

# Znanstvenoraziskovalna dejavnost Univerze v Mariboru in pogled v prihodnje

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Spremenjene družbenoekonomske razmere soočajo Univerzo v Mariboru (UM) z novimi izzivi, ki se nanašajo tudi na organizacijo znanstvenoraziskovalnega dela na Univerzi. V prihodnjem obdobju bo potrebno večje povezovanje med posameznimi znanstvenoraziskovalnimi vedami in področji, z namenom doseganja znanstvene odličnosti, višje kakovosti življenja, večje gospodarske rasti regije in s tem trajnostnega razvoja.

Univerzitetno okolje omogoča akademsko svobodo, pospešuje kreativno mišljenje in pomaga pri snovanju in uresničevanju novih izvirnih znanstvenih idej, ki niso vedno usmerjene k neposrednemu ustvarjanju nove dodane vrednosti izdelkov in tehnologij. Na drugi strani, zaradi vse večjih zahtev po doseganju višje gospodarske rasti, ponuja razvojno-industrijsko okolje kreativno okolje, ki pa je usmerjeno ciljno na razvoj določenega izdelka. Na poti ustvarjanja in razvoja našega okolja in višje kakovosti življenja ter v skladu z glavnimi znanstvenoraziskovalnimi in razvojnimi usmeritvami evropske skupnosti stopamo skupaj, vsak s svojimi prednostmi in pomanjkljivostmi. Vloga Univerze v tem procesu je povezovalna in koordinacijska z namenom doseganja sinergijskih in trajnostnih učinkov. Vizija, poslanstvo in strategija znanstvenoraziskovalnega dela UM opredeljujejo združevanje poučevanja in raziskovanja, povezovanja različnih področij in dejavnosti ter boljšega in učinkovitejšega prenosa in souporabe znanja.

# The University of Maribor's scientific research activities and a look into the future

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Due to changing social and economic conditions, the University of Maribor (UM) is facing new challenges that affect how the University's scientific research work is organised. In the future, greater integration between individual research fields and areas will be necessary in order to achieve scientific excellence, higher quality of life, greater economic growth in the region and, thereby, sustainable development.

The University environment enables academic freedom, promotes creative thinking and helps to devise and realise original scientific ideas; ideas that are not always focused on the direct creation of new value-added products and technologies. Because of the increasing demand for greater economic growth, the development-industrial environment, on the other hand, offers a developmentally and industrially creative environment which is goal-oriented towards the development of a particular product. We all walk together on the path to the creation and development of our environment and a higher quality of life, in line with the European Community's main scientific research and developmental directions, each with our own strengths and weaknesses. The role of the University in this process is to unite and coordinate with the intention of achieving synergetic and sustainable effects. The vision, mission and strategy of the scientific research work at the UM is defined by uniting teaching and research, integrating various fields and activities, and improving the transfer and sharing of knowledge.

## Znanstvenoraziskovalna vizija, poslanstvo in strategija Univerze v Mariboru

Znanstvenoraziskovalna vizija definira UM kot raziskovalno univerzo, ki je po svojih znanstvenoraziskovalnih dosežkih vse bolj razpoznavna in, ki bo konstantno napredovala primerno z drugimi univerzami doma in po svetu. Poslanstvo znanstvenoraziskovalnega dela UM narekuje oblikovanje interdisciplinarnih timov raziskovalcev, sposobnih vrhunskih znanstvenih rezultatov, vodenja in sodelovanja v znanstveno–raziskovalnih projektih, vključevanja v mednarodne integracije ter centre odličnosti in aktivnega vključevanja študentov v znanstveno–raziskovalno delo. Tako je glavni cilj znanstvenoraziskovalne strategije UM: »Vzpostavitev kreativnega delovnega okolja, ki spodbuja akademsko svobodo z namenom doseganja trajnostnega razvoja in vrhunskih znanstvenih rezultatov, ki bodo zagotavljali večjo prepoznavnost UM v domačem in mednarodnem prostoru in odločilno vplivali na razvoj regije in Slovenije«.

V prihodnjem obdobju bo UM soustvarjala in sodelovala v znanstvenoraziskovalnem razvoju Republike Slovenije. S svojimi profesorji in diplomskimi študenti, doktorandi in post doktorandi bo raziskovala med drugim na področjih biotehnologije in medicine, komunikacijskih tehnologij, nanotehnologij, materialov (prioritetna področja EU okvirnega programa; Obzorja 2020). Svoje dosežke bo prenašala v okolje v obliki vrhunskih znanstvenih prispevkov in tako vplivala na rast znanstvene osveščenosti in širjenje znanja. Z razvojem tržno zanimivih idej in prenosom vrhunskih znanstvenih dosežkov v prakso, UM pospešuje rast visokotehnoloških podjetij v regiji in tako vpliva na tehnološko rast regije. S tem namenom je UM zasnovala sodobno »Raziskovalno, razvojno in umetniško središče UM – RAZ:UM«, ki ima naslednje funkcije/dimenzije:

- organizacijsko – je identifikacijska točka inovacijskega okolja UM in regije,
- vsebinsko – vpeljuje nove koncepte skozi poletne šole, razvojne projekte, klub RAZ:UM,
- implementacijsko – implementira znanstvenoraziskovalno strategijo UM na področju inovacij in souporabe znanja in tehnologij,
- komunikacijsko – skrbi za medijsko prisotnost UM, v 2012 skozi EPK.

S svojo znanstvenoraziskovalno politiko UM vpliva na:

- povečanje vpetosti v evropska znanstvenoraziskovalna področja,

## The University of Maribor's scientific research vision, mission and strategy

It's scientific research vision defines the UM as a research university that is increasingly known for its scientific research accomplishments, and which will constantly progress in comparison with other universities at home and abroad. The UM's scientific research mission dictates the formation of interdisciplinary teams of researchers who are capable of achieving top scientific results, leadership and cooperation in scientific research projects, joining international integrations and centres of excellence, and actively including students in scientific research work. Thus, the main goal of the UM's scientific research strategy is: "To establish a creative working environment that encourages academic freedom with the purpose of achieving sustainable development and top scientific results, which will ensure greater recognition of the UM at home and internationally, and have a decisive effect on the development of the region and of Slovenia."

In the future, the UM will co-create and cooperate in the scientific research and development of the Republic of Slovenia (RS). With its professors, undergraduate students, PhD students and post-doctoral students, it will also conduct research in the fields of biotechnology and medicine, communication technology, nanotechnology and materials (priority areas of the EU's framework programme Horizon 2020). It will disseminate its achievements through leading scientific contributions, and thus influence the growth of scientific awareness and the spread of knowledge. Through the development of interesting, highly marketable ideas and the transfer of top scientific achievements into practice, the UM promotes the growth of high-technology companies in the region and thereby influences the technological growth of the region. With this purpose, the UM has founded the modern "Research, development and artistic centre of the UM – RAZ:UM", which has the following functions/dimensions:

- Organisation – it is the focal point for the innovative environment of the UM and the region;
- Content – it introduces new concepts through summer schools, developmental projects, the RAZ:UM club, etc.;
- Implementation – it implements the UM's scientific research strategy in the field of innovation and sharing knowledge and technologies;

- vzpostavljanje kreativnega okolja za mlade, vrhunsko izobražene državljane RS in tujce,
- atraktivnost Podravske regije za rast visokotehnoloških podjetij in posledično na njen tehnološki razvoj in preboj,
- rast delovnih mest z višjo dodano vrednostjo (predvsem za mlade),
- internacionalizacijo,
- trajnostno znanstvenoraziskovalno in razvojno rast regije in s tem RS.

### **Priložnosti za intenzivnejši razvoj znanstvenoraziskovalnega dela Medicinske fakultete UM v povezavi z ostalimi članicami UM**

Dokončanje izgradnje nove Medicinske fakultete (MF) v letu 2013 in načrtovanje izgradnje novega sodobnega infrastrukturnega centra, poimenovanega **LAB:UM** (prizadevanje za umestitev v program strukturnih skladov v letu 2014), bo prispevalo k optimalnemu pretoku raziskovalcev in študentov. Izgradnja nove MF in načrtovanje izgradnje infrastrukturnega kompleksa bosta omogočala zaposlenim in študentom dostop do vrhunske znanstvene opreme, kar bo pripomoglo k ciljnemu raziskovanju na prioritetnih inovacijskih področjih Evropske unije in vplivalo na večjo internacionalizacijo in prepoznavnost regije.

Ena izmed prioritetnih področij raziskovanja je aktivno in varno staranje Evropejcev. Evropska unija in z njo Slovenija se soočata z najtežjimi izzivi doslej, ki niso posledica le slabih ekonomskih in socialnih obetov, temveč tudi obrnjene demografske piramide, kar povzroča mnoge, z zdravjem povezane težave. Evropa je po poročilu Združenih narodov (United Nations Population Division, World Population Prospects: The 2004 Revision Highlights, 2005) na devetem od desetih mest glede na starostno mediano (samo Japonska je še za Evropo). V razvitih državah je število starejših že preseglo število otrok, do leta 2050 pa bo, po projekcijah, starejših dvakrat toliko kot otrok.

Univerza Mariboru se je v mesecu oktobru 2012 odzvala na Javni razpis za vzpostavitev novih kreativnih jeder, ki ga sofinancira Ministrstvo za izobraževanje, znanost, kulturo in šport (MIZKŠ) iz Evropskega sklada za regionalni razvoj s prijavo tako imenovanega **CORE@UM** – Centra za Odprte inovacije in Raziskave UM, ki vzpostavlja

- Communication – it ensures the UM's media presence in 2012 through the European Capital of Culture.

With its scientific research policy, the UM influences:

- The increased involvement in European scientific research areas;
- The establishment of a creative environment for young people, highly educated citizens of the RS and foreigners;
- The attractiveness of the Podravje region for the growth of high-technology companies and consequently its technological development and breakthrough;
- The increase in employment with higher added value (especially for young people);
- Internationalisation;
- Sustainable scientific research and developmental growth in the region and, with that, in the RS.

### **The possibilities for the intensified development of the Faculty of Medicine's scientific research work in connection with other members of the UM**

The completed construction of the new Faculty of Medicine (FM) in 2013 and the planned construction of a new contemporary infrastructure centre, **LAB:UM** (efforts for placement in the Structural Funds programme in 2014), will contribute to the optimal flow of researchers and students. The construction of the new FM and the plans to construct an infrastructural complex will give employees and students access to state-of-the-art scientific equipment, which will contribute to targeted research in the European Union's priority innovation areas and increase the internationalisation and recognition of the region.

One of the priority areas of research is the active and safe ageing of the European population. The European Union and, with it, Slovenia are facing its toughest challenges yet, which are not only a consequence of poor economic and social prospects but also of the inverse demographic pyramid, which causes many health-related problems. According to a United Nations' report (United Nations Population Division, World Population Prospects: The 2004 Revision Highlights, 2005), Europe is in ninth place out of ten regarding the age median (only Japan succeeds Europe). In developed countries, the number of elderly has already outgrown the number of children and, according to projections, their number will twice outgrow them by 2050.

inovacijsko in raziskovalno platformo v Podravju, ki bo jedro inovacijskega ekosistema Podravja, nujnega za gospodarski preboj, ohranitev talentov in trajnostni razvoj regije.

CORE@UM-u je program (v njega je vključenih več fakultet UM), v katerem bomo raziskovali na prioritetenem področju bodočih Obzorij 2020, s horizontalno povezovalno raziskovalno temo usmerjeno v prioriteten področje Obzorij "Better Society – Health, Demographic Change and Wellbeing". Podravska regija izkazuje daleč nadpovprečni indeks staranja (102.4 (m), 166.1 (ž), povprečje: 90.1 (m), 146.2 (ž)) v primerjavi z ostalimi statističnimi regijami RS. Posledično so tovrstne raziskave v tej regiji še posebej aktualne. Program CORE@UM je razdeljen v tri inter- in transdisciplinarno povezane raziskovalno-razvojne projekte. Zagotavljal bo raziskovalne preboje pri načrtovanju in uporabi novih materialov in tehnologij za spremljanje in nadzor stanja starostnikov, s starostjo povezanih obolenj ter naprednih pristopov k njihovi oskrbi. Zajem in analize časovnih vrst fiziološkega stanja bodo podlaga za modeliranje tkiv kot kompleksnih mrež s starostjo povezanih bolezenskih stanj, kot so recimo nevrodegenerativne bolezni, diabetes in kronična ledvična bolezen. Izvajali bomo aplikativno usmerjene raziskave, ki bodo privedle do uporabnih rešitev na področju varnega doma in na področju večje vpetosti starostnikov v vsakodnevno življenje, raziskave opreme ter komunikacijskih tehnologij za lažjo dostopnost naprednih rešitev za starostnike, modeliranje finančnih sistemov za postavljanje učinkovitih napovednih modelov za oceno finančnih posledic izbranih rešitev še pred njihovo vpeljavo v prakso ter aplikacije študij kompleksnih socialnih sistemov in nastanka inovacij. Slednje bodo usmerjene v razumevanje dinamike socialnega in finančnega položaja starostnikov. Glavni cilj programa CORE@UM je krepitev raziskovalne in inovacijske sposobnosti UM in regije za vzpostavitev novega KIC (**Knowledge Innovation Community**) na področju "Innovation for a healthy life and active ageing" Evropskega inštituta za tehnologijo (EIT) v Podravju 2015.

V vseh omenjenih aktivnostih želi UM nadaljevati tvorno sodelovanje s svojimi strateškimi partnerji, kot so Univerzitetni klinični center Maribor, Mestna občina Maribor, različni industrijski partnerji doma in v tujini ter skupaj z njimi omogočati mladi generaciji kreativen razvoj v Podravske regiji.

In October 2012 the University of Maribor responded to a public tender to establish new creative nuclei, co-financed by the Ministry of Education, Science, Culture and Sport from the European Regional Development Fund. It applied with CORE@UM – the UM's Centre for Open Innovation and Research, which will establish an innovation and research platform in the Podravje region that will form the nucleus of the Podravje region innovation ecosystem needed for economic breakthrough, maintaining talent and sustainable development of the region. CORE@UM is a programme (including several faculties at the UM) in which research will be done in the priority area of the future Framework Programme, Horizon 2020, with horizontal inclusive research topics directed at Horizon's priority area "Better Society – Health, Demographic Change and Wellbeing." The Podravje region statistically shows a far above average index of ageing (102.4 (m), 166.1 (f), average: 90.1 (m), 146.2 (f)) in comparison with other regions of the RS. Consequently, this kind of research in the region is particularly relevant. The CORE@UM programme is divided into three connected inter- and transdisciplinary research and development projects. It will ensure research breakthroughs in the planning and use of new materials and technologies to monitor and control the state of the elderly, age-related illnesses and progressive approaches to their care. The capture and analysis of physiological state timelines will form the foundation for modelling tissues as complex webs with age-related illnesses, such as neurodegenerative illnesses, diabetes and chronic kidney disease. We will perform applied research that will lead to useful solutions in the area of home safety and in the area of higher involvement of the elderly in everyday life. We will also research equipment and communication technologies to provide better accessibility to progressive solutions for the elderly. Furthermore, we will model financial systems to establish effective prediction models to assess the financial consequences of selected solutions before their introduction into practice and apply studies of complex social systems and the emergence of innovations. The latter will be directed towards understanding the dynamics of the social and financial position of the elderly. The main goal of the CORE@UM programme is to strengthen the UM and the region's research and innovation capability and establish a new KIC (**Knowledge Innovation Commu-**

**VIRI**

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nity) in the field of “Innovation for a Healthy Life and Active Ageing” of the European Institute of Innovation and Technology (EIT) in the Podravje region in 2015.

The UM wishes to continue productive cooperation with its strategic partners, such as the University Clinical Centre, Municipality of Maribor, various industrial partners at home and abroad, in all the mentioned activities, and, together with them, enable creative development in the Podravje region for the younger generations.

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