

# Research Report

## 2016/17

Danube University Krems. The University for Continuing Education.



## Seizing challenges, building bridges

Danube University Krems has continued to broaden its research activities over the past two years and has developed a clear research profile in the four fields Health and Medicine, Educational Research and Lifelong Learning, European Integration, Migration and Economics, Art, Culture and Architecture.

By establishing this profile we have been able to make great developmental strides forward. To name but a few, these include our first PhD programs Regenerative Medicine and Migration Studies.

„We build bridges between basic research and practical application, between individual disciplines and, most of all, to society.“



Research at Danube University Krems is centered on contemporary and future challenges facing society.

In a transdisciplinary context we build bridges between basic research and practical application, between individual disciplines and – as befits a university for continuing education – most of all to society.

One cornerstone of our success is the competence and motivation of our staff, and their tireless commitment to innovation.

On that note we invite you to explore the research conducted at Danube University Krems, and to meet the people behind it.

A handwritten signature in blue ink, appearing to read 'Viktoria Weber', written in a cursive style.

Prof. Viktoria Weber  
Vice-Rector Research

## Overview

## Application-oriented and transdisciplinary: research at Danube University Krems

Danube University Krems centers on researching current and future societal challenges. These range from searching for new therapy approaches, regenerative methods and preventive practices in medicine to digitalization and its benefits for businesses and public administration; social cohesion in times of growing migration flows, through to preserving cultural heritage and ensuring sustainable building.

### Two-way knowledge transfer

With its transdisciplinary approach, Danube University Krems bridges basic research with practical application, at the same time integrating knowledge stemming from non-academic sources. This approach ensures intensive knowledge transfer not only in one direction – namely from research to practice, but also vice versa.

### Research on strong corner stones

Three faculties provide the organizational framework for research at Danube University Krems. The thematic focus is based on clear research profiles in the fields of Health and Medicine, Educational Research and Lifelong Learning, European Integration, Migration and Economics as well as Arts, Culture and Architecture.

The 2016/17 Danube University Research Report summarizes the research activities in four main chapters: Health and Medicine, Open Society, Building Science and Cultural Heritage, Educational Research and Lifelong Learning. At the same time, it clearly shows how research at Danube University Krems has progressed and intensified during the past two years within this strong, structural and organizational framework. The number of publications has risen to 503 since the 2014/2015 Research Report, of which 157 are first publications in SCI, SSCI and AHCI scientific journals.

### PhD programs and interdisciplinary research groups

One major step forward in the development of research at Danube University Krems concerns a structural aspect: following accreditation by AQ-Austria in 2015, the first two PhD programs at Danube University Krems were successfully launched in 2016: “Regenerative Medicine” and “Migration Studies”.

In the same year, following a selection procedure, the first two interdisciplinary research groups at Danube University Krems took up their work. Scientific staff from various departments and faculties joined forces to meet societal challenges, for example investigating the efficacy of continuing education in preventing dementia or studying the social and economic impact of migration on the health system.

### Science and society

The responsibility that public universities have towards society expresses itself in giving the public an insight into research, involving them, and making science and research attractive to young people.

To this effect, in 2016, Danube University Krems again took part in scientific communication events such as “The Long Night of Research,” “The Young University” and, as every year, gave female students an opportunity to actively experience the research profession on Girls’ Day.

“Our research activities at the Faculty of Health and Medicine are guided by its societal and medical effectiveness. Close collaboration with clinics ensures that in most cases the latest research findings can be transferred seamlessly to everyday medical practice, while collaboration with national and international industrial partners promotes our innovations to the market.”

Prof. Stefan Nehrer

Dean of the Faculty of Health and Medicine



“Global change processes – for example in the wake of digitalization or migration flows – also present innovation opportunities. To shape this process sustainably, the Faculty of Business and Globalization pursues the principle of transdisciplinarity in teaching and research across all departments in a two-way learning process between science and society.”

Prof. Gerald Steiner

Dean of the Faculty of Business and Globalization



“The research activities at the Faculty of Education, Arts and Architecture are to a considerable degree characterized by the symbiotic correlation between pure and applied research. We strive to find answers to current and future societal challenges – be it, for example, by preserving and developing material and immaterial cultural heritage, developing new educational technologies and concepts, or utilizing building and residential structures from the aspect of ecological and economical sustainability.”

Prof. Christian Hanus

Dean of the Faculty of Education, Arts and Architecture







\_\_ Danube University Krems, historical building and "Loops" taken August 2015

<b>Foreword</b>	
Prof. Viktoria Weber, Vice-Rector Research	3
<b>Overview</b>	
Application-oriented, transdisciplinary: Research at Danube University Krems	4
<b>→ Health and Medicine</b>	<b>8</b>
Regenerative Medicine	10
Inflammation	16
Magnetic Sensor Systems and Materials	22
Neuro-Sciences and Prevention	28
Psychotherapy and Bio-Psychosocial Health	32
<b>→ Open Society</b>	<b>34</b>
Security	36
Data-Driven Governance	40
Migration and Integration	44
Democracy Research	50
Epidemiology and Evidence-Based Medicine	52
Legal Studies	56
<b>→ Building Science and Cultural Heritage</b>	<b>58</b>
Sustainable Building Design	60
Image Science and Media Art Research	66
Museum Collections Management	68
<b>→ Educational Sciences and Lifelong Learning</b>	<b>70</b>
Assuring Quality and Professionalism	72
Technology-Aided Learning Arrangements	76
Professionalization in Higher Education Management	80
Transfer and Validation of Informal Learning	84
<b>→ Research Clusters</b>	<b>86</b>
WasserCluster Lunz	88
Interdisciplinary Research Groups	90
<b>Facts and Figures</b>	<b>92</b>
Science and Society	94
Research Service and International Affairs	96
Newly Appointed Professors	97
Key Figures	98
Selected Publications	100
Impressum	102



## Health and Medicine

- Regenerative Medicine
- Inflammation
- Magnetic Sensor Systems and Materials
- Neurosciences and Prevention
- Psychotherapy and Bio-Psychosocial Health





Regenerating damaged cells, tissue and organs is a relatively young branch of study in medicine – and one of the scientific areas in the spotlight at Danube University Krems. It focuses on developing new therapies and/or improving existing therapies for orthopedic problems in the musculoskeletal system. A variety of cell culture methods and cell resources are scientifically investigated while biomaterial is analyzed with respect to its biocompatibility and cell-matrix interaction, as well as their clinical application.

**Pictured**  
(f. l. t. r.)

Prof. Stefan Nehrer  
Tobias Häftner  
Daniela Kern  
Eugenia Niculescu-Morza  
Andrea De Luna-Preitschopf  
Vivek Jeyakumar  
Christoph Bauer

Spotlight

## PhD program “Regenerative Medicine“

**In the summer semester of 2016, the Faculty of Health and Medicine launched the PhD program Regenerative Medicine, thereby underscoring Danube University Krems’ goal to advance this spearheading medical field in teaching and research.**

Current medical practice largely focuses on repairing damage and treating symptoms with therapies. However, regenerating damaged cells, tissue and organs is a comparatively new approach – and in the scientific spotlight at Danube University Krems.

### Restoring damaged functions

Regenerative medicine deals with restoring the function of damaged organs or tissue. This is done by replacing tissue or organs by means of extracorporeal therapies or by stimulating the body’s own regeneration and repair processes. By these means not only complications caused by illness or disease can be prevented, but illnesses or diseases that have been difficult or impossible to treat may be cured.

**The PhD program Regenerative Medicine comprises the following topics:**

- Methods of organ support and extracorporeal blood purification
- Pathophysiology of sepsis and investigating inflammatory mechanisms
- Interaction of blood and/or tissue with biomaterials
- Regeneration of articular surfaces (cartilage transplants, therapy with growth factors, implanting mesenchymal stem cells)
- Immune regulatory mechanisms of mesenchymal stem cells
- Tissue and organ replacement/regeneration using stem cells
- Neuro-rehabilitation
- Geriatric rehabilitation

**PhD students currently enrolled in the Faculty of Health and Medicine are participating in the following research projects:**

- Computer simulation models for osteoporosis screening (Page 15)
- Creating an in-vitro arthrosis model (Page 12)
- Next generation sepsis diagnosis (Page 17)
- Cell-based therapies for regenerating bone (Page 13)
- Immunoregulatory abilities of mesenchymal stem cells

## In-vitro model for arthrosis research

Joints can only function if the cartilage surface is intact and they are adequately "lubricated" with synovial fluid. Degenerative joint disease could cause changes in these areas by exposing the cartilage surface to more friction and hence weakening the affected joint. The results are joint wear and tear, inflammatory reactions, and even complete cartilage degradation. This can affect everyone, but particularly older people. 30-40% of people aged 60 already have arthrosis.

To more closely examine the factors that interplay in the process, a research team at the Department of Health Sciences and Biomedicine is working on creating an in-vitro arthrosis model. The goal is to be able to investigate how cartilage reacts in tribological test situation to pro-inflammatory or anti-inflammatory mediators. Another objective is to study the influence of various lubricants, such as hyaluronic acid, on cartilage using the in-vitro arthrosis model.

### Establishing an In-Vitro Arthrosis Model/Biotribology III

#### FUNDING

NÖ Research and Education Ges.m.b.H. (NFB) – Life Science Call

#### PROJECT DURATION

2016 – 2018

#### DEPARTMENT

Health Sciences and Biomedicine

#### PROJECT LEAD AT DANUBE UNIVERSITY KREMS

Prof. Stefan Nehrer

#### PARTICIPATING RESEARCHERS AT DANUBE UNIVERSITY KREMS

Christoph Bauer  
Eugenia Niculescu-Morzsa

#### COORDINATION

Danube University Krems

#### PARTNERS

AC²T Research GmbH  
(Prof. Friedrich Franek)

## Improving bone regeneration with blood products

Treating bone defects by means of transplants and replacement substances is a lengthy process which, in most cases, does not progress without complications. Studies have shown that bone regeneration can be significantly improved by means of certain blood products, such as platelet-rich plasma and serum albumin. However, the biological processes of transplant integration have not been fully studied yet; this is now being addressed by the project team at the Center for Regenerative Medicine.

For example, the team is investigating the vascularization (i.e. producing new blood vessels) ability of bone explants coated with platelet-rich plasma and serum albumin. Other research currently being conducted includes extracting suitable blood products from human blood, and investigating their influence on cartilage cells under various conditions. Based on these findings, the aim is to provide treatment procedures for the clinical application of blood products for bone regeneration.

### Cell-Based Therapies for Regenerating Bone

#### FUNDING

NÖ Research and Education Ges.m.b.H. (NFB) – Life Science Call

#### PROJECT DURATION

2013 – 2017

#### DEPARTMENT

Health Sciences and Biomedicine

#### PROJECT LEAD AT DANUBE UNIVERSITY KREMS

Prof. Stefan Nehrer

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Vivek Jeyakumar  
Eugenia Niculescu-Morzsa

#### COORDINATION

Danube University Krems

#### PARTNER

OrthoSera. Zsombor Lacza



## Training program to prevent arthrosis

Obesity in childhood and adolescence is a problem on the rise all over the world, with manifold consequences to health, one of them being the locomotion system. Examinations of knee joints have shown that the constant, intensified strain on the joint due to obesity could lead to a higher risk of arthrosis. Yet other studies demonstrated that by means of targeted training programs with neuromuscular and strength exercises for the lower extremities, existing arthrosis symptoms in the knee joints can be alleviated.

Whether this type of training can help reduce joint loads while walking and climbing stairs, thereby preventing the onset of arthrosis, is currently being studied at the Department of Health Sciences and Biomedicine. The project's goal is not only preventing knee joint arthrosis but to develop training programs for obese children and adolescents.

### Training-Induced Reduction of Lower-Limb Joint Loads During Locomotion in Obese Children

#### FUNDING

NÖ Research and Education Ges.m.b.H. (NFB)

#### PROJECT DURATION

2015 – 2018

#### DEPARTMENT

Health Sciences and Biomedicine

#### COORDINATION AND PROJECT LEAD

University of Applied Sciences St. Pölten (Prof. Dr. Brian Horsak)

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS  
Prof. Stefan Nehrer

#### PARTNERS

Center for Sport Science and University Sports, University of Vienna, Department of Health; University of Applied Sciences St. Pölten  
University Clinic for Pediatrics, Medical University Vienna

### Spotlight

## Computer simulation models for early osteoporosis diagnosis

**Digital analysis methods aim to take diagnosing osteoporosis, a wide-spread bone disease, further. Moreover, the researchers at the Department of Health Sciences and Biomedicine are currently working together with the Karl Landsteiner Private University of Health Sciences to investigate a possible connection between osteoporosis and arthrosis.**

Osteoporosis is a common age-related bone disease. Bone density diminishes over time, leading to a higher risk of fractures. In the light of demographical development, osteoporosis also poses an economic challenge exacerbated by the fact that existing diagnostic methods only provide relatively low predictive efficiency. Early diagnosis, however, plays a particularly vital role in musculoskeletal system disease. The researchers at the Department of Health Sciences and Biomedicine are subsequently working on improving early detection.

### Assessing bone quality and bone density

In the course of a clinical study based on different measurement methods, computer simulation models will be designed and validated to assess bone quality and density. The goal is better utilization of digital information in X-ray images to optimize osteoporosis diagnosis. At the same time a possible connection between osteoporosis and arthrosis will be investigated, the latter being an increasingly prevalent joint disease that also changes bone structure.

### Computer Simulation Models for Early Osteoporosis Detection/ OsteoSIM

#### FUNDING

Austrian Research Promotion Agency (FFG)

#### PROJECT DURATION

2015 – 2018

#### DEPARTMENT

Health Sciences and Biomedicine

#### COORDINATION AND PROJECT LEAD

Karl Landsteiner Private University of Health Sciences (Assoc.-Prof. Dieter H. Pahr)

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS  
Prof. Stefan Nehrer

#### PARTICIPATING RESEARCHER AT

DANUBE UNIVERSITY KREMS  
Tobias Haftner

#### PARTNERS

Karl Landsteiner Private University of Health Sciences, TU Wien, Wien Braincon







Developing systems and methods for extracorporeal therapies is one of the core competencies at the Center for Biomedical Technology and the Christian Doppler Laboratory for Innovative Therapeutic Approaches in Sepsis. Backed by more than 20 years of research and development and in collaboration with Fresenius Medical Care, a global leader in the field of dialysis and extracorporeal therapies, Danube University Krems has already developed several products and procedures for clinical application.

**Pictured**  
(f. l. t. r.)

Vladislav Semak  
Birgit Fendl  
Claudia Schildböck  
Prof. Viktoria Weber  
Stephan Harm  
Eva Rossmanith  
Prof. Michael B. Fischer  
Carla Tripisciano  
Karin Strobl  
Margit Schinerl  
Anita Schildberger  
Matthias Pilecky, MSc  
Tanja Eichhorn  
Jens Hartmann

Spotlight

## Sepsis: From more efficient diagnostics to targeted therapy

**The EU Horizon 2020 research project involves ten international partners, among them Danube University Krems, working on developing more efficient methods of identifying pathogens in the blood. The goal is to reduce the time to result from days to hours, and to develop a method that can be applied directly where sepsis is one of the most frequent causes of death: namely in intensive care units in hospitals.**

Sepsis is an out-of-control inflammatory response by the body as a result of bacterial, fungal or viral infection. Inflammation is not restricted locally; it spreads to the entire circulatory system. Activated hemostasis, damaged blood vessels and organs are the result. This can lead to organ failure and, eventually, death. Two thirds of all sepsis cases occur in hospitals, with the prevalence of this medical condition on the rise not least due to increasing antibiotic resistance. Sepsis is one of the most frequent causes of death in intensive care units.

### Pathogen detection within hours

Pathogens must be identified quickly - in a matter of a few hours - to make efficient sepsis therapy possible. The "SmartDiagnos" project involves research teams from ten international partner institutions (among them the Center for Biomedical Technology) working on developing a new generation of devices for faster sepsis diagnosis.

Two devices are under development: a point-of-care system for smaller clinics without 24-hour labs to identify the most important sepsis pathogens directly at the point-of-care (hospital bed); and a laboratory device that can identify a wider pathogen spectrum including possible antibiotic resistances within approximately four hours.

Besides Danube University Krems, universities and companies from Denmark, Sweden, Czech Republic and Germany are involved in the project, which is part of the EU research promotion program Horizon 2020.

### Next Generation Sepsis Diagnosis/ SmartDiagnos

#### FUNDING

EU – Horizon 2020

#### PROJECT DURATION

2016 – 2020

#### DEPARTMENT

Department of Health Sciences and Biomedicine

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS  
Prof. Viktoria Weber

#### PARTICIPATING RESEARCHER AT

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#### COORDINATION

Danish Technical University

#### PARTNERS

Danish Technical University, Nanotech Danish Technical University, Food German industrial norm Unilabs  
Scandinavian Micro Biodevices  
CubeDX  
Högskolan i Skövde Karls-Universität Prag Tataa  
Biocenter  
Kopenhagen Business School

## Spotlight

## Studying the mechanisms of sepsis

**Every year, approximately 20 million people all over the world succumb to sepsis; 30 to 50 percent die of its consequences. Researching innovative approaches to treating this disease is one of the areas the Department of Health Sciences and Biomedicine specializes in. Current studies focus on mechanisms that play a role in the course and progression of sepsis.**

The high heterogeneity of sepsis patients poses a particular challenge to the search for target-oriented therapies. The basis for innovative approaches is being studied at the Christian Doppler Laboratory for Innovative Therapeutic Approaches in Sepsis ([www.sepsisresearch.at](http://www.sepsisresearch.at)) – namely, the mechanisms that play a role in the cause of the illness. One focus is directed towards the endothelium, the innermost cell layer of blood vessels, which loses its barrier function between the blood stream and tissue. Among other things the researchers are investigating if and in which group of patients the removal of inflammatory mediators from the blood using extracorporeal adsorption methods can suppress the activation and damage of the endothelium. Cell culture models were developed to identify the factors influencing the activation of the endothelium.

### Focus on vesicles

The Christian Doppler Laboratory also focuses on studying extracellular vesicles. These vesicles, which are released by activated cells during inflammation, have recently become an own research domain because their manifold roles as intercellular messengers as well as cell activation markers have been increasingly recognized over the past few years. The CD laboratory has developed a wide range of methods to isolate and characterize extracellular vesicles. In the next steps, their role in inflammatory processes and their interaction with immunocompetent cells will be examined.

This work was decisive in the foundation of a national scientific society for extracellular vesicles: [www.asev.at](http://www.asev.at).

### CD-Laboratory for Innovative Therapeutic Approaches in Sepsis

#### FUNDING

Christian Doppler Research Society,  
Fresenius Medical Care

#### PROJECT DURATION

2013 – 2019

#### DEPARTMENT

Health Sciences and Biomedicine

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Ingrid Linsberger  
Prof. Michael B. Fischer

#### COORDINATION

Danube University Krems,  
Center for Biomedical Technology

#### PARTNERS

Medical University Vienna  
Fresenius Medical Care Deutschland GmbH

### Extracellular Vesicles in Sepsis

#### FUNDING

Technologieförderung NÖ/Technopolprogramm

#### PROJECT DURATION

2015 – 2017

#### DEPARTMENT

Health Sciences and Biomedicine

#### PROJECT LEAD AT DANUBE UNIVERSITY KREMS

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René Weiss

#### COORDINATION

Danube University Krems,  
Center for Biomedical Technology

#### PARTNERS

Fresenius Medical Care Deutschland GmbH  
Sepsis Unit at the University Clinic St. Pölten  
Core Facility Flow Cytometry, Medical University Vienna



## Antimicrobial peptides for applications in extracorporeal therapies

Sepsis – the second most common cause of death in intensive care units – is a systemic, out of control inflammatory reaction by the body to infection. The interaction of infection and immune response plays a key role as immune cells are activated and inflammatory mediators are released into the blood. The resulting damage to vessel surfaces leads to fluids being released into tissue, coagulation activation and disruptions to blood circulation in delicate vessels and – ultimately - organ failure.

Endotoxins, the cell wall components of gram-negative bacteria, are often the cause of inflammation and sepsis. Antimicrobial peptides have the ability to deactivate these due to their strong binding affinity with endotoxins.

The project's goal is to develop an endotoxin adsorbent based on antimicrobial peptides to support extracorporeal therapies for liver failure, inflammation and sepsis. For this, peptides are immobilized on biocompatible substrates. The intention is not to replace conventional blood purification methods, but to supplement them.

### Antimicrobial Peptides for Application in Extracorporeal Adsorption Processes

#### FUNDING

Land NÖ, Technopol, WST-3

#### PROJECT DURATION

2016 – 2018

#### DEPARTMENT

Health Sciences and Biomedicine

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Jens Hartmann

#### COORDINATION

Danube University Krems

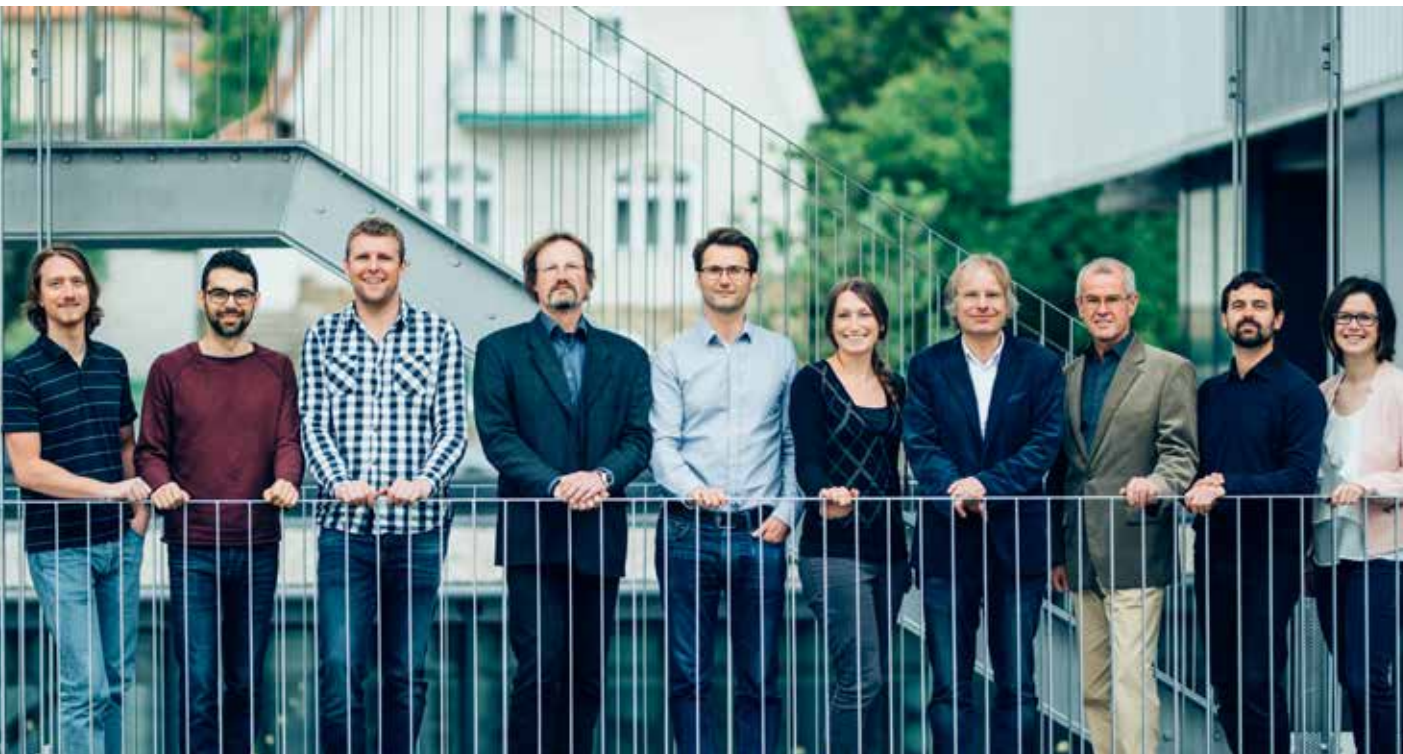
#### PARTNERS

Karl-Franzens-University Graz,  
Institute for Molecular Biosciences  
(Prof. Dr. Karl Lohner),  
pba3 BioMed GmbH  
(Managing Director: Dr. Peter Hecht)



\_\_Danube University Krems, biomedical laboratory, taken in August 2015





Magnetic materials have a multitude of applications in sensors, navigation devices, hard disc drives or wind turbines. Medicine, too, is already taking advantage of magnetic particles or fields (MRI). Research targets improvements and other application areas. Current research topics include a basic understanding of magnetism and magnetotransport as well as the scarcity of material resources and new fields of application.

**Pictured**  
(f. l. t. r.)

Alexander Waldemar Kovacs  
Markus Gusenbauer  
Johann Fischbacher  
Martin Brandl  
Astrit Shoshi  
Lisa-Marie Wagner  
Thomas Schrefl  
Hubert Brückl  
Harald Özelt  
Pia Schneeweiß

Spotlight

## Mission: permanently magnetic materials

**Cellular phone batteries, alloy steels, and light-emitting diodes all have one thing in common: they require rare earths to produce, a resource that Europe must import almost entirely at high prices. The project Novamag aims to develop permanently magnetic materials with low rare earth percentages to make European industry more independent of the increasingly scarce raw materials.**

European countries are almost completely dependent on imported strategic raw materials needed for high tech products such as batteries, laser technology, permanent magnets, steels and sophisticated alloys, conductive layers or light-emitting diodes. These elements can normally not be replaced by any other material. At the same time, the availability of these elements are vital to the European economy.

### Application in key technologies

For this reason the project's goal is to develop a new generation of permanently magnetic materials with a low percentage of rare earths. Permanent magnets are extremely important because they are essential components in key technologies such a clean energy (wind power), transportation (hybrid and electric vehicles) information technology (hard discs) or medicine (nuclear magnetic resonance).

### Computer simulation plays an important role

Experts from the fields of computer simulation, material manufacturing and material characterization work closely with end users to develop innovative new magnetic materials containing much fewer critical elements and

meeting current standards. Computer simulation plays a key role in the method. Proceeding from the chemical composition, the local configuration of the atoms, the matrix structure and the magnetic properties are calculated. The Center for Integrated Sensor Systems at Danube University Krems is investigating how the structure of the material can be optimized to increase the energy stored in magnets. To do this, the finite element method is applied to calculate the material's magnetic properties. In the computer model the magnet is subjected to a magnetic field, thereby making it possible to numerically calculate the critical field strength required to switch magnets.

### Project Novel, Critical Materials Free, High Anisotropy Phases for Permanent Magnets, by Design/ Novamag

#### FUNDING

EU Commission, Horizon 2020

#### PROJECT DURATION

2016 – 2019

#### DEPARTMENT

Health Sciences and Biomedicine,  
Center for Integrated Sensor Systems

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

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#### COORDINATION

BCMaterials, Spain

#### PARTNERS

15 universities, research institutions and companies in Europe, USA and Japan

## Spotlight

## Utilizing magnets by means of precise simulation

**In order to be able to use magnets optimally as a key technology for energy conversion, magnetization reversal must be precisely calculated. This requires adjusting the scales available in computer simulations to the material. The Center for Integrated Sensor Systems provides the required simulation models for the FWF project ViCoM.**

Computer simulations are an essential instrument in materials research and development. Multiscales and multiphysics simulations permit very precise predictions how new materials will behave. In the framework of the special research programme ViCoM, existing experience and competences are pooled to further develop simulation methods in computer-aided materials science. One major goal is to develop new multiscale simulations to align the scales of real material with the time and length scales of computer simulations. A further goal in which Danube University Krems is involved is to simulate permanently magnetic materials based on realistic dimensions.

### Magnets as a key technology

Magnets are used across a broad spectrum of technologies, from sensors in cars to sustainable power supply, where they play a key role in energy conversion. Scaled down models are developed in the project to describe magnetization dynamics for bridging the length scales between atomic distances and the typical lengths of the material's microstructure. To precisely calculate the switching process in magnets, the magnetic field must be calculated to a length of a few billionth meters near the surface of the crystallites.

Otherwise, the magnet crystals can be more than a thousand times as big as these typical lengths. For this reason the Center for Integrated Sensor Systems tests and implements methods for model reduction. Magnetization reversal is thus easier to describe than with conventional macromodels. These methods are used to simulate spin electronic sensors and permanent magnets with lower heavy rare earths content.

### Project Vienna Computational Materials Laboratory/ViCoM

#### FUNDING

FWF, Special Research Programme SFB ViCoM

#### PROJECT DURATION

2016 – 2019

#### DEPARTMENT

Health Sciences and Biomedicine,  
Center for Integrated Sensor Systems

#### PROJECT LEAD AT DANUBE UNIVERSITY KREMS

Thomas Schrefl

#### COORDINATION

University of Vienna

#### PARTNERS

Danube University Krems  
TU Wien  
Technical University Graz  
Wolfgang Pauli Institute Vienna

## New sensors for biomedicine

Sensors based on resistive spin transport are currently state of the art in hard disk drives. Their principle relies on the giant magneto-resistance and tunnel magnetoresistance effect. These new sensors not only use the charge but also the spin of conduction electrons in thin films. The Christian Doppler Laboratory 'Future Magnetic Materials and Sensors', under the leadership of the University of Vienna, is working on expanding this technology for applications in the automotive sector and biomedicine (research field at Danube University Krems). The combination of experimental data and numerical simulations and the development of models aim, on the one hand, to deepen the understanding of the new sensors; and on the other, to develop new functional sensor systems. The goal is to be able to predict the behavior of sensors and to propose new designs, thereby ultimately reducing development periods and costs.

### Future Magnetic Materials and Sensors

#### FUNDING

Christian Doppler Society

#### PROJECT DURATION

2014 – 2020

#### DEPARTMENT

Health Sciences and Biomedicine

#### PROJECT LEAD AT DANUBE UNIVERSITY KREMS

Hubert Brückl

#### COORDINATION

University of Vienna

#### PARTNERS

University of Vienna, Infineon AG,  
Villach, Magnetfabrik Bonn



## Gentle pump for stress-free blood cells

Blood cells are required for lab and research purposes that are as close to the condition as possible in which they occur in the human body. However, this is where the problem lies: the cells change during blood sampling. Be it because they are subjected to pressure as they flow through the needle, or the high shear forces in the pump system, or the conditions in the small tube into which they are pumped – whatever the reason, the cells suffer from mechanical stress, and react to it. At the Center for Integrated Sensor Systems at the Department of Health Sciences and Biomedicine, researchers working on a project were able to develop a cell-protecting pump and produce it by means of 3D printing. The pump's geometry was optimized with the aid of computer simulation models and biocompatibility tests, and the design parameters continuously improved by means of lab-scale testing components. In addition to designing the pump, processes to measure mechanical stress on cells were also studied and established. Further tests will focus on transferring the research findings to practical application.

### Cell Gentle Pumping/Gentle Pump

#### FUNDING

NÖ Forschungs- und Bildungsges.m.b.H. (NFB) – Life Science Call

#### PROJECT DURATION

2014 – 2017

#### DEPARTMENT

Health Sciences and Biomedicine,  
Center for Integrated Sensor Systems

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Thomas Schrefl  
Martin Brandl

#### PARTICIPATING RESEARCHERS AT

DANUBE UNIVERSITY KREMS

Giulia Mazza  
Markus Gusenbauer

#### COORDINATION

Danube University Krems



## Advanced nanoparticles for point-of-care laboratory diagnostics

Point-of-care testing is a fast growing branch in medicine. It requires portable analyzers that, as an alternative to standard diagnostics, can be implemented directly in hospital wards, in doctors' surgeries, pharmacies or even at home to obtain a diagnosis as quickly as possible.

To support this goal, researchers are working on developing a Lab-on-a-Bead for biomolecular diagnostics. Multifunctional, so-called hybrid nanoparticles are generated that react with high sensitivity due to their magnetic properties. These are the centerpiece of this compact, easy-to-use detection method. A follow-up project will implement this idea, in which nanoprobe for immunodiagnostics for early detection of preeclampsia (a complication during pregnancy) will be developed.

### Magnetic Lab-on-a-Bead for Biomolecular Diagnostics

#### FUNDING

NÖ Forschungs- und Bildungsges.m.b.H. (NFB) – Life Science Call

#### PROJECT DURATION

2015 – 2017

#### DEPARTMENT

Health Sciences and Biomedicine

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Hubert Brückl

#### PARTICIPATING RESEARCHERS AT

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#### COORDINATION

Danube University Krems

#### PARTNERS

Profactor GmbH  
TU Wien  
University Augsburg  
OFI Technologie & Innovation, Wiener Neustadt





Neurological and vascular diseases are on the increase. The Department of Clinical Neurosciences and Preventive Medicine responds by directing its research at preventing vascular diseases (stroke, dementia, diabetes) and the resulting complications, as well as developing new therapeutic methods for neurorehabilitation. Top priority: maintaining mental performance after strokes and diabetes, and non-pharmacological therapeutic intervention for dementia sufferers.

**Pictured**

(f. l. t. r.)

Martina Weber  
Assoc. Prof. Yvonne Teuschl  
Prof. Stefanie R. Auer  
Prof. Michael Brainin  
Paulina Ratajczak

Spotlight

## Dementia: Gathering data for future professional care models

**International epidemiological studies show that almost 90 percent of people residing in nursing homes today are suffering from dementia. Scientifically-based professional care models are called for, but supporting data is lacking or insufficient. A research project at the Center for Dementia Studies aims to close that gap.**

Currently, more than 46 million people suffer from dementia around the world. By 2030 this number will have risen to 74.4 million and by 2050, to 131.5 million of dementia. With the increasing prevalence of dementia, solutions for institutionalized long-term care and scientifically-based, critically analyzed care models are urgently required, as international epidemiological studies have shown that 70 to 90 percent of all nursing home patients suffer from dementia.

### Adapting professional care structures

To be able to adapt long-term care structures to current and future challenges fundamental data, currently largely lacking in Europe, is required. The goal of DEMDATA, a research project conducted by Danube University Krems and Charles University Prague, is to close this data gap in Austria and the Czech Republic. The research team bases its work on estimates, which suggest that only a third of dementia sufferers in Austrian and Czech nursing homes are accurately diagnosed and receives adequate medical and psychosocial support.

In the search for facts, the researchers visit seven professional care facilities with 644 residents in Austria and twelve similar institutions with 730 residents in the Czech Republic. Their investigations focus on the frequency of dementia-related illness in nursing homes but also include examining parameters pertaining to the specific needs of the nursing staff, the residents and their families. All of the data gathered is collected in a shared database hosted by Danube University Krems. The results will be available as of 2018.

### Project The Czech-Austrian Long-Term Care Research Database/ DEMDATA

**FUNDING**  
FWF

**PROJECT DURATION**  
2016 – 2018

**DEPARTMENT**  
Clinical Neurosciences and Preventive Medicine

**PROJECT LEAD AT DANUBE UNIVERSITY KREMS**  
Prof. **Stefanie R. Auer**

**PARTICIPATING RESEARCHERS AT DANUBE UNIVERSITY KREMS**  
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**Elisabeth Linsmayer**  
**Doris Prischl**  
Charles University Prague, Czech Republic:  
**Prof. Iva Holmerova**  
**Anna Berankova**  
**Dana Hradcova**  
**Hana Vankova**  
**Martina Matlova**  
**Katerlina Machacova**  
**Eva Jaolimova**

## World Stroke Academy: eLearning platform for physicians

The goal of the World Stroke Academy (WSA) is to provide continuing professional education for physicians working in the stroke field, and to keep them abreast of the latest scientific developments. The WSO project, headed by Univ.-Prof. Dr. Michael Brainin, is implemented as an eLearning platform.

It consists of learning modules on treating and preventing stroke, expert interviews on specialized topics, links to scientific articles and guidelines of various professional associations. The 2017 application for accreditation by the Accreditation Council for Continuing Medical Education, if awarded, will also give physicians a chance to earn education points on completing the WSA professional development modules.

### World Stroke Academy

#### FUNDING

World Stroke Organisation

#### PROJECT DURATION

since 2009

#### DEPARTMENT

Clinical Neurosciences and Preventive Medicine

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Prof. Michael Brainin

#### PARTICIPATING RESEARCHERS AT

DANUBE UNIVERSITY KREMS

Martina Weber

Raoul Eckhardt

#### COORDINATION

World Stroke Academy Office; based at Danube University Krems

## Preventing diabetes complications with lifestyle changes

In the EU project ePREDICE, researchers from the Department of Clinical Neurosciences and Preventive Medicine are investigating the effects of early lifestyle changes on the prevention of diabetes complications. More than 3,000 people with hyperglycemia in twelve countries will take part in the long-term study. 34 partner institutions in 17 countries, among them Danube University Krems, are participating in the EU project, which is coordinated by a research institution in Spain.

### Project Early Prevention of Diabetes Complications in People with Hyperglycaemia in Europe/ ePREDICE

#### FUNDING

EU

#### PROJECT DURATION

2012 – 2018

#### DEPARTMENT

Clinical Neurosciences and Preventive Medicine

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Prof. Michael Brainin

#### PARTICIPATING RESEARCHERS AT

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Prof. Jaako Tuomilehto

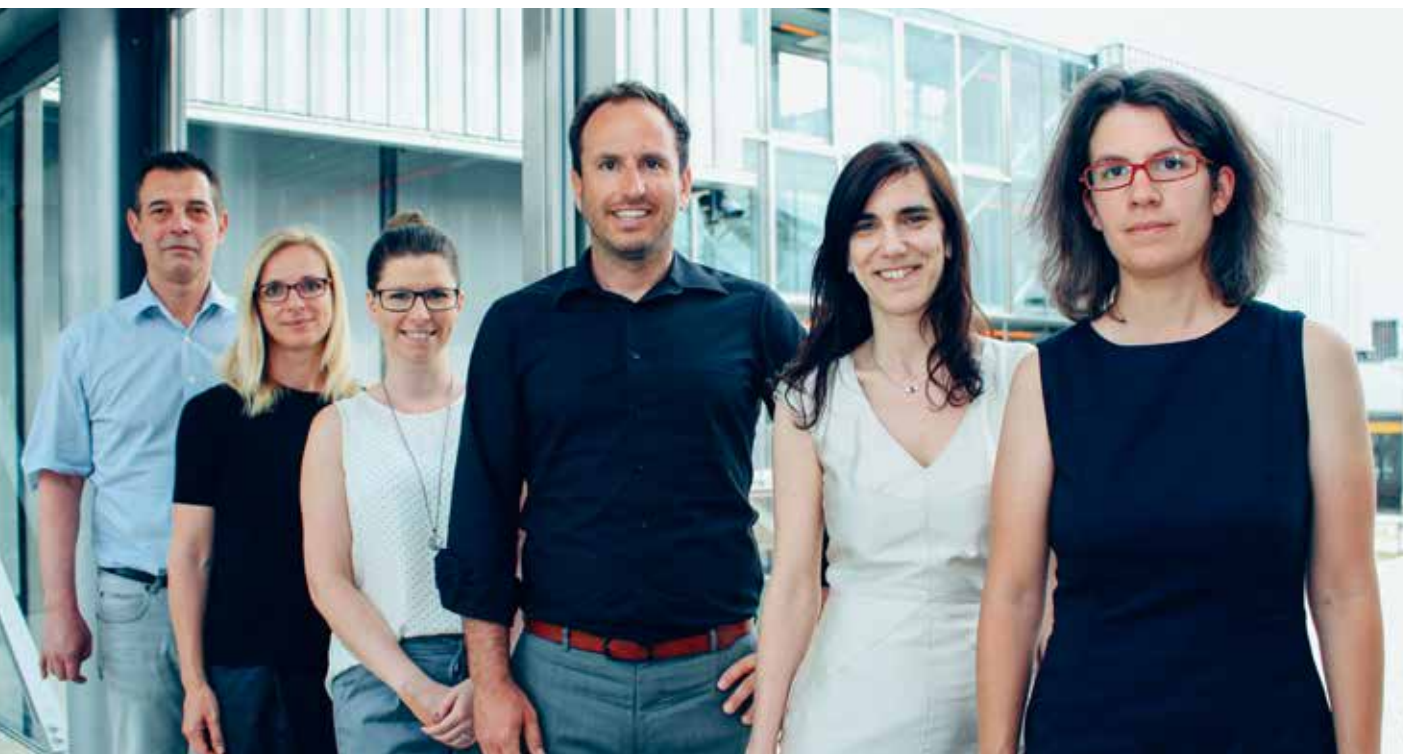
#### COORDINATION

FIRCAVA, Spain

#### PARTNERS

34 institutions in 17 countries





The Department of Psychotherapy and Bio-Psychosocial Health researches fundamentals and clinical applications of bio-psychosocial questions. We focus on psychotherapy research and psychosomatic medicine, ranging from studying the efficacy of psychotherapy, counseling, supervision, psychosomatic medicine, sleep research, somatoform pain research and integrative therapy.

**Pictured**  
(f. l. t. r.)

Robert Jank  
Prof. Claudia Höfner, MSc  
Sabine Fiegl  
Prof. Christoph Pieh  
Katharina Gerlich  
Martha Schneider

## From somnology to preventing human trafficking

**The bandwidth of research at the Department of Psychotherapy and Bio-Psychosocial Health ranges from fundamentals to clinically applied research, focusing on both psychotherapy studies and psychosomatic medicine. Two examples of these are the SleepPa study about the correlation between pain and sleep, and the PRIMSA study on preventing human trafficking.**

The department's research areas of somnology and pain research focus on somatoform pain. The introduced SleepPa study supports the analysis of the correlation between sleep and pain. Additionally, it investigates questions about the effects of pain and sleep and how the pain threshold changes as a consequence of sleep disorders. First results indicate that lack of sleep, for example due to shift work, could increase pain experience. Poor sleep quality may therefore have an influence on the same pain stimulus being perceived as significantly more painful.

### Helping victims of human trafficking

The goal of the Austro-German collaboration project PRIMSA is to develop means of prevention and intervention for victims of human trafficking, and hence sexual exploitation, using an interdisciplinary approach. In addition to measures supporting criminal investigation, the project mainly focuses on concepts to improve assistance and to create new training programs for police officers, social workers and psychosocial professionals.

### Prevention and Intervention Human Trafficking for the Purpose of Sexual Exploitation/PRIMSA

#### FUNDING

##### (AUSTRIAN PORTION OF THE PROJECT)

Austrian Research Promotion Agency (FFG), KIRAS- security research program (bmvit)

#### PROJECT DURATION

2014 – 2017

#### DEPARTMENT

Psychotherapy and Bio-Psychosocial Health

#### PROJECT LEAD AT

##### DANUBE UNIVERSITY KREMS

Prof. Christoph Pieh

#### PARTICIPATING RESEARCHERS AT

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Edith Huber  
Martha Schneider

#### COORDINATION

University Vechta, Institute of Social Work, Education and Sport Sciences

#### PARTNERS

Research Institute AG & Co KG – Center for Digital Human Rights, Vienna; CCS AKAtch Produktions- und HandelsGmbH, Upper Austria; Fraunhofer Institute of Biomedical Technology, St. Ingbert Institute of Criminal Research; Lower Saxony e. V., Hannover; Saarland University, Homburg; Eberhard Karl University Tübingen, Faculty of Law; SOLWODI Germany e. V.; Hope for Freedom e. V.; CEMEC – Intelligente Mechanik GmbH; Austrian Federal Ministry of the Interior, represented by the Federal Police Office Austria and the Security Academy; German Federal Police Office, Police Chief Hannover (associated PARTNERS)





## Open Society

- Security
- Data-Driven Governance
- Migration and Integration
- Democracy Research
- Epidemiology and Evidence-Based Medicine
- Legal Studies





Public services and the attractiveness of a business location depend on the constant availability of many types of infrastructures – from food and water supply to transportation, power, telecommunications and financial services through to social, health and governmental services. To protect these critical infrastructures, Danube University Krems has developed a variety of specialized solutions for the public sector.

**Pictured**  
(f. l. t. r.)

Bettina Pospisil  
Assoc. Prof. Walter Seböck  
Edith Huber  
Ingeborg Zeller

## Protecting transportation systems of the future from cyber attacks

Self-driving vehicles of the future will not only communicate with each other, they will also interact with traffic lights, stop signs and other traffic infrastructure to ensure the safety of all road users. This intercommunication, however, opens up potential security holes because the required IT infrastructure such as CITS and cyber systems are particularly vulnerable to cyber-attacks due to their complexity and connectivity. Traffic control systems shutdowns could therefore have disastrous consequences for critical industries, and society as well.

The “CybSiVerkehr” study in Austria is a first systematic approach to understand and solve this problem. Along with analyzing the challenges facing cyber safety in Austria and the possible effects on Austrian society, CybSiVerkehr also develops recommendations for stakeholders based on expert interviews.

### Cyber Security for Future Transportation Systems/ CybSiVerkehr

#### FUNDING

Austrian Research Promotion Agency (FFG), Ministry of Transportation, Innovation and Technology program KIRAS

#### PROJECT DURATION

2016 – 2017

#### DEPARTMENT

E-Governance in Business and Administration, Center for Infrastructural Security

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS  
Assoc. Prof. **Walter Seböck**

#### PARTICIPATING RESEARCHERS AT DANUBE UNIVERSITY KREMS

**Bettina Pospisil**  
**Ingeborg Zeller**

#### COORDINATION

Austrian Institute of Technology

#### PARTNERS

Kuratorium Sicheres Österreich (KSÖ)  
Federal Ministry of Defense and Sports



## Spotlight

## Clock synchronization against drones

**Drones are a potential new threat from the air. To defend against them the research project Ambos has come up with a technique to disrupt radio and GPS reception. The Center for Integrated Sensor Systems provides highly specialized knowledge on clock synchronization as the basis for this technology.**

Drones are a new dimension when it comes to danger from the air. Easy to buy and to operate, these devices could be used as potential weapons. However, existing defense mechanisms such as classic surveillance technologies or perimeter protection only offer limited protection.

For this reason the security research project is investigating methods and techniques to detect unmanned aircraft, to identify potential attackers and field them off using defense measures that can be used without endangering people nearby. Experts in the fields of electro-optics, acoustics and communication technology are as equally required for finding solutions to this technical problem as are experts to examine the social and legal aspects of deploying such technologies, and to develop suitable frameworks for their application in civil society.

### Specialist knowledge of clock synchronization

The Center for Integrated Sensor Systems contributes its knowledge of clock synchronization and localization at the service of this project. The goal is to develop ways of preventing an attacking drone from continuing its flight by targeting its radio communication system and GPS reception. Some of the challenges to be overcome are the multipath propagation

of radio signals as they bounce off buildings and objects, and how to restrict the disruptive measures to a defined area so as not to interfere with emergency forces radio signals, or drones deployed by security forces. Base stations must be synchronized in the nano-second range to permit focusing the electronic disruptive measures on a single drone. CISS provides concepts and electronics for synchronization in distributed systems. The goal of this research is to achieve synchronization accuracy of around 100ps.

### Defense against Unmanned Aircraft for Public Authorities and Security Organizations/AMBOS

#### FUNDING

Austrian Research Promotion Agency (FFG), Ministry of Transportation, Innovation and Technology program KIRAS

#### PROJECT DURATION

2016 – 2018

#### DEPARTMENT

Health Sciences and Biomedicine, Center for Integrated Sensor Systems (CISS)

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

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#### PARTICIPATING RESEARCHERS AT

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Aneeq Mahmood

Thomas Bigler

#### COORDINATION

Austrian Institute of Technology GmbH (AIT)

#### PARTNERS

Frequentis AG  
CNS-Solutions & Support GmbH  
PIDSO Propagation Ideas & Solutions GmbH  
Austro Control Österreichische Gesellschaft für Zivilluftfahrt mBH  
Joanneum Research Forschungsgesellschaft mbH  
Federal Ministry of the Interior  
Federal Ministry of Defense and Sports  
Federal Ministry of Transportation, Innovation and Technology

## Communication models to counter cybercrime

To counter cyber threats efficiently, Computer Emergency Response Teams (CERTs) must be well connected and up to date with the latest technological and scientific developments. In a previous study, financed by KIRAS, models for a knowledge and communication management system were designed which are now being developed together with business partners and tested for practical implementation. The research team is concentrating on two typical threat scenarios classified as extremely dangerous: defending against targeted attacks or reconnaissance attempts, APTs (Advanced Persistent Threats) and fighting botnets via these networks, so-called bots (remote-controlled malware programs that usually run without the knowledge of their users on networked computers) that can be used by their administrators to spy out passwords or to launch cyber-attacks.

### CERT Communication/ CERT-Komm

#### FUNDING

Austrian Research Promotion Agency (FFG), Ministry of Transportation, Innovation and Technology program KIRAS

#### PROJECT DURATION

2016 – 2018

#### DEPARTMENT

E-Governance in Business and Administration, Center for Infrastructural Security

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Edith Huber

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Assoc. Prof. Walter Seböck

Bettina Pospisil

#### COORDINATION

SBA research GmbH

#### PARTNERS

University of Vienna, Faculty of IT, Multimedia Information Systems Research Group Danube University Krems, Center for Infrastructure Security  
Research Institute AG & Co KG  
IKARUS Security Software GmbH  
Federal Chancellery as essential user







Data is a critical production factor in the information society. Neither the state nor the public or businesses are sufficiently prepared for the data society. Knowledge is lacking with regard to using, managing and providing data as well as its legal and social aspects. Against this backdrop Danube University Krems is researching the technical, social and legal frameworks for Data-Driven Governance.

**pictured**  
(f. l. t. r.)

Malgorzata Zofia Goraczek  
Gabriela Viale Pereira  
Thomas J. Lampoltshammer  
Prof. Peter Parycek  
Johann Höchtl (until June 30th 2017)  
Bettina Rinnerbauer  
Michael Sachs

### Spotlight

## Sounding out the data market

**A flourishing data market and functioning data services are vital factors for promoting innovation and securing jobs and growth. As part of the FFG project Data Market Austria, Danube University Krems is researching the legal, social and economic aspects of an Austrian data market.**

The market for data is enormous. In 2012 the Austrian market volume for Big Data technologies was 18.9 million euro; in 2017, the projected volume is approx. 73 million euros and still strongly growing. Since October 2016, when the Data Market Austria project was launched, the legal implications, organizational hurdles and technical feasibility of an Austria "data ecosystem" have been studied by fifteen project partners led by the Research Studios Austria research agency. The goals are to develop an Austrian "ecosystem" of data and data services, and to demonstrate it in pilot applications.

The Department of E-Governance in Business and Administration at Danube University Krems is in charge of the area focusing on analyzing the legal, social and economic aspects of an Austrian data market. In the legal area, in particular, many questions regarding automatic and validated legal transactions between machines remain to be answered. The research team is analyzing, among other things, the possibility of utilizing blockchain technology for self-executing contracts (Smart Contracts) and to restricting access to certain data regions. Research is also being conducted on intelligent encryption technologies, and maintaining and improving data quality.

The research team is concentrating particularly on the needs, expectations and problems of small and medium-sized companies may encounter with respect to the economic implications of a data ecosystem.

### Data Market Austria

#### FUNDING

Austrian Research Promotion Agency (FFG) – ICT lead project

#### PROJECT DURATION

2016 – 2019

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Prof. Peter Parycek

#### DEPARTMENT

E-Governance in Business and Administration  
Center for e-Governance

#### PARTICIPATING RESEARCHERS AT

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Thomas J. Lampoltshammer  
Bettina Rinnerbauer  
Johann Höchtl (until June 30th 2017)

#### COORDINATION

Research Studios Austria

#### PARTNERS

Austrian Institute of Technology  
Catalysts  
Compass-Verlag GmbH Danube University Krems  
Earth Observation Data Centre University Startup  
Service Vienna (INiTS) JOANNEUM RESEARCH  
Forschungsgesellschaft mbH  
Know-Center GmbH  
Lefkopoulos KG - bouncingbytes Semantic Web  
Company GmbH Siemens  
T-Mobile Austria GmbH  
Trusted Data Analytics GmbH & Co KG (TDA)  
T-Systems Austria GmbH  
Wikimedia Austria  
Central Institute for Meteorology and  
Geodynamics

## Improving the quality of open data

In Industry 4.0, access to open data is essential for promoting innovation. High quality data and metadata are required, as are easier means of connecting datasets from different sources with each other. In the project ADEQUATE, Danube University Krems is exploring various ways of improving data quality using "data.gv.at" and "opendataportal.at" platforms as the basis for research. Firstly, data quality is continuously evaluated based on quality metrics; secondly, (semi)-automated algorithms in combination with crowdsourcing approaches aim to improve quality; thirdly, semantic technologies are applied to harvest text documents and other, older open data sources to convert them into linked data.

### **Analytics & Data Enrichment to Improve the Quality of Open Data/ ADEQUATE**

#### FUNDING

Austrian Research Promotion Agency (FFG), Ministry of Transportation, Innovation and Technology program „ICT of the Future“

#### PROJECT DURATION

2015 – 2018

#### DEPARTMENT

E-Governance in Business and Administration, Center for e-Governance

**PROJECT LEAD AT DANUBE UNIVERSITY KREMS**  
Thomas J. Lampoltshammer

**PARTICIPATING RESEARCHER AT DANUBE UNIVERSITY KREMS**  
Prof. Peter Parycek

**COORDINATION**  
Semantic Web Company

**PARTNERS**  
Danube University Krems  
Vienna University of Economics and Business

### Spotlight

## Leveraging residents' knowledge for urban planning

**How residents experience everything from safe school routes to waste disposal problems is an important source of knowledge for city planners. The project SmartGov is working on models on how to tap into this knowledge. For this purpose so-called fuzzy cognitive maps are used as simulation tools to facilitate planning decisions and to make complex systems more readily accessible.**

Residents know the problems of their neighborhoods best. They know where dangers on the school routes lurk, and where garbage collection obstructs traffic. The goal of the SmartGov-Advanced Decision Support for Smart Governance project is to tie the knowledge of the residents more closely into city planning. For example, residents are involved via platforms on social media, where at the same time information from social media is also gathered using data mining or opinion surveys. This data is linked with open data from cities' internet portals and the knowledge of city administration experts and planning experts and subsequently fed into so-called fuzzy cognitive maps, FCMs for short.

FCMs are quasi diagrams representing relationships or correlations between aspects and concepts. They function as "mental models" depicting the causal relationships between these different aspects and concepts. By simulating scenarios arising from alternative courses of action, they can support city administrations and governments in political decision making. FCMs have been created exemplarily for two pilot cities: Limassol, Cyprus, to optimize waste management; and Quart de Poblet, Spain, to improve safety on school routes.

### **Advanced Decision Support for Smart Governance/SmartGov**

#### FUNDING

EU – JPI Urban Europe

#### PROJECT DURATION

2016 – 2019

#### DEPARTMENT

E-Governance in Business and Administration, Center for e-Governance

**PROJECT LEAD AT DANUBE UNIVERSITY KREMS**  
Malgorzata Goraczek

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Prof. Peter Parycek  
Bettina Rinnerbauer  
Gabriela Viale Pereira  
Johann Höchtl (until June 30th 2017)  
Michael Sachs

#### COORDINATION

Danube University Krems

#### PARTNERS

Danube University Krems, Delft University of Technology, Active Solution AG, Interfusion Services Limited, Kenus Informatica, Cyprus University of Technology, City of Limassol, City of Quart de Poblet

[www.smartgov-project.eu](http://www.smartgov-project.eu)  
[www.facebook.com/SmartGovProject](https://www.facebook.com/SmartGovProject)  
[twitter.com/ProjectSmartGov](https://twitter.com/ProjectSmartGov)

### **Communication and legal frameworks**

Furthermore – and especially by means of the integrated social media engine – communication between citizens and the government, and/or decision-makers and stakeholders in Smart Cities is optimized. Also central to the project are the legal aspects and frameworks. Thus the project moves with the trend to develop Smart Cities by involving all stakeholders in the planning process.







The migration flows of 2015 and 2016 offered a clear demonstration of the impact of globalization on the societies in Europe and the transformation processes flowing from them. The Department of Migration and Globalization studies the multidimensional character of this transformation, ranging from the impact on the education and health system to the labor market and welfare regulations. All of these are a focus of research as well as the diversification of religious beliefs and the response of policy makers.

**pictured**  
(f. l. t. r.)

Manfred Zentner  
Prof. Gudrun Biffel  
Alexandra Zeilinger  
Tania Berger  
Isabella Skrivanek  
Thomas Pfeffer

### Spotlight

## PhD program Migration Studies

Migration research takes place at the intersection of politics, business, technology, civil society, culture and media – making it one of the most dynamic research fields of the day. To take this dynamic into account and to further accelerate research in this area, the Faculty of Business and Globalization launched the PhD program Migration Studies in the winter semester 2016/17.

The migration movements currently taking place pose a great challenge to Europe. Both the causes and the effects on society are so complex that they can only be grasped in the context of their interdependence. Against this backdrop, interdisciplinarity and transdisciplinarity – i.e. a two-way learning process between science and society – play a decisive role in studying migration. This is the aim of the PhD program Migration Studies, which involves all departments of the Faculty of Business and Globalization.

#### It includes the following topics:

- Migration in Europe and social peace
- Integration in Austria in international comparison
- Health, mobility and globalization
- Innovation, international business and cross-cultural management
- Globalization, migration and development in Africa and Asia

The first four students began their studies at Danube University Krems following a competitive selection process in the winter semester 2016/17. One emphasis is on migrant integration in Austria in international comparison. The three projects in this area deal with the integration of refugees in the job market, the role of extracurricular youth work in migrant youth integration, and return migration of highly skilled migrants from Austria to Turkey. In the innovation, international business and cross-cultural management subject area, a project focuses on the challenges of demographic transition in international companies in the context of digitalization, labor migration and globalization.

In the summer semester 2017 three further PhD positions for the research field migration in Europe and social peace were advertised. Immigration to Europe and internal migration within the European Union raise governance issues; to ensure social cohesion in Nation States as well as the European Union are challenges to be addressed, as they also raise issues of security, societal and economic resilience and political legitimacy. The PhD students will also participate in the overriding research theme of the faculty, namely Social Peace.



## Spotlight

## Making India's urban planning more inclusive

**In India, urbanization poses a major challenge to city planners. Despite the building boom, informal urban communities are rapidly expanding because economically disadvantaged population groups can often only afford housing in informal urban communities with insufficient infrastructure and legal uncertainty.**

At the same time, designing housing solutions for low-income city dwellers has not been a priority in the education of future architects and urban planners to date. The number of courses and lectures dedicated to this topic lies in the single-digit percent range at most Indian institutions of higher education. Four Indian and three European universities are cooperating in the Erasmus+ project Building Inclusive Urban Communities (BInUCom), with the goal to professionalize architectural training and education in this field. The students receive the requisite know-how to be able to improve the precarious living conditions of dwellers in informal settlements.

### Case Studies deal with informal urban communities

Following intensive know-how transfer between the project partners, a number of specific case studies on informal housing

solutions will be carried out at all cooperating Indian universities. At the same time the awareness of political decision makers, companies and public institutions – the students' future employers – will be raised for the living conditions of the poorest city dwellers.

### Building Inclusive Urban Communities/BInUCom

#### FUNDING

Education, Audiovisual and Culture Executive Agency (EACEA) as part of Erasmus+/ Capacity Building in Higher Education

#### PROJECT DURATION

2015 – 2018

#### DEPARTMENTS

Migration and Globalization  
Building and Environment

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Tania Berger

#### PARTICIPATING RESEARCHERS AT

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#### COORDINATION

Danube University Krems

#### PARTNERS

Universiteit Twente, Enschede, Netherlands  
Lunds Universitet, Lund, Sweden  
Centre for Environmental Planning and Technology,  
University Ahmedabad, India  
Karpagam University, Coimbatore, India  
School of Planning and Architecture, Vijayawada,  
India  
Kamla Raheja Vidyavidyalaya Institute for Architecture  
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## Spotlight

## Postsecondary education in informal housing

**Around one billion people around the world currently live in precarious housing situations, amongst them also in Ethiopia. With Danube University Krems acting as coordinator, Ethiopian and European universities are professionalizing the training and education of architects and urban planners to improve the living conditions in informal urban settlements.**

The global urbanization trend continues: every year millions of people in developing and emerging countries leave their villages and move to the cities, where these economically weak population groups can often only find living space in informal settlements with insufficient infrastructure and no legal certainty. By 2030, the numbers may rise to two billion people living in precarious housing situations.

### Social inclusion and energy management in Ethiopia

The urban population explosion poses extreme social, economic and above all infrastructural challenges to Ethiopia and particularly its capital city, Addis Ababa. Even though the Ethiopian government is implementing an ambitious housing program, the low-income population only profits from this to a limited extent.

The Erasmus+ project aims at qualifying students to successfully integrate the issues of social inclusion and sustainability in energy management at the household level in their work with informal urban housing.

Pilot studies about inclusive housing solutions are conducted at the participating three Ethiopian universities. Based on these, specially developed teaching materials and courses on the topics of inclusion and sustainable energy management at the household level will be provided as generally accessible open course ware.

Moreover, the aim is to involve decision makers in politics and business so that the research and development results can be applied directly in urban planning. The project incorporates the findings from the BInUCOM project carried out with Indian universities.

### Social Inclusion and Energy Management for Informal Urban Settlements/SES

#### FUNDING

Education, Audiovisual and Culture Executive Agency (EACEA) as part of Erasmus+/ Capacity Building in Higher Education

#### PROJECT DURATION

2016 – 2019

#### DEPARTMENTS

Migration and Globalization and  
Management and Economics

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Tania Berger

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Andrea Hörtl  
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#### COORDINATION

Danube University Krems

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University Kassel, Germany  
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University of Gondar (UoG), Gondar, Ethiopia

[moodle.donau-uni.ac.at/ses](http://moodle.donau-uni.ac.at/ses)

## Integrating refugees into the labor market

**The high incidence of refugee migration in recent years raises the question, among other things, about the best ways to promote their integration into the labor market. The Department of Migration and Globalization addresses this question by comparing and analyzing the systems in place for rapid integration of refugees in Austria, Scandinavia and the USA.**

For society to integrate migrants, labor market integration plays a crucial role. Existing data points to major challenges: on average, it takes five to six years for refugees to reach the employment rates of migrants who came as family members.

The research team is studying the various support measures to promote labor market integration. The prerequisite for successful refugee integration is – according to one of the project’s basic premises – an integrated approach and agreement among stakeholders to link integration policy with labor market policy and social policy at various policy levels. The expected synergy is thoroughly examined for Austria and compared with selected Scandinavian countries and the USA. Best practice examples are subsequently identified for rapid refugee integration.

### Labor Integration of Refugees in Welfare States: Austria in an International Comparison

#### FUNDING

Jubilee Fund Austrian National Bank

#### PROJECT DURATION

2016 – 2018

#### DEPARTMENT

Migration and Globalization

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Prof. Gudrun Biffl

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DANUBE UNIVERSITY KREMS

Isabella Skrivanek

Thomas Pfeffer

### Supply and Demand

Information is generated about socio-demographic factors which accelerate integration into work in addition to institutional incentives. An international comparison based on a literature review as well as empirical case studies in Austria is to help ascertain the criteria which render support structures and measures effective and help identify deficiencies in the Austrian system. Close attention is paid to the balance between supply and demand. Along with institutional stakeholders, also refugees are given voice – to talk about their experiences, their successes and failures when trying to find employment in Austria.

## Gender research in an international comparison

The project Gender in a Changing Society builds on interviews that study the gender identities of young people with Serbian, Bosnian, and Croatian parents as compared to autochthonous Austrians. The interviews are also used to identify similarities and differences between the scientific approaches of the participating partner institutes in Rijeka, Sarajevo and Belgrade and to highlight these as added value in collaborative interdisciplinary and international research. Thus, the same interviews are analyzed by four different disciplines and in four different national contexts. Another goal is to incorporate the research findings into the partner institutes’ methodology.

### Gender in a Changing Society – Impulse Cooperation GeCS/Impulse

#### FUNDING

Austrian Exchange Service (OeAD)

#### PROJECT DURATION

2016 – 2017

#### DEPARTMENT

Migration and Globalization

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Manfred Zentner

#### PARTICIPATING RESEARCHERS AT

DANUBE UNIVERSITY KREMS

Prof. Gudrun Biffl

Aga Trnka-Kwiecinski

Julia Uhlík

#### COORDINATION

Danube University Krems

#### PARTNERS

University of Rijeka, Center for Advanced Studies

Southeast Europe (UNIRI), Croatia

Singidunum University, Faculty of Media and

Communication (FMK), Serbia

Foundation for Women’s Empowerment,

Bosnia and Herzegovina





The research and teaching of the inter-university network for Political Communication, netPOL for short, centers around democratic development, election analyses, political education as well as the related media coverage. Current research focuses on the political views of voters from migrant backgrounds, prevention and social cohesion and the interaction of societal developments with politics and economics. In addition to netPOL, the recently established project ECONet deals with the issues of rural development.

**pictured**  
(f. l. t. r.)

Elisabeth Nadlinger  
Christina Hainzl  
Peter Filzmaier

### Spotlight

## An eye to the future of modern democracies

**The PhD program of the international and inter-university network for political communication, netPOL, mainly focuses on the future of democracy in the EU.**

netPOL aims to reinforce and expand the teaching and research areas in Political Communication as well as to attract the attention of a wider, more international circle of stakeholders by collaborating with partner institutes and partner universities. The international, inter-university network Political Communication was initiated in 2011 and works on thematic priorities in political education, election research, political participation research, public affairs, media research, mass media business communication as well as conducting strategy and network analyses.

### Combining scientific approaches

In addition to research projects and publication activities, a PhD program "Future of Democracy in Europe" is also offered. The program combines political, communication and economic approaches to academic questions relating to the future of modern democracies in Europe. In the course of their dissertations, the students concern themselves with the challenges facing the European Union and the European states in the face of democracy's legitimation and confidence crisis.

### International and Inter-university Network for Political Communication/netPOL

#### FUNDING

Lower Austrian Research and Educational Society (NBF)

#### PROJECT DURATION

2010 – 2021

#### PROJECT LEADER

Prof. Peter Filzmaier

#### COORDINATOR

Christina Hainzl

#### PARTNERS

Andrássy Universität, Budapest, Hungary  
Babes Bolyai University, Cluj-Napoca, Romania  
Zeppelin University, Friedrichshafen, Germany  
Karl-Franzens-University Graz







The Department of Evidence-Based Medicine and Clinical Epidemiology's goal is to support the national and international healthcare systems with evidence-based methods. These include transnational public health research projects to identify effective health-promoting and preventive measures and – in conjunction with Cochrane Austria – to identify appropriate methods for developing rapid evidence syntheses for decision makers in the health sector.

pictured  
(f. l. t. r.)

Prof. Gerald Gartlehner  
Irma Klerings  
Gernot Wagner  
Nina Matyas

## Spotlight

## Following all the rules of evidence

**The EbM (Evidence-Based Medicine Information Center for Physicians) project provides Lower Austria's hospital physicians with evidence-based answers to their questions from daily clinical life.**

Medical doctors find themselves increasingly challenged to keep abreast with new scientific evidence due to the constantly growing number of studies and time constraints during clinical work. Hospital physicians in Lower Austria receive support with these issues from the EbM Information Center for Physicians. Since 2008 they can take their clinical questions to a point of contact at the Department of Evidence-Based Medicine and Clinical Epidemiology at Danube University Krems.

### Response documents available online

Once a question has been submitted by means of an online form, a specialized team of scientific staff begins to search in various databases such as the Cochrane Library, Embase, or PubMed, to establish which studies are relevant to that question. Afterwards, the results thus collected are critically evaluated, summarized citing the relevant sources, and made available to the doctors. Moreover, not only the enquirers themselves benefit from the evidence-based information: the response documents are rendered anonymous and categorized by area of specialization and provided free of charge at [www.ebminfo.at](http://www.ebminfo.at)

The research service, funded by the Lower Austrian Health and Social Fund NÖGUS, is the only free-of-charge, non-industry sponsored service of this type for medical practitioners in Austria. As part of Cochrane Austria, also established at Danube University Krems, the EbM Information Center for Physicians aims to support evidence-based practice in daily clinical life.

### EbM Information Center for Physicians

#### FUNDING

Lower Austrian Health and Social Fund (NÖGUS)

#### PROJECT DURATION

since 2008

#### DEPARTMENT

Evidence-Based Medicine and Clinical Epidemiology

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Anna Glechner

#### PARTICIPATING RESEARCHERS AT

DANUBE UNIVERSITY KREMS

Nina Matyas

Gernot Wagner

Irma Klerings

#### COORDINATION

Danube University Krems

#### PARTNERS

NÖ Landeskliniken-Holding

Lower Austrian Health and Social Fund



## Behavioral therapy as effective as antidepressants

**Depressive disorders are the most prevalent mental illnesses. Antidepressants are the standard course of treatment. However, studies have revealed that cognitive behavioral therapy in cases of major depressive disorder have virtually the same therapeutic effect. This was the result of an analysis of 45 studies by the Department of Evidence-Based Medicine and Clinical Epidemiology in collaboration with American colleagues.**

Prof. Dr. Gerald Gartlehner, Head of the Department of Evidence-Based Medicine and Clinical Epidemiology, analyzed 45 studies together with American colleagues to compare alternative approaches to treating major depressive disorder with second-generation antidepressants. The prevailing result of the study showed that there are no significant differences between cognitive behavioral therapy and antidepressants. The study showed that cognitive behavioral therapy is an equal means of reliable, evidence-based primary care.

### Discussing both options

There were indications of other effective psychotherapies; however, the state of evidence regarding the similar effectiveness of antidepressants and cognitive behavior therapy was the best. The study does not recommend that all patients should be switched from antidepressants to behavioral therapy; doctors should discuss the advantages and disadvantages of both options with their patients to be able to find the optimum treatment in each case.

### Nonpharmacological Versus Pharmacological Treatments for Adult Patients with Major Depressive Disorder

#### FUNDING

U.S. Agency for Healthcare Research and Quality

#### PROJECT DURATION

2014 – 2015

#### DEPARTMENT

Evidence-Based Medicine and Clinical Epidemiology

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS  
Prof. Gerald Gartlehner

#### PARTICIPATING RESEARCHER AT

DANUBE UNIVERSITY KREMS  
Irma Klerings

#### COORDINATION

Danube University Krems

#### PARTNERS

RTI-International, USA  
University of North Carolina, USA

The results of the study were incorporated into the guidelines for treating depression by the American College of Physicians and the American Psychological Association. The study was published as a report by the U.S. Agency for Healthcare Research and Quality and simultaneously appeared in the *Annals of Internal Medicine* and in the *British Medical Journal*.



— Danube University Krems, bridge between the old and new buildings, taken July 2016





Whether basic research in business and commercial law, or collaborating in research projects with other scientific institutions, the Department of Legal Studies and International Relations has been engaged in studying contemporary legal issues for many years now. Besides business, corporate and insurance law, a new area of focus is now on the legal challenges affecting copyright law in the age of digitisation and social media.

pictured  
(f. l. t. r.)

Prof. Thomas Ratka  
Prof. Clemens Appl

## Law – analog and digital

**As digital transformation progresses, copyright law is coming under increasing pressure to move with the times. Alongside its core areas corporate law and insurance law, the Department of Legal Studies and International Relations addresses the challenges of the digital world by establishing a research field for intellectual property and data protection and with it, a new academic chair.**

With the appointment of Prof. Clemens Appl as the first head of International, European and Austrian Copyright Law in Austria, Danube University Krems clearly accentuates teaching and research in this field. The lawyer and industrial engineer researches pertinent fundamental copyright issues and leads the Sparkling Science research project “From User-Generated-Content to User-Generated Copyright.”

In the spirit of the Open Science idea, Appl, together with a team of law and social researchers and pupils from TGM Vienna, are researching a requirements profile for a modern copyright regulation that would protect the interests of all stakeholders equally. The project focuses on the copyright dimensions of Education 4.0 and user-generated content. The project findings will shed light on the reasons for the loss of acceptance that copyright is subject to, and possible solutions as to how a broad consensus can be reached.

The project has spawned numerous publications, including legal commentary and scholarly presentations. Further areas of research center on software copyright, design protection, open innovation and data protection law.

### **Business and Corporate Law**

Research at the Department focuses on business and corporate law. The findings are written and (co)published as scientific textbooks and reference books, among others the prestigious “Vienna Commentaries” on the Commercial Code and Companies Act, published by Manz.

### **Broad dissemination**

Broad dissemination of the research findings as well as research-oriented teaching ensure transfer between science and practice. The department members occupy leading roles in major scientific symposiums. These include the Krems Insurance Forum, the Austrian Building Law Forum, the Austrian Art Law Day, the IP DAY, the Austrian IT Law Day and the MANZ legal academy’s Krems Business and Corporate Law Day.



# Building Science and Cultural Heritage

- Sustainable Building Design
- Image Science and Media Art Research
- Museum Collections Management





Buildings must meet the requirements of both inhabitants and the environment. Overheating in the summer (and hence need for cooling), increasing automation and - not least - the wish for simple, low-tech approaches are the current challenges for buildings whether they are new and modern or already exist. Danube University Krems is researching solutions for the future to create environmentally conscious and energy-efficient buildings while at the same time maintaining a high degree of comfort for their inhabitants.

pictured  
(f. l. t. r.)

Markus Winkler  
Daniela Trauningner  
Klaus Winiwarter  
Gregor Radinger

### Spotlight

## Exploiting urban structures for energy generation

**The project InnoGOK investigates whether existing sealed urban areas could be utilized to produce solar power. As temperatures increase due to climate change, the aim is not only to produce environmentally friendly energy, but also to reduce overheating in cities during heat waves.**

Science surmises that temperatures will increase above the average as a consequence of climate change, especially in the cities. Sealed areas such as roads, squares or pavements combined with high building density cause heat retention, "heat island effects", which will continue to raise the temperature in the cities above the average. For this reason it will be important to curb the heat in urban areas. The measures that come into question to reduce the temperature must be climate-friendly and as energy efficient as possible. This is the research project's guiding question. Its goal is to utilize the heat from sealed areas – or urban "heat collectors" – to produce energy while at the same time reducing heat in the cities by "cooling down" these areas. The energy thus produced could be used to heat service water, to run heat pumps or to keep roads and pavements ice-free, saving both energy and costs.

The existing experimental plant at HTL Krems provided a suitable testing field for the project, from asphalt to concrete through to lawns, as well as energy-retaining technology such as ice and underground storage units. These were technically adapted in the course of the study and retrofitted with measuring instruments to make detailed analyses possible. Moreover, involving the students of the HTL (technical school) Krems increased their awareness of holistic urban planning in an ecological context.

### Energy recovery is achievable

The project demonstrated that recovering heat from built-up and surfaced areas, and storing and using this energy under controlled conditions, is technically feasible and meaningful. In addition it was shown that by extracting the heat, the surface temperature of urban structures can be significantly reduced. Based on the current findings it appears that the energy recovered during summer, in combination with phase-delayed utilization of this heat for de-icing in winter, is particularly promising.

### Investigating of the Energetic and Ecological Usability of Solar Radiation on Urban Spaces and Paths (InnoGOK)

#### FUNDING

Austria Research Promotion Agency (FFG), Ministry of Transportation, Innovation and Technology program "City of the Future"

#### PROJECT DURATION

2015 – 2017

#### DEPARTMENT

Building and Environment

#### PROJECT LEAD AT

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#### COORDINATION

Danube University Krems

#### PARTNERS

ees energy environment solutions GmbH

HTL Krems



## Spotlight

## Sensor technology optimizes energy efficiency

**Heating and cooling systems are often operated inefficiently for years without being noticed. The result is a huge waste of money and resources. A new system aims to reveal these inefficiencies and thus optimize the energy efficiency in buildings. Researchers from the Center for Integrated Sensor Systems are participating in the OptiMAS project to make a major contribution to this development.**

With the aid of innovative sensor technology and complex mathematical models, OptiMAS seeks to deliver precise data about the energy flow and consumption in buildings as a whole. The goal is to identify and localize possible heating and cooling system inefficiencies - and hence excessive consumption. Based on these measurements and derived findings, precise measures to optimize energy efficiency can be implemented.

### Non-invasive sensors at the core

The core of this system are the so-called non-invasive sensors, which are being studied at the Center for Integrated Sensor Systems. Their advantage: they can be mounted to heating and cooling pipes from the outside, and do not influence existing systems and their automation components. The challenge facing researchers is developing sensors that work on pipes of different materials and design. The first project phase has already resulted in a very promising concept.



### Low-cost solution to save energy

In the next step, a modular architecture will be designed to connect the individual sensors to one system for a detailed energy flow analysis in hydraulic networks. The goal is to get by with as few metering points as possible to create an efficient but also low-cost solution for saving energy. Only such a solution can commercially successfully evaluate the energy efficiency of buildings but also building blocks and quarters.

### Optimization of Building Energy Efficiency through Model-based Energy Flow Analysis with Non-Invasive Sensors/OptiMAS

#### FUNDING

Austrian Research Promotion Agency (FFG), Ministry of Transportation, Innovation and Technology program "City of the Future"

#### PROJECT DURATION

2016 – 2019

#### DEPARTMENT

Health Sciences and Biomedicine, Center for Integrated Sensor Systems

#### PROJECT LEAD AT DANUBE UNIVERSITY KREMS

Albert Treytl

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Assoc. Prof. Thilo Sauter

#### COORDINATION

Research Burgenland GmbH (Florian Wenig)

#### PARTNERS

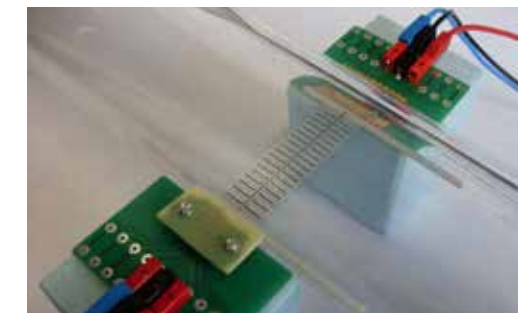
Siemens Aktiengesellschaft Austria  
Danube University Krems  
Reder Domotic GmbH

## Spotlight

## Air conditioning systems: flow sensors reduce power consumption

**Air conditioning systems are a significant factor in a building's energy consumption. Despite the requirements set out in the EU Energy Performance of Buildings Directive, it is difficult to regularly or continuously monitor their efficiency after going into operation because the relevant measurement technology is lacking. The project e.sense has opened up a way to efficient measurement by developing appropriate flow sensors.**

The project's goal was to make it possible to measure the energy flow in ventilation and cooling systems with the aid of flow sensors. The sensors were produced using cost-effective foil-based thin-film and circuit board technology and fitted into the air ducts. The sensors were designed based on theoretical and simulation-aided models for optimal manufacturing. The complex flow conditions in the ducts were studied with the help of modelling and simulation methods to achieve good conformity between measurement data and reality. To ensure distributed and coordinated data collection and simple installation the sensors were connected to a central hub by a wireless sensor network, the hub collecting and delivering data via internet technology where it could be accessed by the building operator or the building control system. Prototypes were created of all system components, and experimentally evaluated in lab and field tests.



### Sensors can be produced cheaply

The project demonstrated that it is possible to produce cheap printed sensors. Breakthroughs were also achieved with respect to modelling and simulating turbulent air flows in air ducts. These and the results from the concluding tests in a realistic application setting suggest that in future, it will be possible to optimize the sensors' positions purely by means of simulation.

### Enthalpy Sensor Technology to Maximize Energy Efficiency in Buildings/e.sense

#### FUNDING

Austrian Research Promotion Agency (FFG)

#### PROJECT DURATION

2012 – 2016

#### DEPARTMENTS

Health Sciences and Biomedicine, Center for Integrated Sensor Systems

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Assoc. Prof. Thilo Sauter

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#### COORDINATION

Danube University Krems

#### PARTNERS

Fachhochschulstudiengänge Burgenland Gesellschaft m.b.H.  
Attophotonics Biosciences GmbH Reder Domotic GmbH

## Spotlight

## When the shop floor helps save energy

**Modern factories in the food sector as well as in many other manufacturing industries require precise air conditioning. The MANUbuilding project explores new grounds to use energy created in the production process to make air conditioning more energy efficient. The goal is to save up to 60 percent energy.**

Overall energy saving is the MANUbuilding project's mandate. This is achieved by linking the factory building and the production process to mutually adapt and optimize building as well as process automation. The research team investigated how to guarantee controlled air condition for production processes while at the same time reducing energy consumption by 20 to 60 percent.

The project was successfully field tested in an industrial environment in northern Germany, and concluded in 2016. The Center for Integrated Sensor Systems, in collaboration with partner institutions, developed a model-based control technology making it possible to steer the complex processes in factories by means of a distributed, cyber-physical system.

### New decision algorithms

These developments are based on so-called cooperating objects and function blocks in accordance with the IEC 61499 technical standard. The combination of these technologies enabled the research team to develop new distributed decision algorithms by splitting the factory into spatial cells, each of which is air conditioned by an embedded control device.

However, as these control devices have very low processing power and memory, a customized room model had to be specifically designed that on the one hand can be run on these small computers, and on the other hand is able to precisely predict the thermal processes over long periods of time to make energy-efficient air conditioning and cooling possible.

The field test showed that with these new control concepts, for example predictive ventilative cooling and even process heat or the cold from refrigerated warehouses can be utilized to reduce the energy consumed by air conditioning in industrial environments.

### Energy Efficient Building for Industrial Environment/ MANUbuilding

**FUNDING**  
ERAnet MANUNET

**PROJECT DURATION**  
2013 – 2016

**DEPARTMENTS**  
Health Sciences and Biomedicine,  
Center for Integrated Sensor Systems

**PROJECT LEAD AT DANUBE UNIVERSITY KREMS**  
Albert Treytl

**PARTICIPATING RESEARCHERS AT DANUBE UNIVERSITY KREMS**  
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Aneeq Mahmood  
Anetta Nagy

**COORDINATION**  
Danube University Krems

**PARTNERS**  
nxtControl GmbH  
UPAS GmbH (Germany)

## Measuring electric fields without distortion

Measuring electric fields without distorting them is a very challenging task. A non-reactive measurement method would be hugely beneficial to all. For this reason the Center for Integrated Sensor Systems has developed an innovative transducing method that paves the way to new types of measurement methods. The method works in the following way: by separating charges on a micromechanical component, an extremely sensitive mechano-optic conversion is achieved, at which two flexible diaphragms modulate the light flux. To guarantee minimal field distortion, the transducer is supplied with light via dielectric waveguides, after which the modulated light is directed to a photo receiver.

The project's successful implementation, supported by field tests and readings from geophysical measuring stations, will lead to a new generation of highly sensitive transducers. These will provide readings with an accuracy of up to 100 V/m for static and changing electric fields.

The suggested approach promises great advantages for numerous applications ranging from lightning research to geophysics.

### Electric Field Sensing/Elfis

**FUNDING**  
FWF, Federal Province of Lower Austria

**PROJECT DURATION**  
2016 – 2019

**DEPARTMENTS**  
Health Sciences and Biomedicine,  
Center for Integrated Sensor Systems

**PROJECT LEAD AT DANUBE UNIVERSITY KREMS**  
Wilfried Hortschitz

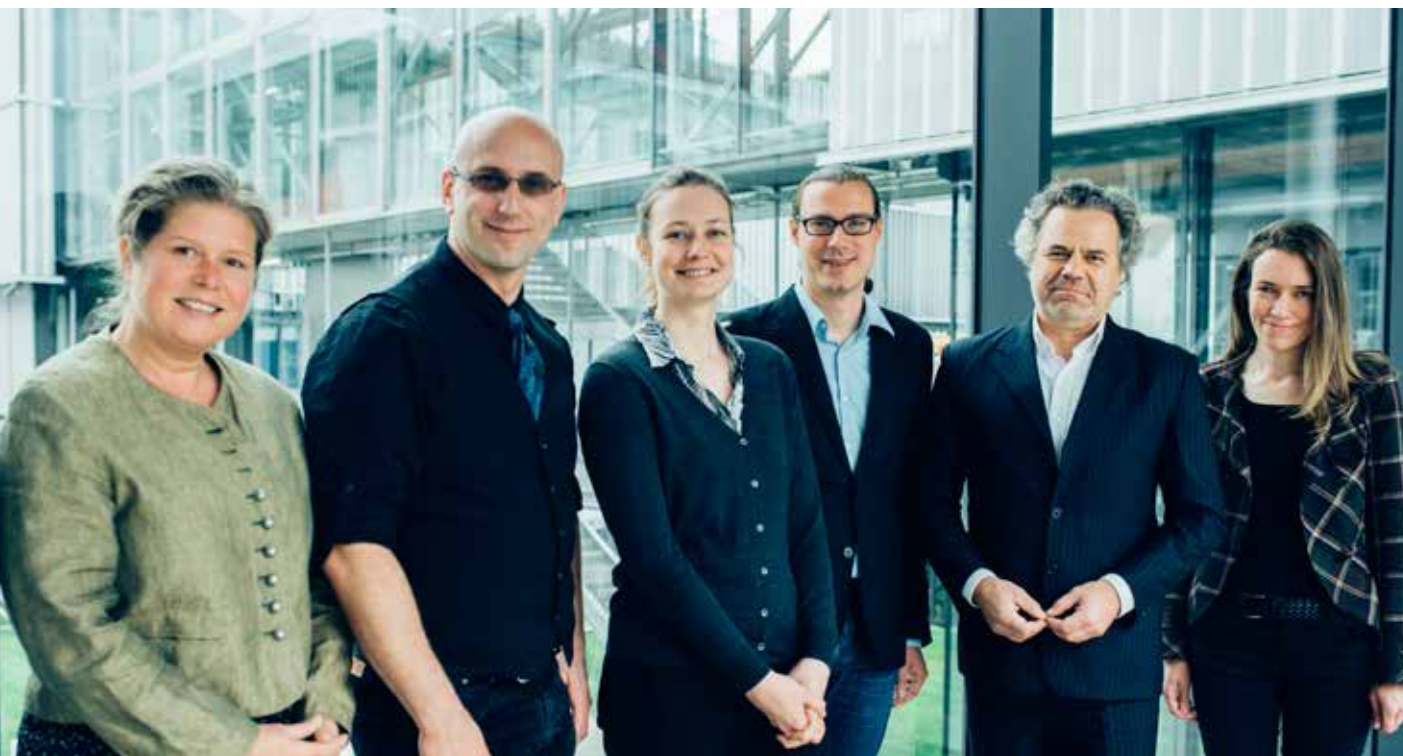
**PARTICIPATING RESEARCHERS AT DANUBE UNIVERSITY KREMS**  
Harald Steiner  
Gabor Kovacs

**COORDINATION**  
Danube University Krems

**PARTNERS**  
TU Wien  
Lightning Research Austrian Electro Technical Association (OVE)







The Department of Image Science, and particularly the professorship for image science, analyzes the medialed global image revolution and its effects on our culture. As the international leader in the field of media art research, the team is responsible for numerous intercontinental research projects, conferences, courses, new research methods and instruments for image analysis. To strengthen its leading position, the Lab for Digital Humanities was founded in 2016.

**pictured**  
(f. l. t. r.)

Wendy Jo Coones  
Devon Leith Schiller  
Janina Hoth  
Florian Wiencek  
Prof. Oliver Grau  
Viola Rühse

Spotlight

## Digital media art: preservation and research

In the project “Interactive Archive and Meta-Thesaurus for Media Art Research”, an interactive and collaborative database infrastructure was developed for ADA – the Archive of Digital Art ([www.digitalartarchive.at](http://www.digitalartarchive.at)) - in order to systematically document, archive and disseminate media art in all of its complexity. Artists, works, festivals, events, technology and other information are continuously collected and edited by members of the ADA Community, which consists of established artists and scholars, and these data are interconnected within the database system to reveal the complex structures of contemporary media art. Furthermore, the team developed interactive tools to involve the community in research, improve documentation processes and disseminate media art via online exhibitions and artist/scholar features.

**Meta-Thesaurus:  
Linking the past and the present**

In a second step, the ADA database was connected in a bridging Meta-Thesaurus with Göttweig Abbey’s extensive digital graphics collection to identify and investigate the continuity and disruptions in media art research, art history and the history of science and technology. The art works are semantically linked via a keyword index, which covers a wide area of subjects relevant to the prehistory of media art ranging from theoretical terms such as illusionism, perspective and anamorphosis, to subjects such as astrology, microscopy and physiognomy, to technological innovations such as the automata, camera obscura and panorama.



Media art is thus historically contextualized, and its connection to art history established, which supports the inadequate integration of media art in our research databases and archives. Upon the conclusion of the research project in 2016, ADA was integrated into the Lab for Digital Humanities at the Department of Image Sciences, where it will be continued.

**Interactive Archive and Meta-Thesaurus for Media Art Research/ AT.MAR**

**FUNDING**  
FWF

**PROJECT DURATION**  
2013 – 2016

**DEPARTMENT**  
Image Science

**PROJECT LEAD AT DANUBE UNIVERSITY KREMS**  
Prof. Oliver Grau

**PARTICIPATING RESEARCHERS AT DANUBE UNIVERSITY KREMS**  
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Valerie Kummer  
Viola Rühse  
Devon Leith Schiller  
Michaela Seiser

**COORDINATION**  
Danube University Krems

**PARTNERS**  
Graphics Collection Göttweig Abbey DARIAH-EU Artport, Whitney Museum of American Art  
The School of Creative Media, City University Hong Kong



Research at the Center for Museum Collections Management is largely based on the collections managed by “Landessammlungen Niederösterreich” (Regional Collections of Lower Austria.) These include cultural and natural history, archaeology, art, as well as conservation and restoration sciences. In addition to its practical aspects, the focus is on collecting as a museological research field and its theoretical foundation in museology. The overriding goal: professionally managing collections as part of our cultural heritage.

pictured  
(f. l. t. r.)

Armin Laussegger  
Sandra Sam  
Peter Trebsche  
Eleonora Weixelbaumer  
Nils Unger

## Spotlight

## Celtic settlements in Eastern Austria

**Over the past few years, scientific pre-occupation with Celtic settlements in eastern Austria has intensified significantly. The focus was mainly on the large hubs, while medium-sized settlements between 6 and 10 hectares have barely been studied so far. A French-Austrian team of archaeologists is now working on closing this gap by means of extensive excavations.**

Research is centered on Haselbach, north of Stockerau. Excavations are carried out in several stages to glean information from the archaeological findings about the architecture as well as economic and social life in the Celtic settlement. The first excavations examined, among other things, pithouses, storage pits, a well and a fireplace; they also brought to light various other finds such as ceramics, brooches, non-ferrous artefacts originating mainly from the mid-Latène period (ca. 250–130 BC) and provided interesting insights into ownership structures, possible building regulations and stockpile-sharing.

### Advantages of international research collaboration

The collaboration between Austrian and French archaeologists implies numerous advantages, for example with regard to sharing knowledge about scientific approaches and designs, and standardizing specialized terminology. A further significant aspect is that findings from the many excavations in France and Central Europe about the settlement history in the Latène period can be merged, resulting in a trans-national synthesis of knowledge about Celtic settlement structures.

### Celtic Settlement Hubs in Eastern Austria

#### FUNDING

Office of the Lower Austrian Provincial Government, Department of Art and Culture, Department of Science

#### PROJECT DURATION

2015 – 2019

#### DEPARTMENT

Art and Cultural Sciences, Center for Museum Collections Management

#### PROJECT LEAD AT

#### DANUBE UNIVERSITY KREMS

Prof. **Stephan Fichtl**, Université de Strasbourg  
**Peter Trebsche**, Danube University Krems

#### PARTICIPATING RESEARCHERS AT

#### DANUBE UNIVERSITY KREMS

**Peter Trebsche**  
**Elisabeth Nowotny**

#### COORDINATION

University Strasbourg  
Danube University Krems

#### PARTNERS

Université de Strasbourg/UMR 7044  
ArchIMédE  
Danube University Krems  
Department of Art and Culture, Office of the Lower Austrian Provincial Government,  
Lower Austria Regional Collections  
Verein der Freunde des Urgeschichtemuseums,  
Asparn an der Zaya





## Educational Sciences and Lifelong Learning

- Assuring Quality and Professionalism
- Technology-Aided Learning Arrangements
- Professionalization in Higher Education Management
- Transfer and Validation of Informal Learning



The challenges facing society as a result of social transformation and digitalization are the starting point for research into solutions for effective, systematic knowledge and process management: web tools for journalists, visualization concepts for easier access to digital collections, and management support to implement gender mainstreaming.

pictured  
(f. l. t. r.)

Eva Mayr  
Florian Windhager  
Susanne Wolke  
Michaela Gindl  
Georg Neubauer  
Kay Mühlmann  
Günther Schreder  
Karin Siebenhandl  
Lukas Zenk  
Florian Halm

## Spotlight

## The power of images

**Journalists often encounter difficulties when communicating statistical data about economic and social developments to the public in an intuitive, easy to understand way. The project DJ Isotype seeks to address this problem by drawing on a historical example: the philosopher of science and public educator, Otto Neurath (1882–1945).**

Neurath developed a method called ISOTYPE (International System Of Typographic Picture Education) that represented statistical information as images to make it understandable to as many people as possible. In the Department of Knowledge and Communications Management's project, contemporary visualization and interaction concepts based on Neurath's ideas are developed and explored in regard to their possible application in data journalism.

### Visualization and interaction templates

Data journalism introduced interactive information graphics about current affairs with the first projects by the New York Times, among others. However, building interactive infographics is often too complex a procedure to produce them for daily news. In DJ Isotype, researchers are developing a tool that will assist journalists with building data visualization and provides re-usable visualization and interaction templates. This software prototype aims to simplify and speed up the design process.

At the same time, new developments in the field of interactive information visualization and visual analytics also move the ISOTYPE approach forward: interactive elements allow interested users to dig even deeper into data than they could with Neurath's static charts. Users can, so to speak, enter into a dialog with data.

Another goal of the project is to examine the intelligibility of this visual form of communication. Experiments are being conducted to obtain cognitive-psychological information about the intelligibility of interactive graphics and to further develop ISOTYPE on a scientific basis.

### ISOTYPE Goes Data Journalism/ DJ ISOTYPE

#### FUNDING

Austrian Research Promotion Agency (FFG),  
Program "Bridge"

#### PROJECT DURATION

2015 – 2018

#### DEPARTMENT

Knowledge and Communications Management

#### PROJECT LEAD AT

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Günther Schreder

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Georg Neubauer  
Florian Windhager  
Florian Halm

#### COORDINATION

Danube University Krems

#### PARTNER

Wiener Zeitung GmbH



## Shedding light on organizational culture

The goal of the SPOC research project was to investigate the unconscious aspects of organizational culture in the form of social schemata. To do this, a new type of methodology, the so-called Implicit Association Test (IAT), was applied, which had hitherto mainly been used in the area of social psychology studies. The IAT is a response-time based method for measuring people's implicit attitudes. This method was further developed to be able to measure unconscious organizational culture. To depict the organizations more extensively, the IAT was combined with established methods such as narrative interviews, online questionnaires and social network analysis.

In the course of the project, a new procedural model and a user-friendly web-based tool were developed and implemented in various case studies. A tech startup, knowledge managers, and sustainability officers took part in the studies in order to analyze the sociocognitive processes of innovations, among other things.

The customizable combination of different implicit association tests also permits studying more complex questions. Thus it was possible to investigate a balance-theoretical concept at a company which integrated the implicit attitudes of the employees towards innovation, the company and their own self-perception. This, in turn, led to a new view of the often invisible aspects of organizational culture.

### Schema Processing in Organisational Culture (SPOC)

#### FUNDING

Austrian Research Promotion Agency (FFG)

#### PROJECT DURATION

2013 – 2016

#### DEPARTMENT

Knowledge and Communications Management

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Lukas Zenk

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Eva Mayr

Kay Mühlmann

Manuel Nagl

Günther Schreder

#### PARTNERS

bettertogether GmbH

Arbeitsfähigkeitserhalten KG

## Promoting women in science

Gender equality is a central concern at higher education institutions and universities. Reforms and re-structuring processes have brought about change. Equal opportunities policy today lays claim to organizational development in higher education, entailing changes at the organizational, interactional and personal levels.

The GenderTime project aimed to increase the participation of women in the scientific sector, thereby inducing a structural development process at several levels. An externally supported evaluation process actively assisted the project team with creating or changing the respective equal opportunities plans. The goal was to raise questions about the execution of the implemented measures and to reflect on their quality and consequences. Specifically it was also about supporting the professionalization of universities so that equal opportunities strategies and structural development processes can succeed.

### Transferring Implementing Monitoring Equality/GenderTime

#### FUNDING

EU Framework-Program 7

#### PROJECT DURATION

2013 – 2016

#### DEPARTMENT

Knowledge and Communications Management

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Karin Siebenhandl

#### PARTICIPATING RESEARCHERS AT

DANUBE UNIVERSITY KREMS

Eva Mayr, Dep. Knowledge and

Communications Management

Michaela Gindl, Section for Equal Opportunities

and Gender Studies

#### COORDINATION

Egalité des Chances dans les Etudes et la

Profession d'Ingénieur en Europe (ECEPIE), France

#### PARTNERS

Inter-University Research Center Graz, IFZ, Austria

Bergische University Wuppertal, Germany

Institute Mihailo Pupin, Serbia

Gothenburg University, Sweden

Loughborough University, Great Britain

Université Paris 12-Val de Marne, France





Digitalism is finding its way into educational processes. In order to leverage this potential for learning, and to avoid digital divisions within society, interdisciplinary research approaches are required. For this reason scholars from the educational and cognitive sciences as well as information technology are working with users to create web platforms to help disadvantaged groups (such a school dropouts or people with refugee backgrounds) learn, and to promote lifelong learning.

**pictured**  
(f. l. t. r.)

Thomas Wernbacher  
Alexander Pfeiffer  
Natalie Denk  
Eva Mayr  
Florian Windhager  
Günther Schreder  
Saminu Salisu

Photo insert:  
Prof. Monika Kil  
Filiz Keser Aschenberger

Spotlight

## Exploring digital (collection) worlds

**Digitalizing the collections of many museums provides ready access to historically significant cultural assets. Today, millions of pictures, pieces of music and writings are only a few clicks away. The polycube project investigates how visitors can more easily explore these digital collection worlds.**

Current studies show that culturally interested visitors enjoy exploring digital collections (although often without a specific goal) to learn something new and to understand the contexts. Conventional websites, however, are mainly geared to experts and usually require specialist knowledge of cultural science or familiarity with the database's structure to be able to navigate through the enormous amount of data. Visualizing these collections could help make them more easily accessible to the general public.

**Space-time cube:  
A compass for digital collections**

The project polycube – Towards Integrated Mental Models of Cultural Heritage Data - applies and further develops a modern information visualization method for this purpose. The so-called space-time cube displays spatial distributions and temporal developments in an integrated way, and thereby not only provides a good overview of the objects in a collection but also shows their relevant spatio-temporal contexts at a glance.

The project investigates whether the space-time cube actually facilitates a deeper understanding of the contexts in digital collections. Cognitive Science terms this understanding as the mental model of the collection. The better the information is structured and connected within a person's mental model, the more comprehensive is his/her understanding.

The space-time cube already presents this information as integrated so that a better mental model can be more easily constructed, according to the hypothesis. To substantiate these assumptions the interdisciplinary project bridges IT and Cognitive Science. In a user-centered design process, information visualizations are developed and the hypotheses empirically tested in experiments.

**Towards Integrated Mental Models of Cultural Heritage Data/polycube**

**FUNDING**

FWF Austrian Science Fund

**PROJECT DURATION**

2016 – 2019

**DEPARTMENT**

Knowledge and Communication Management

**PROJECT LEAD AT**

DANUBE UNIVERSITY KREMS

Eva Mayr

**PARTICIPATING RESEARCHERS AT**

DANUBE UNIVERSITY KREMS

Saminu Salisu

Günther Schreder

Michael Smuc (until Oct. 2016)

Florian Windhager

**COORDINATION**

Danube University Krems

**PARTNERS**

TU Wien

Information Engineering Group



## Spotlight

## Social inclusion: libraries as learning places for young refugees

**In the current debate about refugees, minors occupy a special position. Many of them are traumatized by the experiences in their home countries and the chaotic conditions during their difficult journey and are constantly exposed to various threats. Therefore there is a need for structures in the entry and reception countries to support the traumatized minors, while at the same time to provide them opportunities for a positive educational start. An Erasmus+ project of the Transdisciplinary Continuing Education Planning and Education Research unit aims to develop municipal libraries as learning places for minor refugees.**

The aim of LIB(e)RO is to enable young refugees to have a positive introduction into a new language and culture. To this end, the potentials of libraries are utilized as learning places and librarians and social workers receive support for implementation. Through the LIB(e)RO learning platform, these professionals can start to transform libraries into a secure and socially inclusive learning place, for example, they can organize the set-up of their library and accompany and guide the learning process of the young people.

### Analysis of the inclusive principles for education

The LIB(e)RO project consortium is comprised of six European partners from Austria, Greece and Germany. In order to form the inclusion-enhancing content and structure of the learning platform, existing learning materials are analyzed and experiences about already available learning infrastructures are exchanged. The findings will be put into practice in a learning platform and will be tested in libraries on site.

The research team at Danube University Krems, taking advantage of its research in the area of permeability and participation, will evaluate the initial implementation together with the practice partners and draw conclusions for the development and research in the area of lifelong learning.

### Libraries as Intercultural Learning Spaces: Setting up an e-Learning Platform for Minor Refugees in Public Libraries/LIB(e)RO

**FUNDING**  
EU, Erasmus+

**PROJECT DURATION**  
2016 – 2018

**DEPARTMENT**  
Continuing Education Research and Educational Management

**PROJECT LEAD AT DANUBE UNIVERSITY KREMS**  
Prof. Monika Kil

**PARTICIPATING RESEARCHERS AT DANUBE UNIVERSITY KREMS**  
Filiz Keser Aschenberger  
Rainer Schabereiter

**COORDINATION**  
Danube University Krems

**PARTNERS**  
komm.bib – Association of Community Libraries in Lower Austria, Austria  
University of Passau, Jean-Monnet Chair for European Politics, Germany  
Economic Forum of the Region Passau e. V., Germany  
National Library of Greece, Greece  
Action Synergy, Greece

## Harnessing pupils' expertise

The main objective of the project "Game Based Learning to Alleviate Early School Leaving" is to make lessons more interesting for pupils by means of didactic (computer) games, thereby increasing their motivation to learn the subject matter. The goal is to reduce school drop-out rates in the long term. To be able to integrate Game-Based Learning methods (GBL) meaningfully into the lessons, teaching staff must be provided with the proper know-how and tools. Hence, the core of the project is to develop the web platform TOOLKIT which provides access to a collection of GBL in German and English, for example projects, game analyses, online exercises and tools for creating personalized content. The key to the platform's success is to actively engage pupils, thereby tapping into their expertise. Thus pupils themselves can make suggestions for game descriptions and submit GBL projects.

### Project Game Based Learning to Alleviate Early School Leaving

**FUNDING**  
EU, Erasmus+

**PROJECT DURATION**  
2015 – 2017

**DEPARTMENT**  
Art and Cultural Sciences

**PROJECT LEAD AT DANUBE UNIVERSITY KREMS**  
Alexander Pfeiffer

**PARTICIPATING RESEARCHERS AT DANUBE UNIVERSITY KREMS**  
Thomas Wernbacher  
Natalie Denk  
Martin Reitschmied  
Manuel Ihl

**COORDINATION**  
Malta Information Technology Agency (MITA)

**PARTNERS**  
Malta Information Technology Agency (MITA)  
University of Malta  
St. Margaret's College, Malta  
Nyströmska Skolan, Sweden

**toolkit-gbl.com**





Knowledge is one of the most crucial global resources. This is why schools of higher education and research institutions play a leading role in both social and economic terms. To master the manifold challenges, these institutions require specialized leadership and management competencies. For this reason professionalization in higher education management has become an important subject of research and teaching.

pictured  
(f. l. t. r.)

Attila Pausits  
Anne-Laure Hecquet  
Florian Reisky  
Roland Humer

## Leadership competencies in academic environments

Universities and research institutes drive economic growth, advance technology, draw on great innovation potential and create jobs. Modern and effective management is required for all these tasks. This gave rise to "MARIHE".

MARIHE is a four-semester Master Degree course that gives the participants an opportunity to study in Austria, Finland, China and Germany. The goal of this European joint program is to prepare students for leading functions in scientific institutions. The management and research expertise acquired during the course also qualifies the graduates to work in a wide range of areas in the private sector, in public administration, in international organizations and NGOs.

### Research-oriented teaching

One third of the graduates go on to do a PhD, which is why the course is highly research-oriented. The international MARIHE consortium has therefore developed different formats to facilitate disseminating the scientific knowledge and findings acquired in the program. Current publications by the students deal, among other things, with topics in the areas of quality and human resources management or new public management approaches in higher education.

### Master in Research and Innovation in Higher Education/MARIHE

#### FUNDING

EU – Erasmus+/ Erasmus Mundus  
Joint Master Degree

#### PROJECT DURATION

2012 – 2018

#### DEPARTMENT

Continuing Education Research and Educational  
Management, Center for Educational Management  
and Higher Education Development

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Attila Pausits

#### PARTICIPATING RESEARCHERS AT

DANUBE UNIVERSITY KREMS

Florian Reisky

Roland Humer

#### COORDINATION

Danube University Krems

#### PARTNERS

University Tampere, Finland  
Beijing Normal University, China  
Hochschule Osnabrück, Germany





## Science and management

Universities are the engine driving social and economic development. To do justice to these manifold responsibilities, universities need efficient administration and target-oriented management.

The project "Austrian Universities Management and Administration Academy" takes this as its starting point and aims to support the process by developing professionalization and training opportunities. The need for further education - most prominently in the areas of leadership and communication - was clearly demonstrated following an Austrian-wide analysis of requirements and offers conducted during the first project phase by means of detailed questionnaires.

Based on these data and accompanying research, a new continuing education institute named Create Competence ([www.create-competence.com](http://www.create-competence.com)) was founded to offer specially designed courses for people working in higher education management and administration.

### Austrian Universities Academy of Management and Administration

#### FUNDING

Federal Ministry of Science, Research and Economics

#### PROJECT DURATION

2014 – 2018

#### DEPARTMENT

Continuing Education Research and Educational Management

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS  
Attila Pausits

#### PARTICIPATING RESEARCHERS AT DANUBE UNIVERSITY KREMS

Roland Humer  
Florian Reisky

#### COORDINATION

University Graz

#### PARTNERS

University Graz  
Danube University Krems



— Danube University Krems, stairwell in the historical building, taken in August 2015



Research at the Department of Interactive Media and Educational Technologies concentrates on formal and informal learning processes and how they are supported/documentated by interactive media. Informal learning takes place outside of formal classes, for example when organizing an event. Validation sheds light on this type of learning. It implicates that learners draw on previously acquired knowledge. They take stock of what they already know and are able to do, thereby creating the basis for further learning.

**Pictured**  
(f. l. t. r.)

Peter Baumgartner  
Isabell Grundschober  
Gregor Pirker  
Gerhild Schabasser  
Andrea Ghoneim  
Tina Gruber-Mücke

Spotlight

## Collaborative learning with new educational technologies

**Innovative educational technologies have given rise to new forms of collaborative learning. The project “Assessment of Transversal Skills for Students/ATS2020” focuses on the development of these technologies and the evaluation of their application.**

In the beginning there was the concept of the learning spiral. Pupils aged between 10 and 15 participated in setting their learning goals, assessing their existing skills, defining learning strategies and determining (measurable) success factors. Building on this they create learning artefacts (texts, pictures, presentations, videos) and collect and review them in an “ePortfolio” (digital showcase). Subsequently the results are not only self-evaluated but also assessed by teachers and classmates. New goals are agreed building on these results, after which they move on to the next circle in the spiral, where the process starts again anew.

### Boosting transversal skills with educational technology

Teachers assume the role of mentors in the process and support the learners in every phase of the learning spiral, for example with self-assessment questionnaires and a framework for defining personal learning goals. This approach aims to develop transversal skills to complement the mainstream school subjects, for example media literacy, self-regulated learning and team skills. The Department of Interactive Media and Educational Technologies coordinated the development of educational tools and virtual learning environments to successfully realize this concept.

An integral part of the project is extensive accompanying research to assess the efficacy of the didactic concept and the related technologies. A before and after test will demonstrate whether assessment-driven development of transversal skills leads to more sustainable competence development than conventional teaching.

### Assessment of Transversal Skills for Students/ATS2020

#### FUNDING

EU/European Commission

#### PROJECT DURATION

2015 – 2018

#### DEPARTMENT

Interactive Media and Educational Technologies

#### PROJECT LEAD AT

DANUBE UNIVERSITY KREMS

Prof. Peter Baumgartner

#### PARTICIPATING RESEARCHERS AT

DANUBE UNIVERSITY KREMS

Andrea Ghoneim

Tina Gruber-Mücke

Isabell Grundschober

Wolfgang Rauter

#### COORDINATION

Cyprus Pedagogical Institute Latsia, Nicosia, Cyprus

#### PARTNERS

16 research and public administration institutions in the European Union



## Research Clusters

- WasserCluster Lunz
- Interdisciplinary Research Groups





In partnership with the University of Vienna and the University of Natural Resources and Life Sciences, Danube University Krems conducts ecologically-oriented aquatic ecosystem research at the WasserCluster Lunz through the LIPTOX research group. The research group, headed by Martin Kainz, investigates how essential nutrients, above all cell membrane-forming fatty acids, and potential pollutants, such as heavy metals and microplastics, affect aquatic organisms from algae to fish. The researchers conduct experimental basic research on microorganisms such as algae, zooplankton and insect larvae as well as fish and their food, both in the lab and outdoors.

pictured  
(f. l. t. r.)

Fen Guo  
Katharina Winter  
Nadine Ebn  
Martin J. Kainz  
Mirjam Jehle  
Stefanie Danner  
Thomas Kühmayer

Not pictured: Hannes Hager,  
Serena Rasconi, Suzana Zizek,  
Ariana Chiappella, Lisa-Maria Hollaus

## Spotlight

# Where do fish get their omega-3 fatty acids from?

**A research project funded by FWF investigates the nutrient flows of omega-3 fatty acids in riverine food chains. The aim of this research is to solve the mystery of where fish get these essential fats from, thereby challenging the River Continuum Concept.**

Current riverine research is strongly influenced by the established River Continuum Concept. This concept describes rivers in the upper reaches as very narrow and lined by thick shore vegetation. This prevents sunlight from penetrating, and hence the production of organic material through photosynthesis in the water. At the same time, however, it supplies large amounts of plant matter that falls into the river. Headwaters are important habitats for freshwater salmonids such as trout and char which, in turn, are rich in omega-3 fatty acids.

The terrestrial matter produced in the upper reaches only supplies fish with very small amounts of omega-3 fatty acids, which they would urgently need for physiological reasons. To solve the mystery of the origin of the essential omega-3 fatty acids in fish from these apparently inhospitable habitats, this research project focuses on three aspects: first, the seasonal and environmental fluctuations of food supply in pre-Alpine rivers; second, the effects of different light conditions on the synthesis and assimilation of omega-3 fatty acids in invertebrates; and third, the ability of freshwater fish to synthesize long-chain omega-3 fatty acids.

### New methods

This research project is developing new methods, at the forefront of which is the experimental use of compound-specific stable isotopes as biomarkers in addition to the separate use of fatty acids and bulk stable isotopes.

The results will significantly contribute to the understanding of how invertebrates in creeks obtain and retain their essential dietary omega-3 fatty acids. In collaboration with an international research team from Australia, the US, and Switzerland, the project further develops research in the areas of aquatic biofilms, food chains in flowing waters and their trophic biomarkers whilst offering students and next-generation researchers sophisticated training opportunities.

### Trophic Flow of Omega-3 Fatty Acids in Riverine Food Chains

**FUNDING**  
FWF

**PROJECT DURATION**  
2016 – 2019

**PROJECT LEAD AT DANUBE UNIVERSITY KREMS**  
Martin J. Kainz, WasserCluster Lunz, research group LIPTOX

**PARTICIPATING RESEARCHERS AT DANUBE UNIVERSITY KREMS**  
Fen Guo, post-doc at WasserCluster Lunz  
Nadine Ebn, PhD student, WasserCluster Lunz, University of Vienna  
Mirjam Jehle, MSc student, WasserCluster Lunz, University of Vienna  
Thomas Kühmayer, MSc student, WasserCluster Lunz, University of Vienna  
Katharina Winter, WasserCluster Lunz  
Stefanie Danner, WasserCluster Lunz

**COORDINATION**  
Martin J. Kainz, WasserCluster Lunz/  
Danube University Krems

**PARTNERS**  
Griffith University, Brisbane, Australia  
EPFL Lausanne, Switzerland  
University of Washington, Seattle, USA



## Continuing education may prevent dementia

**The aim of this interdisciplinary project is to examine the preventive effects of continuing education on mild cognitive impairment and Alzheimer's-type dementia, and to carry out further health-economic modeling and to develop pilot projects for health-economic modeling and in case of lacking evidence to develop pilot projects for further studies.**

Cognitive activity, the development of a wide range of interests, as well as engaging in different types of activities and reflection on the individual phases of key events in individual biography constitutes a prerequisite for a satisfying and fulfilled life. Continuing education provides several opportunities in this direction. In Austria, continuing education programmes are available at low cost and in a wide range for people from all aspects of life. However, the preventive effects of continuing education on cognitive decline and dementia have not been comprehensively and systematically assessed yet. In an aging society, though, small effects can result in great health-economic benefits.

### Partners from the field

The multidisciplinary scientific team has started working on the comprehensive systematic literature search on the subject as a basis for all further steps. Afterwards, a systematic review or a meta-analysis will be conducted for the critical evaluation of the studies and to provide a summary of the existing evidence. The practitioners, experts and professionals from the fields of continuing education, health and social care (Berufsförderungsinstitut Tyrol, Haus der Barmherzigkeit, MAS Alzheimerhilfe) are involved in the project from the very beginning.

The systematic review aims at investigating the best available evidence on the preventive effectiveness of continuing education and examining possible differences between certain variables such as gender.

### Does Continuing Education Prevent Cognitive Decline and Dementia?/ CoCoDe

#### PARTICIPATING DEPARTMENTS:

##### COORDINATION

Department of Continuing Education Research and Educational Management

##### EVIDENCE-BASED MEDICINE AND CLINICAL EPIDEMIOLOGY

Prof. Gerald Gartlehner  
Irma Klerings, Nina Matyas

##### HEALTH SCIENCES AND BIOMEDICINE, CENTER FOR GERIATRIC MEDICINE AND GERIATRIC NURSING

Prof. Christoph Gisinger  
Veronika Schauer, Haus der Barmherzigkeit

##### CLINICAL NEUROSCIENCES AND PREVENTIVE MEDICINE, CENTER FOR DEMENTIA STUDIES

Prof. Stefanie R. Auer

##### DEPARTMENT OF HEALTH AND ECONOMY

Prof. Gottfried Haber

##### CONTINUING EDUCATION RESEARCH AND EDUCATIONAL MANAGEMENT, TRANSDISCIPLINARY EDUCATION PLANNING AND RESEARCH UNIT

Prof. Monika Kil  
Filiz Keser Aschenberger  
Martin Suitner, Berufsförderungsinstitut Tyrol

## Health in the age of migration

**Misdiagnosis due to language difficulties or cultural barriers, or rising medical tourism ... the mobility currently taking place due to migration and globalization poses a challenge to the health care system, with both social and economic consequences. These changes, along with related strategies, are being investigated by the interdisciplinary research group "Health, Mobility and Globalization" established in 2016 at Danube University Krems.**

A total of 15 researchers from the Faculty of Health and Medicine and the Faculty of Business and Globalization have joined forces to develop sustainable strategies for dealing with changes in the health system as a consequence of migration and globalization. In accordance with the transdisciplinary approach, stakeholders from various health systems are involved.

One emphasis is on the culture-specific communication of illness and pain. Culture-specific communication forms become apparent, for example, in the way psychological illnesses or symptoms are described. The resulting misunderstandings could, among other things, lead to misdiagnosis and therapies being terminated. In a first step, the research team examined available international studies, and put the relevant results to the Austrian Health Survey 2014 for secondary data statistical analysis. In a second step, perception of health and illness, the communicative schemata of different ethnic groups in Austria, and health system processes are being studied using a mix of methods.

A further focus of research is analyzing internationalization processes in European health systems, including determining economic potentials. One example of this is the rising need for foreign care staff in Austria. The research team's goal is a more in-depth analysis of globalization processes in the health system and their social, institutional, economic, medical and psychological aspects.

### Interdisciplinary Research Group Health, Mobility and Globalization

#### PARTICIPATING DEPARTMENTS:

##### EVIDENCE-BASED MEDICINE AND CLINICAL EPIDEMIOLOGY

Prof. Gerald Gartlehner  
Christina Kien  
Isolde Sommer

##### MIGRATION AND GLOBALIZATION

Prof. Gudrun Biffel  
Anna Faustmann  
Lydia Rössl

##### PSYCHOTHERAPY AND BIOPSYCHOSOCIAL HEALTH

Katharina Gerlich  
Heidemarie Hinterwallner (until July 31st, 2017)  
Robert Jank  
Prof. Christoph Pieh  
Martha Schneider

##### KNOWLEDGE AND COMMUNICATIONS MANAGEMENT

Eva Mayr  
Günther Schreder  
Prof. Gerald Steiner  
Lukas Zenk

##### CENTER FOR MANAGEMENT IN HEALTHCARE

Prof. Gottfried Haber  
Eva Krczal

## Facts & Figures

- Science & Society
- Research Service
- Newly Appointed Professors
- Key Figures
- Selected Publications



Danube University Krems sets great store by giving people, and particularly pupils, an insight into the world of research, to make them curious and in the following raise their awareness of the importance of research to society. By participating in business communication initiatives such as The Long Night of Research, Danube University Krems aims to inspire enthusiasm for research and give young people a chance to look behind the scenes of the work and professional field of research.

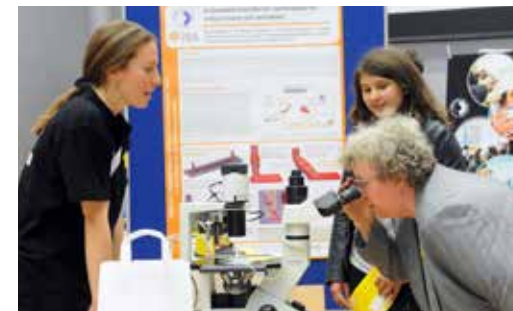


#### → Long Night of Research

Once again, in 2016, Danube University Krems opened its doors on The Long Night of Research, inviting the public to participate, learn, and discuss at 27 stations. How can bones be regenerated? How does climate change affect our lakes? What was daily life like for the workers in the tobacco factory Krems-Stein? And how do you clean blood? These and many other questions were in the spotlight at the event. The range of topics included biomedicine, educational research, sensor technology and thermography. Young visitors eagerly tried their hand at being "science detectives."

#### → Girls' Day

Third grade pupils from the new middle schools Fels-Grafenwörth and Kirchberg/Wagram and their teachers took advantage of the Girls' Day on 28 April 2016 to visit Danube University Krems. Leading female university staff informed them about the career opportunities at universities and let them look over their shoulders as they worked. The curious pupils were even allowed to lend a hand with microscopy or in the light and electronics laboratory to experience everyday work and test their own skills.



#### → Beyond the Horizon

On the occasion of its 20<sup>th</sup> anniversary on 2 October 2015, titled "Beyond the Horizon," Danube University Krems invited the public to look behind the scenes at Campus Krems. More than 1,000 visitors came to the open university day to see the research conducted at Danube University Krems with their own eyes, to visit the research laboratories and converse with the scientists personally.



#### → tecnet | accent Innovation Award

In 2017, Danube University Krems, in cooperation with the founder-service accent and tecnet equity NÖ Technologiebeteiligungs-Invest GmbH, presented the "tecnet | accent Innovation Award" for the first time. The prize honors innovative inventions and research findings, exceptional ideas and original solutions suited to benefit economic development, and is directed at scientific staff at Danube University Krems, PhD candidates, students as well as graduates.



The Office for Research Service and International Affairs at Danube University Krems advises researchers on issues ranging from funding applications through to concluding their research projects.

The Office for Research Service and International Affairs supports research projects, from providing advice on international and national research and mobility programs, information about technical and administrative procedures, and supporting project submissions. In addition, the Center supports the PhD coordinators with organizing PhD programs.

The Center is also the first point of contact regarding disseminating research findings, and assists with documenting all research projects in the Danube University Krems research database.

**pictured**  
(f.l.t.r.)

Claudia Paulhart  
Sabina Ertl  
Julia Uhlik  
Karin Siebenhandl  
Edith Huber  
Katrin Wlcek

→ **Anja Grebe**

Univ.-Prof.in Dr.in Anja Grebe was appointed university professor of Art History and Museum Collections Management at Danube University Krems on 1 October 2015. She took over as Head of the Department of Art and Cultural Sciences at the same time. Prior to this she worked in the Art History Institute of Albert-Ludwigs University Freiburg, and was visiting professor at the University of Beijing. Grebe studied French literature, History, as well as Art and Media Science at the University of Constance and Université Paris-Sorbonne.

→ **Thomas Klestil**

Univ.-Prof. Dr. Dr. Thomas Klestil was appointed university professor for Traumatology at Danube University Krems on 1 January 2016 in accordance with § 99 of the University Act. The trauma surgeon, also a specialist in orthopedics and orthopedic surgery, was previously head of the Department of Accident Surgery at the Baden/Mödling regional hospital and its satellite department at Hainburg regional hospital. Klestil took his degree in medicine in 1987 at the University of Vienna, followed by a degree in Health Sciences at UMIT, Hall, Tyrol.

→ **Ulrike Guérot**

Univ.-Prof.in Dr.in Ulrike Guérot was appointed university professor for European Policy and the Study of Democracy at Danube University Krems on 1 April 2016. She became head of the Department of European Policy and the Study of Democracy at the same time. She studied political science, history and philosophy in Bonn, Muenster and Paris. In 2013, Guérot founded the think tank "European Democracy Lab" in Berlin, which she also headed. Between 2006 and 2013 she held other offices, such as Director of the ECFR (European Council on Foreign Relations) Berlin Office.

→ **Clemens Appl**

Univ.-Prof. Ing. Dr. Clemens Appl, LL.M. was appointed university professor at Danube University Krems on 1 October 2016. The lawyer and industrial engineer is professor of International, European and Austrian Copyright Law and heads the subject area of Intellectual Property and Data Protection at the Department of Legal Sciences and International Relations, Danube University Krems. Prior to this, Appl was part of the ITIP Law Group at the Vienna University of Economics and Business. Besides copyright law, his fields of research also include design law, industrial law, competition law and data protection law.

→ **Peter Parycek**

Univ.-Prof. Mag. Dr. Peter Parycek, MSc MAS has been university professor of e-Governance since July 2015, as well as Head of the Department of E-Governance in Business and Administration at Danube University Krems. Between 2006 and 2011 he held an advisor position at the Austrian Federal Chancellery (BKA), where he conducted projects and work groups in the field of e-Democracy and e-Government. He studied Law at the University of Salzburg, where he took his degree in 2005. He is the founder of the CeDEM conference series (International Conference for e-Democracy and Open Government).

→ **Claudia Höfner**

Univ.-Prof.in Mag.a Dr.in Claudia Höfner, MSc was appointed university professor of Integrative Therapy and Psychosocial Interventions at Danube University Krems on 17 October 2016. Höfner studied psychology and sociology and graduated from the Institute of Higher Studies (IHS, Vienna) as a specialist in social and scientific research methods, as well as the European Graduate School for the Social Sciences at Masaryk University, Brno, Czech Republic. She trained as both a clinical health psychologist and occupational psychologist. Höfner is a psychotherapist in the specialist field of integrative therapy.



**pictured** (from top to bottom)

Prof. Anja Grebe  
Prof. Thomas Klestil  
Prof. Ulrike Guérot  
Prof. Clemens Appl  
Prof. Peter Parycek  
Prof. Claudia Höfner



## Danube University Krems builds bridges between theory and application as well as the disciplines, thereby creating dynamics and innovation.

As a university for continuing education, Danube University Krems is particularly concerned with the current trends and developments taking place in modern society. The result is a high degree of interdisciplinarity and transdisciplinarity in research. Transdisciplinarity includes fundamentals as well as practical application and integrates knowledge stemming from outside academia. Research at Danube University Krems concentrates on **four core fields**:

- Health and Medicine
- Educational Research and Lifelong Learning
- European Integration, Migration and Economics
- Art, Culture and Architecture

Research work is embedded in **three Faculties** and their Departments:

- Faculty of Health and Medicine
- Faculty of Business and Globalization
- Faculty of Education, Arts and Architecture

The promotion of interdisciplinarity as supplementary to research in the disciplines is supported, for example, by internal research groups working across all departments, faculties and disciplines or by courses and lectures at the PhD level open to students of all disciplines.

### Total number of **publications**: 503



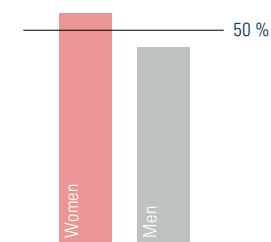
- a → First edition reference books and textbooks: 31
- b → Articles published in compilations: 163
- c → Articles first published in SCI, SSCI and AHCI journals: 157
- d → Articles published in other scientific journals: 82
- e → Art catalogs and other art publications: 4
- f → Artistic sound, image, data carriers: 3
- g → Other scientific publications: 41
- h → Articles in art catalogs and other art publications: 21
- i → Contributions to artistic sound, image, data carriers: 1

## Facts & Figures

### Scientific Staff

Full-time equivalent  
Total: 229

Women: 124  
Men: 105

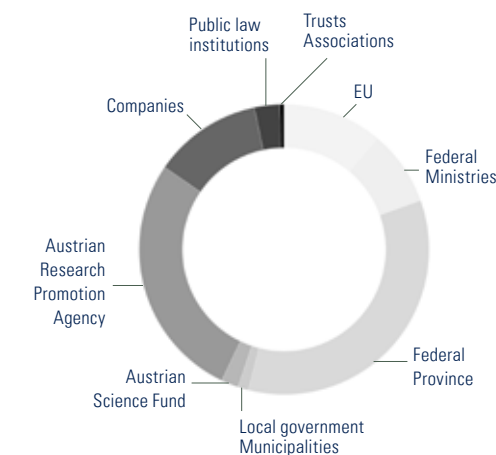


Source: BiDok, 2016  
Full-time equivalent: 452  
(As per 31.12.2016, BiDok)

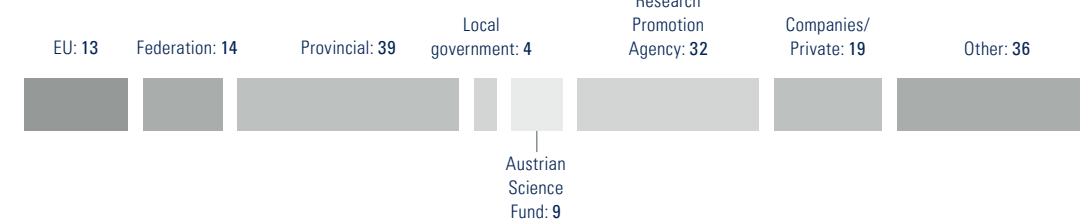
### Third party research funding gained in 2016

Total: 5.1 million euros

#### By sponsors:



### Projects according to funding bodies total: 166



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**Impressum:**

**Herausgeber/Media owner:** Donau-Universität Krems, Dr.-Karl-Dorrek-Str. 30, 3500 Krems  
**Konzept/Concept:** Vizerektorat für Forschung, Stabsstelle für Forschung und Internationales, DLE Kommunikation und Wissenschaftsredaktion  
**Abwicklung und Redaktion/Editing:** Mag. Stefan Sagl; Dr. Roman Tronner (Koordination)  
**Übersetzung/Translation:** Ingrid Dolin  
**Lektorat/Proof-reading:** Ingrid Dolin  
**Gestaltung/Graphic design:** Gert Lanser, lansernutz.com  
**Fotos/Pictures:** Rafaela Pröll, Andrea Reischer, Walter Skokanitsch, European Union 2014 – Source EP/Devillers Arnaud, Archiv Donau-Universität Krems, ZISS - Samir Cerimovic, shutterstock  
**Redaktionsschluss/Copy deadline:** 30.09.2017  
**Druck/Print:** gugler print, 3390 Melk  
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