Sveučilište Josipa Jurja Strossmayera u Osijeku
Građevinski i arhitektonski fakultet Osijek
Josip Juraj Strossmayer University of Osijek
Faculty of Civil Engineering and Architecture Osijek

STRATEGIC PROGRAMME OF SCIENTIFIC RESEARCH OF THE FACULTY OF CIVIL ENGINEERING AND ARCHITECTURE

for the period 2023. - 2027.

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STRATEGIC PROGRAMME OF SCIENTIFIC RESEARCH OF THE FACULTY OF CIVIL ENGINEERING AND ARCHITECTURE OSIJEK

CREATION HOLDER

Faculty of Civil Cngineering and Architecture Osijek

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1. INTRODUCTION

Strategic Programme of Scientific Research for the period from 2023 to 2027 of the Faculty of Civil Engineering and Architecture is aligned with the Development Strategies of the Josip Juraj Strossmayer University in Osijek for the same period. Strategic Programme of Scientific Research is developed in accordance with the Law on Quality Assurance in Science and Higher Education (Official Gazette 151/2022).

Scientific research activity focuses on the positioning of the Faculty as a research centre of civil engineering and architecture in Eastern Croatia and Southeast Europe, which will produce new knowledge in its activities, thus contributing to sustainable development of the University and society. The backbone of scientific and research work consists of ideas set in form of projects that connect scientists, but also businessmen. Postgraduate University Studies of Civil Engineering must be an incubator of new, young scientists whose knowledge and skills should be at the same level as their peers in Europe and the world. Mobility programmes open the door of gaining experience and knowledge for doctoral students, as well as their teachers, on the current research routes of scientific institutions in Europe and the world. By transferring this knowledge, we strengthen research capabilities and open new directions of research by integrating into European research frameworks.

The Faculty, as an educational and scientific research institution, has obligations that must be fulfilled in order to ensure successful scientific research work:

1. Ensuring quality infrastructure and research equipment.
2. Ensuring financial resources for research and development.
3. Employment of expert and qualified researchers and their continuous training.
4. Establishing clear objectives and priorities for research, as well as defining clear expectations and standards for research quality.
5. Participation in cooperation with other institutions and industry for the purpose of knowledge exchange and joint research.
6. Establishing a system for research quality evaluation, as well as reporting on progress.
7. Support and promotion of interdisciplinary approaches in research.
8. Monitoring the latest trends in scientific research activities and continuous improvement in accordance with them.
9. Checking and respecting ethical standards in research.
10. Ensuring transparency and openness in research to enable easier access to research results and facilitate further cooperation with other institutions.

2. MISSION AND VISION

With its Mission and Vision, the Faculty of Civil Engineering and Architecture Osijek shows its commitment to excellence in education and scientific research as the basis for progress of the environment and society in which it lives. In view of the objectives set out in the Faculty's Strategy in the future period, the Faculty defines its mission and vision regarding scientific and research work.

Mission of the Faculty of Civil Engineering and Architecture is:

- To encourage the applications of competitive scientific research projects in accordance with the defined research topics of scientists and to provide all support in the application and implementation of projects.
- To encourage the dissemination of scientific research work in internationally recognised high-factor journals.
- To equip the laboratory in accordance with the defined needs of researchers and continuously provide training on the use of laboratory equipment.
- To ensure the training of scientists through referrals to mobility programmes and networking with high-quality scientists from international institutions.
- To ensure fast and efficient flow of new ideas between researchers and external parties, i.e. the economy.
- To facilitate and strengthen the partnership and cooperation of researchers with industry.
- To implement, develop and improve education at the postgraduate level in the field of technical sciences by implementing the knowledge gained through scientific research work.
- To create a stimulating environment of innovation, creativity, cooperation and equality while promoting high academic values and ethical principles.

Vision of the scientific research work of the Faculty of Civil Engineering and Architecture Osijek:

To be a recognized leader of regional scientific research activity regarding creation of new knowledge and technologies, that directs and conducts applied and theoretical research and increases the impact and recognition of the Faculty through international dissemination of research results and networking with leading European and world scientific research institutions.

3. ORGANISATIONAL STRUCTURE OF THE FACULTY OF CIVIL ENGINEERING AND ARCHITECTURE OSIJEK

Organisational structure consists of organisational units of the Faculty: institutes, chairs, laboratories, library and secretariat. The details of the organisational structure and the management of the Faculty are governed by the Statute of the Faculty, the Regulations on the Organisation of Positions at the Faculty of Civil Engineering and Architecture Osijek, the Decision on the Organisation of Positions of the Faculty of Civil Engineering and Architecture Osijek, the Regulations on Work of the Faculty of Civil Engineering and Architecture Osijek and the Rules of Operation of the Faculty Council.

Institute is the core organisational unit of the Faculty for teaching, scientific and professional work. Applying the principle of grouping scientific disciplines in civil engineering and related fields, through its lower organisational units, i.e. departments, the institutes perform teaching, scientific and expert work.

There are six (6) institutes at the Faculty:

(1) **Institute for Technical Mechanics**
   a. Department for Technical Mechanics
   b. Department for Construction Theory
   c. Laboratory for Experimental Mechanics "Vladimir Sigmund"

(2) **Institute for Materials and Structures**
   a. Department for Metal and Timber Structures
   b. Department for Concrete and Masonry Structures
   c. Laboratory for Materials and Structures

(3) **Instiutute for Organisation, Technology and Management**
   a. Department for Engineering Economy and Management
   b. Department for Organisation and Technology of Building

(4) **Institute for Geotechnics, Transportation and Geodesy**
   a. Department for Geotechnics
   b. Department for Transportation Engineering and Geodesy

(5) **Institute for Hydrotechnics and Ecology**
   a. Laboratory for Hydrotechnics and Environmental Protection

(6) Institute for Architecture and Urban Planning

a. Department for Architectural design, Urbanism and Urban Planning

b. Department for Architectural Structures and Building Physics

Laboratories are an integral part of the Institutes, but with the adoption of the new Statute of the Faculty of Civil Engineering and Architecture Osijek, it is foreseen to separate laboratories as independent organisational units. Laboratories are important structural units of the Faculty, where scientific research related to scientific programmes and scientific projects, professional research and the practical part of teaching are carried out. The basic activities of the laboratory are: testing of construction materials; testing structures to verify their stability and safety; development of new technologies in construction, such as innovative building materials, new construction techniques and new systems for monitoring and maintenance; research on the energy efficiency of buildings; education and consulting in the field of construction in order to ensure that civil engineers, architects and other experts in the field of construction have the necessary knowledge and skills to build quality and safe buildings; conducting specific and customized tests aligned with the needs of scientific and research work.

To perform legal, professional-administrative, accounting-financial tasks, improvement and quality assurance tasks as well as tasks related to student issues, technical and auxiliary tasks and other tasks related to successful work of the Faculty, the Secretariat was established, headed by a secretary with lower organisational units – sections/offices:

(1) General and Staff Office
(2) Sections for Students (Student Office)
(3) Accountancy and Finance Office
(4) Technical Tasks Office
(5) Office for Quality Development and Assurance in Higher Education
(6) Office for Projects, International Cooperation and Business Cooperation
(7) Office for Computer Network and Communication Systems
(8) Office for Business Relations and Procurement.

The Library is an organisational unit of the Faculty for library and IT tasks and tasks related to the teaching, scientific research and expert needs of the Faculty.

The professional council of the Faculty is the Faculty Council. The Faculty Council is composed of the Dean and vice-deans by position, representatives of teachers in scientific and teaching positions, two teachers in teaching positions, two associates in associate positions, one representative of other employees and student representatives who make up 10% of the members of the Faculty Council, of which a maximum of 20% are representatives of postgraduate students. The Expert Collegiums is an advisory body to the Dean, consisting of vice-deans, the secretary, heads of institutes, heads of laboratories, and is convened as necessary to coordinate and monitor overall activity of the Faculty, as well as to improve the work of professional services and to coordinate all business activities of the Faculty.

4. HUMAN RESOURCES

The Faculty employs a total of 101 employees distributed among organisational units of institutes, departments, laboratories, library and secretariat. Of the total number of employees, 59 employees are teaching staff, elected in scientific-teaching, teaching and associate positions, while 42 employees are non-teaching staff.

The structure of employees in scientific-teaching, teaching and associate positions is as follows:

a)	Professor Emeritus	1
b)	Full Professor with Tenure	4
c)	Full Professor	8
d)	Associate Professor	18
e)	Assistant Professor	7
f)	Senior Assistant (Postdoctoral researcher)	5
g)	Assistant	7
h)	College Professor	0
i)	Senior Lecturer	8
j)	Lecturer	2

An extremely important element in the implementation of the scientific research work is the use of laboratories as structural units for the implementation of laboratory tests related to the practical aspects of research work. The laboratories of the Faculty currently employ 4 employees (laboratorians) and 2 teachers with the role of laboratory manager who coordinate and optimize the work of laboratory workers in accordance with the activities of scientific research projects and other work of teachers.

The non-teaching staff is assigned to the secretarial departments and provides full support to the teaching staff and scientific research work. It is necessary to mention the Office for Projects, International Cooperation and Cooperation with the Economy, which performs support tasks for teachers in form of finding potential open tenders for the delivery of project proposals, collecting documentation of registered and approved projects to create a project database, participating in the preparation and notification of scientific research projects, carrying out administrative tasks for the needs of individual projects and making periodical and final reports to institutions that finance projects, participation in the organisation and implementation of conferences organized as part of projects or by the Faculty, organisation and development of promotional material on projects or the Faculty. The Office also performs record-keeping tasks related to notified, approved and realised outgoing and incoming mobility, participates in activities related to the promotion of the Faculty in view of improving international cooperation, keeps records of signed international cooperation agreements and updates the database thereof, looks for potential partners for cooperation and proposes measures and activities to improve international cooperation.

5. INFRASTRUCTURAL CAPACITIES

The building of the Faculty of Civil Engineering Osijek is located in the Campus of the Josip Juraj Strossmayer University in Osijek, Vladimira Preloga 3. The building is located on a building plot with a rectangular floor plan of 6519m2, while the built-up floor plan area is 3239 m2. It has six floors (basement + subbasement + ground floor + 3 upper floors) and height of 19,3 m, and the total gross developed area is 10600 m2. It consists of several programme-functional units, actually six institutes (approximately 70 cabinets and four laboratories) and teaching facilities (lecture rooms, drawing rooms and room for practicum), administration facilities (dean's office, accounting and administration office) and university library, and for student and common facilities (assembly hall, tribunes, open classroom, canteen, corridors), but also for auxiliary and technical premises. The building is elongated in shape and organized through four longitudinal programme lines: two tracts of cabinets with a central corridor, a central space for extended communication and joint spaces, and a tract of lecture halls and drawing rooms with their own corridor. This allows for adaptability of use, i.e. subsequent connection or sharing of rooms. The height is organized in such a way that in the basement and the subbasement there are laboratories and displays of the archeological site and technical rooms, on the ground floor (on the slope) there are lecture halls, the library, student administration office and the assembly hall, on the first floor there is the administrative tract (with the dean's office, administration and exhibition spaces), on the second floor there are lecture halls, offices, an open classroom, gardens and student spaces, and on the third floor there are drawing rooms, offices, a canteen and apartment for visiting professors. In fact, the building can accommodate 1348 students and 179 faculty employees at full capacity.

One hall in the university campus is also temporarily used as a laboratory for testing larger construction models and other activities related to conducting experiments.

The laboratories in the new building of the Faculty of Civil Engineering Osijek are designed and intended, with their contents and arrangement, to actively support the core activities of the Faculty, namely: teaching, scientific research and professional development activities. The layout scheme of the laboratory serves the purpose of forming a practice room adapted to performing experimental demonstration and active exercises in the process of education of civil engineers at the same time meeting the specific requirements and needs of scientific and research work. At the same time, the infrastructure has been designed in such a way that it is possible to upgrade in accordance with the requirements set by the implementation of certain specific market-oriented professional contents. Capital laboratory equipment with a total value of over 5 million HRK has been purchased over the past few years from our own funds, funds from scientific projects, and dedicated funds from the Ministry. The laboratories in the Faculty's premises have been equipped with this equipment for model and field tests of structures, material tests, tests of geomechanical and geotechnical characteristics and procedures, tests of hydrotechnical characteristics and processes, traffic processes, energy efficiency tests of buildings and other.

6. STARTING POINTS OF THE STRATEGY

The Strategic Programme of Scientific Research integrates the scientific research resources of the Faculty, market needs, application of new technologies, sustainability and environmental protection. The construction industry represents one of the key sectors for economic development, but at the same time it can affect the environment and nature significantly. It is therefore important that the latest technologies and innovative solutions are applied in the research, which will enable the construction of environmentally friendly and energy-efficient building and infrastructure. At the same time, it is important to understand the needs of the market and adjust the research according to them, in order to enable the development of products and services that will meet customer demands. Sustainability and environmental protection require development of construction materials and processes that reduce the negative impact on the environment, the consumption of energy and resources, and promote circular economy.

It is also important to invest in education of young scientists and researchers, in order to ensure continuous building of knowledge and developing new ideas in the field of construction. The Strategic Programme of Scientific Research must therefore focus on development of sustainable, environmentally friendly and technologically advanced solutions that will contribute to the development of society.

6.1. SCIENTIFIC RESEARCH ACTIVITIES OF THE FACULTY

The number of published papers in the Web of Science (WoS) database has been increasing constantly. The increase can be attributed to the increased number of scientific research projects in implementation and implementation of measures from the Ordinance on Encouraging and Honouring Scientific Excellence of Employees of the Faculty of Civil Engineering and Architecture Osijek (Ordinance). The objective of the Strategy is to increase the scientific productivity of the teachers at the Faculty through further implementation of the Ordinance and its development aligned with the constantly changing demands of the market and the professional and scientific community. Also, further developing and delivering the potential of the Department for Projects, International Cooperation and Cooperation with the Economy (Office) will continue to encourage and provide full support to teachers in all aspects of application and implementation of scientific research projects.

6.1.1. PUBLISHED PAPERS IN WoS AND SCOPUS

The current measures of the Ordinance to encourage scientific research work and increase scientific productivity include:

- Every employee of the Faculty elected to a scientific-teaching, teaching and associate position and a corresponding position is provided with the amount determined by the Decision on Encouraging the Scientific Excellence of the Faculty, for the following purposes:

a) for the costs of publication of scientific papers published in foreign journals in WoSCC with IF (impact factor) below the median of the field relevant for selection into a scientific profession (Q3 and Q4 papers) and other domestic journals indexed in WoSCC;
b) attending conferences: registration fee, travel and subsistence costs;
c) compensation for the costs of cooperation with scientists from other institutions and mobility, which are not covered by ERASMUS projects and other financing methods (travel and subsistence costs);
d) purchase of books, scientific journals and copies of scientific articles;
e) purchase of laptops to a value of EUR 530,00 (in letters: five hundred and thirty Euros with VAT);
f) purchase of computer programmes;
g) procurement of research equipment and other procurements upon special approval of the Dean.

- The Faculty provides financial resources for publication costs (journal fee for publication, proofreading and translation costs) of scientific papers in foreign journals referenced in WoSCC data with an IF (impact factor) above the median of the area relevant for selection into a scientific title up to the amount defined by the Decision on Encouraging Scientific Excellence.

In addition, the Faculty enables teachers to use software packages to improve writing in English, which significantly improves the quality of international dissemination of scientific research and the communication with foreign researchers.

Table 1. Number of published papers indexed in WoS in the period 2016. to 2022.

INSITUTE		Institute for Materials and Structures	Institute for Technical Mechanics	Institute for Hydrotechnics and Environment Protection	Institute for Geotechnics, Roads and Geodesy	Institute for Organisation, Technology and Management	Institute for Architecture and Urbanism	GrAFOS total
2016.	Number of papers	6	3	2	6	5	0	**22**
	Number of papers/FTE*	0,18	0,09	0,06	0,18	0,16	0	**0,63**
2017.	Number of papers	10	2	0	2	1	0	**15**
	Number of papers/FTE*	0,29	0,06	0	0,06	0,03	0	**0,44**
2018.	Number of papers	13	7	3	3	5	3	**34**
	Number of papers/FTE*	0,39	0,21	0,09	0,09	0,15	0,09	**1,02**
2019.	Number of papers	16,50	6	5	6	6,50	2	**42**
	Number of papers/FTE*	0,49	0,18	0,15	0,18	0,19	0,06	**1,26**
2020.	Number of papers	11,50	4,00	2,50	5,50	4	0,50	**28**
	Number of papers/FTE*	0,32	0,11	0,07	0,15	0,11	0,01	**0,78**
2021.	Number of papers	19,75	6,25	2	10,75	8,75	3,50	**50**
	Number of papers/FTE*	0,55	0,17	0,06	0,30	0,24	0,10	**1,42**

2022.	Number of papers	21,02	3,5	4	8,08	5,5	1,75	**44**
	Number of papers/FTE*	0,58	0,10	0,11	0,22	0,15	0,05	**1,22**
2011.-2022.	Total papers	119,77	40,75	23,50	53,33	41,75	15,75	**295**
	Average number of papers/FTE*	3,33	1,13	0,65	1,48	1,16	0,44	**8,19**

*FTE = Full Time Equivalent

Table 2. Data on the number of papers and citations for the period from 2016. to 2022.

Year	2011.	2012.	2013.	2014.	2015.	2016.	2017.	2018.	2019.	2020.	2021.	2022.	Total
Number of papers in WoS	15	10	12	13	9	22	14	33	42	28	51	44	**293**
Number of papers in WoS/FTE	0,61	0,4	0,4	0,44	0,3	0,63	0,42	0,99	1,26	0,78	1,42	1,22	**8,14**
Number of citations in WoS	11	15	28	53	68	117	80	169	394	575	881	999	**3390**

6.1.2. SCIENTIFIC RESEARCH PROJECTS

Stimulating applications for scientific research projects plays a key role in the development of science and research. One of the ways to encourage project applications is to establish partnership relations with other institutions, industry and other stakeholders in the scientific and research field. Such cooperation can enable sharing of resources, knowledge and experience, as well as access to new sources of financing. Organising workshops and conferences with the aim to connect researchers and potential financiers also contributes to the increase in the number of notified projects. This helps to raise awareness of new research funding opportunities, to provide opportunities to exchange ideas and to prepare quality applications. Also, the allocation of internal financial resources to stimulate research and development of new projects can be intended to encourage researchers who are at an early stage of their careers.

Finally, it is important to have a transparent and assesible information system on tenders and funding possibilities, to ensure that all researchers have equal opportunities to apply and obtain the necessary funds for their work.

The Ordinance lays down measures to encourage applications and the implementation of scientific research projects.

Incentive measures for the notification of domestic and international scientific, research, technological and cross-border cooperation projects are as follows:

- For each application of a project, the Faculty employees selected for scientific-teaching, teaching and associate positions and corresponding positions are paid the total amount defined by the Decision on Encouraging Scientific Excellence, distributed according to Form B1, for the application

of a domestic or international scientific, research, technological project or cross-border cooperation project.

Also, the Faculty pays fees for approved domestic and international scientific, research, technological projects and cross-border cooperation projects, as follows:

- For an approved project of the Faculty, where the Faculty is the institution responsible for the project, a fee is paid to employees of the Faculty selected for scientific-teaching, teaching and associate positions. The amount of the fee is determined according to the number of points achieved for a particular project and the gross value of one point, which is determined for each academic year by the Decision on Encouraging Scientific Excellence, and is paid at the request of the project manager who is an employee of the Faculty.

The list of scientific research projects carried out at the Faculty of Civil Engineering and Architecture Osijek over the period 2016 to 2023 is set out in the **Annex A**.

6.1.3. PUBLISHING ACTIVITY

Publishing activity in the form of scientific books is also one of the significant indicators of scientific productivity of a scientific research institution. Therefore, continuous improvement and enhancement of the quality of publishing activities plays a major role in the development of the institution. One of the key steps for improving publishing activities is providing financial resources for quality preparation, printing and distribution of books. The Faculty currently covers costs with its own funds, and the possibility to raise funds through obtaining projects or other types of grants, authors or institutions should be considered. It is also important to provide adequate equipment and tools for the preparation of books, such as computer programmes for text editing and graphic displays. The process of reviewing and editing books is something that is necessary in order to further raise the quality of the work. In order to achieve that, it is necessary to establish a control system through cooperation with editors of scientific journals or major publishing houses, which will help in the processing of texts and provide expert review. One of the important factors for a successful publishing business is ensuring good marketing for books by organizing book promotions, events and conferences where books and authors will be presented. Cooperation with bookstores, libraries and other institutions is also important in order to make books more accessible to general public. It is necessary to analyse target groups of readers and trends in science regularly in order to be able to adjust the offer of books and to guide authors. Finally, cooperation with other institutions and experts in the field guarantees the continuous development of publishing activities.

Ways to improve and increase publishing activity in the form of scientific books:

1) Organise workshops on book writing for authors who are less experienced in writing books.
2) Establish cooperation with publishing houses.
3) Promote books at important conferences and other events in the field of research.

A measure was adopted as part of the Faculty's Incentive Measures aimed at improving publishing activities of the Faculty:

- The Faculty covers part of the costs to authors of published university and internal editions (books, assignment books, etc.) who are employees of the Faculty in the amount defined by the Decision on Encouraging Scientific Excellence for each published university or internal edition, and the costs to be covered imply the costs of peer review, translation into a foreign language, proofreading and printing.

Table 3. Data on scientific publications for the period from 2016. to 2022.

Year	2016.	2017.	2018.	2019.	2020.	2021.	2022.	Total
Number of scientific publications	4	3	1	2	1	1	2	**15**

6.2. DOCTORAL STUDIES IN CIVIL ENGINEERING

The role of doctoral studies in scientific research is crucial because it educates new generations of scientists/experts capable of conducting original research, developing new ideas, applying advanced methodologies and crating new knowledge. Doctoral studies provide students with the opportunity to focus on specific research areas and to gain a high level of expertise in their research field. During doctoral studies, students are engaged in independent research, developing new ideas and theories, and applying advanced methodologies in their research. Through research, students acquire skills in collecting, processing and interpreting data and in writing scientific papers. It provides the possibility of developing new research topics and projects, as well as establishing cooperation with other institutions and industry, in particular by participating in mobility programmes. Through doctoral studies, it is also possible to find new talents and potential future researchers who will contribute to further development of science and research of the institution, as well as society as a whole.

The doctoral study Civil Engineering is a study for obtaining the academic degree of Doctor of Science (Ph.D.) in the scientific field of technical sciences, scientific field of construction and scientific field of basic technical sciences. It is performed in accordance with the Permit issued by the Ministry of Science, Education and Sports of the Republic of Croatia (CLASS: UP/I-602-04/07-13/00006, REFERENCE NUMBER: 533-07-07-0004) from 10th July 2007. The student completes his studies after a successful public defense of his doctoral thesis. A doctoral thesisis an independent and original work of the applicant that proves independent scientific research using scientific methods and making scientific contribution in the scientific field of technical sciences, that is, in the scientific field of construction or basic technical sciences. Upon completition of doctoral dissertation, in which the student makes his original scientific contribution, he proves himself as a scientist in his field of research.

The study is a permanent investment that ensures the acquisition of top scientific education in the scientific field of construction or basic technical sciences based on scientific research through mastering the study programme and participation in organized scientific research activities.

The study programme is implemented through compulsory and optional courses and extracurricular activities. Through compulsory education activities students of doctoral studies are taught scientific,

professional and transferable skills such as: academic writing, presentation, methods of quoting publications and formatting scientific papers. Extracurricular activities represent the student's scientific research work and scientific publications.

When enrolling, one of the following modules can be selected by the student:

- Bearing structures
- Organisation, technology and construction management
- Engineering mechanics
- Hydrotechnics
- Roads and geotechnics

Learning outcomes acquired by completing individual study obligations, study orientations and the overall study programme are aligned with the standards determined by the European Qualifications Framework (EQF) and the Croatian Qualifications Framework (CQF).

(1) Identify, define and formulate research problem;
(2) critically analyze, evaluate and synthesize new and complex research ideas;
(3) Demonstrate a systematic understanding of the field of study and a high level of knowledge in the field of specialisation;
(4) Self-conduct scientific research;
(5) Independently construct an experimental model and a measuring instrument;
(6) Apply specific knowledge to generate new knowledge and research projects;
(7) Publish scientific papers;
(8) Take responsibility for the implementation of research and social usefulness of the research results;
(9) Take on the most complex tasks in the working environment;
(10) Apply ethical principles in research.

Table 4. Number of enrolled students and defended doctoral theses in the period from 2015./2016. to 2022./2023.

Academic year	2015./ 2016.*	2016./ 2017.	2017./ 2018.	2018./ 2019.	2019./ 2020.	2020./ 2021.	2021./ 2022.	2022./ 2023.
Number of students enrolled in the first year – full time	13	1	2	1	0	3	1	0
Number of students enrolled in the first year – part time	0	11	7	4	0	4	3	2
Total	**13**	**12**	**9**	**5**	**0**	**7**	**4**	**2**
Number of doctoral theses defended – full time	0	2	0	0	0	0	6	0
Number of doctoral theses defended – part time	0	0	0	4	1	0	1	0
Total	**0**	**2**	**0**	**4**	**1**	**0**	**7**	**0**

* in academic year 2015/2016 in ISVU there was no "part time" element of the study structure.

6.3. KEY RESEARCH TOPICS OF THE FACULTY

The research themes of the Faculty can be linked to the National Development Strategy of the Republic of Croatia until 2030, which is a document setting the long-term objectives and priorities for the economic, social and sustainable development of the country in the next decade. The national strategy aims to stimulate economic growth, strengthen competitiveness, improve the quality of life of citizens and ensure sustainable development. The key focus of the strategy includes support for innovation, digitization, energy efficiency and sustainable use of natural resources, development of human resources, strengthening of regional balance and promotion of social inclusion through four development directions: Sustainable Economy and Society, Strenthening Resilience to Crises, Green and Digital Transition and Balanced Regional Development.

Earthen Architecture of Slavonia and Baranja

(1) testing of physical and mechanical properties of traditional and innovative soil mixtures with additives for the construction of earthen structures, (2) assessment of load capacity and seismic resistence of traditional houses wirt earthen walls, (3) testing of dynamic properties of load-bearing structures made of rammed earth and adobe, (4) determination of thermal insulation properties of earthen walls, (5) testing of locally available natural fibres for strengthening earthen walls in seismically active areas, (6) checking the appropriateness of existing and defining new methods for testing mechanical properties of soil mixtures and additives for building earthen structures, (7) drafting recommendations and guidelines for the design of earthen structures in accordance with Eurocode standards, (8) determination of materials and methods for the remediation of earth structures.

Cross-laminated timber (CLT) beam elements

(1) experimental testing of cross-laminated timber beam elements, (2) experimental testing of cross-laminated timber beam elements with openings and/or notches, (3) determination of stiffness and load capacity parameters, (4) defining the relevant forms of failure.

Wood-based materials and structural elements

(1) experimental testing of wood-based products and elements for normal and accidental actions, (2) determination of load capacity and stiffness of linear and flat elements loaded in the plane and/or perpendicular to the plane, (3) defining the relevant forms of failure, (4) numerical modelling of wood-based products for normal and accidental actions, (5) exploring the influence of geometry and composition of elements and materials, (6) research of geometric weakening in the form of openings, cuts and notches, (7) formulating analytical models and simplified design proposals.

Effects of the explosion

(1) measurement of explosion parameters, (2) polygon testing of structural elements, (3) damage to elements exposed to the action of the explosion, (4) procedures for reducing the effects of the explosion on structural elements, (5) laboratory testing of reinforcement of elements for explosion actions , (6) propagation of blast waves through air and ground, (7) numerical simulation of the explosion and its effects on elements, (8) dynamic response of elements exposed to the explosion, (9) connection of earthquake-resistant and explosion-exposed structures.

Reliable methods for the calculation of aluminium structures that meet the requirements of the future

(1) laboratory tests of basic, welded and printed material – various welding procedures with testing at macro and micro level, (2) probalistic processing and upgrading of the statistical database of structural properties of aluminium alloys, (3) development of recommendations for revision of structural properties of aluminium alloys offered in EN 1999, (4) design of complete descriptions of behaviour of welded joints and, based on them, optimization of welding/priniting parameters, (5) experimental, numerical and probalistic research of welded/printed elements and welded aluminium beam-column connections – elements with variable and constant height, (6) determination of the resilience of variable and welded elements and, on the basis of probalistic bases, drawing up a proposal for design procedure, (7) analysis and evaluation of life cycle and costs of buildings made of welded/printed aluminium elements.

Application of photogrammetry and spatial digital correlation of images in the examination of materials and structures

(1) laboratory tests of basic material – definition of the complete stress-strain record, (2) determination of local changes in material behaviour together with a description of the impact area of local behaviour, (3) determination of initial imperfections of elements measuring up to 2 m – deviation from flatness, (4) determining the form of loss of stability in the elements, as well as the force-displacement relationship in the desired point, (5) determining fracture mechanics parameters on samples of different materials and structural elements.

Numerical, laboratory and probalistic research of steel structures and structures in which steel is the dominant load-bearing material

(1) laboratory testing of the basic material, (2) probalistic processing of bases of structural properties of steel, (3) numerical modelling of the behaviour of steel elements, connections and frame structures, (4) experimental testing of steel elements, connections and frame structure, (5) based on experimental and numerical results validation of calculation procedures of steel elements, connections and frame structures.

Design of transport infrastructure according to safety and functional criteria that implement the needs of vulnerable traffic users

(1) formation of databases of field research on the behaviour of vulnerable road users, which include children pedestrians, the elderly population of drivers and pedestrians, cyclists, motorcyclists, student population and road users with special needs, (2) surveying target groups of stakeholders in the design and planning of transport infrastructure, (3) formation of prediction models using statistical methods and neural networks,

(4) model validation in other urban transport networks, (5) analysis of general and local influencing parameters of the behaviour of vulnerable traffic users on the safety and functional indicators of the traffic flow, (6) analysis of the impact of transport infrastructure and regulation on functional and safety indicators of vulnerable road users, (7) analysis of the effectiveness of different infrastructure solutions using microsimulation traffic modeling, (8) design recommendations for the design of different elements of transport infrastructure according to the needs of target groups.

Application of multi-criteria analysis and microsimulation modeling in sustainable traffic planning

(1) analysis of the effectiveness of the application of an increasing number of criteria in the evaluation of project solutions of transport infrastructure on the outcomes of the analytical process, (2) development of methodology for analysis and evaluation of project solutions of transport infrastructure, (3) applying the methodology to different case studies, (4) analysis of the advantages and limitations of the application of the methodology, (5) improving the methodology for assessing transport infrastructure project solutions in sustainable transport planning.

Application of the non-destructive method Ground Penetrating Radar (GPR) in the analysis and assessment of the condition of structures

(1) analysis of the effectiveness of the GPR method in assessing the condition of transport infrastructure, (2) detecting the formation and depth of installations in urban and non-urban field conditions, (3) application of GPR method to different case studies, (4) analysis of the advantages and limitations of the application of the non-destructive GPR method, (5) recommendations for the use of different methods of condition assessment and detection of installations that will increase the reliability of the GPR method for different examples of application.

Research on the application of geosynthetics in construction/geotechnics

(1) field, laboratory, model and numerical studies of the interaction between geosyntetics and soil – geosynthetic efficiency mechanisms – geogrids, geostripes, geotextiles, innovative products; in coherent, non-coherent and recycled filling materials for use in reinforced soil constructions and in the stabilization of road surfaces, (2) the impact of deformations of geo-materials on functional and mechanical stability of waste disposal sites – study of impact of stress and deformation (stretching) and environmental conditions (temperature, UV radiation, chemical agents) on the properties and durability of geomembranes for use in disposal sites .

Studies of geotechnical properties and behaviour of local coherent and incoherent soils and analysis of their applicability in various geotechnical/construction procedures

(1) theoretical approach, field and laboratory tests and the use of numerical models in determining the geotechnical characteristics and behaviour of local coherent and non-coherent soils and analysing their applicability in different geotechnical/construction procedures, (2) analysis of loess properties for usage in construction – application for the construction of embanked structures (embanked earthen dams – dam body and sides, (3) analysis of resistence of (refilled) Drava and Danube sand under the action of static and

dynamic load – foundation, application for construction of embankments – embankments, plateaus – physical and mechanical properties, analysis of compaction and liquefability properties.

Application of numerical modelling in the analysis of geotechnical problems

(1) Application of 2D and 3D numerical tools in modeling geotechnical problems at material level, (2) interactions between different elements or entire constructions: analysis of constitutive models of fine-grained and granular materials, (3) analysis of interaction geosynthetics (geogrid) – soil at the grain-hole-rib level, (4) application of 2D and 3D numerical models in model analyses of geosynthetic behavior models in model tests and reinforced soil constructions, (5) application of 2D and 3D models in the analysis of stress situations and deformations of geotechnical structures.

Energy management in the process of hot asphalt mixture production

(1) use of waste heat in the process of producing hot asphalt mixtures, (2) obtaining energy savings in immediate production, (3) optimization of energy consumption in the process of production of hot asphalt mixtures at cyclic type asphalt plants.

Sustainable materials in pavement constructions

(1) characterization of layers of pavement structures with waste materials, (2) valorisation of the use of alternative materials in pavement constructions, (3) low temperature asphalts, (4) porous concrete and asphalt, (5) evaluation of environmental impact of the use of sustainable materials in road construction.

Modern technology for the characterization of materials and systems of pavement constructions and the design, construction and monitoring of transportation facilities

(1) application of digital stereophotogrammetry in the characterisation of materials, layers and systems of pavement structures, (2) application of remote sensing for the purposes of designing, building and monitoring of transportation facilities.

Old maps

(1) contents (secular, religious, natural), (2) projections, (3)measurements, (4) epoch of creation, (5) where the map is located, how many copies exist (from which year), text data (which language), (6) who is the author of the map, where did he live, what did he do, articles about the author of the map (where they are stored) (7) projection and grid (initial meridian), original name of the map, when published, according to whose order it was made, who prepared it for printing and printed it, where it was printed, number of sheets, dimensions, layout of the map frame, layout of the map title (which language), whether there are axonometric drawings (city panorama...), whether there is an interpreter of signs, whether there is a tabular or different presentation of statistical data, scale of art (linear or numerical), what are the border areas (neighbouring counties), (8) church content of the map: number of archdeaconries, deaneries, parishes, branches, way of separating individual parts (linear cartographic signs), whether there is a representation (signature, color, ...) of the church (of which denominations), chapels, statues, holy paintings and castles with chapels,

monastery, (9) worldly content of the map: the number of cities and which, the number of fortifications and which, number of market places and villages, manors, abandoned forts and chapels, spas and sorrels, parks (French, English), quarries, mines, glass factories, bridges, river ferries, (10) natural content of the map: outline of relief, water and vegetation, height of mountains (absolute and relative), which mountains are shown (oronyms), double names for mountains and relief, waters: hydronyms, forests, (11) whether there is an index for easier finding of individual objects on the map..

Impacts on productivity of employees and machinery in contractor construction companies

(1) indentifying the impact on the productivity of machines on a construction site, (2) identifying the impact on worker productivity at a construction site, (3) determining the importance of different impacts on productivity, (4) field measurements and analyses of machine working time losses on construction sites, (5) case studies and comparative analyses of work stoppages on various construction projects in the country and abroad, (6) identifying responsibility for various negative impacts on the productivity of work performance, (7) defining possible measures for mitigating negative effects and increasing the productivity of the work performed on the construction site.

Management of organisational behaviour in business environment

(1) assessment of the impact of various elements of organisational behaviour on the success of the company/project, (2) communication with subjects of the company's internal and external environment, (3) analysis of leadership in construction and its prospects for its improvement, (4) defining possible activities of public entrepreneurship in the context of infrastructural projects.

Ecological footprint of business in civil engineering

(1) analysis of the potential of circular economy in the construction industry, (2) identifying trends in corporate social responsibility.

Research on the consequences of increasing the energy efficiency of buildings on the life cycle costs of buildings

(1) possibilities of energy simulations in the early design phase, (2) reliability of early estimates of energy consumption and the imapct on the life cycle costs of buildings, (3) quantification of air permeability changes of buildings over time on energy consumption and building life cycle costs, (4) life cycle costs of almost zero-energy buildings, (5) analysis of the potential benefits of different energy efficiency measures, (6) buildings with almost zero energy and indoor air quality.

Active BIM

(1) define and develop the foundations for continuous practical application of active BIM in order to increase the efficiency and safety of construction projects, and according to the recommendations of earlier research, (2) to structure the methodology, limitations and potentials in the application of active BIM for cost and time planning of building construction.

Civil engineering 4.0

(1) increasing the automation of construction production, (2) digitalisation of data and automation of data collection and processing at the construction site, (3) visualisation of time plans on the construction site, (4) developing an automation model for updating construction time plans, (5) preparation of a complete optimization model for planning the process chain of concreting high-rise buildings.

Monitoring the key parameters of reliability of safety and performance of tower cranes

(1) define the key parameters for reliability of safety and impact of tower cranes during active period on the construction site, (2) develop a methodology for early detection of tower crane deformations, (3) develop a model for optimal placement of a crane on the construction site, (4) modelling of the actual status of tower cranes for implementation in the BIM environment and simulation of work operations.

Valuing and improving the behaviour of individual buildings, including historic buildings and monuments

(1) laboratory and in situ destructive and non-destructive testing of structures, parts of structures, structural elements and building materials (including fibreglass, i.e. GFRF and recycled fibreglass i.e. RGFRP4, (2) development or improvement of properties of existing building materials, (3) development or improvement of budget models of building materials (including parametric studies), (4) identifying and selecting the features of accidental activity to improve the evaluation process, (5) assessment of vulnerability in order to determine the endargement of the building (probabilistic approach) , (6) evaluating the effectiveness of the approach in selection of necessary remedial measures of the building.

Developing algorithms for data collection (with webscraping) and data processing

(1) development of systems for remote monitoring of conservation status of buildings, waters, and the environment by using sensors, (2) development of simpler machine learning algorithms for analyzing large amounts of data that can detect patterns, trends, anomalies etc., (3) computer optimization of equations, signal filtration, etc., (4) creation of simple graphic interfaces for programme scripts, (5) automation of varipus computer tasks, such as mouse and keyboard management.

Forensic research of the causes of damage to structures, parts of structures, structural elements and building materials

(1) laboratory and in situ destructive and non-destructive testing of structures, parts of structures, structural elements and building materials for the purpose of insurance company claims and court proceedings; (2) investigating problems, errors and their elimination in construction design; (3) collecting data for the purpose of creating a database on damage to buildings, their determination and elimination; (4) determination od the most suitable procedures and finding guidelines in order to reduce the impact of assumptions, errors in design and construction, i.e. installation of materials and construction supervision.

Quality of the build-up area

(1) identification of quality criteria for residential buildings, (2) identification of quality criteria for buildings for business purpose, (3) identification of quality criteria for buildings for public use, (4 identification of quality criteria for buildings for social purpose, (5) identification of criteria for the design of living and working spaces promoting health, (6) quality theory of build-up area.

Climate neutral and smart cities

(1) identification of sustainability and resilience criteria of urban spaces , (2) valorisation of tools and methods for planning a sustainable and smart city (public tenders, corridor planning, city image), (3) assessment of the situation and instruments for improving the institutional planning of urban space, (4) identification of criteria of sustainability, aesthetics and inclusiveness for sustainable and smart cities, (5) assessment of the situation and instruments for the improvement of green infrastructure in a sustainable and smart city, (6) theory of city development.

Identification and valorisation of rural space

(1) identidfication of rural landscape elements in the discourse of place identity and connection with the place, (2) identification and valorisation of residential and commercial architecture in rural areas, (3) identification and valorisation of cultural heritage of winemaking culture in rural areas, (4) theory of rural space planning and terminology elaboration.

Importance of the concept of function – analysis of normative and individual mental function models

(1) identifying all kinds of mental images/models of the function concept that students have, identifying possible misconception, (2) analysis of some of the most commonly used high school mathematics textbooks to find out which models of the function concept the textbooks most often promote.

Water resource management in climate change conditions

(1) drought analysis (hydrological, meteorological, agronomic), (2) frequency of extreme hydrological phenomena, (3) observations of water balance components, (4) application of remote sensing, (5) protected areas in conditions of extreme hydrological phenomena.

Functionality of the surface drainage system

(1) sustainability of the open channel network, (2) quantitive analysis of deposits in the surface drainage system, (3) qualitative analysis of deposits in the surface drainage system, (4) connection of surface and underground drainage.

Urban drainage mangement

(1) determination of runoff in urban catchment area using neural networks, (2) usage of green infrastructure in urban areas to relieve the sewage system, (3) maintenance of the sewage system with the aim of reducing urban flooding and saving maintenance costs, (4) integrated stormwater management, (5) analysis of the

application of “green”, vegetation measures and facilities in reducing the volume of runoff, (6) dimensioning of buildings.

Machine learning in hydrotechnics

(1) short and long-term prediction of sea level oscillations, (2) monitored learning in hydrology, (3) training and testing monitored learning models.

Infiltration

(1) flow analysis in the subsurface soil zone, (2) dimensioning and analysis of drainage facilities and infiltration of rainwater.

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7. STRATEGIC OBJECTIVES AND ACTIVITIES

The Faculty has long-term objectives for the development of scientific research work and carries out activities that will help in achieving these objectives. The activities are aimed at improving research capacities, increasing the quality of scientific work and the influence of the Faculty in the scientific community, which will help in competitiveness in tenders for financing scientific projects and attracting talented researchers and students. Based on the proposals and opinions of all stakeholders, the Faculty focuses on several key objectives that are important for future development, and activities are defined in accordance with the adopted Development Strategy of the Faculty for the next period, in which three fundamental objectives concerning the development of scientific research activities are set out:

1. Increasing the international recognition of the Faculty and the quality of scientific research. (Objective 2.1)
2. Improving the quality of post-graduate university studies in Civil Engineering and its integration into the European higher education area. (Objective 2.2)
3. Strengthening research potential and infrastructure. (Objective 2.3)

Strategic Objective 1: To increase the number of scientific research projects and projects focusing on solving current problems in the construction industry and society in general.

Link: Development Strategy of the Faculty, Chapter 6.1, Objective 2.1

It is important to encourage applications of competitive scientific research projects and to ensure institutional support for their application and implementation. Cooperation between institutes and institutions in case of project applications can be crucial for increasing the chances of their acceptance and successful implementation. In addition, intensify cooperation with industry in order to gain a clearer insight into real problems and encourage research work towards developing new, innovative, advanced technologies for improving industrial processes. One of the ways to increase this cooperation would be to increase the number of doctoral students in economics who have direct contact with current and real problems in the economy. Also, involving external stakeholders from the economy in the activities of the Faculty through workshops, forums as guest lecturers and involvement in the organisation and implementation of professional practice, which would have a similar effect, i.e. the circzlation of knowledge and skills.

Strategic Objective 2: To develop international cooperation with other universities and research institutions.

Link: Development Strategy of the Faculty, Chapter 6.1, Objectives 2.1 and 2.2

In order to improve the quality of research, it is necessary to develop international cooperation with other universities and research institutions. This includes encouraging cooperation with international institutions and membership in international professional associations. One of the steps in this process is to improve the quality of information related to teaching, science and professional work in English, in order to create better communication with international partners. Apart from that, it is necessary to encourage mobility of teaching and non-teaching staff and ensure all prerequisites for the continuation of international student conferences and workshops. This can create an environment where students and professors can associate with colleagues from other countries and exchange ideas, experience and knowledge. It is important to regularly inform the public about activities and successes in international cooperation, in order to increase the visibility and recognition of the Faculty in the European framework. Only by continuous encouragement of international cooperation and creating new partnerships, the Faculty can enhance the quality of education and research and ensure its position on the international stage.

Strategic objective 3: To expand interdisciplinary cooperation within the Faculty with the aim of creating new multidisciplinary research areas.

Link: Development Strategy of the Faculty, Chapter 6.1, Objectives 2.1 and 2.2

In order to create new multidisciplinary research areas, the Faculty should expand interdisciplinary cooperation within its departments. However, in order to create relevant and quality projects, it is necessary to encourage cooperation between institutes and institutions at local, national and international level. In this way, experts from different fields can work together on projects that span multiple disciplines, thus improving the quality of research and increasing their importance in the scientific community. The Faculty should develop systematic programmes to promote cooperation and establish communication channels to facilitate the transfer of knowledge and technology between fifferent institutions. In addition, supporting joint research projects between faculties and other institutions provides access to additional resources and expertise, resulting in higher quality research and products.

Strategic objective 4: To develop a support programme for young scientists and researchers.

Link: Development Strategy of the Faculty, Chapter 6.1, Objectives 2.1 and 2.2

One of the key challenges young scientists face is the lack of funding for their research. Therefore, it is important to provide financial support for research and projects of young scientists. This can be achieved by encouraging applications for research projects in which young researchers can affirm their research careers and realise their ideas. Providing quality mentoring support by experienced scientists, professors or industry

experts is important. It is necessary to ensure connection with the industrial sector, which can also provide realistic research ideas and provide financial assistance in the form of financing focused research to solve specific problems, but also possible access to resources, equipment and technologies that are not available to the Faculty. Ensuring continuous education and training through courses, workshops, conferences and seminars ensures transfer of knowledge and improvement of research processes. A positive, collegial environment and the establishment of awards for achieved success of young researchers can also be stimulating.

Strategic Objective 5: To improve the quality of post-graduate university studies in Civil Engineering and its integration into the European Higher Education Area.

Link: Development Strategy of the Faculty, Chapter 6.1, Objective 2.2

The quality of mentoring work, the quality of information in English language, the mobility of doctoral students and increasing the visibility of the programme in the European framework are important factors in ensuring high quality of the doctoral study programme and the creation of experts who will be ready to solve all the challenges that await them in this field. Improving the quality of mentoring work is achieved through ensuring quality training of mentors, but also through the use of new technologies that will enable better monitoring of students' work and provide them with the opportunity to receive feedback. In addition, mentoring work should be aligned with the needs of the labor market, in order to ensure high level of students' expertise and their readiness to solve the challenges that await them. English is the official language in the scientific community, and therefore it is extremely important that students have a good level of English knowledge, which is achieved through introducing special programmemes for learning English, and through organising various workshops and seminars. Encouraging mobility of doctoral students to international scientific institutions provides the opportunity to acquire new knowledge and experience and to transfer technologies, which also enables the establishment of connections and cooperation with other scientists. Increasing the visibility of the Civil Engineering Doctoral study in the European framework is achieved through participation in international conferences, student exchanges, cooperation with other universities and scientists, and by promoting the programme on social networks.

Strategic Objective 6: To provide adequate infrastructure and equipment for scientific research.

Link: Development Strategy of the Faculty, Chapter 6.1, Objective 2.3

In order to ensure further progress, it is necessary to continuously improve the infrastructure and equipment for scientific research, and to carry out the accreditation of laboratories. The development and modernisation of laboratories is important for scientific and research work because it provides excellent conditions for conducting research. Encouraging further development of the faculty journal Advances in Civil and

Architectural Engineering can help spread scientific insights and exchange of knowledge. Increasing the availability of scientific research results is crucial for their application in practice, which encourages cooperation with other institutions.

Strategic Objective 7: To increase the number of scientific publications with the aim of improving the academic reputation of the Faculty.

Link: Development Strategy of the Faculty, Chapter 6.1, Objectives 2.1 and 2.2

Encouraging the publication of scientific papers in journals indexed in the database Web of Science (WoS) and SCOPUS with a special emphasis on journals ranked in the first two quartiles (Q1 i Q2) is the key factor in promotion of scientific research work. Also, the promotion of scientific and research work can be improved through activities such as organising conferences, seminars and lectures. It is necessary to ensure that scientists and researchers are acquainted with the possibilities available to them, so that they can present and improve their work and more successfully apply for funding of their projects. Activities are aimed at increasing the quality and visibility of scientific research work, which will contribute to the reputation of the institution and its position in the academic community.

Strategic Objective 8: To promote the culture of research and innovation among students, and encourage student participation in research.

Link: Development Strategy of the Faculty, Chapter 6.1, Objective 2.1

Continue encouraging the participation of students in scientific research projects, which will encourage them to cooperate with colleagues and enable the acquisition of new knowledge and skills. Participation should be made available to all students, regardless of study programme and level of study. Organizing student competitions and reviews that would allow students to present their works, connect with other students and present their work to the general public. Providing mentoring support to students, to help them in their development, and refer them to research and data analysis methods. organizing events for students to promote research culture that includes lectures by famous scientists and innovators, presentations by students who have worked on research or innovative projects, and workshops where students can learn practical skills for research and innovation.

Strategic Objective 9: To develop a programme to encourage and support scientific conferences at the Faculty.

Link: Development Strategy of the Faculty, Chapter 6.1, Objective 2.1

The Faculty is planning to develop a programme to encourage and support scientific conferences as part of the initiative to promote research and establish new multidisciplinary research networks of collaboration with other researchers and institutions around the world. In order to achieve this goal, the Faculty will encourage the organisation of international scientific and professional meetings, workshops and other similar activities. Also, the Faculty will support the organisation of these activities and provide the necessary infrastructure for their successful implementation. This initiative also aims to increase the visibility of the Faculty at global level and encourage collaboration with other research institutions around the world.

Strategic Objective 10: To improve the communication channel with the public and the popularisation of science, in order to increase the visibility and influence of the Faculty.

Link: Development Strategy of the Faculty, Chapter 6.1, Objectives 2.1 and 2.2

The Faculty must define its objectives in the popularisation of science and focus on specific target groups of audience. Target groups include industry, media, academia, prospective students and the general public. The Faculty is trying to establish its presence on most media channels in order to ensure accessibility to the widest possible audience (social networks, websites, television, radio, newspapers and journals.) The Faculty should publish relevant content that could attract the attention of the audience, such as research news, interviews with professors or students, and other similar content. It is important that faculties adapt to the characteristics of social networks and the ways in which users of these networks consume content. Based on the defined target groups, the Faculty negotiates and tries to achieve cooperation with non-governmental organisations, industrial entities and other higher education and secondary education institutions in order to reach the target audience. The organisation of events intended for the target audience in the form of lectures, seminars, workshops, exhibitions and conferences with interesting and relevant content arouses interest of the target audience and contributes to greater visibility of the Faculty.

Strategic Objective 11: To ensure quality project management and transperancy in the management of research funds.

Link: Development Strategy of the Faculty, Chapter 6.1, Objective 2.1

Project management and transparency in the management of research funds are the key elements of successful scientific research. To ensure quality project management, it is necessary to set clear goals, tasks and deadlines, and to monitor project progress through regular reports. It is also important to provide adequate resources and develop a risk management strategy. Transparency in the management of research funds can be achieved through clear definition of costs, cost estimation and transparent reporting on the

financial aspects of the project. It is important to carry out audits to ensure that funds are used according to plan and that all transactions are carried out transparently.

8. EXPECTED RESULTS OF THE STRATEGIC PROGRAMME OF SCIENTIFIC RESEARCH

The expected results of the Strategic Programme of Scientific Research of the Faculty of Civil Engineering and Architecture include the following:

1. Increased number of research projects at national and international level.
2. Increased number of published scientific papers in relevant publications.
3. Increased number of quotes of published papers, which is an indicator of their influence.
4. Improving the quality of scientific papers and raising their level.
5. Increasing cooperation with other scientific and research institutions and industry.
6. Strenthening international visibility and influence of the Faculty in the scientific community.
7. Increased number of doctoral theses.
8. Development of new methods and technologies in the filed of civil engineering.
9. Increased number of lectures and presentations at conferences.
10. Increased number of professional papers and publications.
11. Strenthening international mobility of students and scientific staff.
12. Improvement oft he scientific infrastructure (laboratory) of the Faculty.
13. Strenthening the ties with industry and improving technology transfer.
14. Increased number of research groups at the Faculty.

9. IMPLEMENTATION SUCCESS INDICATORS

Indicators following the realization of the defined objectives are presented in Table 5. Target values represent the annual target value unless stated otherwise.

Table 5. Objectives and indicators of the implementation of the Strategic Programme of Scientific Research for the period 2022.-2027.

Strategic Objective	Indicators	Target value
Increased number of projects	1) Number of applications for competitive projects	5
	2) Number of contracted competitive projects	2
	3) Number of partner institutions	2
Strenthening of international cooperation	1) Number of active cooperation agreements with international institutions (Erasmus, CEEPUS and other)	25
	2) Number of outgoing and incoming teacher mobility	5
	3) Number of participation in conferences	20
	4) Share of active foreign students on doctoral studies	1
Strenthening of cooperation between institutes	1) Share of joint works by teachers of different organisational units	25 %
	2) Share of jointly applied projects by teachers from different organisational units	25 %
Support for young scientists	1) Number of established research groups	1
	2) Number of outgoing and incoming mobilities of young researchers	2
	3) Number of attended workshops, education	5
Improvement of doctoral studies	1) Number of doctoral theses based on published scientific papers	1
	2) Number of doctoral theses writen in English	1
	3) Number of foreign members in commissions	1
	4) Number of scholarships or prizes awarded	1

	5) Number of scientific trainings of study advisors, mentors or co-mentors	2
Development of scientific infrastructure	1) Value of acquired laboratory equipment	25 %
	2) Number of calibrated instruments	20
	3) Number of trainings held for the use of new equipment	2
	4) Number of laboratory staff trainings	2
	5) Number of interlaboratory collaborations	2
	6) Investing in the Faculty Journal ACAE *(in total for a four-year period)*	20 %
	7) Number of published works in open access	3
Increased number of scientific publications	1) Number of papers published in WoSCC and SCOPUS base per scientist*	1,1
	2) Share of Q1 papers according to WoSCC and SCOPUS base	35 %
	3) Number of papers in other publications per scientist	1
	4) Number of books/editorial books	2
	5) Number of active international projects	2
Involvement of students	1) Number of students involved in project implementation	5
	2) Number of students involved in the preparation of scientific papers	2
	3) Number of defended thesis topics resulting from scientific projects	2
Organisation of scientific conferences	1) Number of organized scientific conferences	1
	2) Number of participations in organising scientific conferences	1
Scientific communication	1) Science popularization activities	10
	2) Number of organized visits and events at the Faculty	2
Incresing the quality of project management	1) Number of training courses for staff in Office for Projects	2
	2) Number of submitted reports on spent funds	2

* Total number of papers affiliated to the Faculty, authored by employees in scientific-teaching profession and postdoctoral students.

9.1. Annex A: List of scientific research projects in the period 2016-2023

Table 6. HRZZ (Croatian Science Foundation), Ministry of Science and Education projects contracted from 2016. to 2023.

No.	Code and name	Holder and institution	Programme or funding source	Duration of the project	Approved funds
1.	Development of Reinforced Concrete Elements and Systems with Waste Car Tire Dust – ReCoTip; Code: IUP-2017-57113	Ivana Miličević, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	HRZZ (Croatian Science Foundation)	2018. - 2022.	242.335,26 €
2.	Blast Load Capacity of Highway Bridge Columns / Otpornost stupova nadvožnjaka na djelovanje eksplozije; šifra: UIP-2017-05-7041	Hrvoje Draganić, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	HRZZ (Croatian Science Foundation)	2018. - 2023.	196.994,72 €
3.	Cement Stabilised Load Bearing Layers with Waste Rubber for Sustainable Pavement - RubSuPave; Code: UIP-2019-04-8195	Ivana Barišić, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	HRZZ (Croatian Science Foundation)	2020. - 2025.	177.138,50 €
4.	Effectiveness of Historic Arched Masonry Bridges with Exposure to Multiple Environmental Hazards	Davorin Penava, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	HRZZ (Croatian Science Foundation)	2020. - 2021.	85.389,61 €
5.	Compacted Earth for Modelling and Standardisation in Seismically Active Areas; Code: UIP-2020-02-7363	Ivan Kraus, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	HRZZ (Croatian Science Foundation)	2021. - 2025.	267.500,00 €
6.	Influence of Specific Surface Area of the Particles on Hydrogeological Properties of the Bedrock and the Soils Developed on It in Eastern Croatia, Code: UIP 2017-05-9435,	Tamara Brleković, Faculty of Civil Engineering and Architecture Osijek (GrAFOS); host institution: Croatian Geological Institute, dr.sc. Kosta Urumović	HRZZ (Croatian Science Foundation)	2018. - 2023.	188.591,41 €
7.	Methodological Framework for Effective Energy Management by Using Intelligent Data Analytics	Hrvoje Krstić, Faculty of Civil Engineering and Architecture Osijek (GrAFOS), host institution: Faculty of Economy Osijek	HRZZ (Croatian Science Foundation)	2017. - 2020.	551.654,00 €
8.	Seismic Risk Assessment of Cultural Heritage Buildings in Croatia - SeisRICHerCRO (IP-2020-02-3531)	Associates from GrAFOS: Davorin Penava, holder: Asocc.prof. Snježana Markušić; University in Zagreb; Faculty of Science and Mathematics; Departement of Geophysics	Croatian Science Foundation (HRZZ) "Istraživački projekti" (IP-2020-02)	2021. - 2025.	148.238,00 €

9.	Young Researchers' Career Development Project – Training of New Doctoral Students	Davorin Penava, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	HRZZ (Croatian Science Foundation)	2020. - 2022.	85.390,00 €

Table 7. IPA andINTERREG projects contructed from 2016 to 2023

No.	Code and name	Holder and institution	Programme or funding source	Duration of the project	Odobrena sredstva
1.	Agricultural Waste - Challenges and Business Opportunities - Eco build	Ivanka Netinger-Grubeša, Faculty of Civil Engineering and Architecture Osijek (GrAFOS), host institution: Faculty of Civil Engineering and Architecture Osijek (GrAFOS) and Departement for Civil Engineering and Geodesy (DGG), Faculty of Technical Science (FTN), University in Novi Sad	Interreg IPA Cross-border Cooperation Programme Croatia-Serbia 2014-2020	2017. - 2020.	464.582,54 €
2.	Greening the cities – Development and promotion of energy efficiency and sustainable urban environment in the cities of Croatia-Serbiacross-border region	Hrvoje Krstić, Faculty of Civil Engineering and Architecture Osijek (GrAFOS) and host institution: University in Novi Sad, Faculty of Science and Mathematics Novi Sad	Interreg IPA Cross-border Cooperation Programme Croatia-Serbia 2014-2020	2019. - 2022.	1.364.586,60 €
3.	Greening the cities 2.0 – Development and promotion of energy efficiency and sustainable urban environment in the cities of Croatia-Serbiacross-border region, Code: HR-RS412	Hrvoje Krstić, Faculty of Civil Engineering and Architecture Osijek (GrAFOS) and host institution: University in Novi Sad, Faculty of Science and Mathematics Novi Sad	Interreg IPA Cross-border Cooperation Programme Croatia-Serbia 2014-2020	2023. - 2023.	328.164,00 €

Table 8. COST projects contracted from 2016. to 2023.

No.	Code and name	Holder and institution	Programme or funding source	Duration of the project
1.	NORM4BUILDING	UHasselt Agoralaan - gebouw B, Belgium	COST Action TU 1301	2013. - 2017.
2.	Towards the next generation of standards for service life of cement-based materials and structures	University of Minho Azurem Campus, Dep. Civil Engineering, Portugal	COST Action TU1404	2014. - 2018.

3.	Renewable Energy and Landscape Quality; Obnovljivi izvori energije i krajobrazne kvalitete	Nuertingen-Geislingen University, Germany	COST Action TU1401	2014. – 2018.
4.	Wind energy technology reconsideration to enhance the concept of smart cities -WINERCOST	Birmingham University, Great Britain	COST Action TU1304	2014. – 2018.
5.	COST TD1406 Training School	Faculdade De Ciências E Tecnologia Da Universidade Nova De Lisboa	COST TD1406 Training School	2015. – 2019.
6.	CA18137 - European Middle Class Mass Housing	Sudionici s GrAFOS-a: Ivana Brkanić Mihić, Dina Stober, Zlata Dolaček-Alduk; project developer: prof. Ana Cristina Fernandes VAZ MILHEIRO, University Institute of Lisbon, Portugal	COST CA18137	2019. – 2023.
7.	CA18204 - Dynamics of placemaking and digitization in Europe´s cities	Sudionici s GrAFOS-a: izv.prof.dr.sc. Dina Stober, dipl.ing.arh., izv.prof.dr.sc. Zlata Dolaček-Alduk; project developer: Dr Zsuzsanna VARGA, University of Glasgow, Scotland, United Kingdom	COST CA18204	2019. – 2023.

Table 9. projects financed from the resources of the Faculty of Civil Engineering and Architecture Osijek, contracted from 2016. to 2023.

R.br.	Code and name	Holder and institution	Programme or funding source	Duration of the project	Approved funds
1.	Influence of Melioration Channels on the Transport of Nitrate Pollution and the Retention of Pollution in the Channel Deposit	Lidija Tadić, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2016. - 2018.	22.708,87 €
2.	Effects of Soil – Structure Interaction in Designing According to Expected Response - PENDULARUM	Dragan Morić, Ivan Kraus, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2016. - 2020.	14.971,13 €
3.	Earthquake Risk of Urban Area	Marijana Hadzima-Nyarko, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2016. - 2020.	9.317,41 €
4.	Controlled Seismic Behaviour of Steel Frames with Masonry Infill	Damir Markulak, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2016. – 2020.	11.939,74 €

5.	Evaluation of Experimental Methods for Determining Heat Transfer Coefficient under Controlled Conditions	Hrvoje Krstić, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2016. - 2020.	12.669,32 €
6.	Influence of Openings on the Seismic Resistance of a Load-bearing Structure Made of Framed Masonry out of Its Own Plane	Davorin Penava, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2016. - 2020.	5.972,53 €
7.	Influance of Explosions on Overpass Superstructure	Damir Varevac, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2017. - 2020.	11.082,35 €
8.	Influence of Moisture on the Properties of Masonry Structures	Ivanka Netinger Grubeša, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2016. - 2019.	23.717,57 €
9.	Microsimulation Modelling of Children Pedestrian Movement	Irena Ištoka Otković, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2016. - 2018.	4.300,22 €
10.	Use of Ash from Wood Biomass in Layers of Pavement Construction	Sanja Dimter, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2019. - 2021.	5.128,28 €
11.	Monitoring of Key Parameters of the Reliability of Safety and Effects of Tower Cranes – "Monitor – KRAN"	Mario Galić, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2019. - 2021.	5.308,91 €
12.	Study of the Impact of Geosynthetic Armatures on the Stiffness of Incoherent Fill	Krunoslav Minažek, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2019. - 2021.	5.308,91 €
13.	Seismic Response of the Frame-Wall Structural System Perpendicular to Its Plane Based on the Floor Displacement Method	Filip Anić, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2019. - 2021.	3.162,78 €
14.	Dynamic Test of the Behaviour of Frame Structure Based on Loose Soil	Adriana Brandis, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Internal project	2019. - 2021.	3.848,96 €

Table 10. EU FUNDS – projects contracted from 2016. to 2023.

No.	Code and name	Holder and institution	Programme or funding source	Duration of the project	Approved funds

1.	Forecast Engineering: From Past Design to Future Desicions	Davorin Penava (GrAFOS) i Bauhaus-Universität Weimar (Lars Abrahamczyk)	Erasmus+, Key Action 2 - Strategic Partnerships	2016. - 2019.	433.785,00 €
2.	HU 0028 Active Methods in Teaching and Learning Mathematics and Informatics	Ivanka Stipančić-Klaić (GrAFOS) i partneri: Johannes Kepler University (JKU) Linz, University of Applied Sciences Technikum Wien, University College of Teacher Education Lower Austria; Faculty of Natural Sciences and Mathematics, Department of Mathematics, Sarajevo; Paisii Hilendarski Plovdiv Unviersity, Faculty of Mathematics and Informatics; ranch in Plovdiv, Faculty of Electronics and Automation, Department of Control Systems, Univerzitet Sofija, Angel Kanchev University of Rousse, Higher School of Insurance and Finance - Sofia,, Fakultet kemijskog inženjerstva, Zagreb, Faculty of Education, Department of Mathematics and Mathematical Education, Charles University, Prag, Faculty of Education, Palacký University, Olomouc, Faculty of Electrical Engineering, Czech Technical University in Prague; Faculty of Science i Pedagogical Faculty iz Ostrave, Faculty of Education, Jan Evangelista Purkyne University in Ústí nad Labem; Institut za matematiku, Debrecin; Comenius Faculty, Eszterházy Károly University, Pollack Mihály Faculty of Engineering Department of Mathematics, Pech; Faculty of Materials Science and Engineering, Miskolc; Faculty of Information Technology, University of Pannonia; Gál Ferenc College University, Szeged; Faculty of Information Systems, Visualization, Multimedia and Animation, Ohrid; Siedlce University of Natural Sciences and Humanities, Facullty of Sience i Institute of Pedagogy, Poljska; Jesuit University Ignatianum in Faculty of Education, Krakow; The University College of Tourism and Ecology, Poljska; State University of Applied Sciences in Nowy Sacz, Poljska; "1 Decembre 1918" Univerity of Alba Iuli, Rumunjska; Technical University of Cluj-Napoca, Rumunjska; Technical University of Civil Engineering, Bucharest; “Politehnica” University of Timisoara; Faculty of Technical and Human Sciences, Târgu-Mures; University of Novi Sad, Faculty of Technology i Faculty of Civil Engineering of Subotica, RS; Slovak University of Technology in Bratislava, Slovačka; Technical University in Košice, Department of Mathematics and Theoretical Informatics, Faculty of Electrical Engineering and Informatics, Slovačka	Central European Exchange program for University Studies - CEEPUS	2017. - 2025.	n/p
3.	Research and Education of Environmental Risks	Marijana Hadzima-Nyarko, Građevinski i arhitektonski fakultet Osijek (GrAFOS) i partneri: University of Sarajevo, Faculty of Civil Engineering, Department of Materials and Constructions; University of Novi Sad, Faculty of Technical Sciences; University Sts. Cyril and Methodius - Skopje, Faculty of Civil Engineering-Department of Structural Analysis and Earthquake Engineering; University of Belgrade, Faculty of Geography; J. J. Strossmayer University of Osijek Faculty of Agriculture; University of Nyíregyháza Engineering and Agriculture Faculty; Brno University, Faculty of Civil Engineering; “EPOKA" University , Department of Civil Engineering; University of Montenegro Faculty of Civil Engineering; Transilvania University of Brasov – UniTBv, Faculty of Civil Engineering; University of Belgrade,	Central European Exchange program for University Studies – CEEPUS	2018. -	n/p

		Faculty of Civil Engineering - Department of materials and structure; University of Novi Sad, Faculty of Civil Engineering in Subotica; University of Novi Sad, Technical Faculty "Mihajlo Pupin"; J. J. Strossmayer University of Osijek; Faculty of Electrical Engineering, Computer Science and Information Technology Osijek; University of Mostar, Faculty of Civil Engineering; University of Warmia and Mazury in Olsztyn Faculty of Geodesy, Geospatial and Civil Engineering; University of Prishtina with temporary seat un Kosovska Mitrovica, Faculty of technical Sciences; Technical University in Košice, Faculty of Civil Engineering; North University, Department of Civil Engineering; University of East Sarajevo, Faculty of Mechanical Engineering			
4.	Developing and Improving Teaching Competencies at University - Educa T	Sanja Lončar-Vicković (GrAFOS), Partner: AZVO, Croatian Universities (Zagreb, Osijek, Rijeka, Zadar, Split, Pula, Dubrovnik), Ministry of Science and Education (MZO)	Erasmus+	2016. - 2018.	194.414,75 €
5.	International Study Programme Constructions Resistant to Accidental Actions - Resilient Structures - InterStruct	Damir Varevac, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	European Social Fund (ESF), OPULJP 2014-2020,	2019. - 2021.	237.509,06 €
6.	Development and Application of Advanced Construction Materials for Construction of Healthy Buildings, Z2grade Code: KK.01.1.1.04.0105	Damir Varevac, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	European Commission, European Fund for Regional Development and the Ministry of Science and Education (MZO)	2020. - 2023.	806.866.41 €
7.	Creative STEM Revolution in Slavonia	Ivan Kraus, Faculty of Civil Engineering and Architecture Osijek (GrAFOS); host institution: Dokkica and Association of Technological Culture City of Osijek; partners: Community Development Association Kreaktiva, Osijek; University of J. J. Strossmayer in Osijek; Faculty of Food Technology, Osijek; Technical School Nikola Tesla in Vukovar	Strenthening the capacity of civil society organisations to popularize STEM UP.04.2.1.10, Operational programme "Efficient Human Potentials" 2014-2020, European Social Fund	2021. - 2023.	352.556,92 €
8.	Research and Development of Innovative Wood Wall Coverings, Partition Walls and Load-bearing Walls for Sustainable Construction in the Company Spačva d.d."	Participants from GrAFOS: Dina Stober, Zlata Dolaček-Alduk, Hrvoje Krstić, Mihaela Domazetović, Marija Krajnović; project developer: Wood Industry SPAČVA joint-stock company; partners: University in Zagreb, Faculty of Forestry	European Regional Development Fund, Increasing the development of new products and services resulting from research and development activities - phase II, IRI tender	2020. - 2023.	5.481.150,04 €
9.	Partnership for Virtual Laboratories in Civil Engineering - PARFORCE (KA226- 409D7578)	Participants from GrAFOS: Davorin Penava; project developer: Jun.-Prof. Dr.-Ing. Lars Abrahamczyk; Bauhaus-Universität Weimar	ERASMUS+ Programme - Key Action 2 (KA2); Cooperation for innovation and exchange of good practice; Partnership for Digital Education in Higher Education	2021. - 2023.	287.470,00 €

10.	Environmental Risk Assessment and Mitigation on Cultural Heritage Assets in Central Asia, Code: 609574-EPP-1-2019-1-IT-EPPKA2-CBHE-JP	Holder: Fulvio Rinaudo, University "Politecnico di Torino", Torino, Italy and Davorin Penava (coordinator of partner university), University of Josip Juraj Strossmayer in Osijek, Faculty of Civil Engineering and Architecture Osijek	ERASMUS+ programme of theEuropean Union – Key Action 2: Cooperation for innovation and exchange of good practice; Type of Action: Capacity Building in Higher Education	2020. - 2024.	801.376,00 €
11.	Sustainable Model of Professional Practice at the faculty of Civil Engineering and Architecture Osijek – PRAG, Code: UP.03.1.1.04.0012	Zlata Dolaček-Alduk, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	European Social Fund in the financial period 2014-2020	2020. - 2023.	415.196,03 €

Table 11. Bilateral cooperation - scientific projects contracted from 2016. to 2023.

No.	Code and name	Holder and institution	Programme or funding source	Duration of the project	Approved funds
1.	Development of Models for Assessment of Energy Efficiency of Buildings from the Aspect of Air Permeability	Hrvoje Krstić, Faculty of Civil Engineering and Architecture Osijek (GrAFOS)	Tender for co-financing Croatian-Serbian scientific research projects in 2016 and 2017	2016. - 2017.	7.963,37 €
2.	Assessment of Damage to Reinforced Concrete Frame Structures Filled with Masonry due to Seismic 3D Action	Davorin Penava(GrAFOS) andi Lars Abrahamczyk (Bauhaus-Universität Weimar)	Ministry of Science andEductaion (MZO) and Deutscher Akademischer Austauschdienst(DAAD)	2018. - 2019.	16.000,00 €
3.	Microstructures and Mechanical Characteristics of Concrete with Recycled Materials	Marijana Hadzima Nyarko(GrAFOS) and Institute for Multidisciplinary Research, University of BelgradeFaculty of Electrical Engineering, Computing and Information Technologies Osijek	Tender for co-financing Croatian-Serbian scientific research projects in 2019 and 2020	2019. - 2021.	1.500,00 €
4.	Morphological Characteristics, Development Potential and Regulatory Elements of Slovenian and Croatian Rural Settlements in the Pannonian Area	Dina Stober, Project developer for Croatia: University Josip Juraj Strossmayer in Osijek, Faculty of Civil Engineering and Architecture Osijek (GrAFOS) and Project developer for Slovenia: Alma Zavodnik-Lamovšek, Faculty of Civil Engineering and Geodesy, Ljubljana, Slovenia	Tender for co-financing scientific research projects as part of Croatian-Slovenian cooperation	2020. - 2022.	2.000,00 €

5.	Development of a Model Predicting the Behaviour of Children Pedestrians in Urban Traffic Network	Irena Ištoka Otković, University Josip Juraj Strossmayer in Osijek, Faculty of Civil Engineering and Architecture Osijek (GrAFOS) and Tomaž Tollazzi University in Maribor, Faculty of Civil and Traffic Engineering and Architecture (FGPA UM)	Scientific research project as part of Croatian-Slovenian cooperation	2020. - 2021.	2.000,00 €
6.	Digital Transpormation of Construction Projects Driven by Synergy of Optimization Methods and the BIM Concept for More Efficient and Safer Building	Head of the Croatian side: Mario Galić, Faculty of Civil Engineering and Architecture Osijek (GrAFOS) and Head from the Slovenian side Uroš Klanšek, University in Maribor, Faculty of Civil and Traffic Engineering and Architecture	Tender for co-financing scientific research projects as part of Croatian-Slovenian cooperation	2023. - 2025.	4.000,00 €