STU
SLOVENSKÁ TECHNICKÁ
UNIVERZITA V BRATISLAVE

Óbudai
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UNIVERSITY AND SMART SPECIALISATION - FROM ACADEMIC RESEARCH TO SOCIETAL NEEDS

ROBERT REDHAMMER

OBUDA UNIVERSITY, BUDAPEST, HUNGARY, 6 SEPTEMBER 2016

OUTLINE

- Academic research vs. innovation
- What can WE do for innovation
- RIS3 method
- Slovak example
- STU example
- Other remarks

ACADEMIC RESEARCH (FREEDOM) VS. INNOVATIONS

THE INNOVATIONS

NEW MEDICAL & PHARMACEUTICAL PRODUCTS

- Aspirin
- Penicillin
- ...
- Small molecules
- Genetic tailored to patient needs
- Nanorobots
- Cancer treatment, painkillers, ...

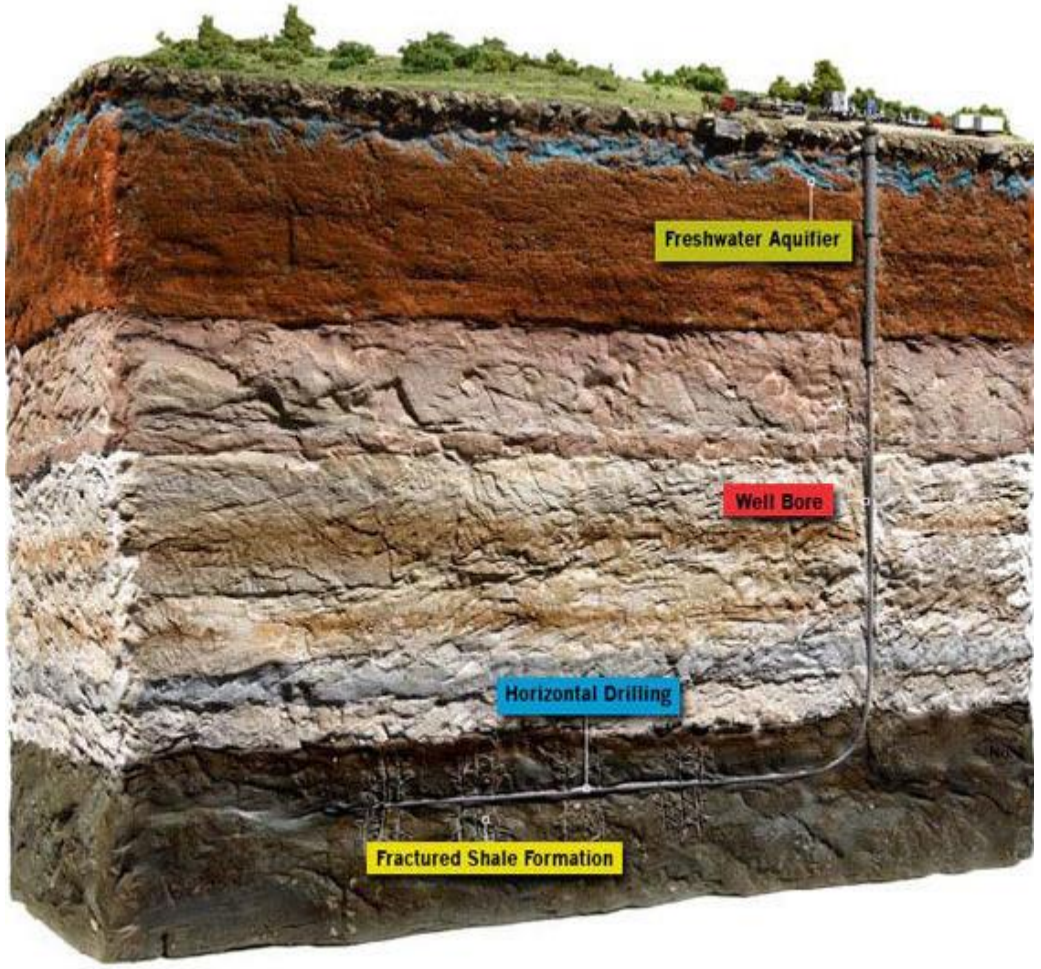
CLOUD, BIGDATA, CYBER SECURITY

- Cloud based services
- Software as a service
- Big data analysis
- Antiviruses
- Antispyware
- …

OIL EXPLOITATION: FRACKING, HORIZONTAL DRILLING

- Global production equilibrium disturbed
- Fight for keeping the share of global market
- Oil price crack
- Alternative technologies suffer (Tesla - electric car producer)

http://www.popularmechanics.com/science/energy/g161/top-10-myths-about-natural-gas-drilling-6386593/



ALTERNATIVE ENERGY & SAVINGS

- Cheapest energy is saved energy
  (... But is it always true?)
- Heating conservation – low energy and passive houses (new standards for building refurbishment and construction)
- Transport optimisation
- Reduction of fossil fuel consumption and green gas production

...WHAT CAN WE DO FOR INNOVATIONS?

- Anything...
- Just we need some money
- Where are the money?
- In Europe... use EU structural funds if possible...

EC: OK, but:

Specialise (focus) on specific R&I areas with the potentially highest positive impact on economy (growth) and society (employment)

RIS3

RESEARCH AND INNOVATION SMART SPECIALISATION STRATEGY

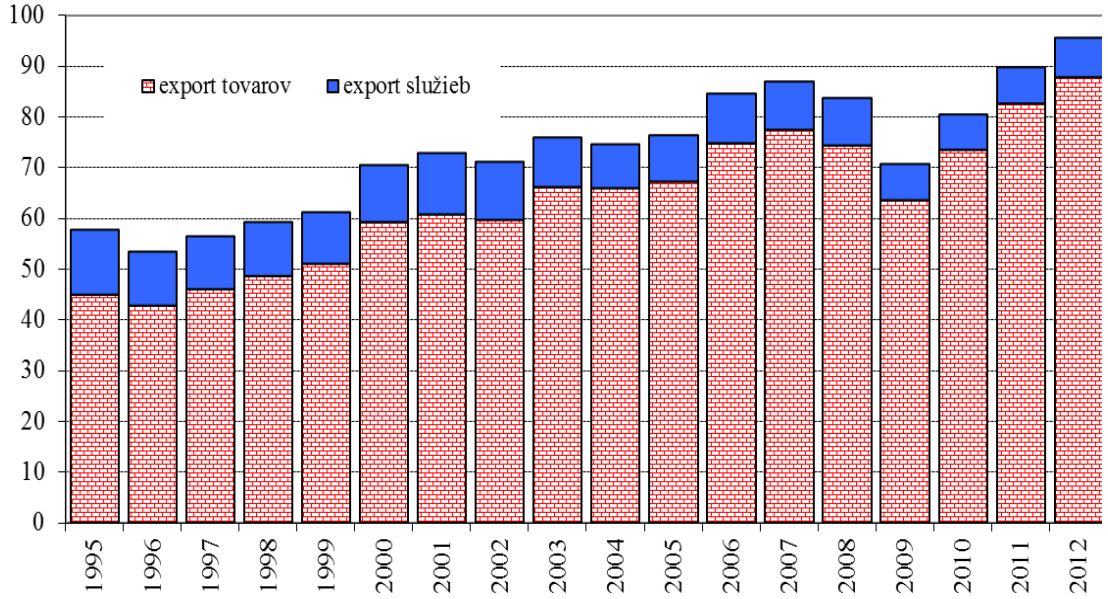
SIX KEY PARTS OF RIS3 METHODOLOGY

1. Analysis – in wider context, based on evidence
2. Governance (participation in the process)
3. Strategic goal – a common vision
4. Identification of priorities
5. Sustainable policies
6. Monitoring and evaluation

SLOVAK EXAMPLE
PROSPERITY THROUGH KNOWLEDGE

SLOVAK EVIDENCE

Growing export
of goods
and services



© Poznatkami k prosperite; Goverment SR (Vladimír Baláž, SAV), 2013

- Strong but narrow industry
- Relative large unemployment (cca 13%)
- Large disparities in research infrastructure (missing industrial research)

VW SLOVAKIA – BRATISLAVA (500 000 cars/year)

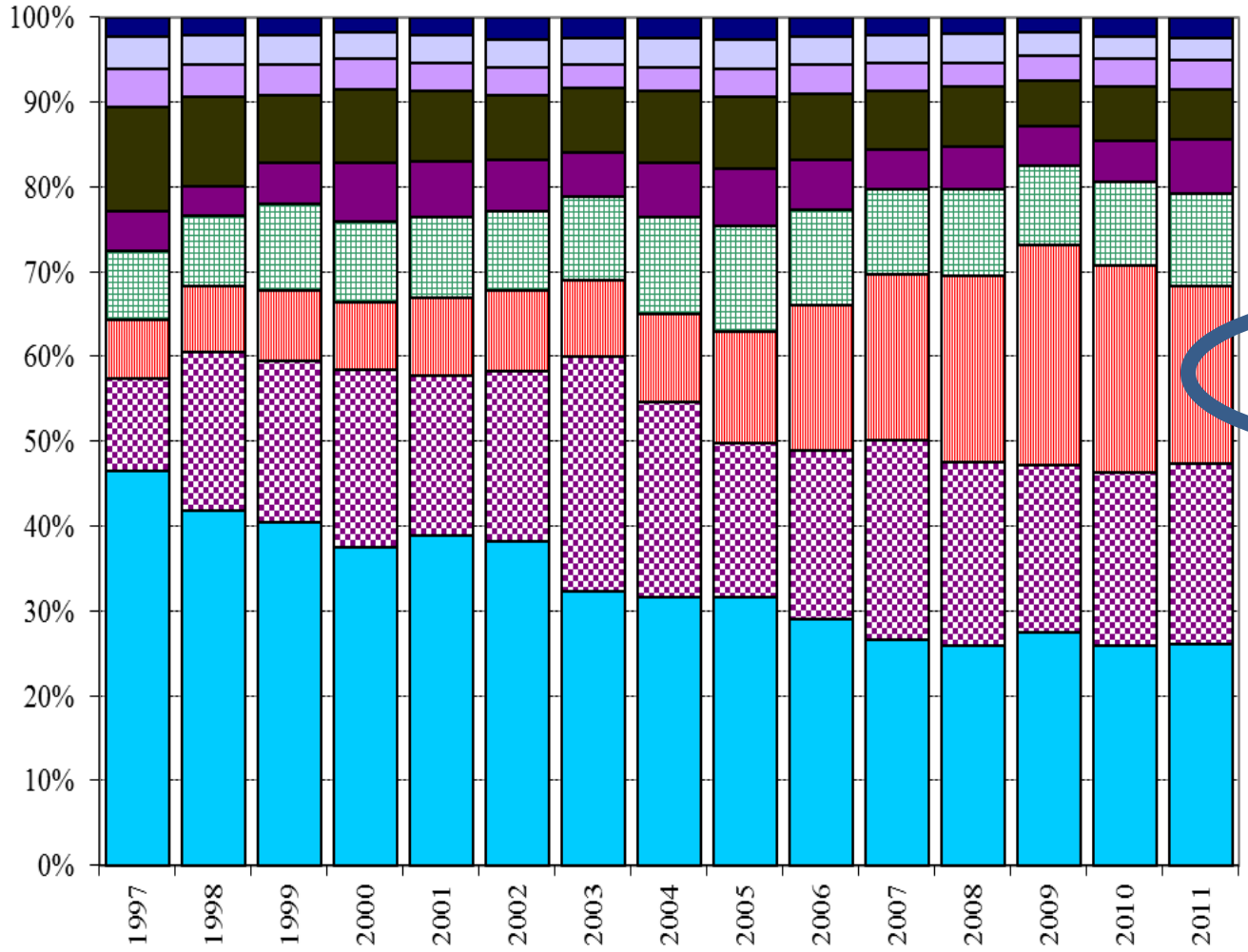
VW Small Family

PSA TRNAVA, KIA ŽILINA (500 000 cars/year)

PSA produces
Peugeot 208 in Trnava

KIA plant in Žilina

SLOVAK EXPORT OF GOODS BY CLASSES



Iron

Machinery

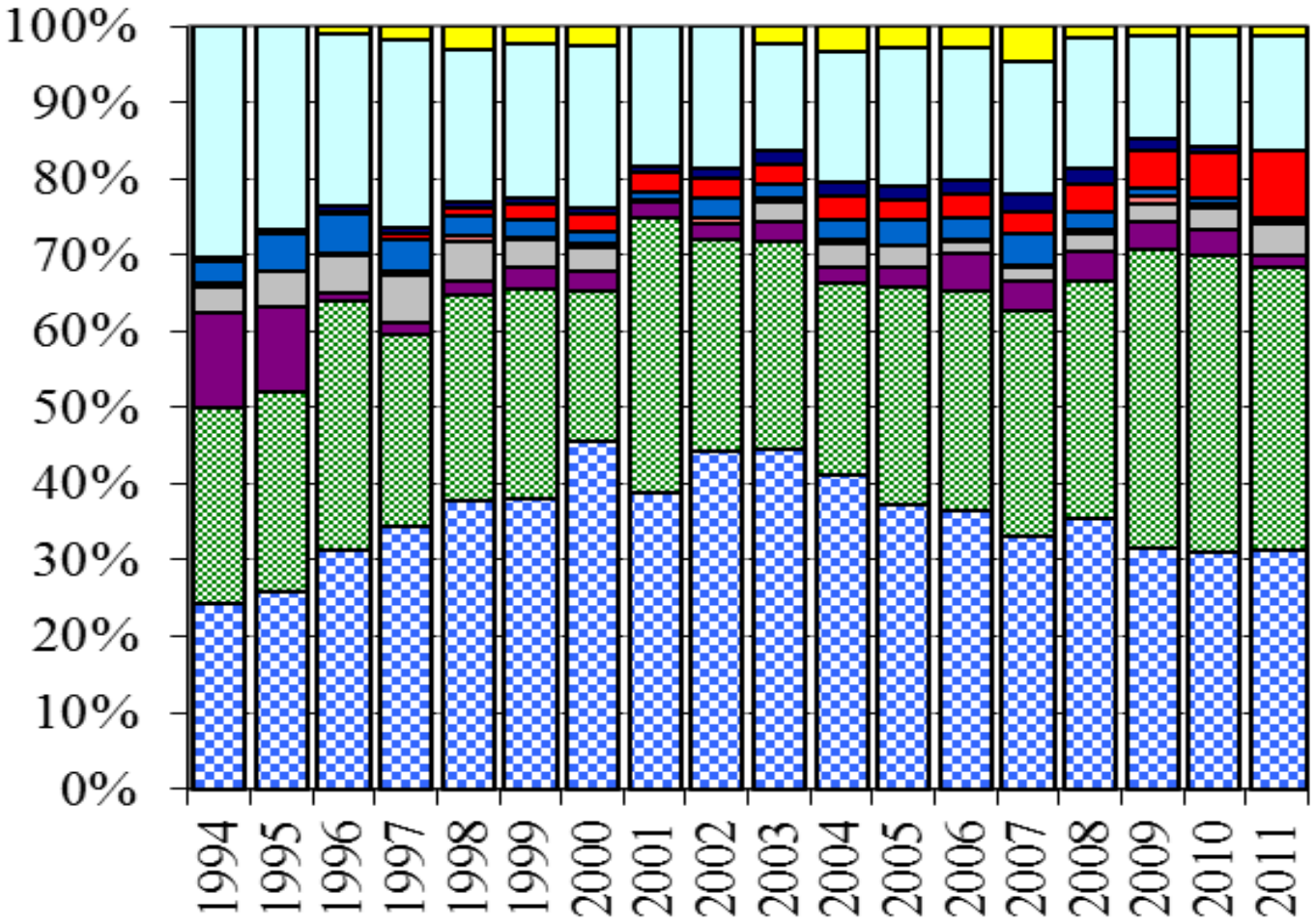
Electronics

Cars

Others

© Poznatkami k prosperite; Goverment SR (Vladimír Baláž, SAV), 2013

SLOVAK EXPORT OF SERVICES BY CLASSES



Business services

IT Services

Tourismus

Transport

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IT SERVICES & CREATIVE INDUSTRY

- 15 years growing export
- IT + business services make 1/3 of export services
- 50 000 employees
- Largest income for state budget
- Naturally grown centres (HP, IBM, Atos, CISCO...)
- Slovak owned start-ups (e.g. ESET – a global antivirus company with highest No. of installations in the world*)

RIS3 PRIORITIES

PRIORITY 1: DEEPEN EMBEDDEDNESS OF FDI

by enhancement of R&D and innovation ability of local suppliers

- **Improve R&D innovative level of local suppliers**
- **Clusters** which support the development of networks feeding into higher tier MNCs.
- Connect to the mother country to create R&D Laboratories and/ or technology centres to Slovakia

PRIORITY 2: INCREASE CONTRIBUTION OF R&D TO ECONOMIC GROWTH

via global excellence and local relevance

- Improve **international excellence and collaboration**
- **University-industry R&D links** through competence centres, centres of excellence, university science parks...
- Industrial led **strategic research programmes** involving universities, AS, and industrial partners

PRIORITY 3: CREATING A DYNAMIC, OPEN AND INCLUSIVE INNOVATIVE SOCIETY

- Stimulating of the **creative industries**
- Support for innovation and **entrepreneurship activities**, including social, open, environmental innovation.
- Support for R&D&I to address the **social challenges** of relevance to Slovakia, including Demographic Ageing.

PRIORITY 4: IMPROVING THE QUALITY OF THE HUMAN RESOURCES FOR AN INNOVATIVE SLOVAKIA

- Improving the **quality of secondary and tertiary of education** to upgrade the quality of graduates
- Better **involvement of businesses in 'education'** from secondary schools to post-doc schemes
- Greater **mobility** of highly skilled personnel between sectors (placements, exchanges, mentoring)

RIS3 RESEARCH SPECIALISATIONS

KEY RESEARCH AREAS

3 key areas

- Material Sciences
- Computer Sciences
- Molecular medicine & biotech.

3 key institutions

- Slovak Academy of Sciences (SAV)
- Comenius University (UK)
- Slovak University of Technology (STU)

KEY SPECIALISATION AREAS WITH R&D CAPACITY

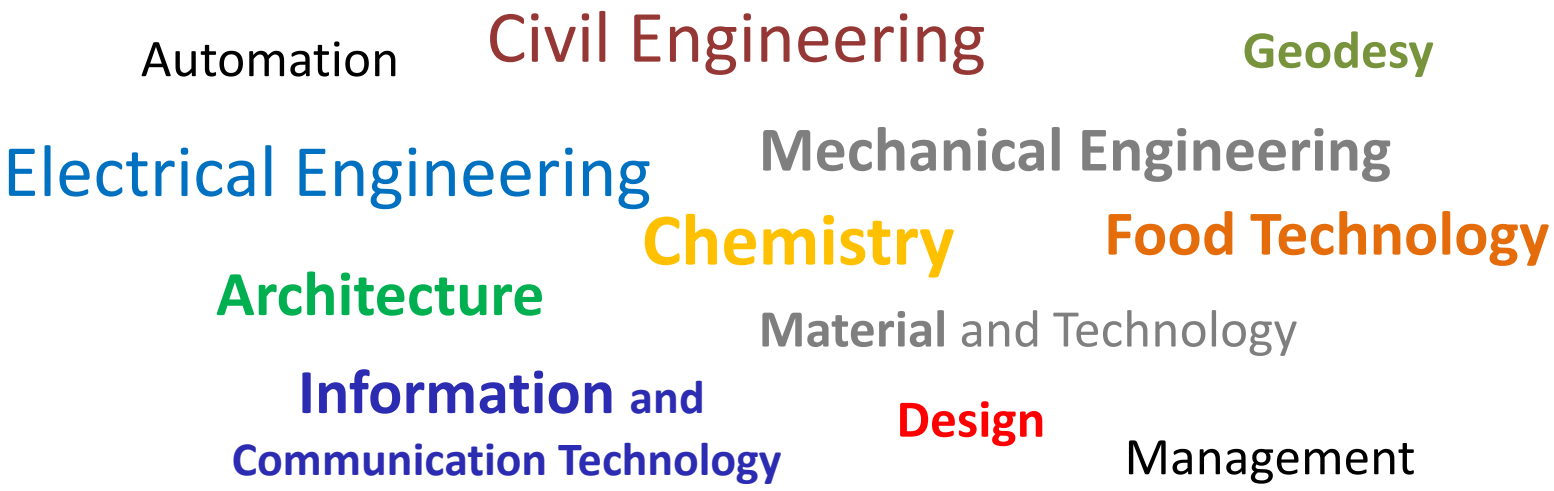
- Materials research and nanotechnologies
- Information and communication technologies
- Biomedicine and biotechnologies
- Sustainable energy
- Environment and agriculture

CURRENT STATUS OF RIS3 SK

- Approved by government and EC
- Operational programme starting to implement
- Call for proposals:
  - Industrial R&D centres
  - Strategic research
  - Technology upgrade...

Selectively targeted finances pushes for cooperation public research organisation and industry companies

KEY INCENTIVES FOR ACADEMIA/INDUSTRY COOPERATION



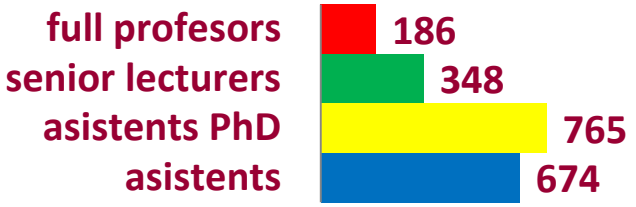
SLOVAK UNIVERSITY OF TECHNOLOGY AS AN EXAMPLE

SLOVAK UNIVERSITY OF TECHNOLOGY (STU)

VALUES

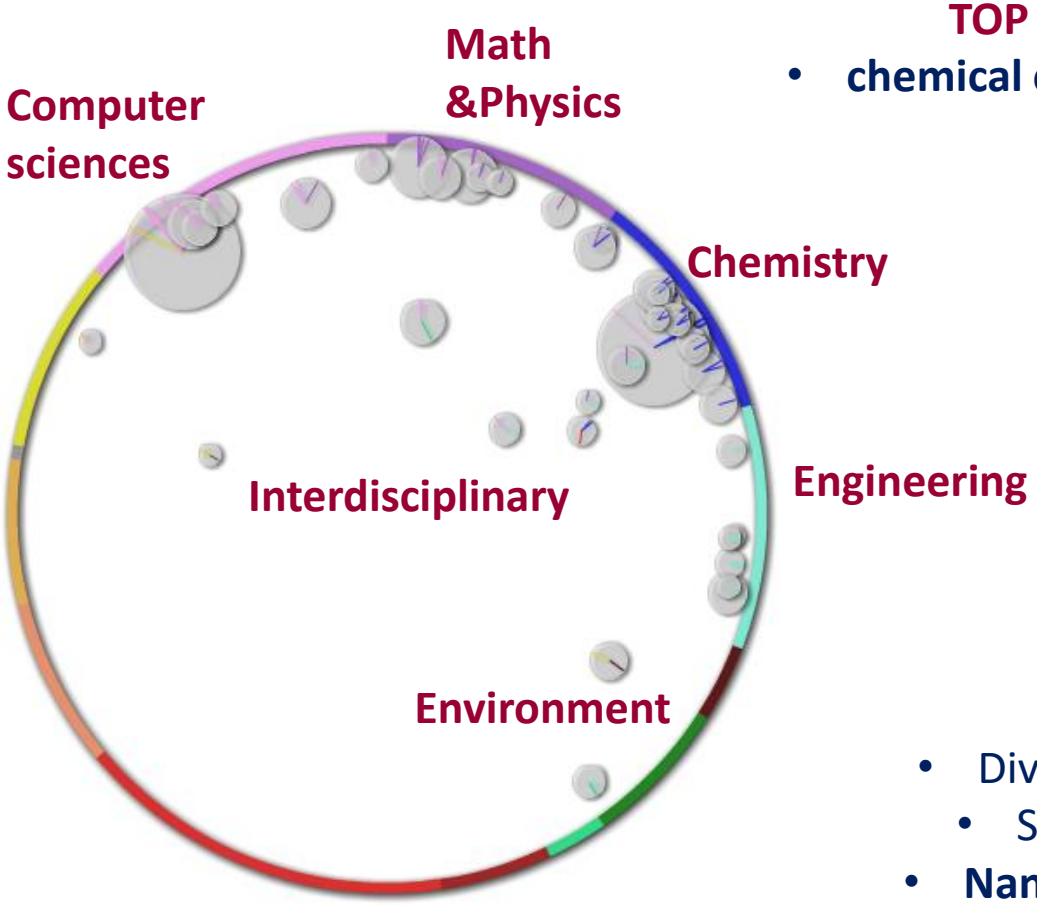
- **Theoretical-practical learning** methods (Mining academy in Banská Štiavnica, 1762)
- **Unity of education and scientific research**, engineering and arts (Von Humboldt principles, 1810)
- Direct **cooperation with industry** & strong **international links**
- **ECTS and three degree** study system (Bologna declaration)

150.000	graduates
15.000	**students**
4.100	continuing edu.
1.400	staff members
600	research project
200	contracts
100	international proj.
7	schools (faculty)
2	institute



QS RANKING VALUATION

SCIVAL SPOTLIGHT PROFILE OF STU



TOP 10 STU COMPETENCIES OUT OF 42

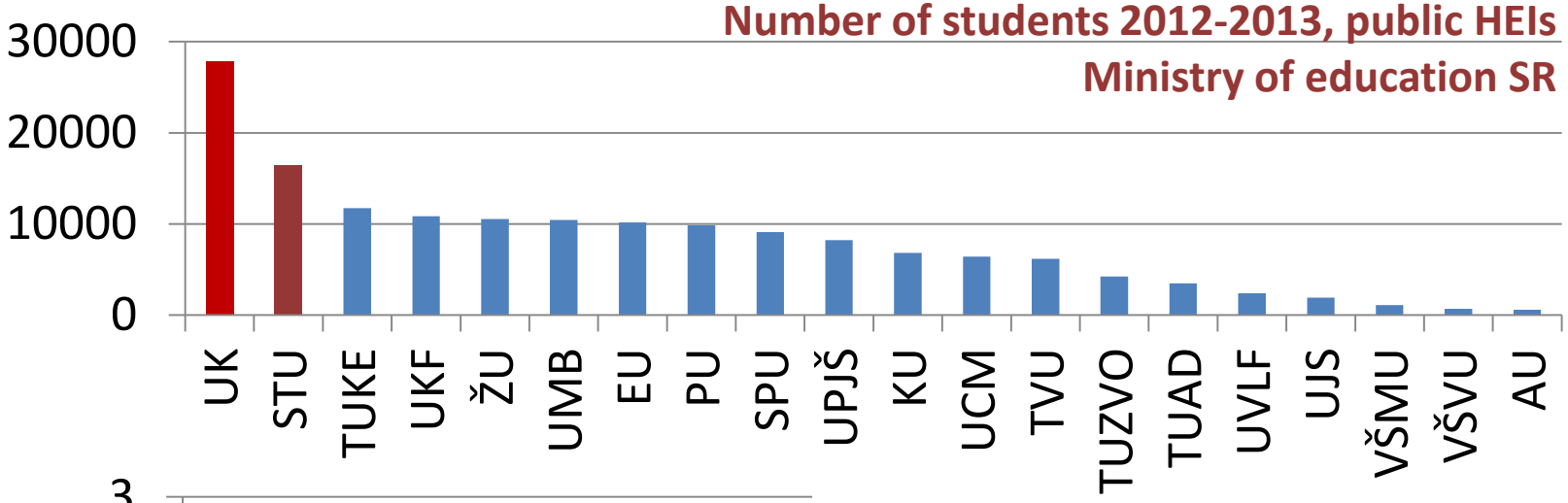
- **chemical compounds**; hydrogen bonds; rings
- **t-norm**; Copula; Effect algebra
- **Magnetic properties**; Amorphous materials; Alloys
- frequency analysis; **flood**; flood frequency
- **Semantics; Ontology**; Recommender systems
- Speech; **Speech synthesis**; Speech analysis
- **Controllers**; Linear matrix inequalities; Control
- Divorce; Stereoisomerism; Teicoplanin
- Semantics; Semantic Web; Ontology
- **Nanocomposites**; Polypropylenes; Clay

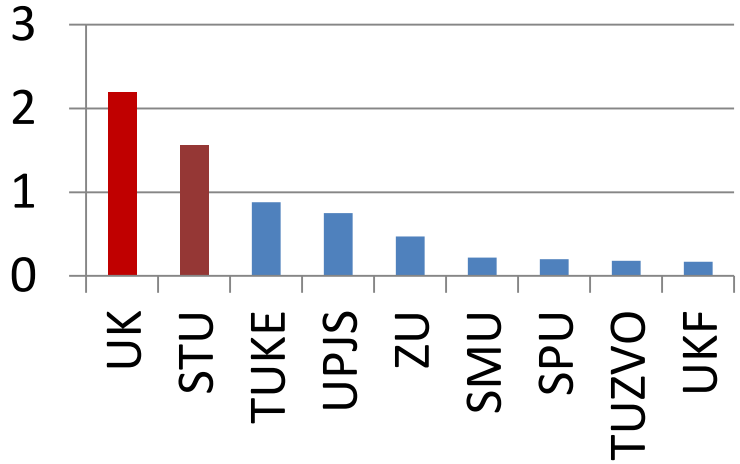
SciVal Spotlight – http://www.spotlight.scival.com/

Generated : Sun Sep 02 13:31:33 EDT 2012

NUMBER OF STUDENTS & RESEARCH OUTPUT SIR

Number of students 2012-2013, public HEIs
Ministry of education SR

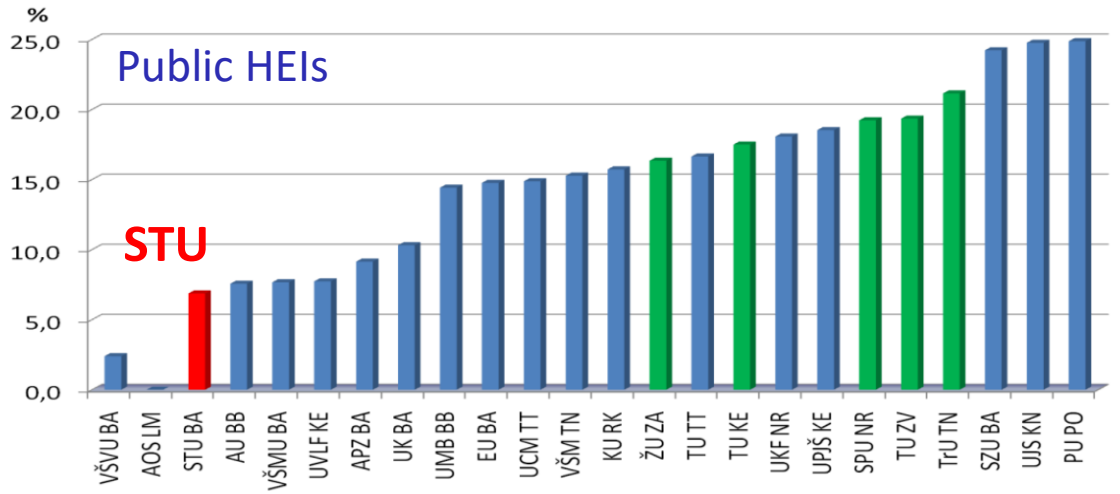




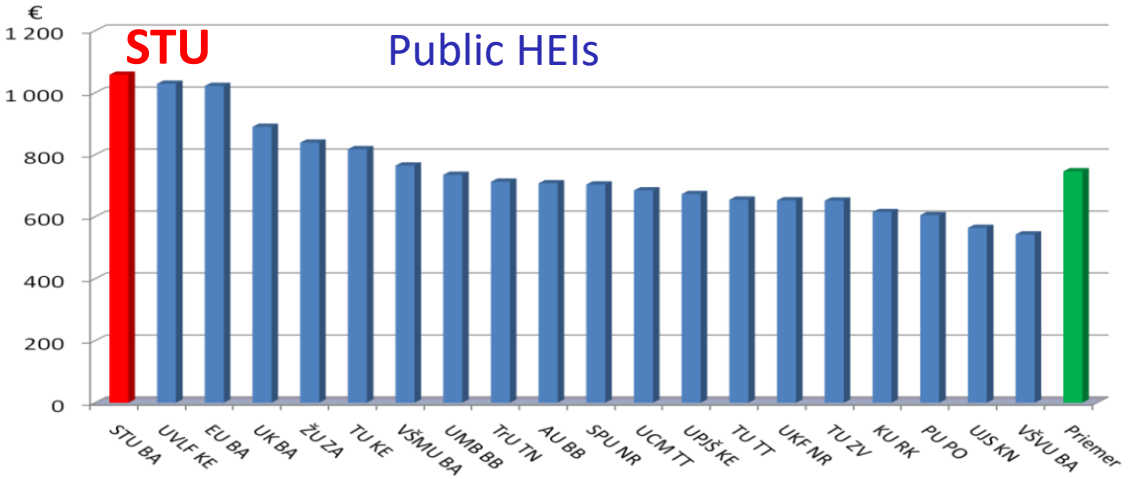
Research output score
public & state HEIs SR
SCIMAGO SIR 2014

HIGH EMPLOYABILITY OF GRADUATES STU

The lowest unemployment of STU graduates among other HEIs in Slovakia



The highest wages of graduates from STU among other HEIs in Slovakia



> 50 SME START-UPS

Start-up office and InQb program

- Entrepreneurship awareness program
- Business development consultancy
- Office space and services

Supported SMEs

foretaster, s.r.o.

ANV, s.r.o.

KONSTRUKT ENGINEERING DEVELOPMENT DESIGN

EXetra solutions

SG Studio architektúra interiér urbanizmus

GeoModel SOLAR

VISIBILITY internet marketing agency

iDOMY Inteligentné riešenia pre Váš dom

IMPERGAM s.r.o.

ambitas make it happen

altamira softworks

GeoModel

IURA CAPITAL, s.r.o.

Infinit

www.mawerick.com

Be

ALURYS PROJEKCIA · MONTÁŽ · PORADENSTVO

ITIS.

nettoSK

wms unique solutions

Academy X

MICHAL KRÁTKY ARCHITEKTI s.r.o.

Biorealis

USAGI

GEODESIGN AB

SAIV
Slovenská akadémia inžinierskych vied

SOLUTIONS Let's do business mobile

Defendion Software Security

conferware

GREEN energy

IOP INSTITUTE PROMOTION

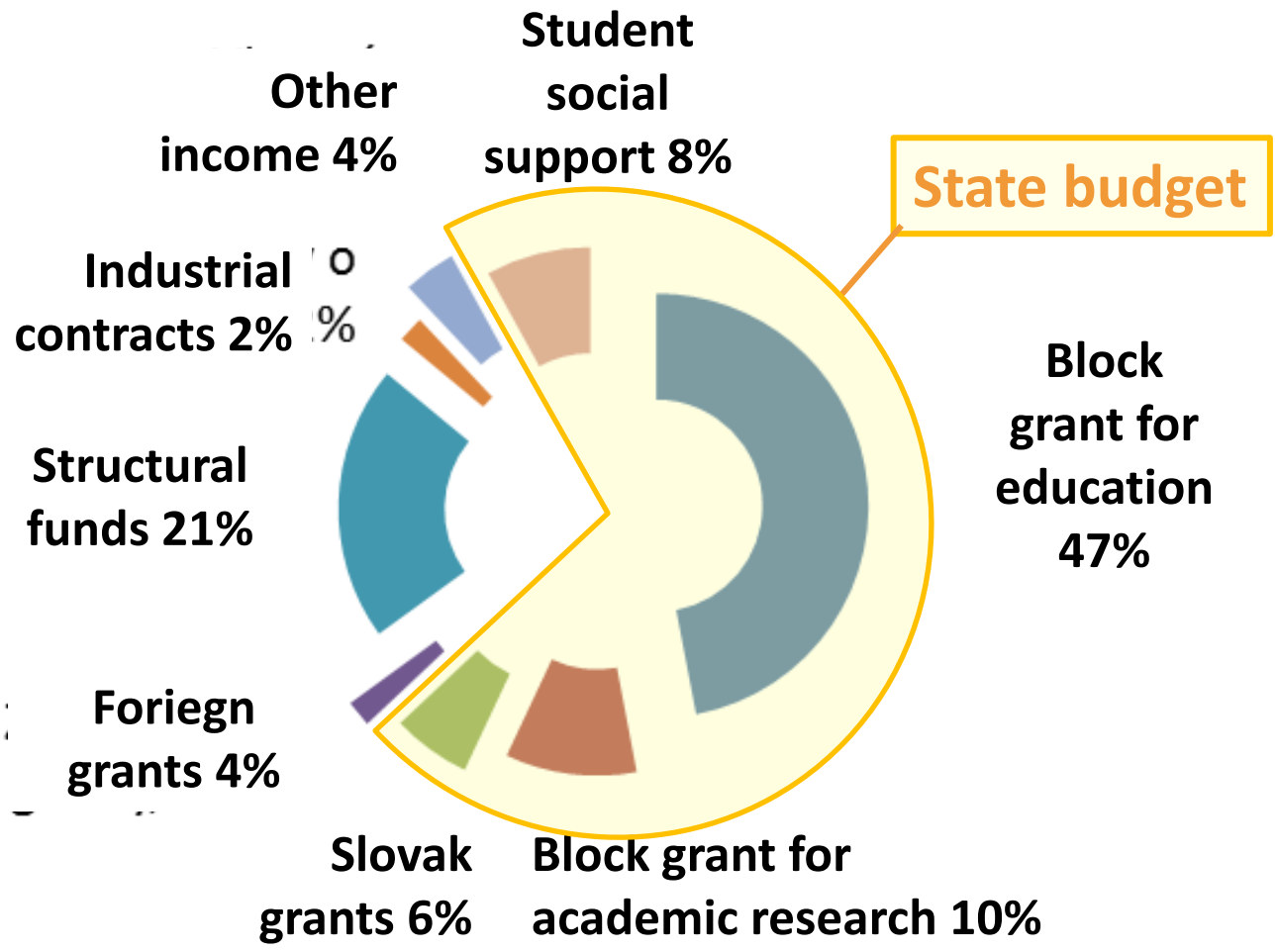
software industry AT YOUR SERVICE

INNOVATRICS

prodig

Caldera business intelligence

FINANCIAL INCOME STU



STU (SMART) SPECIALISATION

- We did not have sophisticated methodology (2006), but we used our brains for:
- Pragmatic use of existing opportunities
- We have evaluated the strongest research areas of the university that were in line with actual governmental strategy
- We have asked the best people what they need...

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UNIVERSITY SCIENCE PARK STU

SCIENCE CITY CONCEPT

SCIENCE CITY
MESTO VEDY STU BRATISLAVA

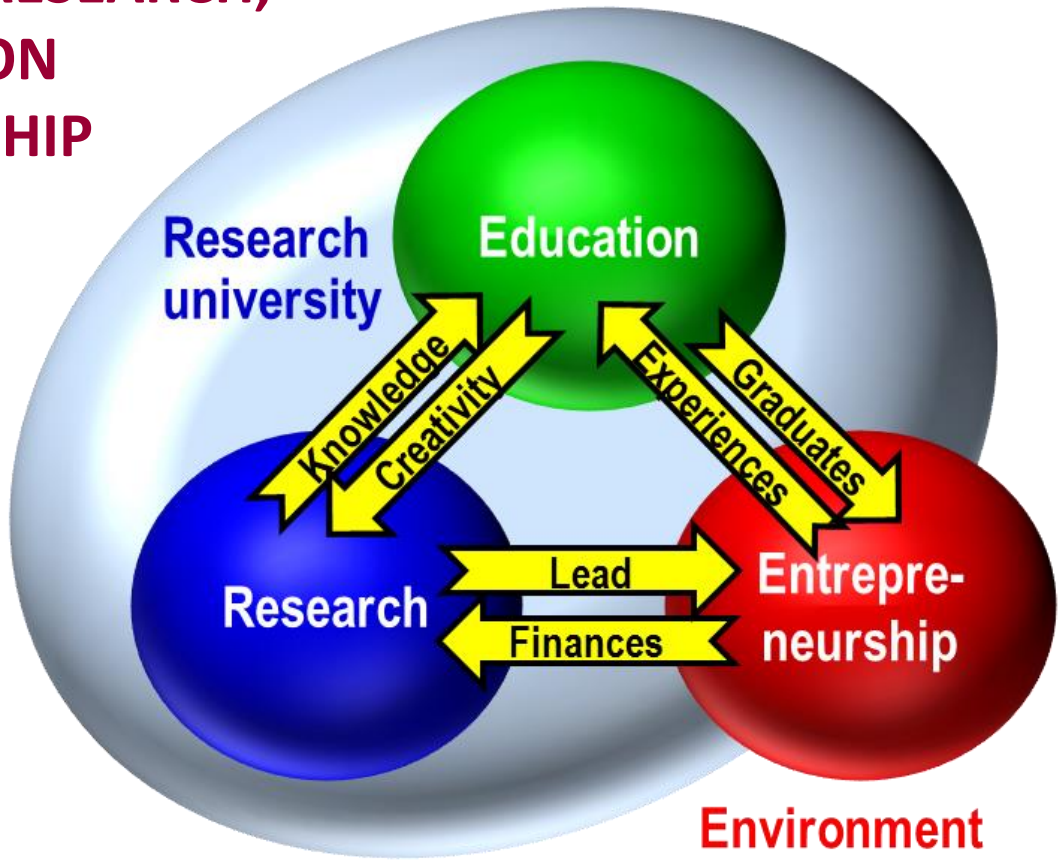
VISION:
THREE KEY UNIVERSITY CAMPUSES **CONVERT** TO SCIENCE PARKS AND SO IMPROVE PARTICIPATION IN ERA

KEY ELEMENTS ON PLACE

- Bologna declaration; Bc, Mc, PhD study system
- ECTS system (ECTS Label), DS Label
- 2003 new Faculty of Informatics STU (FIIT)
- 2007-2013 new research equipment in some areas
- 2012 new building for FIIT STU
- 2015 new 2 buildings in Trnava
- Renewed part of scientific building, labs and equipment within University science park STU

SCIENCE CITY BRATISLAVA PROJECT

THE COLOCATION OF RESEARCH, UNIVERSITY EDUCATION AND ENTREPRENEURSHIP



PRIORITIES OF DEVELOPMENT (UVP)

- Reconstruction of premises
  + floor space enlargement
- Renewed research infrastructure
- Enhance applied research
- Intellectual rights protection
- Knowledge transfer
- Management

RESEARCH SPECIALISATION (UVP)

- Information and communication technologies
- Electrical engineering, Automation and Control
- Industrial Biotechnology
- New Materials and nanotechnology
- Safety and reliability of buildings

NEW BUILDING FOR COMPUTER SCIENCES

15 000 m2 (30 mil. € state and STU) **2012**

1 400 students

UVP STU BRATISLAVA - MLYNSKÁ DOLINA

- Refubrishment of buildings: Faculty of Electrical Engineering and Information Technology and
  Faculty of Chemical and Food Technology

1. INFORMATION AND COMMUNICATION TECHNOLOGIES

- Cloud computing, Data mining, Process mining for more than 2000 concurrent users
- System for Collaborative programming/coding
- System for telecommunication technology development
  (LTE, DVB a IP standards, multimedia)
- System for computer graphics and visions
- Laboratory for user experience „uxLab“

2. ELECTRICAL ENGINEERING, AUTOMATION AND CONTROL

- Embedded systems
- Nanoelectronic structures and systems (semiconductors and organic materials, LED...)
- Electrical power engineering
- Physics and technology for nuclear power
- Microwave, optical, sensor and communication systems

3. INDUSTRIAL BIOTECHNOLOGY

- LABORATORY OF BIOCATALYSIS: milan.polakovič
- LABORATORY OF COMPOSITE BIOMATERIALS: jan.hives
- LABORATORY OF NEW MATERIALS: jan.hives
- RESEARCH CENTRE OF MATERIAL UTILISATION OF BIOMASS: ludovit.jelemensky

4. SMART AND SAFE BUILDINGS

LABORATORY

- PHYSICAL PROPERTIES OF BUILDING CONSTRUCTIONS: anton.puskar
- STATICS AND DYNAMICS OF LOAD-BEARING STRUCTURES: juraj.kralik
- BUILDING MATERIALS: mikulas.sveda

Equipments

- Wind tunnel
- Climate chamber
- Acoustic chamber
- Large rain chamber
- Small pressure chamber
- High pressure chamber

4. SMART AND SAFE BUILDINGS

LABORATORY

- MODELING GEOSPATIAL OBJECTS AND PHENOMENA: jan.hefty
- NATURAL HAZARDS MODELING AND MITIGATION LABORATORY: andrej.soltesz

Equipments

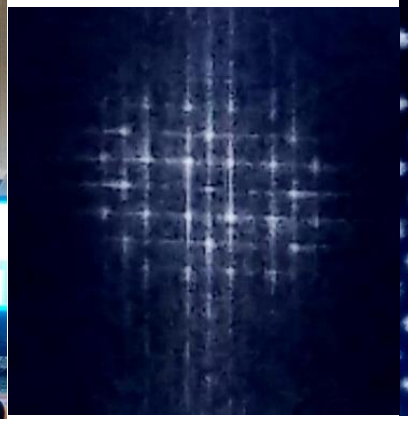
- Relative Monitoring and Absolute Gravimeter
- Hydraulic engineering laboratory
- Laser flow velocity sensors by 2D traverse mechanism, 2D acoustic Doppler anemometer
- Terrestrial 3D laser scanner

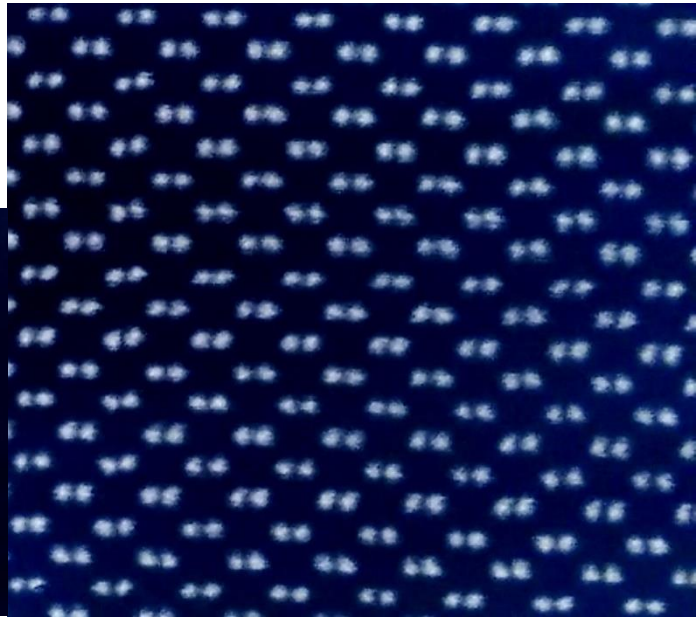
5. MATERIAL RESEARCH AND NANO

- Transmission electron microscopy TEM, double correction
- Various scanning electron microscopy (SEM), Autoemision, EDX...
- Auger electron spectrometer
- Monocrystalline diffractometer
- Mass spectrometry
- Different types of chromatography, spectrometry
- Diagnostics of flexibility, strength...

5. ATOMIC RESOLUTION ANALYTIC MICROSCOPE

TEM of monocrystalline silicon atoms, resolution 0.070 nm, double correction
Diffraction pattern
12. 6. 2015, STU Bratislava, Slovakia





UNIVERSITY SCIENCE PARK STU TRNAVA

- New building with infrastructure „SlovakIon“, plasma and ion technology
- New building for automation, manufacturing processes and systems
- Investment cca. 42 mil. €

1. CENTRE OF MATERIALS RESEARCH

- LABORATORY OF ION BEAM TECHNOLOGIES
- LABORATORY OF PLASMA TECHNOLOGIES
- AND PLASMA SURFACE INTERACTION
- LABORATORY OF NUMERICAL MODELING

2. CENTRE OF AUTOMATION AND ICT IMPLEMENTATION OF PRODUCTION

- LABORATORY OF CONTROL SYSTEMS
- LABORATORY OF ICIM
- LABORATORY OF INTEGRATED INFORMATION AND CONTROL SYSTEMS

3. CENTRE OF EXCELENCE OF 5-AXIS MACHINING

- WORKPLACE OF CNC HSC HIGH-TECHNOLOGIES FOR 5-AXIS MACHINING
- CAD/CAM HIGH-TECHNOLOGY WORKPLACE FOR 5-AXIS MACHINING

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