

C) Long-term work with talented individuals in primary and tertiary education

Periodically recurring activities between 2019 and 2023 (in 2020 some were cancelled, others took place online). The most interesting examples are as follows:

8. *Clothing and textiles competition for primary and secondary schools*; ten primary schools from the Liberec region and thirty secondary schools from the whole Czech Republic regularly participate (in total, approximately 500 primary and secondary school students). The agenda includes a combination of technical and artistic direction in the field of textiles and clothing, familiarisation of students with the activities of textile companies, textile workshops, presentations of student creations.
   One day to one week events for interested primary and secondary school students (250 students per year): *project days, holiday courses*, *Children's University, consultation of student works* and support for competitions (e.g., secondary school professional activity), internships of secondary school students.

D) Open days, excursions, workshops, lectures, competitions

9. FT is regularly involved in the following activities: *Open Days* (face-to-face and online, February and November), Researchers' Night, and Maker Faire - a festival of innovators, excursions to laboratories for primary and secondary schools, *popularisation lectures* (e.g., Girls belong at TUL), *European Cultural Heritage Days*.

E) International cooperation and promotion of science

10. The aim is to make FT viable on a global scale and strengthen its international reputation. In addition to professional events (conferences, seminars, summer schools) presentation for foreign students and applicants are held:
    - 2019: event "Study in Czech Republic", Alumi group, Czechia (M. Venkataraman, M.Tech., M.F.Tech., Ph.D.)
    - 2019: webinar on "Insights into Textile Material Research" - K.S. Rangasamy College of Technology, Coimbatore, India (M. Venkataraman, M. Tech., M.F. Tech., Ph.D.)
    - 2021: presentation for students from Ukraine - at KNUTD Kyiv

    promotion of textile innovations at foreign exhibitions (e.g., 2021: World Expo in Dubai 2020) *cooperation with embassies and support of cultural diplomacy* (2021: presentation for the Indian embassy entitled History and Present of Textiles - doc. Dr. Ing. Dana Křemenáková).

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 IEP 2018 report, FT paid increased attention to the involvement of employees in international activities. Connection with the international community was both incoming and outgoing. On the one hand, the activities of employee trips and their involvement in international

institutions and events (outgoing) were supported, as well as the organisation of foreign visits, seminars, summer schools, and international conferences at FT (incoming). In that period, special emphasis was placed on the motivation and involvement of younger colleagues.

Support of international cooperation of junior employees, Support of the creation of new partnerships of faculty employees and junior faculty employees with foreign research teams

FT supports the travel of all employees as part of the Erasmus+ project and similar projects. Junior staff are actively involved in scientific research projects and encouraged to submit their own projects. In relation to the TUL Career Rules, it is necessary to complete an internship abroad once every three years, which will create another opportunity to establish cooperation. Younger colleagues have the opportunity to present their results at conferences.

Involvement of younger employees in editorial work

FT enables employees to perform editorial activities. In 2021, one employee became an editor-in-chief of a journal and another became an executive editor. A total of nine employees are editors (not of retirement age), special editors or associate editors of various journals. Membership of editorial boards can be obtained based on the professional community becoming aware of an academic and he or she is recommended or offered to become an editor based on their professional activity. Therefore, FT supports personal contact within the framework of international cooperation (conferences), and supports publication activities in renowned journals, etc.

In its annual reports, FT also monitors other indicators of connection with the international community, i.e., employee mobility, international seminars, summer schools, conferences organised by FT, participation of FT employees in the organising committees of international conferences, and participation in international network projects. Below are several cross-sectional indicators:

Employee mobility (number of people/number of days of mobility)

	2019	**2020**	**2021**	**2022**	**2023**
Incoming	18/141	2/16	1/5	5/34	8/37
Outgoing	32/226	1/5	3/9	13/116	11/55

Comment: In 2020, due to the COVID-19 pandemic, mobility was significantly reduced compared to previous years. Only stays in the first quarter took place, the others were cancelled. Many activities (seminars, bilateral meetings) have since been transferred to an online form.

International conferences held by FT

2019: *Textile Research Symposium* 17-19/06/2019 - International conference organised based on Czech-Japanese cooperation with international participation co-organised by the Textile Machinery Society of Japan; (http://trs2019.ft.tul.cz); 123 participants from 10 countries;

2022: *15th International Conference on Textile Bioengineering and Information* (TBIS 2022) (online 05-08/09/2022, https://tbisociety.org/index.php?thispage=subpage&c=news&s=news&p=2022news1), 125 participants from 15 countries

2022: *23rd International Conference STRUTEX (Structure and Structural Mechanics of Textiles*) (30/11-02/10/2022 in Liberec, with physical participation) focused on the presentation of textile structures and building mechanics (http://strutex.ft.tul.cz); 85 participants from 10 countries.

International summer schools

2019, 2021, 2022, 2023: *Summer School Fabric Patterning* – 14-day international summer school of patterning (weaving, knitting); www.ft.tul.cz/fabric_patterning

2019: *Summer school of composites with textile reinforcement*

2020, 2021, 2023: *Winter school Course on Finite Element Method in textile Engineering,* http://www.ft.tul.cz/veda-a-vyzkum/course-on-fem/schedule
2021, 2023: Summer School of Textile Structures – first year, https://www.ft.tul.cz/veda-design/summer-school-of-textile-structures

International network projects - Erasmus+ KA220 Programmes
Sustainable Design and Process in Textiles for Higher Education (Reg. No. 2021-1-PL01-KA220-HED-000032201) – – main coordinator: POLITECHNIKA LODZKA; project manager from FT: Ing. Pavla Těšinová, Ph.D. (2022-2023)
European Digital Readiness Strategy for Clothing Studies (Reg. No 2021-1-DE01-KA220-HED-000023124) – main coordinator: TECHNISCHE UNIVERSITAET DRESDEN; project manager from FT: Ing. Adnan Ahmed Mazari, Ph.D. (2022-2023).

Evaluation:
In the period under evaluation, it was possible to support more active involvement of younger colleagues in shaping international relations and internationalisation (although this period was disrupted by the COVID-19 pandemic). The result is greater involvement in editorial activities in international journals, active organisation of international summer schools and conferences at FT (both physically and online), which are attractive to foreign students and invited lecturers, participation in international network projects and, of course, active staff trips.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

Document name	No. criteria	Location (link in HTML)
FT website	3.1-3.7	http://www.ft.tul.cz/en/
FT Self-Evaluation Report 2019-2023	3.1-3.7	https://www.ft.tul.cz/en/faculty/reports/reports
R&DI strategy 2030+	3.3, 3.4	https://www.ft.tul.cz/en/faculty/mission-vision-strategy
FT Annual Report	3.1-3.7	https://www.ft.tul.cz/en/faculty/reports/reports
FT projects	3.3	http://www.ft.tul.cz/en/research/projects/projects
FT Mission, vision, strategy		https://www.ft.tul.cz/en/faculty/mission-vision-strategy
FT Lists of partners	3.2, 3.3	http://www.ft.tul.cz/en/research/cooperation/national-activities
FT R&D&I Cooperation	3.2, 3.3	http://www.ft.tul.cz/en/research
FT Laboratories	3.3	http://www.ft.tul.cz/en/labs
FT Organised Conferences	3.2	http://www.ft.tul.cz/en/research/conferences/conferences
FT List of Individual Awards	3.2	https://www.ft.tul.cz/en/faculty/publicity/awards
FT Media	3.6	https://www.ft.tul.cz/en/faculty/publicity/media