

Excellence in research at the VUB

Introduction

SRP and Methusalem - Themes and Topics

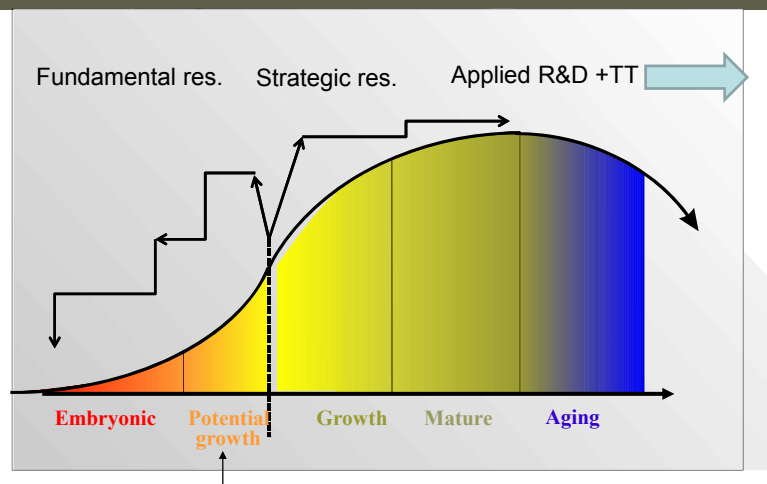


Jan Cornelis
Vice rector International Policy

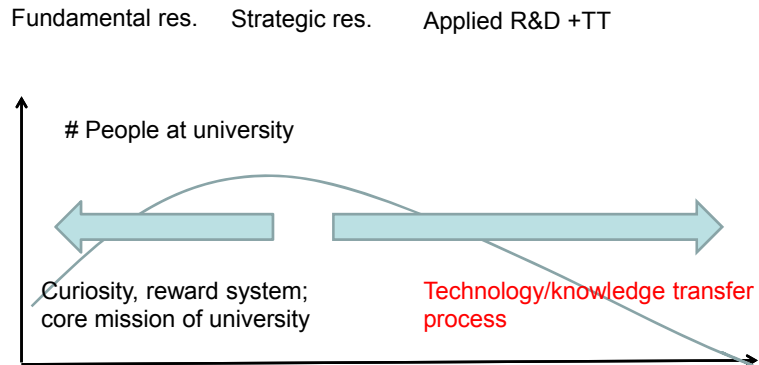


Vrije Universiteit Brussel

Sketchy Technology/Knowledge Life Cycle: Research Types and Process

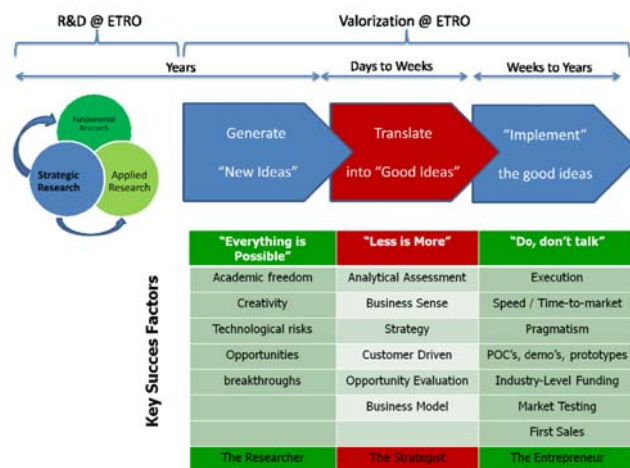


Research personnel involved in different research types



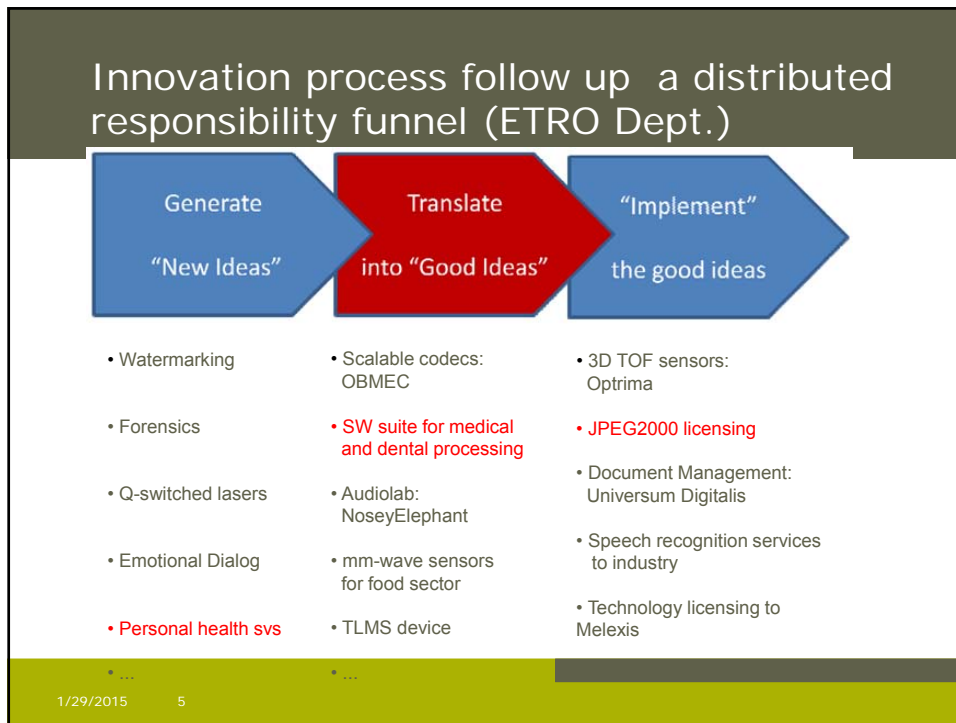
3

Coherence at all levels of organisation (e.g. 3 phases in the innovation framework of a dept.)



1/29/2015

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Excellence in research at the VUB

Doctoral schools





Vrije Universiteit Brussel

Three Doctoral Schools

Human Sciences

Natural Sciences and (Bioscience) Engineering

Life Sciences and Medicine

Aim: good guidance and support
 ownership (together make better programmes)
 build a community/interactivity
 broaden experience

How: in strategic alliance with UGent
 tailor-made training programme to own needs
 not compulsory

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Doctoral Schools

Central PhD Office: university wide support

- Time management, communication skills, English for academic research purposes,...
- Co-tutelles

Doctoral school: more domain specific support

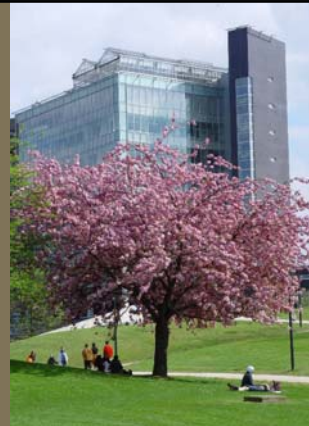
- °master classes, workshops, thematic days,...
- °grant system for international seminar participation

<http://www.vub.ac.be/phd/english/DoctoralSchools.htm>

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Excellence in research at the VUB

Themes and Topics (Focus and clustering)



Vrije Universiteit Brussel

Research clusters

Science & Engineering

Big Science

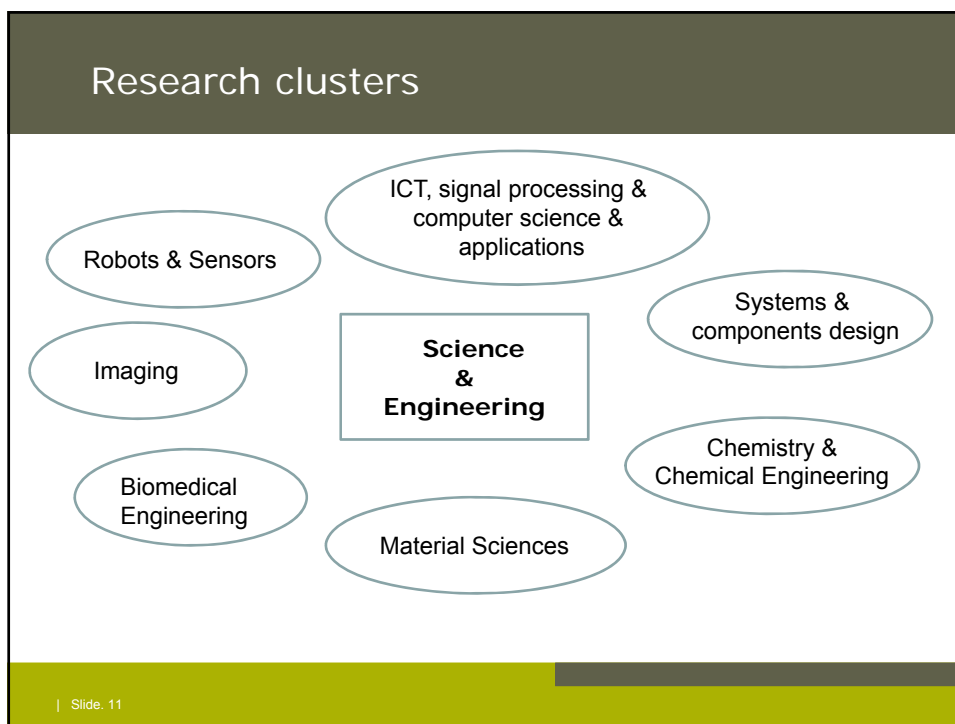
Society & Human behavior

Medicine

Biotechnology

System Earth

Small can be beautiful too



SRP

Conceptual Density Functional Theory: Towards a general treatment of chemical reactivity and design of molecules with optimal reactivity properties (page 21)

the General Chemistry Research Group focusses on (1) Development and/or implementation of reactivity indices, (2) Use and study of reactivity indices within the framework of principles, such as Hard and Soft Acids and Bases principle, the principle of maximum hardness or the principle of electronegativity equalization, (3) use of concepts and principles in application in organic and inorganic chemistry, catalysis, biochemistry, and nanochemistry

Chemistry & Chemical Engineering

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SRP

Exploiting the Advantages of Order in Confinement for a Greener Chemistry (page 24)

The department of Chemical Engineering does research on liquid chromatography and adsorptive separations, low-energy cost liquid phase separation techniques, such as membrane separations and micro-scale extractions and the fabrication of micro- and nano-fluidic devices

Chemistry &
Chemical Engineering

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SRP

Exercise and the brain in health & diseases: the added value of human-centered robotics (page 9)

The Human Physiology and the Robotics & Multibody Mechanics research group combines expertise in cutting edge (neuro) physiological research with expert knowledge and experience in modern robotics research and engineering.

The human performance lab provides sport science services. *Human physiology and sports medicine* (e.g. the role of neurotransmitters on human performance and training)

Robots & Sensors

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SRP

Processing of large scale multi-dimensional, multi-spectral, multi-sensorial and distributed data - M³D² (page 16))

Multidimensional signal processing and communication & Micro- & Photonelectronics focusses on i) the data modeling, (ii) the exploitation of sparsity, (iii) the associated data analysis and fusion, (iv) the sensor design. Signal, image and video processing, compression, data analysis, end-to-end system design.

cross-disciplinary: multi-dimensional signal theory, system theory & design, and physical engineering sciences

ICT, signal processing & computer science & applications

Systems & components design

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SRP

From Computer-Aided Engineering to Model-Aided Engineering (page 5)

The Centre for model-based system improvement aims at model-based enhancement of CAE techniques using a unified modelling, analysis and design paradigm. System optimisation (mm wave communication systems; optoelectronic systems) by intervening in the full design cycle.

Systems & components design

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SRP

Quantitative Molecular Imaging (page 20)

In vivo Cellular and Molecular Imaging Lab investigates specific biological questions in intact living subjects using non-invasive imaging based on emission tomography and optical imaging in combination with anatomical imaging (CT and MRI)

Expertise: reconstruction of images and numerical aspects of inverse problems combined with molecular probes and experimental small animal imaging lab.



Imaging

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Research clusters



Big Science

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SRP

High-Energy Physics (page 22)

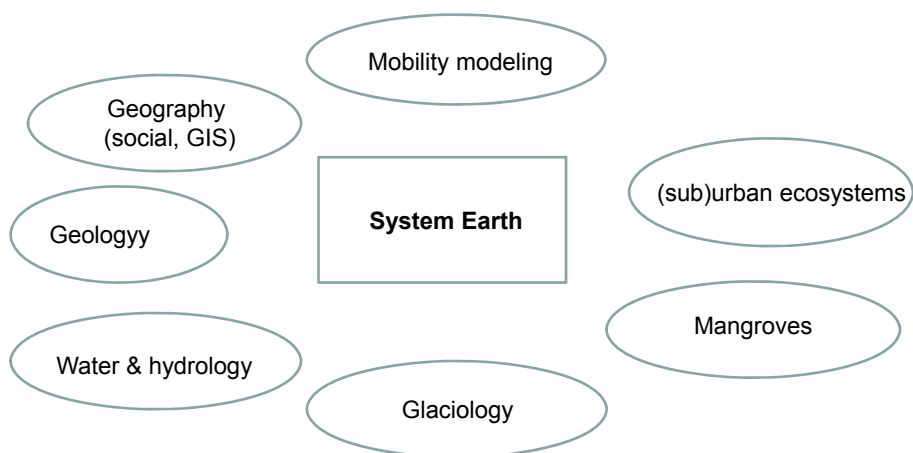
Fundamental physics processes involved in the most energetic phenomena in the Universe, the nature of dark matter and the structure of primordial quark-gluon plasma using the CMS detector at the Large Hadron Collider and beyond this reach, the most energetic particles coming from the cosmos, as detected by the IceCube observatory.



Big Science

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Research clusters



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SRP

Tracers of past & present global changes (page 1)

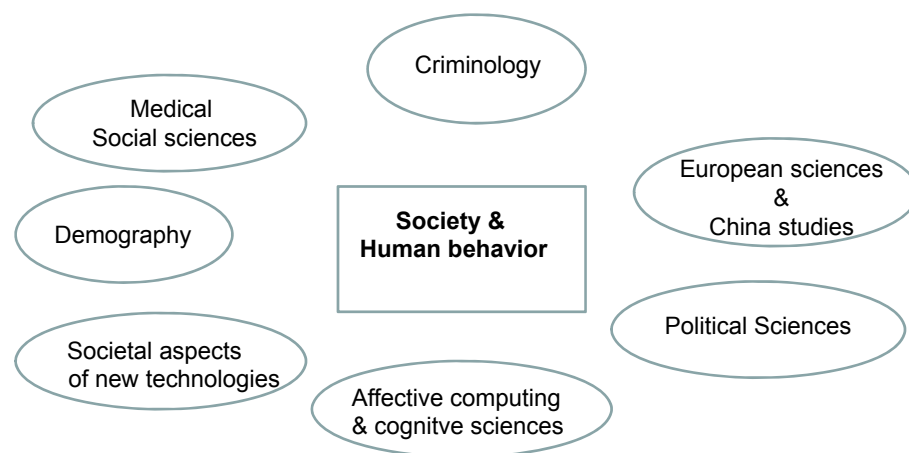
Earth System Science is an interdisciplinary group set up to unite scientists working on the global evolution of the planet
 Scientific approach: mathematical modeling and the use of isotopes and tracer elements to document biogeochemical processes



System Earth

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Research clusters



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SRP

Towards a Sustainable Media Ecology? The Case of the Flemish Audio-visual Industry (page 7)

SMIT: Study of the long term sustainability of the audio-visual media ecosystem; assessment of the state-of-play and structural dynamics in the audio-visual media industry

Part of i-Minds, the Interdisciplinary Institute for Broadband Technology

Societal aspects
of new technologies

Affective computing
& cognitive sciences

Social and Affective Brain (page 11)

Social psychology, part of experimental and applied psychology): neuroscientific research (psychology, neuropsychology, behavioral neurology)

Exploration of the social and affective dimension of the brain: social cognition and affective regulation

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SRP

Democratic Governance in Europe (page 26)

Topics that are covered: voting behaviour, party strategies, citizenship, political representation, deliberative democracy, regionalism and nationalism, discourse analysis, political socialization, EU internal and external decision making, EU coordination mechanisms, chains of accountability and multilevel governance

Close collaboration with the **Institute for European Studies**, a Jean Monnet Centre of Excellence and a policy think tank that focuses on the European Union in an international setting

Political Sciences

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SRP

Demographic challenges of the 21st century (page 2)

Interface Demography: demography-oriented data analysis

research on population issues

- Households, fertility, the Second Demographic Transition,
- Mortality, causes of death, health
- (Sub)regional population dynamics, population geography
- Ethnic minorities
- Data banks and archives

Demography

Criminology

Crossing borders: crime, culture and control (page 14)

Crime & Society and Criminology performs interdisciplinary research into crime phenomena, societal reactions and criminal justice policies and practices, bringing together criminology, sociology, law, history, pedagogical sciences, psychology and psychiatry

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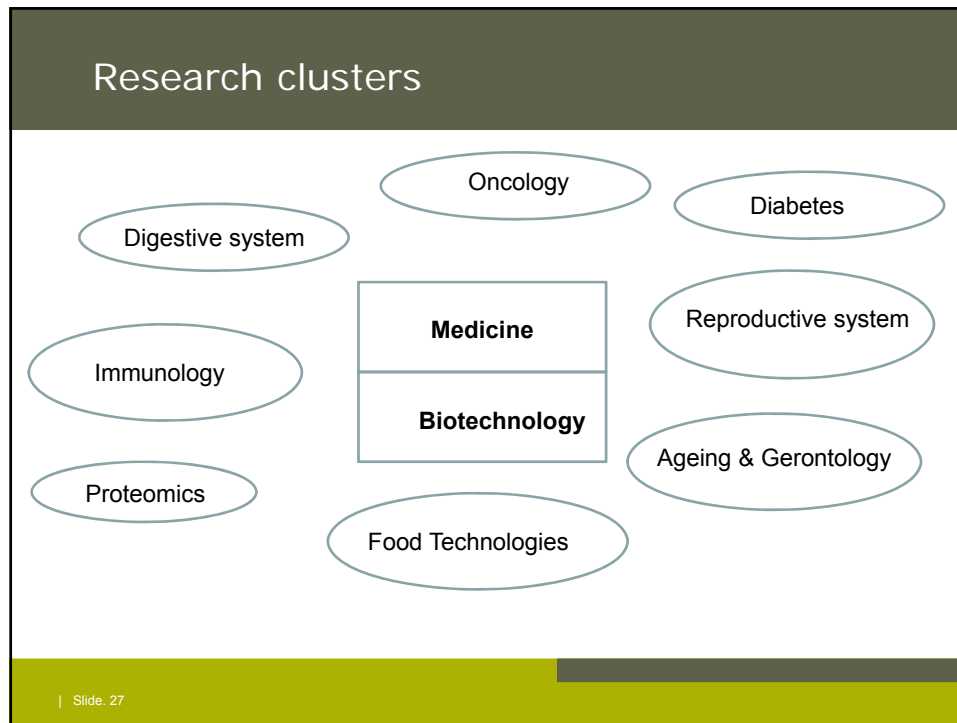
SRP

End-of-life in cancer and non-cancer patients: public health, health services and clinical research (page 30)

the End-of-Life Care Research Group focusses on research of the circumstances and the quality of dying and its determinants from a population perspective (i.e. applying a public health research perspective to end-of-life care) and acquiring the necessary insights to improve the quality of palliative care.

Medical
Social sciences

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SRP

Understanding the competitiveness and functional role of microorganisms in fermented food ecosystems (page 23)

Industrial Microbiology and Food Biotechnology aims at the improvement of the naturalness and quality of the human diet via functional microbial metabolites and functional starter cultures.

A single oval labeled 'Food Technologies' is centered at the bottom of the slide.

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SRP

Protein structure, function and disease (page 13)

The Structural Biology Brussels Lab is one of the Flanders Institute for Biotechnology departments (SOCs)

Understand protein function in health and disease. 3D-structures and dynamics of biological macromolecules are unraveled and combined with cellular data to turn abstract representations of biomolecular interaction networks into models that more accurately reflect biological reality.




Proteomics

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SRP

Targeting of inflammation linked to infectious diseases and cancer (page 3)

The cellular and molecular immunology group is focusing on analysis of the mechanisms covering immune modulation in normal and pathological conditions
three interconnected core themes: (i) myeloid cell immunology, (ii) immunoparasitology and (iii) molecular targeting units (nanobodies)



Immunology

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SRP

Targeting residual cancer cells: myeloma and melanoma as model diseases (page 12)

The Oncology Research Center (molecular and cellular therapy) is a multidisciplinary group in which basic, translational and clinical investigators work together.

Anti-tumor vaccination requires the identification of target antigens on resistant tumor subpopulations, adequate immune competence of the patients and the availability of efficient vaccination techniques.

Oncology

Type of cancer: Myeloma and melanoma

Development stages: Pre-clinical mouse model and clinical practice (phase 1 and phase 2 for dendritic cell vaccination)

Objectives: Immune therapy; new agents, combination therapy, personalized therapy

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Methusalem



Characteristics:

- structural funding for top researchers based on competitive research plan of 7 years
- for growth of research team (excl. wage of Methusalem researcher)

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Methusalem

Biologic Platform for Beta Cell Therapy in Diabetes:
D. PIPELEERS Diabetes

Centre for Data Based Modelling and Model Quality Assessment;
J. SCHOUKENS (also ERC grantholder!!) Systems & components design

Research at the interface between human genetics and reproduction;
I. LIEBAERS / K. SERMON Reproductive system

International Photonics Access and Research Center (iPARC@VUB); **H. THIENPONT** Systems & components design

Design and Prediction of Nanostructured Metal Surfaces;
H. TERRYN Material Sciences

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BRUSSELS



TIME: Top Industrial Managers for Europe



Vrije Universiteit Brussel



Network of Universities from the capitals of Europe