



RESEARCH AND DEVELOPMENT
STRATEGY OF THE UNIVERSITY OF MARIBOR
2013 - 2018

The Research and Development Strategy of the University of Maribor has been adopted at the 7th regular session of the Senate of the University of Maribor of 24 January 2012.

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1. Research vision and mission¹

VISION

The University of Maribor shall become a globally recognized **innovation ecosystem**, inspiring the creativity of both employees and students.

MISSION

The mission of the University of Maribor is based on honesty, curiosity, creativity, freedom of spirit, cooperation and knowledge transfer in the field of science, art and education. Concerned with mankind and sustainable development, the University of Maribor expands knowledge, raises awareness, and promotes humanistic values as well as the culture of dialogue, quality of life and global justice.

VISION of R&D

In terms of scientific achievements, an increasingly recognized **research University**, achieving continued progress.

MISSION of R&D

Forming **interdisciplinary research teams** able to produce **outstanding scientific achievements**, manage **research projects** and participate in **international networks** and **centres of excellence**, thus enabling the **active participation of students in scientific research**.

¹ The vision and mission of the University of Maribor were adopted at the 11th regular session of the Senate of the University of Maribor of 29 May 2012. The Research and Development Strategy of the University of Maribor was adopted at the 7th regular session of the Senate of the University of Maribor of 24 January 2012.

Research goals

In order to accomplish its research mission, the University of Maribor has formulated/adopted a **strategy** with the following primary goal:

fostering a **creative environment** encouraging **academic freedom** with the purpose of promoting **sustainable development** and **outstanding scientific achievements**, ensuring **greater visibility** of **UM** both in **Slovenia** and **abroad** and contributing to the **development of the region and Slovenia**.

All **subgoals** are subordinated to the primary goal.

Important research **subgoals** and strategies of UM management and bodies:

- encouraging the **participation of UM employees in bodies of the relevant Ministry and the Slovenian Research Agency (ARRS)**
- increasing the **visibility of scientific views** in Slovenia
- funding of **access to international scientific databases**
- developing **criteria for the remuneration of leading experts**
- promoting both the **purchase and shared use of research equipment**
- revised **appointment procedure**

Subgoals and strategies of UM management and bodies for **facilitating the transfer of scientific achievements into practice**:

- encouraging and promoting the **establishment of interdisciplinary teams** for a successful **transfer of important scientific findings to the economy**
- encouraging **cooperation between labs and faculties**
- promoting **spin-offs**
- providing assistance and encouraging cooperation within the framework of **RAZ:UM**, thus enabling the development of **small innovative enterprises**
- promoting **networking with industrial partners** and providing legal assistance in establishing consortiums that may cooperate in the European area (7FP, Horizon 20)

UM will co-create and **participate in research and development flows**, which are based on:

- **greater integration** into European scientific guidelines;
- **a sustainable strategy** for long-term development;
- development of a **limited number of target-oriented research priorities**;
- **a concept of integration** enabling better coordination of work and effective drawing on EU funds, thus ensuring sustainable growth;
- development of the **principle of cooperation**, which is the main added value of the EU;
- observing the “**partnership agreement**” concept - cooperation of all partners for the implementation of the **long-term strategy**.

Thus, UM will contribute to:

- **the establishment of a creative environment** for highly educated young Slovene citizens and foreigners;
- **increased attractiveness of the cohesion region “Eastern Slovenia”** for the establishment of high-tech companies and consequently technological development and breakthrough;
- **increased number of jobs with high added value**, esp. for young people;
- **integration into the international context (internationalization)**;
- **smart, sustainable and inclusive R&D** accelerating the development of the entire country.

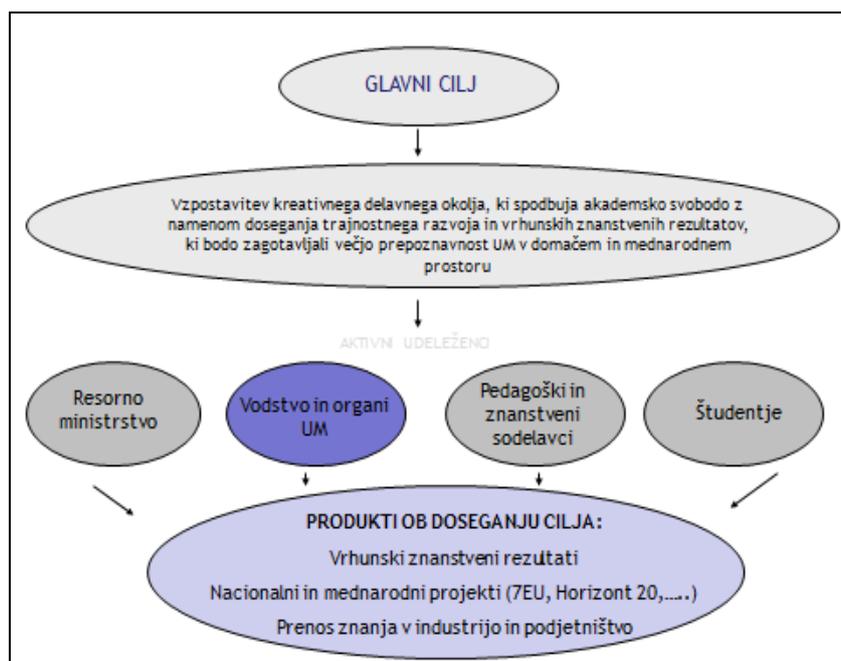


Figure 1: Interdependence of the primary goal of UM's research strategy, active participants and results of goal attainment

2. Key mechanisms for implementation

In order to **accomplish the mission, vision and goals**, thus implementing its research strategy based on the 2011-2020 Research and Innovation Strategy of Slovenia (RISS), strategic documents of Europe 2020, Horizon 2020 and other leading European initiatives emphasizing the importance of the link between science and technology in form of innovations, UM must establish the **following mechanisms**:

1. Establishment and development of the **Research and Arts Zone at the University of Maribor (RAZ:UM)** as a key integrative part of UM's innovation ecosystem. Within the framework of RAZ:UM, the University introduced **DEMOLA Maribor** in order to encourage the participation of students, companies and higher education institution through project assignments that could be of interest to the economy. By participating in the DEMOLA concept, companies can leverage their research and innovation process with creative ideas of students and meet potential human resources.
2. Establishment and development of a **modern infrastructure centre of the University of Maribor for Innovative Open technologies (IOT); LAB:UM**, providing researchers from UM and the broader region with access to research equipment and R&D capacities in the field of new, advanced and key technologies.

3. Implementing the **creative core** programme of the University of Maribor – **Centre for Open Innovations and Research of the University of Maribor (CORE@UM)** to establish a **common innovation and research platform in the Region of Podravje** focusing on **active and healthy ageing**, which will represent the core of Podravje's innovation ecosystem necessary for achieving economic breakthrough, preventing brain drain and encouraging the region's sustainable development. With the initiative **AHA@UM – »Active and Healthy Ageing for a better tomorrow«**, UM became a part of the European Innovation Partnership on Active and Healthy Ageing (EIP-AHA), which focuses on **increasing the quality of life of the elderly and improving solutions for the early diagnosis of age-related non-communicable diseases**.
4. **The revision of appointment procedures** uniting fragmented research fields, **promoting cooperation between university members and encouraging progress in competitive disciplines**. The adopted guidelines **facilitate an overview of the candidate's work**, and the criteria are tailored to the research area in question. Greater flexibility will contribute to the development of areas, which could be of interest with regard to the situation in the international community.



Website: <http://www.raz.um.si>

The Research and Arts Zone at the University of Maribor (RAZ:UM) is a key integrative part of UM's innovation ecosystem. The primary objective of RAZ:UM is to establish and coordinate a student-, researcher- and entrepreneur-friendly environment and strengthen UM's leading position in terms of knowledge transfer in the region.

Key tasks:

- providing assistance and encouraging both the **implementation of ideas produced by UM's researchers** (students, professors, etc.) and the **transfer of know-how to the economy** and the **broader social environment**
- organizing **access to labs** of university members for project work conducted by interdisciplinary groups of students, postdoctoral researchers and professors
- designing a **portal of ideas and innovations**
- **connecting groups with a relevant entrepreneurial or research environment**
- providing assistance in the **establishment of start-ups and spin-offs**, establishing **mechanisms of an innovative environment** and managing UM's **intellectual capital**
- fostering active **cooperation with LAB:UM and UM's Research and Arts Department**
-

RAZ:UM's activities have the following four dimensions or functions:

- **organization:** identification point of the innovative environment (both regionally, together with the municipality of Maribor, and globally), formation and management of the consortium of UM's innovative environment
- **content:** sLabs (student labs and studios), introduction of the artscience concept through summer schools, development projects, RAZ:UM club
- **communication:** branding and publicity through RAZ:UM
- **infrastructure:** design, establishment and operation within the framework of the future IOT centre (Innovative Open Technologies) through the implementation of UM's research strategy in the field of innovation and knowledge transfer

RAZ:UM covers the following topics:



Figure 2: Thematic pillars within RAZ:UM

- **Entrepreneurship:** providing assistance for entrepreneurship and innovation in the university environment; an important tool for the commercialisation of professional knowledge and technologies developed within UM
- **Consultancy:** connecting, coordinating and promoting work in the field of human resources development, careers and professional advice and lifelong learning in cooperation with the broader social environment
- **Core:** coordinated and smooth running of all sections of RAZ:UM and RAZ:UM as a whole, sLabs (student projects), communication with the public, management of RAZ:UM consortiums
- **Development:** conducting, managing and preparing new development projects supporting the operation of RAZ:UM and the development of UM's innovation ecosystem as well as national and international communication of RAZ:UM
- **Art:** linking, uniting and complementing art and science

DEMOLA

MARIBOR

3.1.1.

DEMOLA Maribor

Website: <http://maribor.demola.net/>

Within the framework of RAZ:UM, the University introduced **DEMOLA Maribor** in order to encourage the creativity of students, companies and higher education institutions through project assignments that could be of interest to the economy. Under the auspices of Demola, companies publish project assignments to be completed by groups of students under the mentorship of companies and researchers from UM. Project assignments are designed in a manner as to require the cooperation of multidisciplinary teams of students. The main goal of project assignments is to design a prototype on the basis of the problem and the solution on paper. Students must complete the assignment within three and a half months. This is not a lot of time but competitive knowledge of companies and UM is available to these creative groups of students. Rooms for exchanging creative ideas between students and representatives of companies and UM are also available.

By participating in the DEMOLA concept, companies can leverage their research and innovation process with creative ideas of students and meet potential human resources. Participation in the DEMOLA concept is also a great opportunity to establish efficient and sustainable cooperation between companies and UM.

The DEMOLA concept has been developed and tested in Tampere, Finland. The DEMOLA network is spreading and is currently introduced at 7 locations in Europe – Tampere, Oulu, southern and eastern Sweden, Vilnius, Budapest and Maribor. Companies joining the DEMOLA community have thus the opportunity to cooperate with 22 universities in Europe. In 2013, over 800 talented students participated in DEMOLA projects.

3.2.



IOT@UM (LAB:UM)

The University of Maribor endeavours to establish a **modern infrastructure centre – IOT Centre in Maribor** providing employees and students with **access to state-of-the-art research equipment, qualified personnel (experienced researchers from the University and the economy as well as postdoctoral researchers), effective management** and thus contributing to the **region’s international integration**. The Centre will adhere to the principle of complementarity with collocation IOT centres in partner companies and organizations. Research equipment will be available for joint research conducted by UM and its partner companies.

The infrastructure centre will be composed of **six “infrastructure units”** designed in accordance with global and European research guidelines. They will **link science and art** and **foster the transfer of knowledge to innovations**, which will represent the basis for new start-ups. These innovations will be intended for the needs of the industry and will offer comprehensive interdisciplinary cooperation and the planning of solutions.

The infrastructure centre will also be able to function as a KIC (Knowledge Innovation Community) with **smart specialisation in the priority field “Innovation for healthy living and active aging”** of the Horizon 2020 **“Better Society”** pillar within the framework of the **European Institute of Innovation and Technology (EIT)**. It will be established in Eastern Slovenia by 2015, connecting the Alps-Adriatic and the Danube research community.

3.3.



CORE@UM creative core

Website: <http://www.core.um.si>

With **CORE@UM (UM Centre for Open Innovation and Research)**, the University of Maribor is establishing **a common innovation and research platform in the region of Podravje** focusing on **active and safe ageing**, which will represent the core of Podravje’s innovation ecosystem necessary for achieving economic breakthrough, preventing brain drain and encouraging the region’s sustainable development.

UM's creative core programme (CORE@UM) is aimed at **strengthening research and innovation capacities of UM and the region at large** in the field of "Innovation for healthy living and active ageing".

The attainment of the primary goal is based on a sustainable strategy, which enables long-term development, and on the attainment of the following subgoals:

- increased attractiveness of the region of Podravje to give rise to **high-tech companies** and to achieve a **technological breakthrough** by strengthening UM's innovation ecosystem and promote the sharing of knowledge and technologies
- **smart, sustainable and inclusive** scientific research and regional development
- development of both the environment and region for **safe and active ageing**

The content of CORE@UM is divided into **three inter- and transdisciplinary-related R&D projects** offering **innovative solutions in the field of materials, technologies and methodologies** for the increased integration and safety of the elderly in a rapidly developing society.

Research is linked by the priority of future **Horizons 2020: Societal challenges – Health, demographic change and wellbeing**.

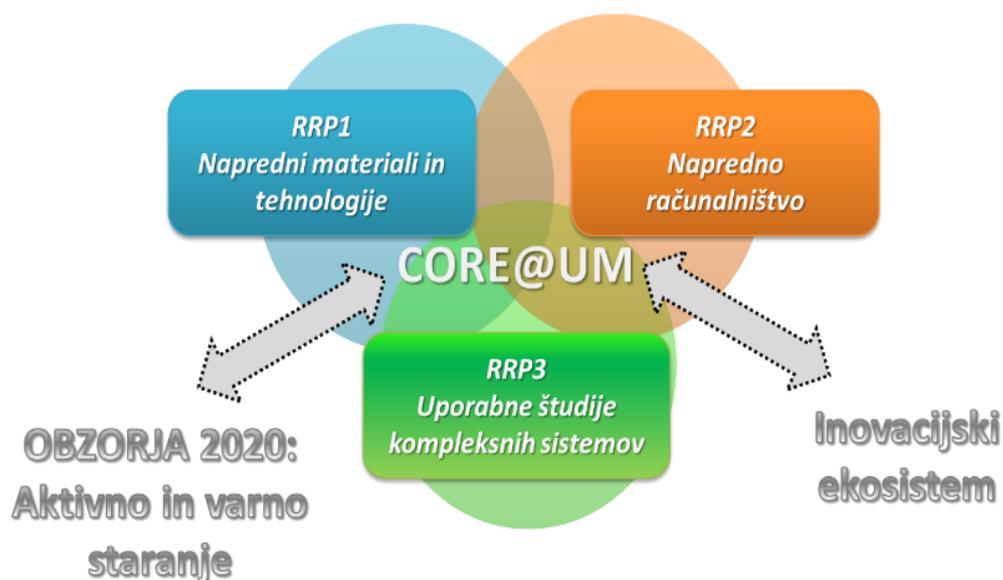


Figure 3: Correlation between R&D projects within the framework of CORE@UM

With the initiative *Active and Healthy Ageing for a better tomorrow (AHA@UM)*, the University of Maribor became part of the *European Innovation Partnership on Active and Healthy Ageing*. AHA@UM belongs to the Action Group **B3: Integrated Care**, which currently has 3000 stakeholders (research and educational institutions, hospitals, cities, regions, etc.). The primary consideration of our joint efforts is (in addition to the goals of EIP-AHA) the achievement of **smart, sustainable and inclusive** growth for sustainable economic development in Europe. The main principle of integration is based on the development and implementation of good practices in as many participating and non-participating countries as possible.

AHA@UM aims at **increasing the quality of life of the elderly** (the goal is to achieve two additional healthy years for the elderly by 2020) and **improving the early diagnosis of age-related noncommunicable diseases**. It also aims at producing solutions for teliagnosis and early diagnosis of life-threatening events. The AHA@UM consortium is composed of faculties of the University of Maribor (Faculty of Medicine, Faculty of Health Sciences, Faculty of Mechanical Engineering, Faculty of Electrical Engineering and Computer Science, Faculty of Chemistry and Chemical Engineering) and the University Medical Centre Maribor.

The most significant contribution to EIP AHA lies in the **combination of ICT fields, sensor technologies and materials** for the development of effective solutions benefitting all stakeholders directly or indirectly related to the elderly population. At the same time, existing approaches to integrated care will be improved, and examples of good practice will be applied to other fields with the cooperation of companies in the region.

3.4. REVISION OF APPOINTMENT PROCEDURES

The **revision of appointment procedures** is of the utmost importance for the sustainable development of a socially responsible University and its surroundings. In Slovenia, the appointment of faculty ranks for university teachers, researchers and other employees in higher education has a deep-rooted tradition. Appointments are subject to tight governmental regulation, both with regard to appointment requirements as well as the appointment procedure. In accordance with the amended documents of the Slovenian Quality Assurance Agency for Higher Education (SQAA), the University of Maribor redefined its appointment criteria in 2010.

The revision of appointment criteria will also be used in order to regulate other fields influencing staffing, research work and cooperation between various research groups both within the University as well as the international community. The University of Maribor had a large number of appointment fields narrowly defining the work of university teachers. **Due to the revision, the number of fields decreased from 417 to 157.** The establishment of a new appointment field must be supported by proof of international comparability and a list of experts active in this field. By employing this measure, **UM endeavoured to join fragmented fields, facilitate cooperation and increase the possibility of successful applications to national and international calls for proposals.**

At the same time, UM abolished the restrictive practice in accordance with which a certain field of appointment could only be developed by one university member. In accordance with the relevant guidelines, appointment fields may now be developed by anyone exhibiting sufficient activity in the field. Since the same field may be developed by several university members and candidates are evaluated by acknowledged experts active in the same field, stricter criteria for appointment of university members have been abolished. Due to specific features of certain appointment fields and scientific disciplines, within the framework of which they are being developed, new stricter criteria are related to the appointment field or, by consent, scientific discipline.

In the past, it was an established practice to evaluate candidates almost exclusively in accordance with the score earned in individual categories (quantitative criteria) rather than their entire opus. It was established that, in the majority of cases, the candidate's work cannot be strictly quantified. For this reason, the Guidelines for Appointment Procedures have been formulated and adopted, describing the type of work university teachers with a certain faculty rank should be conducting. Thus, the **numerical aspect of the evaluation gave way to an academic overview of the candidate's opus.**

In the continuation of the revision, the University of Maribor will formulate stricter criteria for individual appointment fields and later also appointment criteria for individual disciplines. In this manner, the University will adapt to specific features of scientific disciplines and enable a more **focused and controlled development of scientific research.** **By identifying the most important and successful appointment fields,** the University will be able to **encourage progress in disciplines,** in which it is **more competitive,** and promote fields that could be of interest with regard to the situation in the international community.

4. Priority research fields

UM analysed its **research potential** (also by applying the principles of smart specialisation–RIS3 methodology, self-assessment tool) and established its research priorities.

Scientific research at the University of Maribor focuses on the implementation of the 2011-2020 Research and Innovation Strategy of Slovenia and especially the **priorities of Horizon 2020**:

1. **Excellent science** (esp. joint research for the development of innovations and the participation of UM researchers in the Marie Curie programme)
2. **Industrial leadership** (esp. innovation of SMEs – encouraging all forms of innovation in all industries and types of SMEs)
3. **Societal challenges** with research in the following fields:
 - Health, demographic change and wellbeing
 - Food security, sustainable agriculture, marine and maritime research & bioeconomy
 - Climate action, resource efficiency and raw materials
 - Smart, green and integrated transport
 - Inclusive, innovative and secure societies

With **CORE@UM (UM Centre for Open Innovation and Research)**, the University of Maribor laid the foundations for future research (conducted by professors, researchers, students, doctoral candidates and postdoctoral fellows) on the priorities of Horizon 2020 (horizontal topic **Demographic Change and Wellbeing**), which could be observed in substantive premises of UM's smart ERA specialisation.

Within the framework of the integrated IOT project (Innovative Open Technologies) and **in cooperation with its regional partners, UM links and disseminates knowledge and technologies** for strengthening the region's research and innovation capacities in order to establish a KIC (Knowledge Innovation Community) in Eastern Slovenia by 2015 in the field of "Innovation for healthy living and active aging" within the framework of the European Institute of Innovation and Technology.

In accordance with its smart, sustainable and inclusive strategy fostering long-term development, UM and its members (17 faculties) will develop priority research fields defined by the EU as **Key Enabling Technologies (KET)** as well as other areas:

- **Information and communication technologies** with emphasis on: information, telecommunication, computer, microelectronic, measurement and sensor systems as well as intelligent services
- **Advanced production and process technology** with emphasis on mechatronics systems, systems for automated management and electro-mechanical systems management
- **Safe, clean and efficient energy** with emphasis on systems for energy production, transport and use
- **Photonics, including optical sensors and systems for information transfer**
- **Remote sensing systems**
- **Introduction and development of other advanced technologies based on or related to electromagnetic phenomena, e.g. biomedical technologies and nanotechnologies**
- **Innovative industrial technologies**
- **Sustainable materials and technologies**
- **Energy, process and environmental engineering**
- **Computer models and simulations in engineering**
- **Chemical engineering and biotechnology**
- **Chemistry and biochemistry**
- **Materials**
- **Renewable resources**
- **Civil engineering**
- **Traffic engineering**
- **Architecture and spatial planning**

- **Earth and environment**
- **Thermal energy, hydropower and nuclear power**
- **Alternative energy engineering and renewable sources of energy**
- **E-mobility**
- **Mathematics**
- **Physics**
- **Biology and ecology with environmental conservation** (High-quality development of basic sciences, such as mathematics, physics and biology, is of the utmost importance for both the University and the entire country since it influences various other scientific disciplines in which these sciences are present as tools or an inherent part of their syntax or methodology.)
- **Logistics and sustainable supply chains** (The field of logistics and sustainable supply chains explores tools and strategies for making supply chains sustainable in terms of optimum utilisation of resources, use of green technologies and changes of travel habits.)
- **Biomedicine**
- **Active and safe aging**
 - Food safety
 - Advanced materials (implants, delivery systems, sensors ...)
 - New therapeutic approaches
 - Degenerative changes
- **Communicable and non-communicable diseases**
- **Telemedicine**
- **Palliative care**
- **Nursing care (paediatrics, gerontology, oncology, perioperative care, medical prescriptions (medications and non-medical devices), safety and effectiveness in health care)**
- **Preventive nutrition and clinical dietetics**
- **Health technology with simulations in health care**

- **Public health and the impact of environmental issues on health**
- **Health care informatics**
- **Environmental agriculture and food safety**
- **Biotechnology and renewable sources of energy**
- **Agricultural economics**
- **Adapting the Slovene economy and Slovenia's development identity within the EU**
- **Entrepreneurship for an innovative society**
- **Dynamic economic and business systems**
- **Inclusive innovation systems** (living labs, open innovation processes in the field of modern ICT, safe aging, sustainable use of energy, innovation and competitiveness of SMEs, smart cities and regions)
- **Human capital management** (organizational learning and behaviour in collaboration systems and open innovation systems, strengthening competitive human resources)
- **Systems approach to assistance in planning sustainable policies** (on the basis of big and open data, participation of stakeholders)
- **Legal adaptation to new social requirements** with solutions for the excessive normativization and formalisation in the law; laying the foundations for proper application of the law with emphasis on increased efficiency brought in line with fairness, use of information technologies in legal proceedings and greater responsibility of clients for the efficient and less expensive implementation of legal proceedings, including the executive – economic analysis
- **Studies on the European Legal Area** (corporate law, legal proceedings and substantive law, e.g. with regard to the responsibility for medical complications)
- **Legitimacy**
- **Organized crime**
- **Social control**
- **Computer crime**

- **Spa tourism**
- **New technologies in tourism**
- **Human resources in tourism**
- **Teacher education focusing on lifelong learning and the development of key/transferable competencies**
- **Art as a foundation of human culture**
- **Humanities** (interpretation and re-interpretation of history, issues concerning multiculturalism, co-existence, tolerance and intolerance, social and ethnic minorities in various periods, social inclusion and marginalisation; modern linguistic issues in Central Slovenia and contiguous geographical areas; intercultural issues in linguistics and literature; demographic change and inter-generational cooperation; education and training; creativity, culture and leisure time; sustainable social functioning; mobility of youth and globalization; psychological and educational problems; problems concerning the artistic identity of Slovenia in the European context; issues concerning the media and memory; multicultural and multilingual content at different levels of education, etc.)
- **Social sciences**
- **Education of teachers of humanities, social sciences, technical sciences as well as natural sciences and mathematics**

The University of Maribor will cooperate with entities of the regional, national, European and global environment and participate in the preparation and implementation of important flagship projects under EU directives, e.g. **Horizon 2020, EU Strategy for the Danube Region, Alps-Adriatic Rectors' Conference (AARC) and other European initiatives.**

The strategy focuses on cross-border cooperation in the field of R&D. It is being executed on the basis of existing relations with foreign universities in Europe and elsewhere and is evident in international publications, patents and innovations, international monograph and journal collections, project development in cooperation with the industry as well as the mobility of researchers, students and professors. The University of Maribor aims to establish interdisciplinary relations with partner institutions.

The development of business and innovation infrastructure will ensure:

- **Increased scope and quality of R&D in the region of Podravje:** The scope refers to an increased number of R&D projects (and programmes), inventions, innovations, spin-offs and start-ups;
- **Increased synergies of scientific research** facilitating the development of **inter- or multidisciplinary fields**, which will multiply the effect when drawing on (Slovene and European) budgetary resources and when cooperating with the economy;
- **Ensuring sustainable high-quality support for the transfer of knowledge/technologies to the environment/economy** by connecting regional R&D potentials and processes.

TABLE OF FIGURES

Figure 1: *Interdependence of the primary goal of UM's research strategy, active participants and results of goal attainment*

Figure 2: *Thematic pillars within RAZ:UM*

Figure 3: *Correlation between R&D projects within the framework of CORE@UM*