



Research Report

2020/21

Danube University Krems. University for Continuing Education.



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We gratefully acknowledge funding by:



Imprint

Herausgeber / Media owner: Universität für Weiterbildung Krems, Dr.-Karl-Dorrek-Str. 30, 3500 Krems
 Konzept / Concept: Vizerektorat für Forschung, Stabsstelle für Forschungsservice, DLE Kommunikation und Wissenschaftsredaktion
 Abwicklung und Redaktion / Editing: Stefan Sagl, Roman Tronner (Koordination), Rainer Alexander Hauptmann, Katharina Roll
 Übersetzung / Translation: University for Continuing Education Krems
 Lektorat / Proof-reading: Josef Weilguni
 Gestaltung / Graphic Design: Gudrun Mittendrein, DLE Marketing und Marketing Services / studio d-p
 Fotos / Pictures: University for Continuing Education Krems/Archive, Andrea Reischer, Walter Skokanitsch, private, Unsplash, Michael Dürr, Michael Brus
 Redaktionsschluss / Copy deadline: 30 April 2021
 Druck / Print: gugler* print



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Research Driven by Responsibility for Society

Research at the University for Continuing Education Krems is motivated by a desire to find answers to the major challenges facing society today. In keeping with our transdisciplinary focus, we build bridges between basic and applied research and integrate knowledge from various disciplines with knowledge from outside the academic sphere.

Based on a clear research profile and the university's transdisciplinary approach, in the past two years the University for Continuing Education Krems has set priorities that have led to significant developments in research: The university's four research fields Cohesive and Innovative Societies; Cultural Heritage; Regenerative Medicine; and Continuing Education Research have recently undergone thematic adaptation, and a new focus on Evidence-based Health Research has been adopted. This enables the University for Continuing Education Krems to respond to the rapid pace of changes in society and ensures that its research continues to produce value for society.

The University has continued to develop its European and international research networks and is increasingly involved in projects under Horizon 2020/Horizon Europe, in particular projects targeting societal challenges. Apart from acting as a coordinator of H2020

“The University for Continuing Education Krems responds to the rapid pace of changes in society and ensures that its research continues to produce value for society.”



research projects, the university has additionally been able to raise third-party funding generated by EU programs. Furthermore it has expanded its existing PhD studies by introducing new programs reflecting the university's focus on research.

The most important foundation for this constant development and research success is our staff. It is their expertise, enthusiasm for innovation and passion for new scientific insights that enable us to explore new terrain and generate new knowledge.

With this in mind, we invite you to take a look at our research and meet the people behind it.

Viktoria Weber
Vice-Rector for Research

Helping Find Solutions to Overcome Societal Challenges

Developments in recent years have intensified the dynamics of societal challenges even further. Environmental issues and events connected with the ongoing pandemic have put a spotlight on the role of science and research in the service of society. Using research to help overcome major challenges, ranging from protecting health to digital transformation, from migration to the impact of innovation and transition processes, and from the influence of lifelong learning to preserving our cultural heritage, is an important part of the responsibility borne by the University for Continuing Education Krems vis-à-vis society.

Clear Research Profile

Research at the University for Continuing Education Krems is developing in tandem with the dynamics of these societal challenges. The main research fields of the University, "Cohesive and Innovative Societies", "Cultural Heritage", "Regenerative Medicine" and "Continuing Education Research", previously four in number, have now been extended to include an additional field: "Evidence-based Health Research". This approach of continuous further development ensures the distinctive profile of the research carried out at the University for Continuing Education.

Networking and Europe

Over the last two years, the University for Continuing Education Krems has also successfully continued its strategy of increasingly anchoring its research in international networks and aligning it to the European Research Area. There has been a significant rise in the number of research projects benefiting from EU funding over the last years, in particular in Horizon Europe-projects targeting societal challenges. This upward trend is reflected, for example, in the increased volume of third-party funds that have been raised.

PhD Programs and Interdisciplinary Research Groups

The two PhD programs accredited by AQ Austria, namely "Regenerative Medicine" and "Migration Studies", are proud of their new graduates and have also seen a fresh intake on these courses. Building on the successful implementation of both PhD programs, the establishment of further PhD programs in the five university-wide research fields has already been initiated. Research was further stepped up by the award of additional tenure track positions (assistant professors) and the appointment of new university professors.

With the establishment of two new interfaculty research groups, the University for Continuing Education Krems further deepened its strategy of interdisciplinary collaboration. These new groups are likewise exploring research topics in conjunction with scientific lifelong learning. They are dedicated to imparting meta-competencies for complex decision situations and to strengthening critical health literacy.

Science and Society

Research at the University for Continuing Education Krems is characterized by a transdisciplinary approach, which specifically incorporates knowledge and experience from outside the academic sphere. Transdisciplinary research approaches are particularly suitable when the aim is to develop a solution-oriented focus to deal with complex societal challenges and transition processes. The transdisciplinary laboratories, TdLabs for short, at the Faculty of Business and Globalization provide an environment for investigating complex issues and devising systemic solutions. This research revolves around the impact of digitalization on the world of work and society, questions of sustainability and issues of political decision-making and democracy.

The University for Continuing Education Krems also upholds its responsibility to society by making its research known to the general public. It thus took part in the 2020 Long Night of Research, an event which was held online, and hosted school outings to offer students an insight into science. With the Research Summit series organized by the University for Continuing Education Krems, it offers a forum where scientists and students from different disciplines can enter into discussion with members of the public interested in doing so.

"The Faculty of Health and Medicine is characterized by its readiness to take up medical issues and deliver innovative therapy approaches. Strong transdisciplinary knowledge and competence transfer are additionally ensured through close collaboration with hospitals, institutes, and businesses working in the field. This interaction enables us to effectively tackle the challenges arising in the health system."

Stefan Nehrer
Dean of the Faculty of Health and Medicine



"The accelerated pace of global change has a far-reaching impact on society and brings with it extremely complex challenges that call for innovative methods of analysis and new decision-making competencies. This is why the Faculty of Business and Globalization relies on transdisciplinarity in teaching and research, an approach resulting in sound orientations that come into being only with interaction between science and society."

Gerald Steiner
Dean of the Faculty of Business and Globalization



"The impacts of climate change, digital transformation or indeed societal change are three key issues for the future that sometimes pose challenges with regard to ecological-sustainable building, continuous further education, the further development and integration of smart sensor systems and the protection, preservation and communication of cultural heritage. The faculty tackles these challenges with new university programs and research projects as well as with increased transdisciplinary and interdisciplinary collaboration."

Christian Hanus
Dean of the Faculty of Education, Arts and Architecture



Overall university main field of research:
Regenerative Medicine

Regenerative

Medicine

- Regenerative Medicine
- Sepsis and Pathogen Diagnostics
- PhD Program Regenerative Medicine
- Psychotherapy and Biopsychosocial Health
- Neurosciences and Prevention

R

M



The higher incidence of osteoarthritis in an aging yet increasingly sporty population, the impact of digitalization on medicine and its paradigm shift from repair to regeneration are all challenges taken up by the Department for Health Sciences, Medicine and Research. They form the main direction of the research performed by the department, which aims to overcome these challenges with the help of its results. This research focuses on the following three key areas: firstly, blood products and their mechanisms of action; secondly, the use of artificial intelligence, above all to facilitate diagnostics; and thirdly, the development of new regenerative therapies in the field of cartilage and bone regeneration. New biotechnological therapies to treat diseases of the musculoskeletal system are under development in cooperation with partner institutions from the universities, hospitals, and industry.

Pictured

(f. l. t. r. & top down)

Stefan Nehrer
 Thomas Klestil
 Andrea De Luna
 Eugenia-Paulina Niculescu-Morzsza
 Christoph Bauer
 Karina Kramer
 Daniela Kern
 Vivek Jeyakumar

Bone Regeneration Using Biomaterials

Scientists developed a biomaterial-cartilage complex to treat injuries to bone and cartilage. The results of the research project show that this complex promotes bone formation.

Scientists are researching transplants produced from tissue constructs to improve the healing of bone defects, by simulating natural bone formation processes. For this purpose, a hybrid biomaterial was developed using cartilage-derived extracellular matrix (CD-ECM) in combination with the organic polymer silk fibroin. Using the cartilaginous intermediate scaffold on solid biomaterials, bone regeneration is expected to form a neo-tissue that mimics bone structure and functionality.

Testing Bone Formation

The developed biomaterial scaffold was compared to the gold standard, bone allografts used in the clinics. The next step was to implant the biomaterial under the skin of rats. A range of tests was carried out to examine the bone formation and determine the stiffness and strength of the constructed bone.

This study shows that the developed biomaterial can be used to produce a scaffold that has a significant effect on bone cell growth. With the scaffold, it was also possible to demonstrate an improved expression pattern of specific genes compared with current bone tissue engineering approaches. The results of this study likewise show an acceleration in stem cell-mediated, mineralized tissue formation in the hybrid biomaterial. Thus, the biomaterial-cartilage complex is a promising tissue engineering approach.

Developmental Tissue Engineering Model of Endochondral Ossification for Bone Regeneration – EndoBone

FUNDING

Gesellschaft für Forschungsförderung
 Niederösterreich m.b.H., Life Science call

DURATION

2018–2021

DEPARTMENT

Health Sciences, Medicine and Research

PROJECT LEAD

Vivek Jeyakumar
 Stefan Nehrer

COORDINATION

University for Continuing Education Krems

PARTNER

Karl Landsteiner University of Health Sciences

Stimulating Regenerative Processes in Cartilage

Signals and substances can be transferred between different cell types with the help of extracellular vesicles. This project investigates whether such vesicles can activate regenerative processes in joints. Based on their effects, vesicles can also stimulate cell-autonomous repair. Vesicles are isolated from stem cells of Hoffa's fat pad, a part of the articular tissue of the knee.

As the incidence of osteoarthritis is increasing in frequency and now affects almost one-quarter of the population, the focus of attention is shifting to developing new therapeutic approaches for cartilage regeneration. Besides conventional treatments, stem cells have become a promising cell source for repairing cartilage due to their modulating properties. However, the use of cells has not just resulted in benefits. Still, it could also involve adverse effects, e.g., the rejection of cells following transplantation, tumor formation or a low differentiation capacity into the required cells and tissue.

To circumvent these limitations, it is necessary to establish cell-free approaches that include the beneficial properties of stem cells. Extracellular vesicles (EVs) open up a new pathway, allowing for the communication of signals between different cell types and prompting cellular reactions due to their cargo (e.g., proteins, lipids, mRNA, miRNA).

Exploring New Therapies

This project aims to evaluate the therapeutic potential of extracellular vesicles isolated from stem cells of Hoffa's fat pad. It also investigates the impact of blood products on the stem cells of Hoffa's fat pad and extra-

cellular vesicles. Products derived from the blood, such as platelet-rich plasma (PRP), are frequently utilized in orthopedics. The use of blood products as a cell culture supplement will help translate laboratory findings from cell culture experiments to clinical practice.

Extracellular Vesicles from Hoffa's Fat Pad – a New Strategy for Cartilage Regeneration – Stemsicles

FUNDING

Gesellschaft für Forschungsförderung
Niederösterreich m.b.H., Life Science call

DURATION

2020–2023

DEPARTMENT

Health Sciences, Medicine and Research

PROJECT LEAD

Andrea De Luna

PARTICIPATING RESEARCHERS

Karina Kramer
Stefan Nehrer
Alexander Otahal

COORDINATION

University for Continuing Education Krems

PARTNERS

IMC University of Applied Sciences Krems
Medical University Vienna
OrthoSera GmbH

Further Projects

→ Cartilage Regeneration with the Help of Blood Products

To stop or reverse degenerative processes in joints, hyperacute serum (hypACT), a product derived from blood, was developed in collaboration with Ortho-Sera GmbH. Now, new methods using freeze-dried products will expand the therapeutic applications. The objective is to test the regenerative abilities of the two new freeze-dried hypACT formulations both by themselves and in combination with hyaluronic acid.

Funding:

Lower Austria Technology Fund, Technopol program

Project lead:

Andrea De Luna, Department for Health Sciences, Medicine and Research

Knowledge Transfer & Dissemination

→ **Staging of regular webinars** to communicate the acquired knowledge with renowned research institutions such as the Society for Orthopaedic Traumatologic Sports Medicine (GOTS), the Knee Society, the International Cartilage Regeneration & Joint Preservation Society (ICRS), and others.

→ **Participation in regular consensus meetings with GOTS on therapy strategies**, e.g., regarding "Platelet-rich plasma" (autologous blood plasma) or "Primary prevention of sports injuries".

→ Organization of the MiniMed lecture series at the University for Continuing Education Krems:

Medical experts explain specialist subjects to make them understandable to an audience of non-professionals.

→ Online lectures:

The Department has stepped up regular online lectures due to the distance learning of the University for Continuing Education Krems during the pandemic.

Selected Publications

- Bauer C, Stotter C, Jeyakumar V, Niculescu-Morza E, Simlinger B, Rodríguez Ripoll M, Klestil T, Franek F, Nehrer S. Concentration-Dependent Effects of Cobalt and Chromium Ions on Osteoarthritic Chondrocytes. *Cartilage*. 2019 Nov 28;1947603519889389.
- De Luna A, Otahal A, Nehrer S. Mesenchymal Stromal Cell-Derived Extracellular Vesicles – Silver Linings for Cartilage Regeneration?. *Front Cell Dev Biol*. 2020 Dec 10;8:593386.
- Nehrer S, Ljuhar R, Steindl P, Simon R, Maurer D, Ljuhar D, Bertalan Z, Dimai H P, Goetz C, Paixao T. Automated Knee Osteoarthritis Assessment Increases Physicians' Agreement Rate and Accuracy: Data from the Osteoarthritis Initiative. *Cartilage*. 2019 Nov 24;1947603519888793.
- Neubauer M, Kuten O, Stotter C, Kramer K, De Luna A, Muellner T, Lacza Z, Nehrer S. The Effect of Blood-Derived Products on the Chondrogenic and Osteogenic Differentiation Potential of Adipose-Derived Mesenchymal Stem Cells Originated from Three Different Locations. *Stem Cells Int*. 2019 Dec 31;2019:1358267.
- Otahal A, Kramer K, Kuten-Pella O, Weiss R, Stotter C, Lacza Z, Weber V, Nehrer S, De Luna A. Characterization and Chondroprotective Effects of Extracellular Vesicles from Plasma- and Serum-Based Autologous Blood-Derived Products for Osteoarthritis Therapy. *Front Bioeng Biotechnol*. 2020 Sep 25;8:584050.
- Paixao T, DiFranco M D, Ljuhar R, Ljuhar D, Goetz C, Bertalan Z, Dimai H P, Nehrer S. A Novel Quantitative Metric for Joint Space Width: Data from the Osteoarthritis Initiative (OAI). *Osteoarthritis Cartilage*. 2020 Apr 23;S1063-4584(20)30981-X.
- Stotter C, Bauer C, Simlinger B, Ripoll M R, Franek F, Klestil T, Nehrer S. Biotribological Testing and Analysis of Articular Cartilage Sliding against Metal for Implants. *J Vis Exp*. 2020 May 14;1(59). DOI: 10.3791/61304.



The research activities of the Department for Biomedical Research revolve around extracorporeal therapies and the blood-biomaterial interface. The range of its work extends from inflammation and sepsis, through extracorporeal adsorption therapies, investigation into the role of extracellular vesicles, to the immune-modulating properties of stem cells. These topics and questions arose from the current challenges facing medicine: firstly, increasing levels of life expectancy and associated diseases such as sepsis; secondly, the safety of global care chains in the medical / pharmaceutical sectors, which is also the focus of the Master's program MBA Biotech, Pharma & Medtech Management; and management of the COVID-19 pandemic, to which the Department is contributing with a COVID test laboratory (PCR tests). The basis for the transfer of research findings into practical applications is provided by an interdisciplinary team, high quality standards, continuous further development of the range of methods and a network of partners from universities, industry and hospitals.

Pictured

(f. l. t. r. & top down)

Jens Hartmann
Anita Brindlmayer
Ute Fichtinger
Tanja Eichhorn
Viktoria Weber
Michael Bernhard Fischer
Claudia Nicola Schildböck
Carla Tripisciano
Stephan Harm
Sabrina Summer
Karin Strobl
Rene Weiss
Lucia Krajcik Lauková
Vladislav Semak

Not Pictured

Birgit Fendl
Eva Rossmannith

Detecting Pathogens from Whole Blood

Until the pathogenic germs involved are identified, sepsis is treated with broad-spectrum antibiotics. Although they are effective against a wide range of pathogens, their use can encourage the development of antibiotic resistance. This is why scientists are working on methods to quickly identify pathogenic bacteria and resistance patterns and to treat them with targeted therapies.

Swift and focused antibiotic treatment of sepsis is crucial to the progression of the disease and the survival of patients. Identification of the pathogens involved in an infection using hemoculture is a time-consuming process and necessitates initial treatment with broad-spectrum antibiotics. Molecular diagnostics using processes such as PCR (polymerase chain reaction) delivers results within a matter of hours but can be inhibited by specific constituents present in samples. Swift and sensitive diagnostics allows targeted antibiotic therapy to be administered sooner and reduces the risk of patients dying from sepsis.

Developing Targeted Therapies

The aim of this project is to improve and further develop the detection of pathogens in the blood. Scientists are investigating how long the DNA of pathogens remains detectable in the blood, even once inactivated with antibiotic treatment. The researchers are also identifying factors that can inhibit the molecular diagnostic process. They are furthermore searching for biomarkers which indicate the presence of pathogenic germs in the bloodstream and are investigating the development of resistance. The aim is to come up with a concept for direct pathogen detection from whole blood using next-generation sequencing.

Improved Pathogen Detection in Blood

FUNDING

Austrian Research Promotion Agency FFG (BRIDGE)

DURATION

2019–2022

DEPARTMENT

Biomedical Research

PROJECT LEAD

Viktoria Weber

PARTICIPATING RESEARCHERS

Anita Brindlmayer
Birgit Fendl
Lucia Krajcik
Matthias Pilecky
René Weiss

COORDINATION

University for Continuing Education Krems

PARTNERS

ARES Genetics GmbH
Medical University Innsbruck

Developing Life-Saving Therapies for Sepsis

Sepsis is a life-threatening organ dysfunction resulting from severe systemic inflammation. The outcome is often fatal. The development of new analytical procedures and supportive therapy approaches enables faster diagnostics and a better understanding of the complex pathophysiology involved.

Sepsis is one of the most common causes of death throughout the world. It is not generally the local infection that is responsible for the severity of sepsis, but the systemic immune response mechanisms that have got out of control. This also affects organs and tissue which are not concerned by the primary infection.

Central Role of the Endothelium

A key role is played here by the endothelium – that layer of cells lining the blood vessels and so forming a barrier between the blood and surrounding tissue. The immune response causes important properties of the vascular endothelium to be lost, e.g. the ability to act as a barrier between blood and tissue or to maintain blood pressure levels. Activation of the endothelium and its underlying mechanisms are investigated on this project with the help of physiologically relevant cell culture models. The researchers use for example endothelial cells whose receptors for specific pathogens can be switched on and off with light, allowing the influence of certain factors on endothelium activation to be investigated. These cell culture models can additionally offer indications for the effectiveness of particular therapy approaches.

Extracellular Vesicles in Sepsis

Extracellular vesicles serve as signal carriers between cells. Depending on the context, they may have coagulation-activating properties, so further intensifying the pathophysiology in sepsis through their interaction with immune cells. This project examines whether extracellular vesicles may also be of diagnostic significance based on certain surface molecules and offer indications for the presence of a systemic infection.

Inflammation, Sepsis and Regeneration: Development of Efficient Diagnostic Methods and New Therapeutic Approaches in Inflammation and Sepsis

FUNDING

Gesellschaft für Forschungsförderung
Niederösterreich m.b.H., FTI call

DURATION

2020–2022

DEPARTMENT

Biomedical Research

PROJECT LEAD

Tanja Eichhorn

PARTICIPATING RESEARCHERS

Marie Ebeyer-Masotta
Michael Bernhard Fischer
Carla Tripisciano
Viktoria Weber
René Weiss

COORDINATION

University for Continuing Education Krems

PARTNER INSTITUTIONS

IMC University of Applied Sciences Krems
Karl Landsteiner University of Health Sciences
University Hospital St. Pölten

Specifically Eliminating Uremic Toxins

Almost 100 years have passed since German physician Georg Haas carried out the first “blood washing” on a patient in 1924. Despite the enormous progress made to date, dialysis still offers many starting points for optimization even today. One of them is the removal of specific toxic metabolic products (uremic toxins). This project aims to develop procedures to eliminate such substances.

Patients dependent on dialysis frequently suffer from metabolic disorders. This is partly due to the inability to sufficiently remove certain metabolic products from the circulation. These substances that are poorly soluble in water bind to proteins such as albumin. As however albumin is also needed to transport drugs or natural metabolites, the natural transport systems are blocked by uremic toxins. At the same time, the toxins cannot themselves be excreted, sometimes thus resulting in metabolic disorders. As uremic toxins cannot at present be sufficiently removed using dialysis, scientists are developing methods to eliminate these substances.

Characterizing Adsorbers for Uremic Toxins

The first step is to detect the uremic toxins in blood samples and to identify protein binding via filtration. Next, the scientists test adsorbers for their ability to remove uremic toxins from the circulation. Adsorbers bind toxic and pathogenic substances and are used in extracorporeal therapies for blood purification. The individual adsorber efficiency is determined by quantifying the uremic toxins before and after treatment.

In the case of patients requiring dialysis, the adsorbers could be used during dialysis to eliminate toxins that are protein-bound and poorly soluble in water and to improve the state of health and quality of life for such patients.

Elimination of Bacterial and Uremic Toxins in Extracorporeal Procedures

FUNDING

Technology Fund Province of Lower Austria

DURATION

2019–2021

DEPARTMENT

Biomedical Research

PROJECT LEAD

Jens Hartmann

PARTICIPATING RESEARCHERS

Stephan Harm
Ute Fichtinger
Claudia Nicola Schildböck
Karin Strobl

Knowledge Transfer & Dissemination

→ Co-organization of the ESAO Winter School 2020 “Science and Technology for BioArtificial Organs and Tissue Engineering”, Lutherstadt Wittenberg, February 26–29, 2020

→ Survey article in *Österreichische Ärztezeitung*: “Sepsis – Innovative Behandlungsstrategien” (October 2020) and “Extrazelluläre Vesikel und ihre Bedeutung für die Diagnostik und Therapie” (September 2020)

→ Report on Austrian contributions to the e-ISICEM symposium 2020 in the blog of the Austrian Society for Anaesthesiology and Intensive Care (ÖGARl): Fendl, B.; Weiss, R.; Eichhorn, T.; Spittler, A.; Weber, V.: Influence of extracellular vesicles on the distribution of monocyte subsets.

→ Contributions to the Long Night of Research 2020 (online) with three questions: “Challenge COVID-19”, “How do cells communicate?”, “What do we understand by sepsis?”

Further Projects

→ Characterizing Exosomes

The project focuses on the isolation of extracellular vesicles (EV), in particular exosomes, from human blood or plasma or from all culture media, and investigates the application of Nano Electrospray Gas-phase Electrophoretic Mobility Molecular Analysis (nES-GEMMA) for the characterization of EVs. This method provides insights into diameter and number. The project also examines whether EVs of varying sizes differ in relation to their protein and lipid content and whether there are differences in the composition of EVs from physiological vesicles and pathological samples.

Funding:

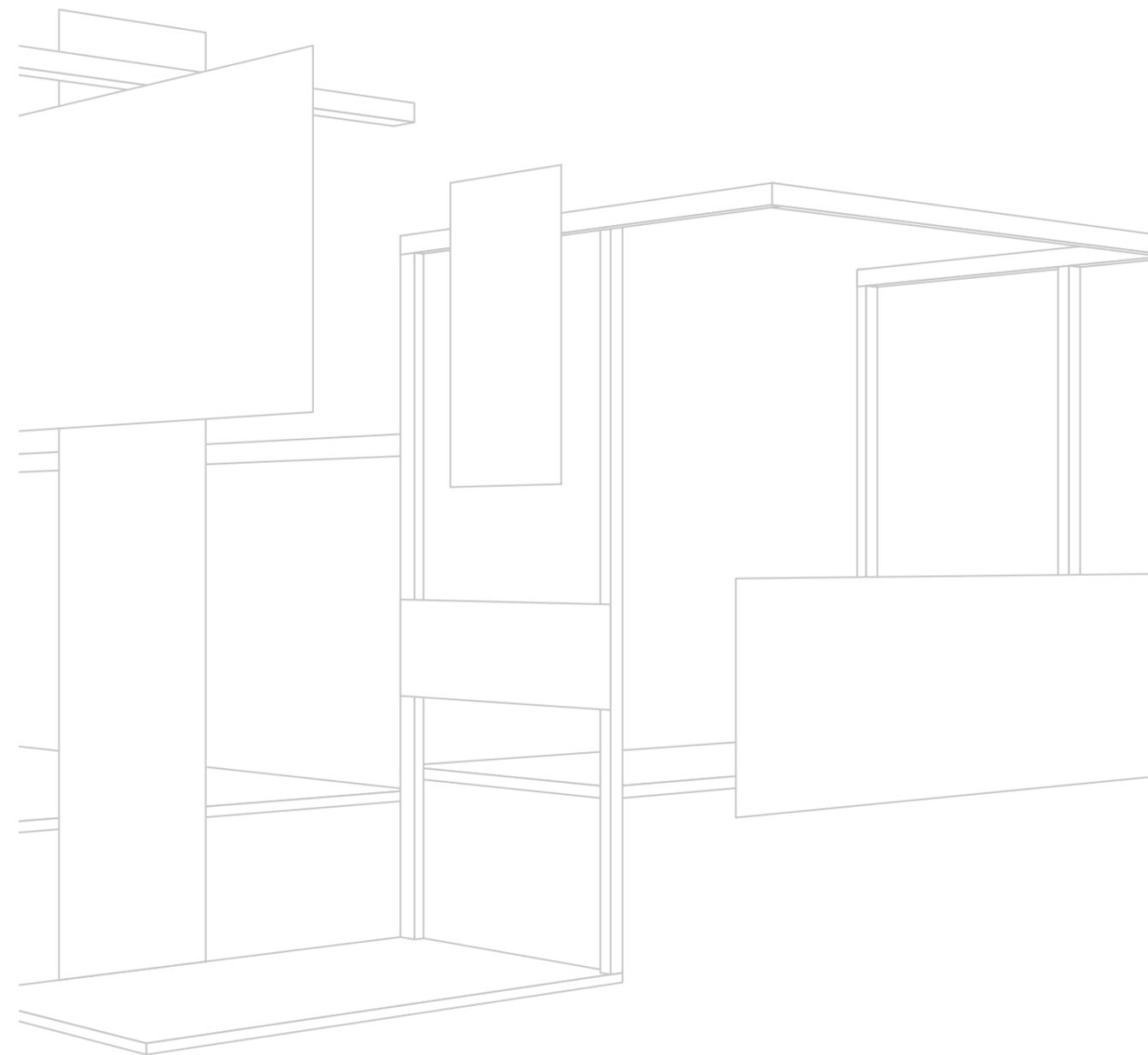
Gesellschaft für Forschungsförderung Niederösterreich m.b.H.

Project lead:

Carla Tripisciano, Department for Biomedical Research

Selected Publications

- Eichhorn, T, Linsberger, I, Lauková, L, Tripisciano, C, Fendl, B, Weiss, R, König, F, Valicek, G, Miestinger, G, Hörmann, C, Weber, V. Analysis of inflammatory mediator profiles in sepsis patients reveals that extracellular histones are strongly elevated in nonsurvivors. *Mediators of Inflammation*, Mar 17, 2021; 2021: 8395048.
- Fendl, B, Weiss, R, Eichhorn, T, Linsberger, I, Afonyushkin, T, Puhm, F, Binder, C J, Fischer, M B, Weber, V (2021) Extracellular vesicles are associated with C-reactive protein in sepsis and elicit a pro-inflammatory response in human monocytes. *Scientific Reports* 11(1):6996.
- Harm, S, Schildböck, C, Strobl, K, Hartmann, J (2021) An in vitro study on factors affecting endotoxin masking in human plasma using the Limulus amoebocyte lysate test. *Scientific Reports* 11(1):4192.
- Hohensinner, P J, Mayer, J, Kichbacher, J, Kral-Pointner, J, Thaler, B, Kaun, C, Hell, L, Haider, P, Mussbacher, M, Schmid, J A, Stojkovic, S, Demyanets, S, Fischer, M B, Huber, K, Wöran, K, Hengstenberg, C, Speidl, W S, Oehler, R, Pabinger, I, Wojta, J (2020) Alternative activation of human macrophages enhances tissue factor expression and production of extracellular vesicles. *Haematologica*, 105. DOI: 10.3324/haematol.2019.220210
- Huber S, Weinberger J, Pilecky M, Lorenz I H, Schildberger A, Weber V, Fuchs S, Posch W, Knabl L, Würzner R, Posch A, Orth-Höller D. A high leukocyte count and administration of hydrocortisone hamper PCR-based diagnostics for bloodstream infections. *European Journal of Clinical Microbiology & Infectious Diseases* 2021 DOI: 10.1007/s10096-020-04126-w.
- Lauková L, Weiss R, Semak V, Weber V. Desialylation of Platelet Surface Glycans Enhances Platelet Adhesion to Adsorbent Polymers for Lipoprotein Apheresis. *International Journal of Artificial Organs*. Nov. 3, 2020, DOI: 10.1177/0391398820968849
- Tripisciano C, Weiss R, Karthedom George S, Fischer M B, Weber V (2020). Extracellular vesicles derived from platelets, red blood cells, and monocyte-like cells differ regarding their ability to induce factor XII-dependent thrombin generation. *Frontiers in Cell and Developmental Biology*, 8:298.





In 2020, the University for Continuing Education Krems offered the PhD program in Regenerative Medicine for the fifth time, so helping to train the researchers of tomorrow. This course focuses on investigating processes such as inflammation and regeneration at a molecular and cellular level to enable the development of appropriate therapies. The PhD program in Regenerative Medicine blends an innovative curriculum with research activities at the University for Continuing Education Krems. In the course of externally funded projects students become an integral part of research.

Pictured
(f. l. t. r. & top down)

Bojana Simlinger
Katrin Colleselli
Lukas Moser
Markus Neubauer
Matthias Pilecky
Sobha Karuthedom George
Alexander Otahal
Agnes Kocsis
Marie Ebeyer-Masotta
Markus Pasztorek
Anna Stierschneider
Kai Sauerwein

Not Pictured
Christoph Stotter

The PhD program in Regenerative Medicine covers these 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 and nursing science

There now follows an overview of the students and the projects that have occupied them over the last two years.

→ **Exosome Analysis by Hyphenated Electrophoresis Techniques**

Name: Sobha Karuthedom George (ongoing)

Title of Dissertation: Isolation and Characterization of Extracellular Vesicles from Different Biological Matrices

Description of Project: Extracellular vesicles are key elements in intercellular communication. In order to better understand the different functions, standardized protocols are developed for the isolation of extracellular vesicle fractions from blood products and cell cultures, and the role of vesicles from healthy donors and patients with sepsis examined in immunomodulation and coagulation activity.

Funding: Gesellschaft für Forschungsförderung Niederösterreich m.b.H. – Life Science call

→ **Treatment of Osteoarthritis using Glucocorticoids and Hyaluronic Acid**

Name: Lukas Moser (ongoing)

Title of Dissertation: Treatment of Osteoarthritis using Monovisc, the Glucocorticoid Lederlon and Cingal

Description of Project: This project examines the treatment of osteoarthritis using glucocorticoids, a category of steroid hormone with an anti-inflammatory and analgesic effect, and hyaluronic acid, a component of connective tissue in various in-vitro models. It aims to uncover new findings the mode of action of these substances and contribute to the further development of existing therapeutics.

Funding: Anika Therapeutics Inc.

→ **The Effect of Blood-Derived Products on the Chondrogenic and Osteogenic Differentiation Potential of Adipose-Derived Mesenchymal Stem Cells Originated from Three Different Locations**

Name: Markus Neubauer (completed)

Title of Dissertation: Regenerative Medicine in Cartilage Repair

Description of Project: This project deals with the regenerative potential of fat cells, which are derived from subcutaneous fat or fatty tissue in the knee joint. This research aims to use these cells to treat cartilage defects.

Funding: Evangelisches Krankenhaus Wien

→ **The Role of Microvesicles from Blood Products in Osteoarthritis**

Name: Alexander Otahal (completed)

Title of Dissertation: Characterisation of Extracellular Vesicles in Different Blood Products and Cytoprotective Effects in Osteoarthritic Chondrocytes

Description of Project: Derived from the patient's blood, platelet-rich plasma (PRP) and hypACT serum are already used for regenerative therapy approaches with osteoarthritis. This research aims to isolate and

characterize microvesicles from the two blood products PRP and hypACT serum, to determine their regenerative potential in the treatment of osteoarthritis.

Funding: Technology Fund Province of Lower Austria, AtheNOE

→ **Smartdiagnos: Next Generation Sepsis Diagnosis**

Name: Matthias Pilecky (completed)

Title of Dissertation: Advanced Pathogen Diagnostics of Bloodstream Infection

Description of Project: The project investigated the factors influencing the detection of pathogens in blood using molecular diagnostic methods.

Funding: EU – Horizon 2020

→ **Characterization of Specific Antibodies with Viral and Bacterial Infection: A Relationship between Isotype Affinity and Avidity of the Formed Immunoglobulins**

Name: Kai Sauerwein (ongoing)

Title of Dissertation: The Role of Specific Antibodies in the Protection against Infectious Agents Causing an Exaggerated Pro-Inflammatory Host Response Thereby Supporting Regeneration.

Description of Project: The immune response to a viral or bacterial infection can cause severe damage to tissue and organs. This project aims to establish a link between the protective function of specific immunoglobulins and their influence on tissue regeneration. The thesis: A well-controlled immune response neutralizes the viral or bacterial infection, helping to make regeneration more effective.

Funding: Immunologische Tagesklinik Wien

→ **Immune Regulatory Capacity of Mesenchymal Stem Cells**

Name: Agnes Kocsis (ongoing)

Title of Dissertation: Dependence of Mitochondrial Function on the Filamentous Actin Cytoskeleton in Cultured Mesenchymal Stem Cells Treated with Cytochalasin B

Name: Markus Pasztorek (completed)

Title of Dissertation: Immune Regulatory Capacity of Mesenchymal Stem Cells

Description of Project: Mesenchymal stem cells are the stem cells of connective tissue and are responsible for the regeneration of destroyed tissue and organs. Besides their regenerative capacity, mesenchymal stem cells also offer immune regulatory capacity. This research project examines the mechanisms underlying the immune regulatory capacity of mesenchymal stem cells.

Funding: Gesellschaft für Forschungsförderung Niederösterreich m.b.H. – Life Science Call

→ **Tribocorrosion: Lifetime Assessment and Prediction of Partial Replacement Technology**

Name: Bojana Simlinger (completed)

Title of Dissertation: Tribocorrosion of Orthopedic Implants Sliding Against Articular Cartilage Studied on CoCrMo Alloy

Name: Christoph Stotter (completed)

Title of Dissertation: Biotribology of Articular Cartilage in Partial Joint Replacement Technology

Description of Project: This project defines the mechanical and physiological parameters that influence the lifetime of partial joint replacement technology. The results are used as the basis for assessing the effects of partial endoprostheses on cartilage biology and on synovial fluid to optimize the concept of joint-affecting partial endoprosthesis.

Funding: Gesellschaft für Forschungsförderung Niederösterreich m.b.H. – Life Science call

→ **Inflammation, Sepsis, and Regeneration: Development of Efficient Diagnostic Methods and New Therapeutic Approaches in Inflammation and Sepsis**

Name: Anna Stierschneider (ongoing)

Title of Dissertation: The Role of TLR4 in the Endothelial Immune Response

Name: Katrin Colleselli (ongoing)

Title of Dissertation: Establishment and Characterisation of TLR-2/1 and 2/6 Knock-Out and Light-Inducible TLR Knock-In in Monocyte Cell Line(s)

Name: Marie Ebeyer-Masotta (ongoing)

Title of Dissertation: Endothelial Activation under Septic Conditions

Description of Project: In this project physiologically relevant cell culture models are developed to characterize the role of the endothelium in sepsis in order to explore new approaches for the treatment of sepsis and the effect of the removal of inflammatory mediators through extracorporeal adsorption therapies in septic patients.

Funding: NÖ Forschungs- und Bildungsges.m.b.H. (NFB) – Research, Technology and Innovation Program (FTI)



The implications of the COVID-19 pandemic for mental health are currently playing a major role in the research of the Department for Psychotherapy and Biopsychosocial Health. This work revolves around the psychological burden on the population here, with special regard for children and adolescents, and the provision of psychotherapy during the pandemic. Further societal challenges that the Department is investigating through its research include the aging population and the resulting demands on psychotherapy, as well as topics in the context of psychosomatic medicine. The Department contributes to overcoming these challenges by researching digitalization in psychotherapy, the evaluation of psychotherapy, the use of biomarkers in diagnostics and treatment for mental disorders.

Pictured

(f. l. t. r. & top down)

Thomas Probst
 Christoph Pieh
 Elke Humer
 Afsaneh Gächter
 Robert Jank
 Rachel Dale
 Teresa O'Rourke
 Sanja Budimir
 Rafael Rabenstein
 Andrea Jesser
 Yvonne Schaffler
 Martin Kuska

Bodily Perception in Times of COVID-19

In this study, researchers are investigating how the perception of the body and health changed during the Corona pandemic and whether this varies between different countries. The objective is to develop proposals for measures that enable good health and ensure that people positively experience the body.

The perception of our own body plays an important role in our health, for example, our perception of hunger, thirst and pain. Previous studies on adults have shown that bodily perception is closely associated with our physical and mental health. Factors such as stress, fear, or isolation may have a negative impact on our perception of the body and health. And above all, the COVID-19 pandemic and its effects are confronting people with numerous challenges and new stressful situations.

Understanding Feelings and Responses Better

In cooperation with various universities, the perception of the body and health during the COVID-19 pandemic is under international investigation using online surveys involving adults. The results compare our perceptions of health and the body during the COVID-19 pandemic with those in the time before. They enable proposals to be developed regarding measures that could be introduced to ensure good health and a positive experience of the body during and after the Corona pandemic. These results additionally provide information, as well as a better understanding of the feelings of people and their responses.

Body and Health in Times of COVID-19

FUNDING

Self-financed

DURATION

2020

DEPARTMENT

Psychotherapy and Biopsychosocial Health

PROJECT LEAD

Thomas Probst

COORDINATION

Department for Clinical and Biological Psychology of the Catholic University Eichstätt-Ingolstadt, Germany

PARTNERS

Department for Clinical and Biological Psychology of the Catholic University Eichstätt-Ingolstadt, Germany
 Philipps-Universität, Marburg, Germany
 University of Otago, Dunedin, New Zealand

Telephone Emergency Services in Times of COVID-19

During the pandemic, offers of help that are easily accessible such as Austria's telephone emergency service (Telefonseelsorge) are greatly in demand. This also repeatedly confronts counselors of telephone emergency services with new challenges. This project aims to survey the mental wellbeing and perceived stress level of helpline counselors and to identify the challenges facing them in their work to optimize their professional situation.

2020 was characterized by different burdens on mental health. Many people suffer from loneliness, depressive symptoms, anxiety, or have trouble sleeping. Many of those affected thus seek help from low-threshold support services such as Telefonseelsorge. The impact of the COVID-19 pandemic on this telephone emergency service is the focus of this research project. The observational study is being carried out in cooperation with the Austrian Telephone Emergency Service (Telefonseelsorge) and the Viktor Frankl Education Austria (ABILE).

Supporting Staff at Telefonseelsorge

This study investigates whether the mental wellbeing and subjective stress experienced by the volunteers manning the helpline differs from that of the general population. It additionally examines the professional challenges facing Telefonseelsorge in the age of COVID-19. This also includes analyzing whether there is currently a greater demand for the helpline's services and whether there has been a change in the topics thematized by helpline callers.

The results should provide information about potential stress factors for staff: Research suggests that increased levels of stress impair the ability to respond optimally and to deliver adequate care. The results of the study can serve as a basis for developing measures to optimize the professional situation of staff working for Telefonseelsorge, so also ensuring high quality of easily accessible offers of help for people in crises.

Telephone Emergency Services in Times of COVID-19

FUNDING
Self-financed

DURATION
2020–2021

DEPARTMENT
Psychotherapy and Biopsychosocial Health

PROJECT LEAD
Elke Humer

PARTICIPATING RESEARCHERS
Christoph Pieh
Thomas Probst

COORDINATION
University for Continuing Education Krems

PARTNERS
Viktor Frankl Education Austria (ABILE)
Austrian Telephone Emergency Service (Telefonseelsorge)

Evaluating Psychotherapy Methods

In Austria, there are 23 accredited psychotherapy methods, with this number constituting a unique situation in the world. The research project plans to study these unparalleled circumstances for the provision of psychotherapy in Austria. The application of a mixed-methods design for the first time will offer detailed insights into the process and outcome of individual psychotherapy for adults treated in private practice.

The various psychotherapy methods differ in terms of the procedures used to heal and alleviate psychological problems. Some methods are based on talking therapies, while other techniques also involve exercises or taking a creative approach, painting for example. The aim here is to support patients in exploring their personal experiences and inner conflicts. The ways of working also differ, e.g. the frequency of therapy sessions and the time the course of psychotherapy is scheduled to last.

Determining the Process and Outcome of Psychotherapy

This research project is investigating the process and outcome of psychotherapy in Austrian primary care and will be the first to supply such data for individual psychotherapy involving adults. The focus here falls on the outcome of psychotherapy in private practice concerning symptom improvement. The study is also investigating the development of the therapeutic alliance in the psychotherapy process and whether there is a link between this alliance and the outcome of the psychotherapy.

Quantitative Internet-based surveys involving both psychotherapist and patient take place at the onset, in the course of treatment and at the end of the psychotherapy. Qualitative interviews with psychotherapists and patients are additionally being held at different points in the psychotherapeutic process.

Process and Outcome in Psychotherapy Practices

FUNDING
Self-financed

DURATION
2020–2023

DEPARTMENT
Psychotherapy and Biopsychosocial Health

PROJECT LEAD
Thomas Probst

PARTICIPATING RESEARCHERS
Elke Humer
Yvonne Schaffler

COORDINATION
University for Continuing Education Krems

PARTNERS
Austrian Federal Association for Psychotherapy
Karl Landsteiner University of Health Sciences

Knowledge Transfer & Dissemination

→ Symposia, organized by the Department for Psychotherapy and Biopsychosocial Health:

EAPM (European Association of Psychosomatic Medicine) Conference 06.02.2021–06.05.2021 (www.eapm2021.com),

Kremser Woche: Psychotherapy Update “Lockdown – Opportunities for the Future”, 09.20.2021–09.25.2021

→ Transfer of specific results from research to the general public, with a special focus on the COVID-19 pandemic via media activities (press conferences, broadcasts, interviews). Focusing on: The stresses and strains on mental health and the provision of psychotherapy during the COVID-19 pandemic

Further Projects

→ **Effects of the First Lockdown on Mental Health**

Since the beginning of the COVID-19 pandemic, the mental health of the Austrian population has been repeatedly studied by the Department for Psychotherapy and Biopsychosocial Health. The results of the first lockdown in spring 2020 showed that one in four people were suffering from depressive symptoms, one in five from anxiety and one in six from insomnia. The greatest decline in mental health was seen in adults under the age of 35 years, women, and persons who were unemployed or with a low income.

Project lead:

Christoph Pieh
Thomas Probst

→ **Diminished Mental Health Persists During the Second Lockdown**

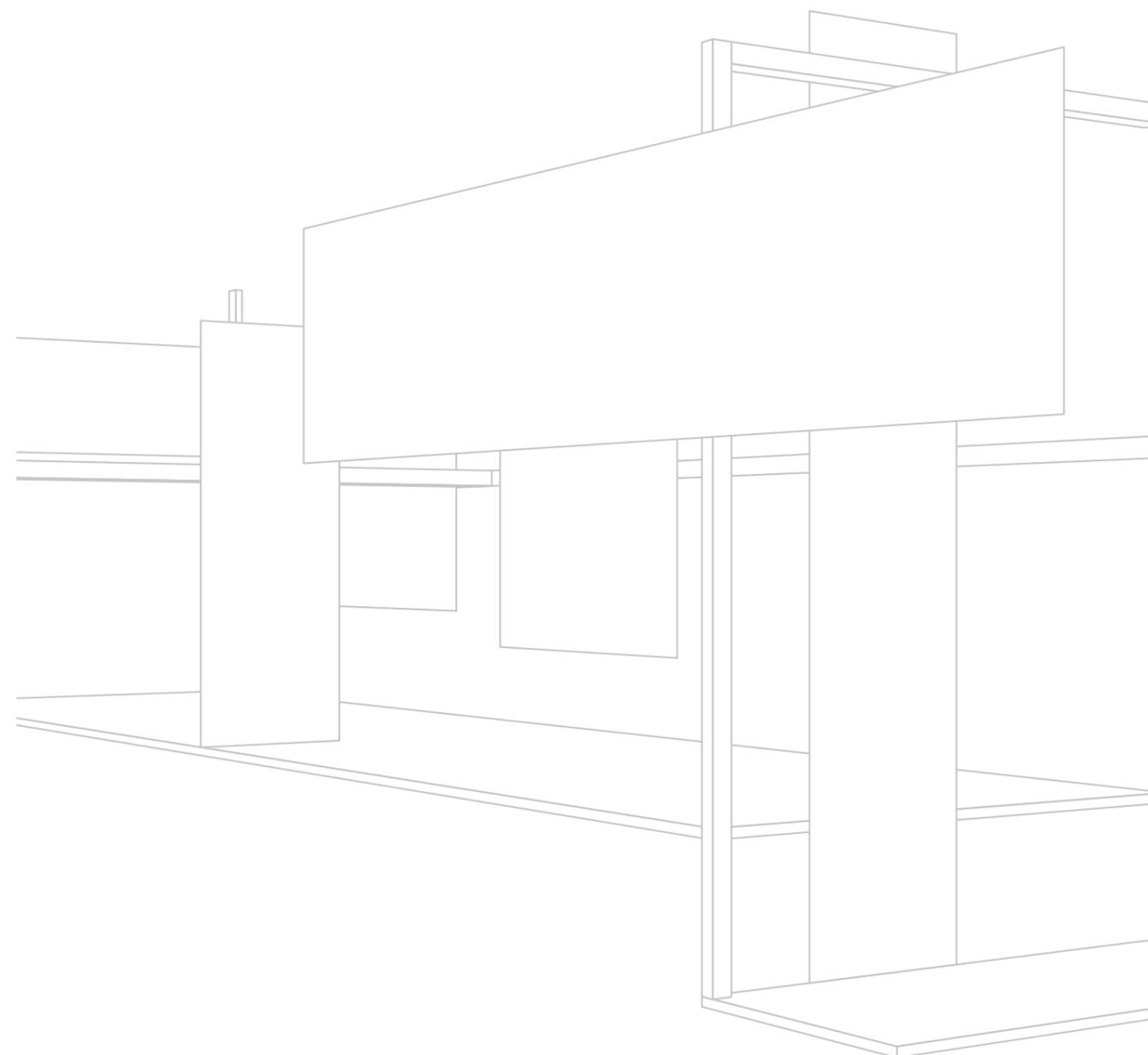
A further study evaluated the mental health of the Austrian general population during the Christmas break in 2020/21. The results show that the mental health burden remained at a high level during this period and mental health even deteriorated compared with the first lockdown. Around a quarter of the population experienced depressive symptoms, one in four anxiety and one in five sleep disorders. Individuals younger than 24 years were most burdened.

Project lead:

Christoph Pieh
Thomas Probst

Selected Publications

- Humer E, Pieh C, Probst T. Metabolomic biomarkers in anxiety disorders. *International Journal of Molecular Sciences* 2020; 21: Article 4784.
- Humer E, Stippel P, Pieh C, Pryss R, Probst T. Experiences of psychotherapists with remote psychotherapy during the COVID-19 pandemic: Cross-sectional web-based survey study. *Journal of Medical Internet Research* 2020; 22: Article e20246.
- Klein J P, Probst T, Kriston L, Assmann N, Bailer J, et.al. Changes in therapeutic alliance and in social inhibition as mediators of the effect of the Cognitive Behavioral Analysis System of Psychotherapy: A secondary analysis from a randomized clinical trial. *Psychotherapy and Psychosomatics* 2020; 89, 261-262.
- Pieh C, Budimir S, Probst T. The effect of age, gender, income, work, and physical activity on mental health during coronavirus disease (COVID-19) lockdown in Austria. *Journal of Psychosomatic Research* 2020; 136: Article 110186.
- Pieh C, Budimir S, Delgado J, Barkham M, Fontaine J R J, Probst T. Mental health during COVID-19 lockdown in the United Kingdom. *Psychosomatic Medicine* 2020; 10/2020, DOI: 10.1097/PSY.0000000000000871.
- Probst T, Berger T, Meyer B, Späth C, Schröder J, Hohagen F, Moritz S, Klein J P. Social phobia moderates the outcome in the EVIDENT study: A randomized controlled trial on an Internet-based psychological intervention for mild to moderate depressive symptoms. *Journal of Consulting and Clinical Psychology* 2020; 88, 82-89.
- Probst T, Stippel P, Pieh C. Changes in provision of psychotherapy in the early weeks of the COVID-19 lockdown in Austria. *International Journal of Environmental Research and Public Health* 2020; 17: Article 3815.





We are currently observing a global increase in non-communicable diseases (NCD) such as stroke, cardiovascular disease, diabetes and dementia. This increase is caused by an aging of the population in many countries and by an increasing prevalence of vascular risk factors. Poor diet, lack of exercise, smoking, alcohol abuse and air pollution contribute to this trend. Research at the Department for Clinical Neurosciences and Preventive Medicine is dedicated to target these challenges. Focused areas of research include brain health, treatment of neurological diseases and prevention of NCD such as stroke, diabetes or dementia. These activities are embedded in an international network of collaborations and have as common denominator a neuroscientific based research focusing on cognition and the central nervous system as well as their preservation and rehabilitation in the context of vascular and chronic neurological diseases.

Pictured
(f. l. t. r. & top down)
Michaela Pinter
Stefanie Auer
Margit Höfler
Irene Ebhardt
Karl Matz
Yvonne Teuschl
Alina Schwarz
Alexandra Dachenhausen

Dementia-competent Community Employees

Currently more than 50 Million people worldwide are living with dementia. This number will double every 20 years. Societies need to integrate persons living with dementia, empower their support providers and create dementia-competent communities. Awareness building and providing knowledge is therefore crucial. The project “Demenz.Aktivgemeinde” (Dementia.Active.Community) has developed a digital learning program for Austrian community workers. A 2-Step certification process will be developed.

A timely diagnosis of dementia and an early support program can help persons with dementia to live an independent life for much longer. This way, severe phases of the disease with costly care can be shortened and thus overall life quality can be improved. In order to reach this goal, awareness building and knowledge transfer into all levels of society are necessary. Awareness building creates an atmosphere of sympathy and solidarity with persons with dementia and their support providers. Understanding persons with dementia can prevent crises and promote competent behavior. The project “Demenz.Aktivgemeinde” developed a learning program aiming at raising awareness and improving knowledge about dementia as well as increasing competent behavior in critical situations among various professions in the public administration.

Understanding the stages of Dementia

The E-learning program was developed in a co-creation process with community workers and administrative staff. Focus groups were organized within a pilot region. In the focus groups, experiences with persons with dementia and their support providers (family members, care workers) were discussed. Three learning modules were created in which general knowledge about the disease (disease stages), communication principles

and problem-solving strategies are discussed in an interactive and entertaining style. The content of the learning modules was created by a team at the University for Continuing Education Krems, while the technical implementation was accomplished by the Federal Ministry of Internal Affairs.

Municipalities, authorities and public administration can now be informed about dementia with this E-learning program. A community can apply to become a “dementia-competent community” under defined conditions.

Demenz.Aktivgemeinde

FUNDING

Federal Ministry of Internal Affairs

DURATION

2019–2021 (delayed by one year due to the COVID19 pandemic)

DEPARTMENT

Clinical Neurosciences and Preventive Medicine/Center for Dementia Studies

PROJECT LEAD

Stefanie Auer

PARTICIPATING RESEARCHER

Margit Höfler

COORDINATION

Security Academy

PARTNERS

Bundesministerium für Inneres Abt. I/9 – Sicherheitsakademie Zentrum für Ressourcensteuerung und Unternehmensqualität
Security Academy (BMI-E@academy; Markus Richter)
Federal Ministry of Internal Affairs, Federal Criminal Police Agency (Gerhard Lang t)
University for Continuing Education Krems, Department for Continuing Education Research and Educational Technologies

Instrumental Evaluation of Therapy for Spasticity

Motor neuron disease causes a wide range of motor symptoms, including spastic ataxic gait. The observational study examines the effect of a single injection of botulinum toxin A on patients with gait disorders. The effect on patient's gait speed will be measured using instrumental gait analysis prior to the injection of botulinum toxin A and again three weeks after injection.

Neurological diseases such as stroke, traumatic injuries and inflammations of the brain or of the spinal cord cause lesions of the first motoneuron leading to motor symptoms such as muscle weakness and spasticity.

Evaluating Gait Patterns with Instrumental Gait Analysis

Besides physiotherapy and oral antispastic therapy, injection with botulinum toxin A (BoNT-A) is recommended to treat spasticity. BoNT-A is a naturally occurring bacterial toxin which is frequently used as a therapy for neurological diseases. Tiny quantities of this toxin are injected into the hypertonic muscles of the lower extremity to "sedate" and "relax" overactive muscles. The effect of BoNT-A has hitherto been measured mainly with passive goals such as changes of muscle tone or mobility of individual joints. In the planned study, the gait pattern will be evaluated using instrumental gait analysis before the injection of BoNT-A and three weeks after injection.

The aim of the observational study is to investigate the effect of a single intramuscular injection of BoNT-A on the spastic ataxic gait pattern of patients with lesions of the first motoneuron three weeks after injection. If the results are promising, this will be followed by a multicenter randomized clinical trial.

Effect of Botulinum Toxin A on the Spastic Gait Pattern in Patients with Upper Motor Neuron Syndrome

FUNDING
Self-financed

DURATION
2021

DEPARTMENT
Clinical Neurosciences and Preventive Medicine

PROJECT LEAD
Michaela Pinter

PARTICIPATING RESEARCHERS
Alexandra Dachenhausen
Karl Matz
Alina Schwarz
Yvonne Teuschl

PARTNER
Landeskrankenhaus Allentsteig/Horn Neurology Dept.

Preventing Stroke and Dementia

The Department for Clinical Neurosciences and Preventive Medicine has investigated options for the prevention of stroke and dementia. Against this background, the stroke expert Michael Brainin initiated the development of the strategy "Cut Stroke in Half". The aim is to reduce the incidence of stroke by 50 percent.

The burden imposed by strokes and dementia is increasing throughout the world. 200 million people will suffer a stroke and 106 million will be affected by dementia by 2050. Therefore, the University for Continuing Education Krems organized in 2017 an international workshop, resulting in the development of the prevention strategy "Cut Stroke in Half". This strategy aims at preventing dementia and stroke by a population-wide approach including a fixed-dose combination pill (polypill), which lowers blood pressure and cholesterol, coupled with encouragement to adopt a healthy lifestyle. The incidence of stroke could be reduced by up to 50% if such a polypill were distributed free of charge or at low cost within populations with a high level of untreated risk factors and problematic access to medication in conjunction with a healthy life style (regular exercise, healthy diet, giving up smoking). "Cut Stroke in Half" has become the official strategy of the World Stroke Organization for the primary prevention of stroke and dementia and is currently being established in a number of countries.

Using Preventive Potential

The mentor and promoter of this strategy is Michael Brainin, who has established and developed a focus of stroke prevention at the University for Continuing Education Krems. He was the co-founder of the Stroke Units in Austria and the Austrian Stroke Unit Registry, which contributed to stroke research and helped to improve the quality of care. Michael Brainin retired in 2020.



Michael Brainin

Further Projects

→ Treatment of Spasticity in Lockdown

The COVID-19 lockdown has caused delays in the treatment with botulinum toxin A for patients suffering from dystonia and spasticity. A survey will investigate the impact of the delays in re-injection on mobility, participation and quality of life. The study includes patients for whom the predefined intervals of two to four months could not be observed and whose injections were delayed by at least two weeks.

Project lead:

Michaela Pinter

Participating researcher:

Alina Schwarz, Department for Clinical Neurosciences and Preventive Medicine

Partner:

Landeskrankenhaus Allentsteig/Horn Neurology Department

→ Vascular Risk and Cognition

Yvonne Teuschl and Karl Matz are investigating the prevention of post-stroke cognitive decline by changes in lifestyle and in association with disorders of glucose metabolism. In this context, Yvonne Teuschl is involved in the preparation of guidelines by the European Stroke Organization and the European Academy of Neurology. Karl Matz is investigating treatment options for stroke patients in the setting of his clinical activities, e.g. treating swallowing disorders with electrical stimulation.

Project lead:

Karl Matz, Yvonne Teuschl, Department for Clinical Neurosciences and Preventive Medicine

Knowledge Transfer & Dissemination

→ Organization and staging of the “Krems Dementia Conference” (to date two conferences)

→ Organization and staging of the 19th Krems conference on topical issues in neurorehabilitation: Botulinum toxin and functional electrical stimulation in neurorehabilitation: A contradiction or complementary?

→ ESO-WSO 2020 Virtual Conference. First joint conference of the European and World Stroke Organization under the management of Michael Brainin (president of the WSO from 2018 to 2020)

→ Webinar series “Schau aufs Gehirn” (Mind the Brain):

Webinars on paths to brain health

→ Webinar series “Gehirn zählt” (Brain counts):

Webinars on facts and figures for cerebrovascular health

→ Collaboration on the “Joint European Stroke Organization and European Academy of Neurology guideline on post stroke cognitive impairment”

Selected Publications

→ Auer S, Ratajczak P, Span E, Höfler M (2020). Timely diagnosis of dementia in rural areas in Austria: the Dementia Service Centre model. In: Innes A, Morgan D.(eds.) Rural Dementia Care.

→ Brainin M, Feigin VL, Norrving B, Martins SCO, Hankey GJ, Hachinski V; World Stroke Organization Board of Directors (2020). Global prevention of stroke and dementia: the WSO Declaration. *Lancet Neurol* 19(6):487-488.

→ Brainin M; World Stroke Organization, Sliwa K; World Heart Federation. WSO and WHF joint position statement on population-wide prevention strategies. *Lancet*. 2020; 396(10250):533-534.

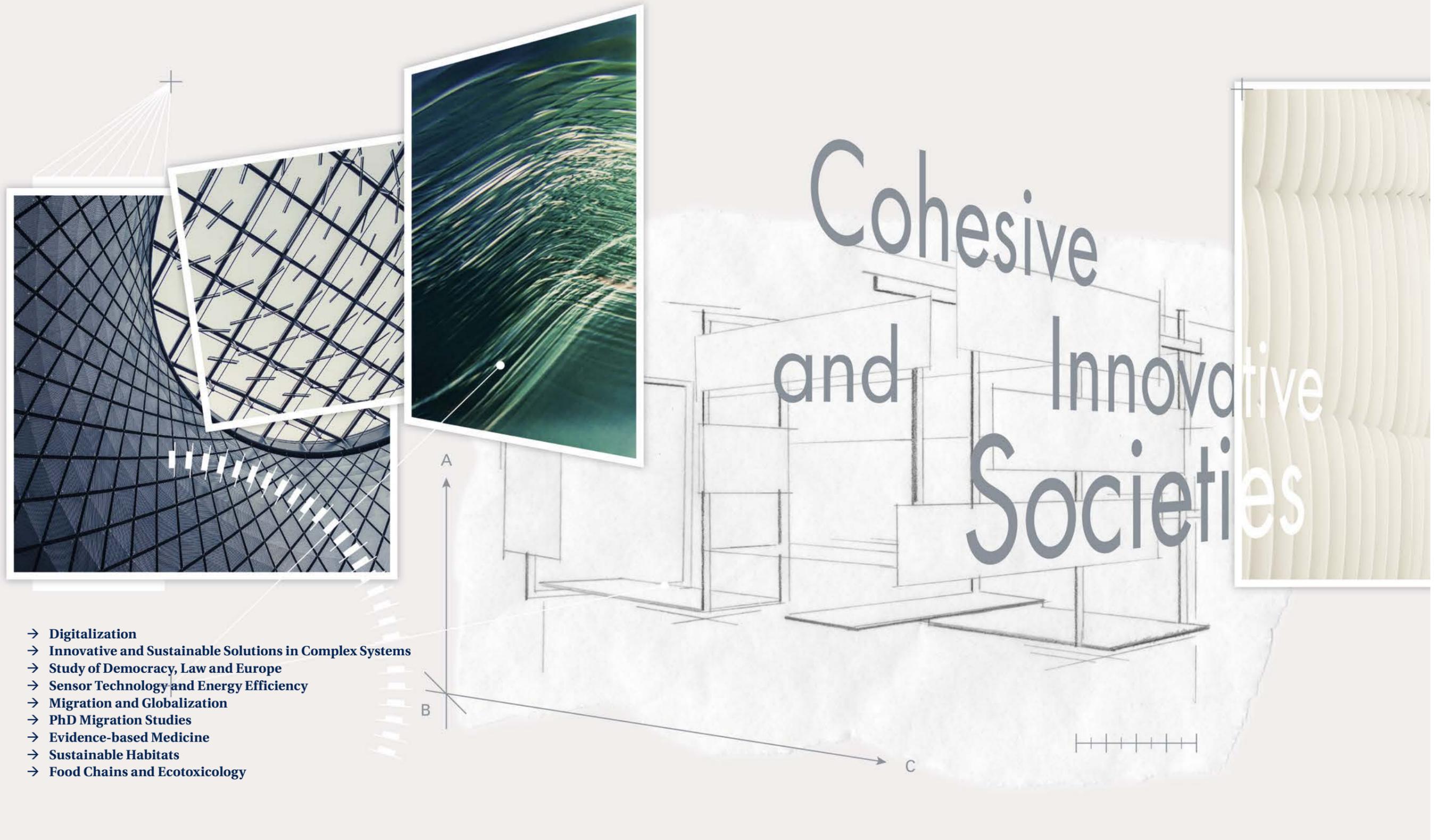
→ Davis SM, Hacke W, Norrving B, Brainin M, Lees KR, Donnan GA. International Impact of Stroke. *Stroke*. 2020; 51(3):1036-1039.

→ Feigin VL, Vos T, Nichols E, Owolabi MO, Carroll WM, Dichgans M, Deuschl G, Parmar P, Brainin M, Murray C. The global burden of neurological disorders: translating evidence into policy. *Lancet*. 2020; *Neurol* 19(3):255-265.

→ Gabriel R, Boukichou Abdelkader N, Acosta T, Gilis-Januszewska A, Gómez-Huelgas R, Makrilakis K, Kamenov Z, Paulweber B, Satman I, Djordjevic P, Alkandari A, Mitrakou A, Lalic N, Colagiuri S, Lindström J, Egido J, Natali A, Pastor JC, Teuschl Y, Lind M, Silva L, López-Ridaura R, Tuomilehto J; e-PREDICE Consortium. Early prevention of diabetes microvascular complications in people with hyperglycaemia in Europe. ePREDICE randomized trial. Study protocol, recruitment and selected baseline data. *PLoS One*. 2020; 15(4):e0231196.

→ Ntaios G, Michel P, Georgiopoulos G, Guo Y, Li W, et.al. Characteristics and Outcomes in Patients With COVID-19 and Acute Ischemic Stroke: The Global COVID-19 Stroke Registry. In: *Stroke*. 2020; 51(9):e254-e258.

Overall university main field of research:
Cohesive and Innovative Societies



- Digitalization
- Innovative and Sustainable Solutions in Complex Systems
- Study of Democracy, Law and Europe
- Sensor Technology and Energy Efficiency
- Migration and Globalization
- PhD Migration Studies
- Evidence-based Medicine
- Sustainable Habitats
- Food Chains and Ecotoxicology



Our society is confronted with ongoing progress in digitalization and new challenges centered around technical issues and the need for a secure, inclusive socio-technical organization of analog and digital living spaces. The research conducted at the Department for E-Governance and Administration examines these issues, but also focuses on a data exchange and data processing issues in a cross-border European context, the use of data that respects data sovereignty, data solidarity and data security, the requirements for education and skills in the digital era, the adaptations that need to be made to the legal framework in order to ensure innovation in digital administration, Smart City space for public administration and the use of artificial intelligence to identify disinformation and fake news. All results gained from this research are implemented in order to address the challenges and help shape future society.

Pictured
(f. l. t. r. & top down)

Pablo Collazzo
Karin Steiner
Shefali Virkar
Lőrinc Thurnay
Judith Schoßböck
Tomasz Janowski
Thomas Lampoltshammer
Melanie Morawek
Anna-Sophie Novak
Heike Strumpfen
Gabriela Viale Pereira
Peter Parycek
Walter Seböck
Günther Burkert
Joanna Rutkowska
Lucy Temple

Not Pictured
Bettina Biron
Bernhard Riedl

Developing Digital Administration

New technologies make it possible to offer accessible, personalized, and user-friendly public services, and to deploy e-governance models and mobile apps for interactions with those services. The inGOV project aims to help public administrators achieve better performance and use resources more efficiently. The goal is to increase citizens' involvement, trust, and satisfaction with public services.

To make the use of e-governance more attractive to the public the project focuses on involving citizens and stakeholders in the process of developing digital services. To ensure that as many citizens as possible have access to these services, mobile apps should be used, data has to be shared and re-used and compatibility must be improved between the systems used in public administration.

Real-Life Tests of New Functionalities

One challenge is to ensure collaboration between different public agencies in order to provide users with personalized electronic public services. The basis for such services is a framework in which all legal, cultural, and administrative challenges are identified, for example, for mobile applications, a mobile reference architecture needs to be developed. Pilot projects based on this framework are implemented and evaluated in four EU member countries (Austria, Croatia, Greece, Malta), with plans to involve over 160,000 citizens to assess their satisfaction and increased trust in public institutions.

Inclusive Governance Models and ICT Tools for Integrated Public Service Co-Creation and Provision – inGov

FUNDING

EU – Horizon 2020

DURATION

2021–2023

DEPARTMENT

E-Governance and Administration

PROJECT LEAD

Noella Edelmann

PARTICIPATING RESEARCHERS

Valerie Albrecht
Lucy Temple
Shefali Virkar

COORDINATION

University of Macedonia (Greece)

PARTNERS

Office of the Government of Lower Austria (Austria)
Bjelovar (Croatia)
Centre for Research and Technology-Hellas – CERTH (Greece)
Deloitte Consulting SRL (Italy)
KU Leuven (Belgium)
Malta Information Technology Agency (Malta)
Periferia Thessaly (Greece)
RIDE Technologies (Croatia)
UBITECH LIMITED (Cyprus)
UNI SYSTEMS (Greece)
UNISYSTEMS LUXEMBOURG (Luxembourg)

International E-Governance Services

The project promotes the use of inclusive mobile government services in the EU. Core elements of the project are electronic identity management, data storage, and the exchange of electronic documents across international borders – all in the context of the ongoing implementation of the Single Digital Gateway Regulation (SDGR) and the eIDAS regulation on electronic IDentification, Authentication and trust Services.

A basic prerequisite for acceptance and use of e-government processes is the secure identification of the participants involved, e.g. through electronic signatures. Additional challenges arising in the international context, such as technical, organizational, legal and semantic hurdles, are addressed by the project as well. The project also aims to make mobile e-government services more attractive to the general public through sustainable development of the technical infrastructure for cross-border use of mobile eID, mobile electronic identification with online IDs, and mobile signatures.

Pilot Projects in Three Areas

The central goal of the project is to develop mobile-first approaches using eID and electronic signatures, and to run pilot projects based on these approaches in an international, cross-border context. Findings from the pilot projects in the three core areas of eID, mobile signatures and e-voting will serve as starting points for later projects and applications within the EU. The practical experiences gathered in the pilot projects will contribute to early identification and elimination of potential hurdles and sticking points with the technologies being developed.

Alongside the technical results, the transdisciplinary evaluation framework and strategic sustainability concepts developed for the project will help to establish the foundation for further implementation of the Single Digital Gateway Regulation (SDGR) on the way to the Digital Single Market.

Mobile Cross-Border Government Services for Europe – mGov4EU

FUNDING

EU – Horizon 2020

DURATION

2021–2023

DEPARTMENT

E-Governance and Administration, Center for E-Governance

PROJECT LEAD

Thomas Lampoltshammer

PARTICIPATING RESEARCHERS

Gregor Eibl
Lucy Temple

COORDINATION

TECHNIKON Forschungs- und Planungsgesellschaft mbH (Austria)

PARTNERS

ecsec GmbH (Germany)
Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (Germany)
go.eIDAS e.V. (Germany)
Scytl Secure Electronic Voting, S.A (Spain)
Time.Lex CVBA (Belgium)
TU Graz (Austria)
University of Tartu (Estonia)
A-SIT – Secure Information Technology Centre – Austria (Austria)

www.mgov4.eu

→ The mGov4EU project was funded by the European Union's Horizon 2020 research and innovation program under grant agreement no. 959072.

Data-Driven Development of Sports Funding

This project addresses data-driven and evidence-based policy development in Austria's sports funding landscape. A transdisciplinary approach is used to develop and model a shared understanding of the environment, and to translate that understanding into an agent-based simulation which can then be used to play through and evaluate different scenarios.

As more data become available, the challenge is how to translate the vast amounts of data into recommendations for action. This project considers the technical, organizational and legal hurdles in data management and the necessary skills in order to use data-driven technologies in public administration. In the field of strategic decision-making, the project also aims to support structural shifts and changes in education and training in order to exploit the full potential of agent-based approaches and methods of computer-aided modeling and simulation.

Objective Criteria for Increased Transparency

Based on the example of federal sports funding in Austria, sustainable long-term budget management and monitoring are studied from an output-oriented perspective. This leads to the development of an agent-based model that represents the current stakeholder landscape, funding streams, and the impact of the resources provided. The goal is to derive objective, indicator-based evaluation approaches from this model, leading to increased transparency for budget expenditures and forming the basis for the establishment of a flexible budget structure.

A further objective is to develop capacities and create knowledge, even outside the sports domain, in the field of strategic decision-making through agent-based simulations.

Evidence-Based Policymaking using Agent Based Modelling – DG-R/SP1-ABM

FUNDING

EU – Structural Reform Support Programme (SRSP)

DURATION

2020–2021

DEPARTMENTS

E-Governance and Administration
Knowledge and Communication Management

PROJECT LEAD

Thomas Lampoltshammer

PARTICIPATING RESEARCHERS

Nicole Hynek
Nike Pulda
Liliya Satalkina
Gerald Steiner
Lukas Zenk

COORDINATION

University for Continuing Education Krems
Institute for Advanced Studies (IHS)

PARTNERS

Federal Ministry of Arts, Culture, Civil Service and Sport (BMKÖS), Austria
Bundesrechenzentrum GmbH
Complexity Science Hub Vienna

→ The DG-R/SP1-ABM project was funded by the European Union's Structural Reform Support Programme (SRSP) under grant agreement no. GA2020/023.

Coping with Unexpected Consequences of Digitalization

For two years, scientists and practitioners on the DiDaT research project worked on the negative consequences (“unseens”) of the use of digital data. Based on a transdisciplinary process developed by the University for Continuing Education Krems, the findings from theory and practice have led to a white paper that proposes socially robust guidelines for working with digital data.

As digitalization progresses, data is omnipresent. As people and computer systems are linked into global networks, the storing, sharing and processing of our data leads to the creation of “digital twins” that are more than just copies or simulations of the original. These twins can be used to monitor, diagnose or control the original, or predict behavior – be it human or machine. Search engines, cloud storage, social media, web browsers and data encryption services are controlled by a small number of global oligopolies. How can public governance be established as a counterweight to these supranational actors?

Transdisciplinary Research

The DiDaT project involved over 150 scientists and practitioners and investigates the unexpected consequences of the use of digital data – the so-called “unseens”. The project focuses on the topics mobility, health, agriculture, the future of small and medium-sized enterprises (SMEs), and the use of social media, as these are seen as highly relevant to the achievement of social development goals. In order to deal with the identified “unseens”, socially robust guidelines were developed through a transdisciplinary process developed by the Transdisciplinary Laboratory for Sustainable Digital Environments (SDE TdLab).

Forming a Responsible Use of Digital Data in Transdisciplinary Process (DiDaT)

FUNDING

Federal Ministry for Education and Research (Germany) – FONA

DURATION

2019–2020

DEPARTMENT

Knowledge and Communication Management

PROJECT LEAD

Roland Scholz

PARTICIPATING RESEARCHERS

Gabriel M. Lentner
Peter Parycek
Gerald Steiner

COORDINATION

Institute for Advanced Sustainability Studies (IASS) Potsdam

PARTNER

Brandenburg University of Technology

didat.eu

Further Projects

→ Innovation Lab for Public Administration Collaboration

GovLabAustria is an open and interdisciplinary experimental space that provides a platform for public administration, science, business and society to address key challenges facing the public sector. Potential solutions are developed in collaboration between organizations in a scientific and practice-relevant context. The lab focuses on implementing prototypes from research and development projects to support innovation in public administration and evidence-based policymaking. The knowledge acquired here is put into practice in training and education programs.

Project lead:

Noella Edelmann
Peter Parycek
Gerald Steiner

Coordination:

University for Continuing Education Krems, Federal Ministry of Arts, Culture, Civil Service and Sport (Austria)

→ Public Participation in a Digital Era

Continuing progress in digitalization changes the interaction between governments, public administrations and citizens. Social media, digital technologies, new online tools and societal demands generate opportunities for participation and interaction, but lead to new challenges for politicians, public administrators and society. In 2020, the Participation in the Digital Era project led to the development the Green Paper on Participation in the Digital Era presented to the Austrian Council of Ministers in 2020.

Funding:

Federal Ministry of Arts, Culture, Civil Service and Sport (Austria)

Project lead:

Noella Edelmann

Participating researchers:

Gregor Eibl
Valerie Albrecht

→ Knowledge for Digital Transformation

The process of digitalization changes technological, economic, political and social structures throughout the whole of society. In order to study such processes the Faculty of Business and Globalization founded the Transdisciplinary Laboratory for Sustainable Digital Environments (SDE TdLab). Here, scientists and system-relevant stakeholders generate knowledge of these complex processes of change, and derive strategies for a sustainable transition into the digital era.

Scientific Co-Leaders:

Peter Parycek
Roland Scholz
Gerald Steiner

Co-Leaders Practice:

Reiner Czichos
Michael Dell
Peter Harold

→ Developing Expertise for Sustainable Cities

The goal of the Strengthening Governance Capacity for Smart Sustainable Cities project is to promote expertise for smart, sustainable cities in Latin America and Europe by developing course content at different levels of education. The proposed course curriculum focuses on technology and administration, and is based on a multidisciplinary approach. An international network of universities and smart city-related actors is involved in the project.

Funding:

EU – Erasmus+

Project lead:

Gabriela Viale Pereira

Further Projects

→ Detecting Misinformation with Artificial Intelligence

In the field of civil security research, the project on Detecting Misinformation with Artificial Intelligence explores ways to automatically identify misinformation, especially of a politically motivated nature. The focus is on audiovisual media forensics, text analysis, and their multimodal fusion using methods from artificial intelligence. An example scenario is the verification of content in “news articles” on the Internet.

Funding:

FFG Austrian Research Promotion Agency

Project lead:

Walter Seböck

→ A New Teaching Concept on Video Game Culture

The “StreamIT!” project examines children and adolescents’ video game culture, which has so far received only little attention in school contexts. The project aims to develop a participatory teaching concept centered on creating gameplay videos in close collaboration with partner schools. Methods are developed and tested at all grade levels and an iterative process-oriented evaluation ensures a close alignment with the target groups’ needs.

Funding:

FFG Austrian Research Promotion Agency

Project lead:

Natalie Denk

Pictured (f. l. t. r. & top down)

Verena Huber, Günther Kainz, Gregor Eibl, Noella Edelmann, Corinna Raith, Gabriele De Luca, Valerie Albrecht, Nike Pulda, Cornelia Lendl, Ingeborg Zeller, Monika Oswald, Bettina Pospisil



Knowledge Transfer & Dissemination

Selected contributions by the department to “science-to-science” knowledge transfer:

→ Co-organization of the EGOV-CeDEM-ePart Conference:

This conference brings together communities from the fields and communities of Electronic Government (EGOV), Electronic Participation (ePart), and E-Democracy and Open Government (CeDEM).

→ Participation in the International Data Science Conference series (iDSC).

→ Annual organization of the Krems Security Conference (SiKo) at the University for Continuing Education Krems, which brings together the Austrian cybersecurity community.

Selected “science-to-public” activities:

→ Participation in the Data Intelligence Offensive (DIO), the public cooperation platform designed to build networks among stakeholders who create, process and use data. (www.dataintelligence.at)

→ GovLabAustria I-Lab Chat 2020 – “Sharing Findings – Developing Ideas”:

online event (September 2020) on the COVID-19 pandemic’s impact on administrative processes. GovLabAustria is an innovation lab for the public sector, operated by the University for Continuing Education Krems and the Austrian Federal Ministry of Arts, Culture, Civil Service and Sport. (www.govlabaustralia.gv.at)

→ TIN Academy:

At the TIN Academy, a transdisciplinary innovation network of representatives from industry, science and public administration (University for Continuing Education Krems and the New Design University St. Pölten) develops creative solutions. (www.tin.academy)

Selected Publications

- Edelmann N, Albrecht V, Eibl G, Rosenbichler U, Grünwald A, Kallinger M (2020). Grünbuch: Partizipation im digitalen Zeitalter. BM für Kunst, Kultur, öffentlicher Dienst und Sport, Vienna
- Janssen M, Brous P, Estevez E, Barbosa L S, Janowski T (2020). Data governance: Organizing data for trustworthy Artificial Intelligence. *Government Information Quarterly*, 37 (3): 101493
- Matheus R, Janssen M, Janowski T (2020). Design principles for creating digital transparency in government. In: *Government Information Quarterly*, 38(1): 10155
- Pospisil B, Huber E, Quirchmayr G, Seböck W (2020). Modus Operandi in Cybercrime. In: Khosrow-Pour M (ed.) *Encyclopedia of Criminal Activities and the Deep Web*, pp. 193-209, IGI Global, online
- Scholz R W, Czichos R, Parycek P, Lampoltshammer T J (2020). Organizational vulnerability of digital threats: A first validation of an assessment method. *European Journal of Operational Research*, 282(2), 627-643
- Seböck W, Lampoltshammer T, Zeller I, Pospisil B (2021). Künstliche Intelligenz im Risikomanagement – Ein Überblick aus Sicht der KMUs. *Österreichisches Jahrbuch für Risikomanagement* 2021, pp. 139-152.
- Vale Pereira G, Estevez E, Cardona D, Chesñevar C, Collazzo-Yelpe P, Cunha M A, Diniz E H, Ferraresi A, Fischer F M, Cardinelle Oliveira Garcia F, Joia L A, Luciano E M, de Albuquerque J P, Quandt C O, Sánchez Rios R, Sánchez A, Damião da Silva E, Silva-Junior J S, Scholz R W (2020). South American Expert Roundtable: Increasing Adaptive Governance Capacity for Coping with Unintended Side Effects of Digital Transformation. *Sustainability* 2020, 12, 718



The Department for Knowledge and Communication Management applies a systemic approach to deal with the analysis of profound social transformation processes. Its research activities focus on three topics: Firstly, transdisciplinarity: How can collaboration between scientists and practitioners be better understood and developed further? Which approaches and methods have proved to be effective and how can we improve them? Secondly, digital transformation: How is digitalization changing society as part of the human-environment system? Which unintended side effects come into play here and how can they be utilized to create niches for innovation from spaces of vulnerability? And thirdly, sustainable innovation: How can complex systems be understood and sustainably facilitated through intervention and innovation? How do transitions and transformations function and how can they be successfully guided?

Pictured
(f. l. t. r. & top down)

Andrea Höltl
Lukas Zenk
Gerald Steiner
Günther Schreder
Liliya Satalkina
Nikolai Neumayer
Roland Scholz
Georg Neubauer
Tanja Lumetsberger
Nils Haneklaus
Kay Mühlmann
Ilija Steffelbauer
Nicole Hynek

Not Pictured

Heike Köckler
Michael Obersteiner

Addressing Complexity with Improvisation

The world is ruled by systems of increasing complexity, a circumstance that can lead to unexpected situations. The relevant competences and organizational frameworks that would enable us to deal appropriately with the unforeseen in the short term are often lacking. The project examines the ability to improvise in order to respond in a professional manner in real time and to make proactive and creative use of the resources available at a given moment.

For the homo economicus the plan of action was simple: set objectives, identify available resources, calculate consequences based on the knowledge relevant in each case, take account of routine procedures and draw up an action plan within this guiding framework. However, today's ever-more complex world of work presents a challenge to this theoretical concept from the 19th century. The constant acceleration of processes and procedures and interactions which are less and less transparent requires a closely timed separation of problem identification, generation of ideas and implementation of ideas. The art of improvisation in the context of organizations and companies is set to become a key skill of the 21st century.

Furthering of Competencies

The project investigates which factors are important for the ability to improvise and how these skills can be fostered by means of individual training or basic organizational conditions. One outcome of the project will be a framework which sets out significant factors for improvisational ability on the basis of scientific studies and empirical research. It

will incorporate expertise from research into innovation and improvisation, cognitive and organizational psychology, communication and systems sciences, cognitive sciences and complexity research. This will provide a basis for developing concepts for interventions, for instance, how improvisation can be systematically trained. Ongoing results will already be made available during the project, including interviews with experts.

Organizational Improvisation

FUNDING

FFG Austrian Research Promotion Agency – BRIDGE

DURATION

2019–2022

DEPARTMENT

Knowledge and Communication Management

PROJECT LEAD

Lukas Zenk

PARTICIPATING RESEARCHERS

Nicole Hynek
Günther Schreder
Gerald Steiner

COORDINATION

University for Continuing Education Krems

PARTNERS

Beratergruppe Neuwaldegg GmbH
Roland Gareis Consulting GmbH
University of Vienna

www.improvisation.science

Understanding Mineral Fertilizer as a System

The Transdisciplinary Laboratory (TdLab) Sustainable Mineral Resources is one of the longest-established TdLabs of the Faculty of Business and Globalization at the University for Continuing Education Krems. As at the other TdLabs, the objective here is to create a space in which scientists and practitioners can work with one another on an equal footing to tackle socially relevant challenges: In this case the fact that phosphorus, a key element of mineral fertilizers, is a limited resource, thus endangering worldwide food production.

Building on the global transdisciplinary project Global TraPs, the TdLab Sustainable Mineral Resources took up its work with a focus on sustainable and efficient phosphorus management in the interest of ensuring global food security. Around half the world's food production relies on the use of mineral fertilizer containing phosphate. Phosphate rock is not an unlimited resource, so dealing with this resource in a sustainable manner makes a key contribution to ensuring global food security in the future. Our understanding of this system has been advanced through previous research into a comprehensive phosphorus value chain. The TdLab has since then been engaged in transferring the expertise acquired in value chain analysis to other critical fields relevant to the future, concentrating in 2020 on the recovery of uranium as a by-product of phosphorus extraction.

The Issue of Phosphorus as a Game

Ongoing projects include the development of a Phosphorus-Game modeled on Harvard University's Mercury Game to address the global political dimension to phosphorus use.

A further aim is, conversely, to communicate transdisciplinary approaches in the framework of the forthcoming TISE Erasmus Mundus Master program in the form of innovative, interactive learning spaces.

The TdLab additionally forms part of ENRUE (Enhanced Nutrient and Resource Use Efficiency), a pan-European research consortium, within the framework of the EU Green Deal. The project focuses on testing a wide range of transdisciplinary approaches and offering scientific support in this regard to optimize the efficacy and sustainability with which fertilizers and pesticides are used. The TdLab has also organized regular virtual round table discussions (Sustainable Td-Mineral Resources Think Tank) with expert practitioners and scientists from Austria, Europe and the USA since fall 2020.

Transdisciplinary Laboratory (TdLab) sustainable mineral resources – SMR TdLab

SCIENTIFIC CO-LEADERS

Gerald Steiner
Roland Scholz
Michael Obersteiner
Prof Friedrich-W. Wellmer
Nils Haneklaus

CO-LEADER PRACTICE

Michael C. Mew
Ludwig Hermann

Transatlantic Cooperation Platform

The engagement of the University for Continuing Education Krems in the Complexity Science Hub Vienna forms the starting point of a new transatlantic platform for scientific cooperation. An approach based on systems science is currently in use with the aim of contributing to solving complex social issues of today. This revolves around questions resulting from the COVID-19 pandemic.

In the face of the COVID-19 crisis and the first lockdown in Austria, a transatlantic group of researchers came together in spring 2020 to discuss current societal challenges arising from the pandemic. The core of the original "COVID Group" was formed by a network of researchers from the University for Continuing Education Krems, the Medical University of Vienna, the University of Arizona in Santa Fe, the World Climate Forum and Harvard University, who already had an established work basis through cooperations in the Complexity Science Hub Vienna.

Contribution to Overcoming Global Crises

In light of the situation at the time, this group of European and North-American researchers established a contemporary format in which weekly online meetings were held to discuss joint publications, research projects, new developments in research and current events and to coordinate shared activities. What was originally planned as an informal cooperation platform for joint work on important issues then became a permanent institution. The original group was extended to include experts from the fields of Transdisciplinarity, Mineral Resources and Social Evolution, re-establishing itself in 2021 as a permanent

cooperation platform going by the name of the "Transatlantic Research Lab on Complex Challenges".

The object of the laboratory is to jointly test and further develop the interdisciplinary, systems-scientific approach towards complex challenges based on the participants' specific research and publication projects, and to make a scientific contribution to overcoming future global crises. With this end in mind, cooperation with the Decision Theater of Arizona State University was stepped up and initial joint publications placed in prominent journals.

Complexity Science Hub

DURATION
since 2018

www.csh.ac.at

Transatlantic Research Lab on Complex Challenges

DURATION
since 2021

PROJECT LEAD
Gerald Steiner
Lukas Zenk

COORDINATION
University for Continuing Education Krems

PARTNERS
Harvard University (USA)
Medical University of Vienna
University of Arizona in Santa Fe (USA)
World Climate Forum (Germany)

Knowledge Transfer & Dissemination

→ Virtual presentation of the study “Trust in Digitalization & Governments in Times of COVID-19” at Tufts University in January 2021; with a panel discussion and approx. 150 international participants.

→ Virtual presentation and handover of the **DiDaT White Paper** jointly with IASS Potsdam, Fraunhofer FOKUS, etc. with approx. 140 participants (Germany, Austria, Switzerland). (www.didat.eu)

→ **Biodiversity conferences:**
Third Austrian biodiversity forum “Tage der Biodiversität #FlattenTheCurve der Biodiversitätskrise”, 4 December 2020 (online), with a one-week lead-in including online workshops and presentations with approx. 300 registered participants.

→ **Transatlantic workshops:**
Series of weekly online transatlantic workshops on complex challenges arising from the COVID-19 pandemic with participants from the USA, Austria, Switzerland and Germany. TdLab sustainable mineral resources: in parallel a monthly online jour fixe.

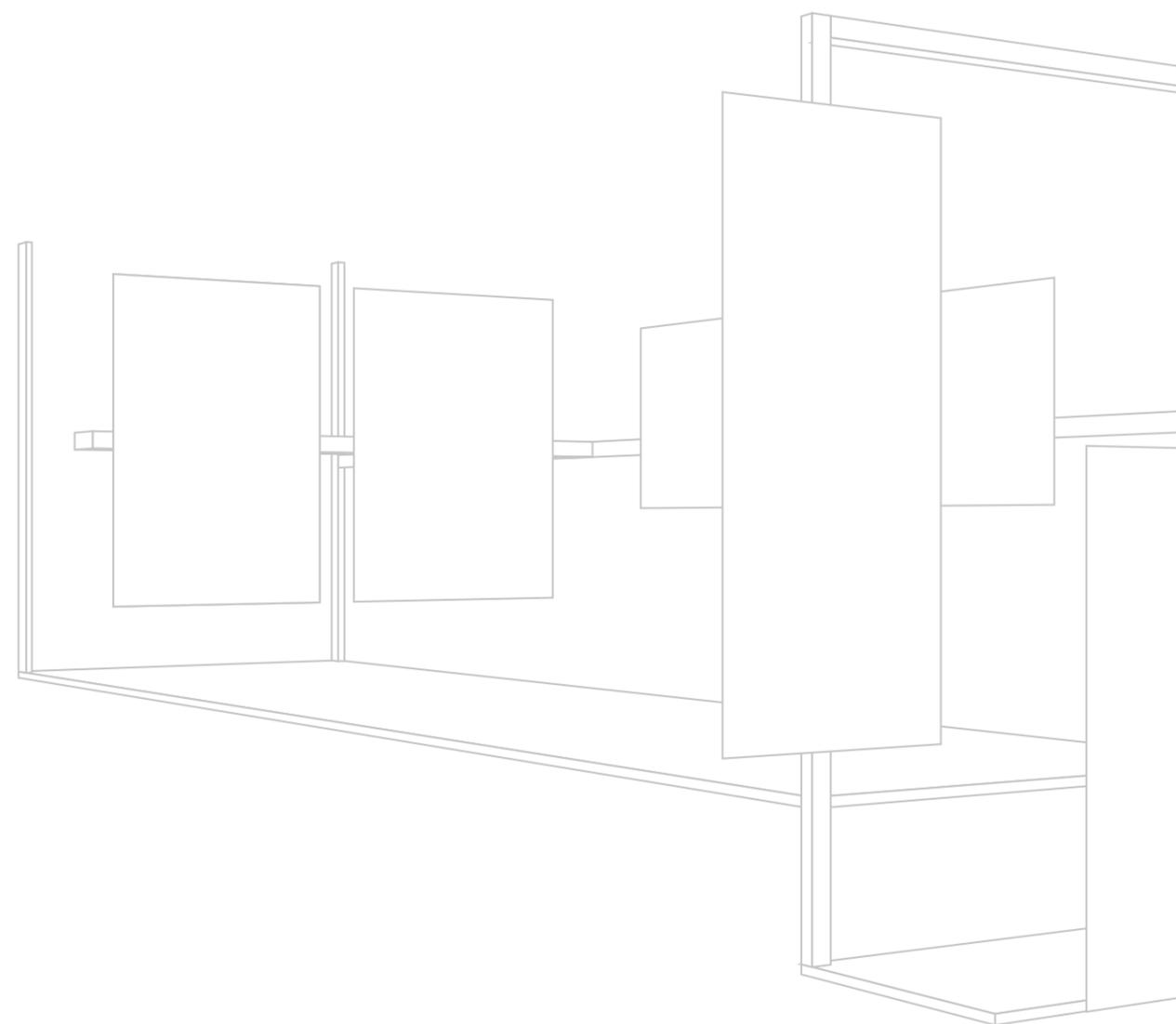
→ Series of pre-meetings of the **Global Transdisciplinarity Conference** to discuss the further development of science-society collaboration with international groups of experts and partners from practice and research, each attended by approx. 40 participants.

→ In the framework of the research project “**Organizational Improvisation**”, creation of the website www.improvisation.science and organization of interviews with experts.

→ “**Transition, Innovation and Sustainability Environments (TISE)**”:
Students on the new Erasmus Mundus Joint Master of Science program gain an insight into findings from research into transformation processes. Core topics: Shaping social transformation processes, relevant couplings between human-nature-technology systems, their mechanisms and rebound effects, in addition to options for intervention.

Selected Publications

- Caniglia G, Zenk L, Schernhammer E, Bertau M, Steiner G, Kainz M, Jaeger C, Schlosser P, Laubichler M (2021). Scientists' Responsibility for Global Futures. *Science & Diplomacy*, 1: online, American Association for the Advancement of Science, Washington D.C.
- Höltl A, Steiner G, Lumetsberger T, Weinhäupl H, Greilhuber I, et.al. Ein Netzwerk für die Biodiversität in Österreich. *GAIA*, 2020; GAIAEA 29/2 73 – 136: 126-128.
- Shang D, Geissler B, Mew M, Satalkina L, Zenk L, et.al. Unconventional uranium in China's phosphate rock: Review and outlook. *Renewable and Sustainable Energy Reviews* 2021; 140: 2021.110740.
- Satalkina L, Steiner G. Digital Entrepreneurship and its Role in Innovation Systems: A Systematic Literature Review as a Basis for Future Research Avenues for Sustainable Transitions. *Sustainability* 2020; 12(7):2764.
- Steiner G, Risopoulos-Pichler F, Daghofer F. Competences for Solving Complex Problems: A Cross-Sectional Survey on Higher Education for Transformative Learning and Transdisciplinarity. *Sustainability* 2020; 12(15): 6016.
- Zenk L, Steiner G, Cunha MP, Laubichler M, Bertau M, Kainz M, Jäger C, Schernhammer E. Fast Response to Superspreading: Uncertainty and Complexity in the Context of COVID-19. *Int. J. Environ. Res. Public Health* 2020; 17: 7884.





Research activities of the departments for Legal Studies and International Relations, European Policy and the Study of Democracy, and the Research Lab Democracy and Society in Transition revolve around the two interdependent spheres of law and democracy. The topics covered include the globalization of business law, the private insurance industry and its dynamic development, intellectual property rights and laws pertaining to cultural heritage, law and the data economy, the institutional state of Europe, the role of the EU, the future of European democracy and the question of participation and representation of citizens in Europe as well as the current challenges posed by technical innovations, digitalization and social change.

Pictured

(f. l. t. r. & top down)

Gabriel M. Lentner
 Susanne Fraczek
 Clemens Appl
 Philipp Homar
 Lisa Jost
 Johannes Kerschbaumer
 Stefan Knotzer
 Arlinda Berisha
 Siegfried Fina
 Thomas Ratka
 Henning Deters
 Katharina Fritsch
 Michael Heber
 Sarah Meyer
 Ulrike Guérot
 Elisabeth Donat
 Michael Hunklinger
 Edma Ajanovic
 Simon Lenhart
 Peter Filzmaier
 Katrin Praprotnik
 Ernst Füllinger
 Christina Hainzl
 Daniela Ingruber
 Marc Grimm

Not Pictured

Patricia Oberluggauer

First-Time Voters in the Digital Age

The project Digitalizing Youth Politics analyzes the political participation of first-time voters. It examines the link between social media communication, mass media and civic participation, focusing on the potential of digitalization to expand the democratic space for young voters.

Today's first-time voters are digital natives, i. e., they grew up in the digital world. For this generation, social media use is something they take for granted which also influences their political socialization. The project examines how first-time voters participate in democratic processes, how they appropriate the public sphere and what potential social media has to widen the public participation. These questions are explored by focusing on three research areas: The digital lifeworlds and political participation of first-time voters; the online communication of political party actors with a focus on Twitter; and the communication of local mass media.

Starting Point for Research and Practice

These insights are of more than just regional relevance. They also provide an impetus for the use of digital media and e-platforms to enhance political participation by young people both at the local level and throughout Austria as a whole. The development of a digital brochure, for example, should awaken young citizens' interest in democratic processes and increase their willingness to engage with it. Decision-makers too, learn how digital infrastructure, e-participation and e-government can be made more inclusive.

The project at the interface of political science, e-governance, media and digital sociology, and social work, seeks to contribute to a better understanding of the relationship between young people and the political establishment in the digital age.

Digitalizing Youth Politics – Opportunities and Obstacles to Digitalization for Local Democratic Processes and Political Participation of Young People in Lower Austria – DYP

FUNDING

Gesellschaft für Forschungsförderung
 Niederösterreich m.b.H.

DURATION

2019–2021

DEPARTMENT

European Policy and the Study of Democracy

PROJECT LEAD

Edma Ajanovic

PARTICIPATING RESEARCHERS

Katharina Fritsch
 Ulrike Guérot
 Thomas Lampoltshammer
 Lörinc Thurnay

COORDINATION

University for Continuing Education Krems

PARTNER

St. Pölten University of Applied Sciences

Digitization in Healthcare

The Telemed Monitor Austria is an annual study conducted by the Research Lab Society in Transition. It attempts to trace the development of telemedicine services, to generate comparable data by repeating the study each year and to address current issues. Each year, a different thematic focus is chosen.

The Telemed Monitor seeks to examine the relationship between health and society, with a special emphasis on digitization. The Monitor also endeavors to point out perspectives for further development and areas in which specific (political) action is needed. In the first phase, Telemed Monitor Austria focuses on the perspective of the physicians; subsequently, the positions of the patients will also be taken into account. Health policy and the provision of health care to society are cross-sectional issues and require interdisciplinary and transdisciplinary approaches. This study therefore combines knowledge from the disciplines of political communication, sociology and medicine.

Identifying Current Challenges

Technological innovation and social change are closely related. How we communicate, treat and deal with illness and disease is changing constantly. With advancing digitalization, the question in many areas of life is not whether digital health services should be expanded but how they should be expanded and applied. The guidelines, standards and competencies this requires are still being developed and a social discourse on the limits of digital forms of care has yet to take place. The quantitative survey provides an up-to-date overview of the acceptance and use of

telemedicine services by physicians and also the challenges they face, while shedding light on the effect of the current framework conditions. This provides a basis from which recommendations for action can be made.

Telemed Monitor Austria

FUNDING
Self-funded

DURATION
From 2020

DEPARTMENT
Research Lab Democracy and Society in Transition

PROJECT LEAD
Christina Hainzl

PARTICIPATING RESEARCHER
Isabella Juen

COORDINATION
University for Continuing Education Krems

PARTNER
Austrian Medical Chamber

www.telemedmonitor.at

The Role of Regional Parliaments in the EU

The research project REGIOPARL explores EU related activities of regional parliaments and their role in the EU system of multi-level governance from the perspective of democratic theory. The project thus contributes to the current debate on the future of the EU. Workshops with parliamentarians and a participatory art project are used to initiate a dialog on the present and future of the EU.

The European integration process is transferring more and more competences to the EU. The fact that this has reduced the legislative competence and policy space of national parliaments within the EU is a topic of regular discussion, yet its impact on the regional level is barely mentioned. Although the latter has only little involvement in decision-making processes at the European level, it plays a mediating role in the implementation and application of European legal acts "on the ground". Due to their proximity to citizens, regional parliaments play an important role in respect of the acceptance and democratic legitimacy of European governance. The changing role of these parliaments in the context of the EU integration process is at the core of the project's research interest.

Research, Participation and Dialog

The project pursues three interrelated goals: The study makes an empirical-analytical contribution on the activities of regional parliaments in European affairs from a comparative perspective and assesses the role of regional parliaments in the EU multi-level governance system from the perspective of democratic theory. The second goal focuses on the project's participatory element, i. e. research

not just on, but also in interaction with relevant regional political actors. The third aspect aims at fostering the dialogue on Europe more broadly. Extensive science2public activities should be used to establish dialog between academia and politics, academia and art, and between academia and society, and to stimulate participation in the ongoing debate on the future of the EU. Parallel to this, the artwork Outer Space Transmitter invites people to approach Europe and life in the European Union from a personal perspective.

REGIOPARL | Regional Parliaments Lab

FUNDING
Forum Morgen

DURATION
2018–2022

DEPARTMENT
European Policy and the Study of Democracy

PROJECT LEAD
Sarah Meyer

PARTICIPATING RESEARCHERS
Henning Deters
Elisabeth Donat
Simon Lenhart

COORDINATION
University for Continuing Education Krems

PARTNERS
European School of Governance (EUSG) gGmbH (Germany)
Jagiellonian University in Kraków (Poland)
University of Tübingen (Germany)
WZB Social Science Center Berlin (Germany)

regioparl.com

Copyright from a Citizen's Perspective

In the INTER!ACT project, legal experts and social scientists collaborated with school pupils to set up a digital interaction platform. This was then used by representatives of all stakeholder groups – content creators, users, intermediaries – to discuss copyright and new model regulatory proposals. The comprehensive analysis of this discussion process produced valuable insights for the further development of approaches to copyright.

As digitalization made it easier for citizens to create their own content and access content from others, the practical importance of copyright has grown. Whereas in the past, it was a special-interest topic for publishing houses and media companies, it now affects citizens in all manner of ways. Yet despite this, their voice remains largely unheard in the legislative process. Nor do they have any opportunity to constructively contribute their own experiences and needs in the political and legislative consultation and negotiation processes. Evidence and feedback from members of the public provide valuable contributions that can be used to strengthen the acceptance of legislation by society as a whole.

Academically Supervised Exchange

The Top Citizen Science research project takes this citizens' perspective and examines which topics and challenges determine how citizens deal with copyright in their everyday personal and professional lives. The project also explores which aspects of copyright law have entered the public discourse and how they are evaluated. To do this, the transdisciplinary project pursues a citizen science

approach, in which citizens are integrated in the interdisciplinary research process at multiple levels. Project outcomes include specialist publications and lectures as well as a series of outreach activities, including presentations and workshops targeting a non-specialist audience. However, the main outcome is the interaction platform developed for the project, which forms the infrastructure for citizen participation, and which enables a comprehensive scientific analysis of the data obtained from the discussion.

INTER!ACT – Interactive Consensus-Based Development of a Copyright Model Act

FUNDING

Federal Ministry of Education, Science and Research (OeAD), Top Citizen Science

DURATION

2017–2021

DEPARTMENT

Legal Studies and International Relations

PROJECT LEAD

Clemens Appl

PARTICIPATING RESEARCHERS

Philipp Homar
Stefan Knotzer

COORDINATION

University for Continuing Education Krems

PARTNERS

HTL Krems
MM Webconsulting
TGM – Die Schule der Technik, HTBLuVA Vienna
Vienna University of Economics and Business

www.inter-act.at

Further Projects

→ Political Seismograph

The Austrian Democracy Lab studies democracy and attitudes to democracy in Austria. The main focus of the team's work is on democracy and constitution, direct democracy and participation, homo politicus, federalism and electoral law. The centerpiece of the project is the Democracy Radar, a large-scale representative survey that is carried out every six months. As political education is a key concern, a new political science textbook on democracy in Austria is being developed.

Austrian Democracy Lab (ADL)

Funding:

Forum Morgen

Project lead:

Christina Hainzl, Katrin Praprotnik

Participating researchers:

Marc Grimm, Daniela Ingruber, Patricia

Oberluggauer

Partner:

University of Graz

→ Improved Resolution of Legal Disputes in Austria and Ukraine

The aim of the project is to identify the main differences between the two legal systems and to compare their advantages and disadvantages by comparing the relevant provisions of Ukrainian and Austrian law, engaging in reciprocal exchange and by analyzing the practical realities in both countries on the basis of interviews with experts. The project will run from 2021 to 2023 and should produce recommendations for action or proposals for improvement in the fields of procedural, arbitration and mediation law to ensure efficient and accessible dispute resolution.

Funding:

OeAD, Agency for Education and Internationalisation

Project lead:

Gabriel M. Lentner, Department for Legal Studies and International Relations

Coordination:

University for Continuing Education Krems

Partner:

Taras Shevchenko National University of Kyiv

Knowledge Transfer & Dissemination Department for Legal Studies and International Relations

→ Organization of academic conferences:

5th Annual Conference on business and corporate law, 10/11 September 2020

→ 6th Krems Insurance Forum 2020:

10 November 2020

→ IP-DAY 2020:

22 September 2020

→ Museum + Recht 2020 – Online Symposium on "Original, Reproduction & Ownership"

12 November 2020

→ IT-Rechtstag 2020:

15 October 2020

→ Forum Wettbewerbsrecht 2020:

29 November 2020

→ Science-to-Public:

Cooperation between the Center for Intellectual Property, Media and Innovation Law and the Austrian Patent Office within the IP-Academy: Regular seminars on copyright

→ Additional lectures are held for start-ups within the framework of "AWS First" as are courses for pupils in cooperation with various schools (e.g. HTL Krems, TGM Wien)

→ Interview with Gabriel M. Lentner on the Ö1 radio program Radiokolleg on the "Roaring Twenties", broadcast on 28+29 December 2020, legal-history reflections on the Austrian Federal Constitution and on the League of Nations Loans.

Knowledge Transfer & Dissemination Department for European Policy and the Study of Democracy

→ Participation in numerous academic conferences and public discussion events as well as lectures by Ulrike Guérot, e.g., in Davos (Switzerland), in the Euronews Debates (24 January 2020)

→ Event to mark 25 years of Austrian EU membership held in the Austrian Parliament: 10 February 2020

→ “Die Post-Corona-Demokratie in Europa”: Wiener Vorlesungen, 2 April 2020

→ “Grenzen überwinden”: Panel Discussion organized by the Alois Mock Institut and the Federal Ministry for European and International Affairs (11 September 2020, Vienna)

→ Conference: “Europäisch Sein” from the series »Hamburger Horizonte«, Hamburg Institute for Advanced Study (HIAS) and the Körber-Stiftung (20 November 2020)

Knowledge Transfer & Dissemination Research Lab Democracy and Society in Transition

→ Participation in discussion events, e.g. the panel discussion “Jugend und Politik”, 2 March 2020, Linz

→ Online Media Summit 2020, Tel Aviv: “Generation Media Bridges - When the discourse gets nasty” (Anti-Semitism, Hate-Speech, Fake-News – Discussing the Official Definition of Anti-Semitism: Agreeing to Disagree?) on 9 September 2020, online

→ Politik Café of the University of Graz: Sport und Politik in Coronazeiten, 13 October 2020, Graz

→ Participation in the Dürnstein Symposium: “Familie ist alles? Politische Sozialisation junger Menschen”, 6 March 2020, Dürnstein

→ Participation in the Danube Conference “Post-Corona in the Danube Region: Possible Challenges and Chances for Youth, Culture, Media and Civil Society”, 11 November 2020

→ Participation in the fall conference of the Deutsche Vereinigung für Politische Bildung e.V.: “Affekte als vernachlässigte Kategorie der Politischen Bildung gegen Antisemitismus”, 13 November 2020, online

Selected Publications Department for Legal Studies and International Relations

- Appl C (2020). Mashups, Remixes, Sampling und Co: Abhängiges Werkschaffen in der Tonkunst aus urheberrechtlicher Sicht. *ipCompetence*, 24: 12-23.
- Appl C (2020). Revision harmonisierter Normen – Grenzen der Herabsetzung von Sicherheitsstandards. *Zeitschrift für Energie und Technikrecht (ZTR)*, 3: 141-148.
- Berisha A, Reisinger W (2020). *Verträge des Versicherungsrechts*, Verlag Linde, Wien.
- Homar P (2020). Die Anwendung der Speichermedienvergütung auf Cloud Storages. *ÖBI – Österreichische Blätter für Gewerblichen Rechtsschutz und Urheberrecht*, 2: 52.
- Lentner G M. *Bridgestone v Panama: When Are Trademarks Covered Investments?* *ICSID Review*, 2020; 34(3): 569-576.
- Lentner G M (2020). Investor-State Dispute Settlement and the Relationship between IP and Investment Chapters in Free Trade Agreements. *Stanford Transatlantic Technology Law Forum Working Paper*, 50: 1.
- Ratka T (2020). Kommentierung der Einführung (Co-Autor Straube M) § 5, § 15 (Co-Autoren Straube M, Stöger K, Völkl C), § 15a, § 16 (Co-Autor Straube M), § 16a. Straube M, Ratka T, Rauter R (eds.) *Wiener Kommentar zum GmbHG*, Verlag Manz, Wien.
- Ratka T (2020). *Gesellschaftsrechtlicher Missbrauch*. Kalss S, Bergmann S (eds.): *Handbuch Rechtsformwahl*: 133-168, Verlag Österreich, Wien.

Department for European Policy and the Study of Democracy

- Mayer S, Ajanovic E, Sauer B (2020). Man, Woman, Family. Gender and the Limited Modernization of Right-Wing Extremism in Austria. In: Dietze G, Roth J (ed.) *Right-Wing Populism and Gender*: 101-116, Transcript, Bielefeld.
- Donat E, Meyer S, Abels G (2020). *European Regions Perspectives, Trends and Developments in the 21st Century*. Transcript, Bielefeld.
- Guérot U (2020). *Nichts wird so bleiben wie es war? Europa nach der Krise*. Molden, Wien.
- Guérot U (2020). *Perspektiven für Europa und seine Demokratie(n) nach Corona*. In: Volkmer M, Werner K (Hrsg.) *Die Corona-Gesellschaft Analysen zur Lage und Perspektiven für die Zukunft*: 289-300, transcript, Bielefeld.
- Guérot U (2020). *Lackmustest für die Europäische Solidarität*. In: *Wiener Vorlesungen, Protokolle der Krise - Wie Corona unser Leben verändert*: 17-45, Picus Verlag Wien, Wien.
- Guérot U, Hunklinger M. *European Democracy after Covid-19*. *Journal Democratic Theorie*, 2020; 7/2: 160-165, Berghahn.
- Hunklinger M, Ferch N. *Trans* voting – Demand and Supply Side of Trans* Politics in Germany*. *European Journal of Politics and Gender*, 2020; 3/3: 389-408

Research Lab Democracy and Society in Transition

- Filzmaier P (2020). *Strategische Kommunikation in der Politik*. In: Fähnrich B, Holenweger M (eds.) *Anwendungsgebiete und Grundlagen von Strategischer Kommunikation*, 175-196, Nomos, Baden-Baden
- Filzmaier P (2020). *Sichtweisen von Sicherheit in Österreich. Eine Einführung*. In: *Bundesministerium für Landesverteidigung (ed.) Sicher. Und morgen? Sicherheitspolitische Vorschau 2020*, 8-24, Amtliche Publikation der Republik Österreich, Wien
- Furlinger E (2020). *Schwierige Ankunft. Ein historischer Abriss des Moscheebaus in Österreich*. In: *Kunst und Kirche. Magazin für Kritik, Ästhetik und Religion* 83 (3), 20-27.
- Hermann A, Ingruber D, Perlot F, Praprotnik K, Hainzl C (eds.) (2020). *regional.national.föederal. Zur Beziehung Politischer Ebenen in Österreich*. *Facultas*, Wien.
- Grimm M (2020). *Philosemitismus als Kampfbegriff*. In: *Dachs G (ed.) Jüdischer Almanach Freundschaften Feindschaften – Essays*, 143-153, Suhrkamp, Frankfurt a.M.
- Perlot F, Hermann A, Praprotnik K, Ingruber D, Hainzl C (2020). *Democracy Radar Wave 1 (SUF edition)*.
- Praprotnik K, Perlot F. *Discontent as Motivation. Why People Engage with the Democratic Process*. *Human Affairs*, 2020; 30 (3), 449-467.



The global environmental challenges of today are the motivation behind the highly international research performed at the Department for Integrated Sensor Systems. The key issues here are energy / resource efficiency, and the economical use of raw materials and water as a vital resource. Programs such as the European Union's Green Deal rely on sensor solutions to save energy in the mobility, manufacturing and housing sectors; likewise, substitution for scarce and rare magnetic materials or a reduction in their use—catchword: rare earths in e-mobility—as well as sensor technology for clean water. Important ongoing research topics thus include sensor / sensor network developments, artificial intelligence in materials development, building automation and production monitoring, as well as to water analysis methods.

Pictured
(f. l. t. r. & top down)

Thomas Bigler
Albert Treytl
Gerald Franzl
Almir Talic
Hubert Brückl
Thilo Sauter
Wilfried Hortschitz
Leoni Breth
Andreas Kainz
Matthias Kahr
Martin Brandl
Sylvia Schneider
Karlheinz Kellner
Lakshmi Devi Chakkarapani
Thomas Posniecek
Markus Gusenbauer
Johann Fischbacher
Markus Hovorka
Thomas Schrefl
Harald Özelt
Alexander Kovacs

Not Pictured

Roman Beigelbeck
Samir Cerimovic
Anja Knecht

Christian Doppler Laboratory for Magnet Design

High-performance magnets play a crucial role in green technologies such as sustainable energy generation and clean transportation. As such, climate policy has an impact on the demand for critical materials. Addressing the risk of rare earth supply, magnets are being developed that dispense with heavy rare earth elements such as terbium and dysprosium and have a reduced neodymium content.

Permanent magnets are a key technology in modern society. They have become an indispensable part of everyday life in sound transducers, air conditioners, electric bicycles, wind turbines, hybrid and electric cars, and hard disk drives. Furthermore, green technology applications, for example in the fields of energy generation and mobility, are driving demand for permanent magnets even higher. To meet this increase, the project aims to develop low-cost magnets without critical elements.

In the field of materials development and design, the newly founded CD Laboratory focuses on artificial intelligence and related topics such as machine learning, neural networks and big data, topics of high relevance for the European research area. Here, fresh knowledge is generated and young researchers have the benefit to learn how to use these technologies. Alongside the development of new magnet designs, machine learning methods are likewise under development.

Simulation of the magnetic fields

Computer-aided magnet design is to be supported with machine learning methods by integrating physical models across all relevant length scales. The Department for Integrated Sensor Systems has developed a software package for this purpose. By using the computational power of many computers working at the same time, studying magnetization pro-

cesses based on the smallest magnetic units, the core-shell grains, is made possible. Their properties are extrapolated to the level of the entire magnet by machine learning. Researchers use these micromagnetic simulations to calculate the opposing field strength required for demagnetization, the coercivity. These data are fed into a regression model. This links the coercive field of a grain with its size and shape as well as with the rare earth content.

Christian Doppler Research Laboratory for Magnet Design Through Physics Informed Machine Learning – MagLearn

FUNDING

Christian Doppler Research Association, Federal Ministry for Digital and Economic Affairs

DURATION

2020–2027

DEPARTMENT

Integrated Sensor Systems

PROJECT LEAD

Thomas Schrefl

PARTICIPATING RESEARCHERS

Johann Fischbacher
Markus Gusenbauer
Markus Hovorka
Alexander Kovacs

COORDINATION

University for Continuing Education Krems

PARTNERS

National Institute of Advanced Industrial Science and Technology – AIST (Japan)
Toyota Motor Corporation (Japan)
University of Tokyo, Institute for Solid State Physics (Japan)
Wolfgang Pauli Institute Vienna (Austria)

Qualification for the Urban Planning of Tomorrow

To be sustainable, a city needs solutions to face up to the challenges of climate change and social justice. With this in mind, the universities, architects, planners and developers contributing to this project are developing joint qualification measures that will allow entire parts of a city to be designed as sustainable digital “PlusEnergy” quarters with high living quality.

In the EU, buildings account for some two fifths of energy consumption and 36 percent of CO₂ emissions. This shows that it is possible to provide major impetus for the climate by stepping up energy efficiency and a sparing use of resources, both in new building and through the renovation and revitalization of old building stock. One approach here involves PlusEnergy Quarters (PEQs), which are designed with a positive annual energy balance and rely on renewable energy with a high degree of efficiency. A PEQ consists of multiple buildings which create synergies through mixed use. PEQs are to also offer affordable housing through their high levels of economic efficiency, so making an important contribution to social cohesion.

PEQs in Theory and Practice

The DigiPEQ project is devoted to the interdisciplinary transfer of research findings and practical knowledge between universities and partners from business through research-led teaching and the inclusion of practical know-how. It aims to develop qualification measures with a focus on fundamentals, system boundaries and framework conditions for digital PEQs worth living in, in addition to establishing replicable planning and man-

agement processes of PEQs. The orientation to users is noticeable here in the focus on sustainable cooperation/business models and in the innovative digital technologies for integrated energy systems.

The new content is incorporated in selected Master’s study programs. Tailoring them to the relevant target groups results in a major improvement in applicability and practical suitability.

Build-up of skills for sustainable development and realization of congenial digital PlusEnergy Quarters – DigiPEQ

FUNDING

FFG – Austrian Research Promotion Agency

DURATION

2020–2022

DEPARTMENTS

Integrated Sensor Systems
Building and Environment

PROJECT LEAD

Albert Treytl

PARTICIPATING RESEARCHERS

Helmut Floegl
Christina Ipser
Gregor Radinger
Thilo Sauter
Wolfgang Stumpf
Daniela Trauninger

COORDINATION

University of Applied Sciences Technikum Wien

PARTNERS

29 partner institutions from science and practice

Computer-Aided Maintenance Strategies

Predicting the remaining service life of rolling bearings in different production machines using artificial intelligence (AI) improves the scheduling of costly stoppages for bearing replacement and permits a reduction in stock levels. This project generates synthetic data for failure scenarios of machinery by means of a specific numerical method, namely from finite element simulations. The resulting data is combined with the learning algorithms of the artificial intelligence models.

In an age of tightly timed production chains, just short breakdowns can incur major costs. For this reason, plants mainly rely on "preventive maintenance", i. e. replacing rolling bearings that are still intact in advance to avoid unplanned failures and stoppages in production. Predicting the service life of components using AI makes it possible to pre-plan maintenance activities. The optimized use of wear parts is easy on both resources and the environment while boosting productivity.

Synthetic Instead of Experimental Data

To be able to determine the remaining service life of rolling bearings, the damaged component of the bearing needs to be identified by artificial intelligence. While damage to the outer ring generally causes a slowly worsening defect, damage to the bearing cage will bring about failure far sooner. An extensive data set is required for AI learning. The project therefore also investigates whether synthetic simulation data can be used for this purpose. As the generation of such data by purely experimental means presents an immense challenge due to the large number of rolling

bearings in use, the application of synthetically acquired data would greatly simplify the process. Rolling bearings are simulated here according to a specific numerical method in finite element models, defects incorporated systematically and the frequency-dependent emission of acoustic waves in the bearing then recorded during rotation.

Artificial Intelligence for Ultrasonic Measurements to Predict Rolling Bearing Failures

FUNDING

FFG – Austrian Research Promotion Agency

DURATION

2020–2022

DEPARTMENT

Integrated Sensor Systems

PROJECT LEAD

Hubert Brückl

PARTICIPATING RESEARCHER

Matthias Kahr

COORDINATION

Senzoro GmbH

Energy Communities as Regional Partners

The aim of the project is to tap unused flexibilities in energy communities with a cellular organization to enable an increased use of renewable energy sources in the distribution network. By using data-driven analysis and neural forecasting models, balancing mechanisms are to be automatically activated at different network levels, so coordinating production, storage and consumption.

As photovoltaic systems become increasingly widespread, and ever more surplus electricity is fed into the power grid, there is a growing risk that transformers and lines connecting a group of consumers to a higher network level then become overloaded. The existing power grid was not originally designed for the major fluctuations in renewable energy production. One solution is to bring consumers together into energy communities in which energy generation and consumption are internally balanced and optimized. By applying adaptive algorithms for the operation of energy communities and increasing the domestic consumption rate, the project makes a key contribution to achieving the objectives of the EU's Green Deal and planned decarbonization of the energy sector.

Modeling with Real Data

One of the questions explored by the project is how great the optimization potential of such communities is. This involves the creation of energy community models with real data and structures. Different scenarios are simulated with these models and algorithms for control evaluated with the partial inclusion of real data.

The Department for Integrated Sensor Systems contributes expertise in distributed control systems. The main tasks here are the development of use cases, the definition of interfaces and implementation of control concepts to optimize the energy flow in energy communities for the benefit of participants while supporting the power network to avoid supply bottlenecks at a local level.

cFlex – Community Flexibility in Regional and Local Energy Systems

FUNDING

FFG Austrian Research Promotion Agency

DURATION

2019–2022

DEPARTMENT

Integrated Sensor Systems

PROJECT LEAD

Thilo Sauter

PARTICIPATING RESEARCHERS

Gerald Franzl
Albert Treytl

COORDINATION

Technical University of Vienna

PARTNERS

Nymea GmbH
PowerSolution Energieberatung GmbH
SOLAVOLTA Energie- und Umwelttechnik GmbH
Sonnenplatz Großschönau GmbH
Spotty Smart Energy Partner GmbH
Associated partner: E-Control

Knowledge Transfer & Dissemination

→ 59 publications in peer-reviewed journals, in 32 conference papers and in 21 invited lectures:

The Department for Integrated Sensor Systems has presented its research results from 2019/2020 to the scientific community in 59 publications in peer-reviewed journals, in 32 conference papers and in 21 invited lectures.

→ Special tributes were paid to this research in the form of several awards, incl. nomination of the project "Unconventional Spin Topology for Magnetic Field Sensors in the Automobile", Hubert Brückl, for the Houska Prize in the category "University Research" (See also Facts & Figures/Science Prizes, page 129)

→ The contribution "The Future of Industrial Communication – Automation Networks in the Era of the Internet of Things and Industry 4.0" (M. Wollschlaeger, T. Sauter, and J. Jasperneite, IEEE Industrial Electronics Magazine, vol.11, no.1, 2017) was listed as a Hot Paper in the Web of Science.

→ The Department acted as (co-)organizer of ETFA 2020 (Conference on Emerging Technologies and Factory Automation) and of WFCS 2019 (IEEE International Conference on Factory Communication Systems).Systems).

Selected Publications

- Ahmad I, Shahabuddin S, Malik H, Harjula E, Leppänen T, Lovén L, Anttonen A, Sodhro A H, Alam M, Juntti M, Yla-Jaaski A, Sauter T, Gurtov A, Ylianttila M, Riekkilä J (2020). Machine Learning Meets Communication Networks: Current Trends and Future Challenges. IEEE Access, 8, 223418
- Gusenbauer G, Oezelt H, Fischbacher J, Kovacs A, Zhao P, Woodcock T G, Schrefl T (2020). Extracting local switching fields in permanent magnets using machine learning. npj Computational Materials, 6, 89
- Kovacs A, Fischbacher J, Gusenbauer M, Oezelt H, Herper H C, Vekilova O Y, Nieves P, Arapan S, Schrefl T (2020). Computational design of rare-earth reduced permanent magnets. Engineering, 6, 148
- Jasperneite J, Sauter T, Wollschlaeger M (2020). Why We Need Automation Models: Handling Complexity in Industry 4.0 and the Internet of Things. IEEE Industrial Electronics Magazine, 14(1), 29-40
- Schrittwieser S, Haslinger M J, Mitteramskogler T, Mühlberger M, Shoshi A, Brückl H, Bauch M, Dimopoulos T, Schmid B, Schotter J (2019). Multifunctional nanostructures and nanopocket particles fabricated by nanoimprint lithography. Nanomaterials, 9, 1790
- Treytl A, Huber E, Sauter T, Kieseberg P (2020). Securing Home Automation Systems against Sensor Manipulation. ERCIM News, 122, 57-58
- Wurft T, Raberg W, Prügl K, Satz A, Reiss G, Brueckl H (2019). Evolution of magnetic vortex formation in micron-sized disks. Applied Physics Letters, 115, 132407



Societies are shaped by migration in multiple ways: not only demographically, economically, socially and politically, but also in terms of culture and religion. Conversely, migration itself is influenced by broader social processes such as globalization, aging, climate change or digitalization. Migration is thus at once a driving force and an expression of wider transformation processes in society. The research carried out by the department investigates these relationships, focusing on three interlinked topics: firstly, the integration of migrants and impact of migration on social cohesion and inequality, the job market, health, education, diaspora and youth; secondly, causes of migration and transnational processes with a substantive focus on dynamic interdependencies of migration, globalization, development and conflicts; and thirdly, migration policy and governance of migration and integration, focusing on immigration / integration policy, policy on asylum-seekers and refugees and measures for their return.

Pictured
(f. l. t. r. & top down)
Anna Faustmann
Heidrun Bohnet
Lydia Theresia Rössl
Mathias Czaika
Friedrich Altenburg
Federica Zardo
Albert Kraler

Future Scenarios of European Migration

Migration is a phenomenon characterized by numerous uncertainties. Policy must take account of this in order to control the complex processes and interactions between the different types of migratory flows, whether voluntary or forced. A comprehensive quantitative method set allows migration processes to be analyzed and explanations developed for current migration, and estimates produced for future levels.

Dealing with migration has now become a key issue of European policy. If we are to find appropriate responses, it is first necessary to arrive at a better understanding of the starting position. The QuantMig project investigates what migration drivers will play a significant role in 21st century Europe. When generating scenarios, the aim is to reflect the complexity of these drivers and the associated uncertainties. At a practical level, the project deals with the question of how to improve and harmonize migration data in Europe.

Managing Uncertainties

The QuantMig project is unique for its integrated approach to analyzing the uncertainties of migration, as it incorporates both the conceptual and theoretical levels and uses statistical modeling for scenarios and simulations. The project examines migratory processes at multiple analytical levels, from the individual – the decisions taken by the individual – to processes at macro level, which are then brought together in the resulting simulations and forecasts.

The results will supply tools for dealing with the uncertainties of future migration, from short-term operational responses to long-term strategic planning.

Quantifying Migration Scenarios for Better Policy – QuantMig

FUNDING

EU – Horizon 2020

DURATION

2020–2023

DEPARTMENT

Migration and Globalization

PROJECT LEAD

Mathias Czaika

PARTICIPATING RESEARCHERS

Heidrun Bohnet
Simona Schreier
Lucas Skrabal
Akira Soto-Nishimura
Federica Zardo

COORDINATION

University of Southampton (UK)

PARTNERS

International Institute for Applied Systems Analysis – IIASA
Max-Planck-Gesellschaft zur Förderung der Wissenschaften e. V.
Netherlands Interdisciplinary Demographic Institute – KNAW (Netherlands)
Peace Research Institute Oslo (Norway)
University of Oslo (Norway)

Bundled Integration Knowledge for Practice

The SPRING project takes stock of knowledge on integration policies, collects systematic information on integration practices, and promotes new approaches to evaluation and learning, engaging both with academic experts on integration and communities of practice on integration, including policy makers.

The arrival of large numbers of refugees and other migrants in 2015 and the politicization of migration as a consequence thereof represented a turning point, the effects of which on different social spheres are still making themselves felt today. One consequence of the events in 2015 is investment in both practical measures for the integration of newly arrived migrants and in the study of their integration and the impact of the measures taken. The sheer volume of practical and scientific knowledge calls for synthesis of the acquired findings and structures to make accessible relevant, often highly localized knowledge, and to promote the exchange of knowledge and learning beyond different political levels, countries and languages.

Best Practices and Evaluation

The project will provide the various stakeholder groups with relevant knowledge. The aim is to improve the competencies of the stakeholders regarding the integration of migrants, as well as the ability of stakeholders to reflect on and evaluate their own procedures themselves. To this end, Best Practices are collected and presented on an online portal and practitioners provided with tools to show how such practices from specific national, regional or local contexts might be translated to their own sphere. A manual of

integration policy procedures for newly arrived migrants is likewise planned, as well as an evaluation toolkit which enables the impact of integration efforts to be measured.

Sustainable Practices of INteGration – SPRING

FUNDING

EU – Horizon 2020

DURATION

2021–2023

DEPARTMENT

Migration and Globalization

PROJECT LEAD

Albert Kraler

PARTICIPATING RESEARCHERS

Hakan Kilic
Lydia Theresia Rössl
Isabella Skrivaneck
Manfred Zentner

COORDINATION

ISMU Foundation – Foundation for Initiatives and Studies on Multi-Ethnicity (Italy)

PARTNERS

Erasmus University Rotterdam (Netherlands)
Migration Policy Institute Europe (Belgium)
International Catholic Migration Commission Europe VZW (Belgium)
International Centre for Migration Policy Development – ICMPD (Austria)
Migration Policy Group – MPG (Belgium)
SOLIDAR (Belgium)
YOUNGMINDS SRL (Romania)

Access Services to Rights for Migrants

Through the development and use of intelligent technologies, the project aims to make it easier for migrants to access services to which they are entitled and to extend their understanding of their rights. easyRights is under development and in use in Birmingham, Larissa, Palermo and Málaga. The intention is for migrants to become more autonomous, so not only saving themselves and public service-providers time, but also cutting costs and effort for administrative agencies.

State administration procedures present even many citizens with challenges due to the legal terminology and complex processes involved. For migrants, who neither speak the language, nor are sufficiently familiar with the practices of their host country it is generally even more difficult to exercise their rights. In consequence, the majority of social services, from social housing through public healthcare to language courses, then prove to be inaccessible. The easyRights project sees such services as interfaces to these rights and thus, subsequently, as a key factor for the social participation of immigrants.

Better Procedures and Digital Support

Fundamental barriers confronting immigrants seeking to access social services and the complex procedures they face in the process are analyzed with the targeted employment of all relevant actors and stakeholders involved in the development and dissemination of the easyRights services, e.g., service-providers, public administrative agencies, their staff and migrants. Digital solutions and add-ons for services offered by the pilot cities are developed in a continuous co-creation/co-design process, with the aim of supporting implementation of, and access to, services and helping migrants to exercise their rights. In addition, further work is underway on developing a web-based platform and mobile apps to assist migrants with acquiring language

and communication skills and to improve their understanding of the framework and procedures involved in the relevant bureaucratic systems. This approach is focused on the users and their individual capabilities and characteristics.

Enabling Immigrants to Easily Know and Exercise their Rights – easyRights

FUNDING

EU – Horizon 2020

DURATION

2020–2022

DEPARTMENT

Migration and Globalization

PROJECT LEAD

Lydia Rössl

PARTICIPATING RESEARCHERS

Christina Khoury
Federica Zardo

COORDINATION

Politecnico di Milano – POLIMI (Italy)

PARTNERS

21c Consultancy Limited (UK)
Aalborg University (Denmark)
BIC Euronova SA (Spain)
Birmingham City Council (UK)
Capeesh (Norway)
Charstar International Inc (USA)
Institute of Entrepreneurship Development – iED (Greece)
Larissa (Greece)
LINKS Foundation – Leading Innovation & Knowledge for Society (Italy)
Norwegian University of Science and Technology – NTNU (Norway)
Palermo (Italy)
University of Thessaly (Greece)

Further Projects

→ How Migration Policy Works at Local Level

Whole-COMM analyzes the integration of post-2014 migrants in small to medium-sized towns and rural areas. This project examines communities from a holistic perspective and by means of a systematic comparative study across different countries and localities. The aim is to acquire scientific findings on the dynamics and mechanisms involved in the interaction between integration policy and social cohesion and fragmentation at local level, so making a contribution to political debate.

Funding:

EU – Horizon 2020

Project lead:

Albert Kraler

Coordination:

Collegio Carlo Alberto (Italy)

→ Aligning Migration Management and the Migration-Development Nexus

The management of migration and the interactions between migration and development are the subject of the ongoing research under the MIGNEX project. MIGNEX is driven by one overarching objective: Contribute to more effective and coherent migration management through evidence-based understanding of the linkages between development and migration. Fieldwork is underway in ten home and transit countries as the foundation for in-depth analyses, for example to better identify the role of the EU in migration and the effectiveness of its approach in collaborating with third countries. Through an evidence-based understanding of these interdependencies, it is hoped that the management of migration can be made more coherent and thus effective.

Funding:

EU – Horizon 2020

Project lead:

Mathias Czaika

Coordination:

Peace Research Institute Oslo – PRIO (Norway)

Knowledge Transfer & Dissemination

Science-to-public:

→ Dialogforum Migration and Integration:

In 2020 and 2021 the Department for Migration and Globalization is once again holding the Dialogforum Migration and Integration, set up in 2010, as an important platform for the dissemination of knowledge and exchanges between scientists, politicians and practitioners.

→ Events in the framework of Dialogforum for exchanges with practitioners (virtual and in person):

“Between School and Family – Offers for Female Adolescents” (September 29, 2020, Graz), Discussion of Aspects of Migration; “Lifeworld Education – Challenges for Adolescents with a Migrant Background” (October 15, 2020, Innsbruck); topic Migrant Entrepreneurship, Exchanges between Care Facilities and Counselors, event in Krems (November 3–4, 2020)

→ Symposium Dürnstein:

The department acts on behalf of the University for Continuing Education Krems as a cooperation partner for the annual platform concerning issues such as migration.

→ OSCE manual:

After more than ten years, it was time to update the “Handbook for Labour Migration”, and this task was taken on by the department, which also digitized the manual. It is used by decision-makers as a sound basis for controlling labor migration in countries of origin and destination.

Science-to-science:

→ Hosting the Faculty Talk of the University for Continuing Education Krems, topic “Arab Spring, 10 Years On”, June 29, 2020

→ International Research seminars:

“Emigration in South-Eastern Europe – Is the region losing its future?” (November 20, 2020); “Internally Displaced Persons and International Refugee Law” (February 12, 2021)

Selected Publications

→ Adovor E, Czaika M, Docquier F, Moullan Y. Medical brain drain: How many, where and why? *Journal of Health Economics* 2021; 76, March 2021, 102409. doi.org/10.1016/j.jhealeco.2020.102409.

→ Biffl G, Martin Ph (2020). Integrating Low-Skilled Migrants in the Digital Age: European and US Experience, university press “Edition Donau-Universität Krems”, Krems.

→ Czaika M (2020). National Migration Policy: Nature, Patterns and Effects. In: Bastia T, Skeldon R (Eds.) *Routledge Handbook of Migration and Development*: 298-309, Routledge, London.

→ Czaika M, Kraler A (2020). Refugees. In: Stone J, Dennis R, Rizova P, Hou X (Eds.) *The Wiley Blackwell Companion to Race, Ethnicity, and Nationalism*, pp. 321-348, Wiley Blackwell, Hoboken, NJ.

→ Natter K, Czaika M, de Haas H. Political party ideology and immigration policy reform: an empirical enquiry. *Political Research Exchange*, 2020;2 (1): doi.org/10.1080/2474736X.2020.1735255.

→ Kraler A, Katsiaficas C, Wagner M (2020). Climate Change and Migration. Legal and policy challenges and responses to environmentally induced migration, EU Parliament, Brussels: [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/655591/IPOL_STU\(2020\)655591_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/655591/IPOL_STU(2020)655591_EN.pdf)

→ Hynek N, Franczukowska A, Rössl L, Schreder G, Faustmann A, Krczal E, Skrivanek I, Sommer I, Zenk L. A System Model of Post-Migration Risk Factors Affecting the Mental Health of Unaccompanied Minor Refugees in Austria — A Multi-Step Modeling Process Involving Expert Knowledge from Science and Practice. *International Journal of Environmental Research and Public Health* 2020;17(14):5058. doi.org/10.3390/ijerph17145058



The PhD program Migration Studies contributes to ensuring an improved understanding of issues relating to migration. It examines the backgrounds and drivers of migration, the challenges facing emigration and immigration countries, as well as the significance of integration measures to ensure social cohesion and quality of life. In the following ongoing PhD projects are presented.

Pictured

(f. l. t. r. & top down)

Gabriele De Luca
Manfred Zentner
Dino Pitoski, MSc MBA
Margarita Fourer
Hakan Kilic
Safi Ali Ahmad
Akira Soto-Nishimura
Simona Janine Schreier

Not Pictured

Shaddin Almasri
Christina Khoury
Isabella Skrivaneck
Zina Weisner

→ Afghan Diaspora in Europe: The Agents of Peace and Development

Name: Safi Ali Ahmad (ongoing)

Title of Dissertation: Afghan Diaspora in Europe: The Agents of Peace and Development

Description of Project: Afghan migration over the last forty years can be attributed to invasions, civil war and the rule of the hardline Taliban government. This gave rise to a large number of Afghan diaspora communities and transnational organizations in many European countries. The project examines the manner in which the diaspora organizations and their members play a part in the development of their "home country".

Funding: Gesellschaft für Forschungsförderung Niederösterreich m.b.H.

→ Measures for a More Successful Social Integration of Young Syrian Refugees Into Host Societies: A Comparative Study of the Social Integration and Sense of Belonging of Young Syrian Refugees in Austria

Name: Christina Khoury (ongoing)

Title of Dissertation: Measures of a More Successful Social Integration of Young Syrian Refugees in Austria

Description of Project: This project examines the social integration of young Syrian refugees in Austria. Different perspectives of social integration are covered in three subprojects, which examine the effects of social integration on mental wellbeing and the role of musical activities to further social integration. In addition, the policy and practices of European governments in influencing the social integration of refugees is also analyzed.

Funding: Gesellschaft für Forschungsförderung Niederösterreich m.b.H.

→ Return and Reintegration Processes: a Focus on Nigeria

Name: Simona Janine Schreier (ongoing)

Title of Dissertation: From Returning Back to Reintegration? A Focus on Nigeria

Description of Project: The assisted voluntary return of migrants is ever-present in politics, as it is one of the attempts to reduce irregular migration. To obtain deeper insights into the concept of return and reintegration, this project examines the special national features and general procedures existing between Austria and Nigeria as the country of origin of migrants in relation to their return and reintegration.

Funding: Gesellschaft für Forschungsförderung Niederösterreich m.b.H.

→ Quantifying Migration Scenarios for Better Policy?

Name: Akira Soto-Nishimura (ongoing)

Title of Dissertation: Connecting (anti-)Immigrant Attitude to Migration Policy, Internal Migration, and International Migration

Description of Project: This project is devoted to the effect of the attitude (hostile to immigration) on policy and internal and outward migration. It examines the feedback effect between policy and attitude, domestic migration as a response to the influx of international migrants, and the impact of the attitude on the immigration of different categories of migrants.

Funding: EU – Horizon 2020

→ The Significance of Extra-Curricular Activities for the Integration of Adolescents with a Migrant Background

Name: Manfred Zentner (ongoing)

Title of Dissertation: The Role and the Impact of the Third Sector – Especially of Extra-Curricular Youth Work – for the Integration of Migrants in the Society

Description of Project: The integration of children and adolescents does not just take place in the setting of school and vocational training, but to a major extent also in the extra-curricular environment. The aim of this project is to explore the role of extra-curricular offers in individual integration processes from a retrospective and perspective stance, as well as the integrative function of relevant organizations and facilities.

Funding: Gesellschaft für Forschungsförderung Niederösterreich m.b.H.

→ Labour market integration of refugees in welfare states: Austria in international comparison

Name: Isabella Skrivanek (ongoing)

Title of Dissertation: Refugees and their impact on integration and welfare systems. Lessons from Austria.

Description of Project: While integration policy has evolved as a field of public action and policy in many European states, its features and scope differ between states. The present dissertation project considers the integration measures that have evolved for refugees in Austria since 2015 as a starting point to examine the complex structures and interactions between different levels of governance, policy areas and actors. It analyses when, how and why integration policy represents a new distinct policy field in Austria, focuses on the specific role of federal states in this regard, and discusses implications of these developments for the Austrian welfare state model.

Funding: Anniversary Fund of the Oesterreichische Nationalbank, 2016–2019

→ PhD Migration and Social Peace – Interdisciplinary Environmental Research in the Framework of the PhD Program “Migration Studies” by selected students

Name: Margarita Fourer (ongoing)

Title of Dissertation: Effect of Offshore Processing Arrangements on Receiving States

Description of the Project: The project contributes to the understanding of the impact externalisation policies have not only on the asylum seekers and refugees themselves, but also on the political and legal development of states hosting, processing and settling the refugee. Beyond the national, the project delves into the effect of these policies on the host communities.

Funding: Asylum, Migration and Integration Fund – Federal Ministry of Internal Affairs (BMI)

→ PhD Migration and Social Peace – Interdisciplinary Environmental Research in the Framework of the PhD Program “Migration Studies” by selected students

Name: Dino Pitoski (ongoing)

Title of Dissertation: The Complex Network of Human Migration: Inputs for European Migration Policies

Description of Project: The project contributes to the efficient control of European migratory flows and the further development of a joint European asylum policy. To this end, teaching and education are combined with transdisciplinary research in order to improve the decision-making basis for stakeholders. The target groups of this project are the government agencies, political decision-makers, scientists, as well as civil society.

Funding: Asylum, Migration and Integration Fund – Federal Ministry of the Interior (BMI)

→ Smart Migration and Asylum Governance

Name: Shaddin Almasri (ongoing)

Title of Dissertation: Refugee Inclusion — for Whom? The Political Economy of Nationality-Based Refugee Aid and Inclusion Policy

Description of the Project: This research explores the recent history behind international cooperation on the issuance of refugee aid. It critically analyzes how problems arise for refugees in host countries as these aid structures often determined specific nationalities of refugees as beneficiaries of support, inclusion and protection policies, leaving unconsidered populations excluded from these support mechanisms. This will look at both historical events and recent cases with a focus on aid compacts in Jordan, Ethiopia and Turkey. This project will contribute a new understanding of these often criticized aid deals by considering the impacts they have had on populations that were excluded from these deals and the policies and practices that followed.

Funding: Federal Ministry of Internal Affairs (BMI)

→ Smart Migration and Asylum Governance

Name: Gabriele De Luca (ongoing)

Title of Dissertation: Assessing Extraterritorial Interventions on the Basis of Agent-Based Modelling

Description of the Project: The focus of the PhD research is on migration policy interventions “upstream” that are measured in or by countries of origin and transit. It also studies how such measures impact on migration decisions and what this implies for the design of effective governance and cooperation. The methodology through which the research is implemented is agent-based modeling for social sciences.

Funding: Federal Ministry of the Interior (BMI)

→ Smart Migration and Asylum Governance

Name: Zina Weisner (ongoing)

Title of Dissertation: The Migration-Development-Security Complex from a Multi-Level Governance Perspective

Description of Project: The project aims to contribute to a better understanding of the effects of political measures in the area of migration and asylum policy. It specifically examines local impacts and repercussions of EU external migration governance on migrant and refugee protection. Specific case studies include the practices and policies of the European border regime, as well as the implications of EU aid (“root cause”) policies for managing migration in third countries.

Funding: Federal Ministry of the Interior (BMI)



One of today's major challenges is filtering out facts and trustworthy knowledge from the flood of information available. Sound health decisions, for individuals and society, require accurate data. The Department for Evidence-based Medicine and Evaluation meticulously analyzes and independently processes scientific findings for physicians, nursing staff / caregivers, patients and decision-makers in the healthcare sector. Top priorities include the creation of systematic evidence syntheses, the evaluation of health-promoting programs, and the dissemination of scientific findings. In addition, the Department works at finding new ways to deliver quality information faster while adhering to the same quality standards.

Pictured
(f. l. t. r. & top down)

Gerald Gartlehner
Barbara Nußbaumer-Streit
Irma Klerings
Angela Kaminski-Hartenthaler
Andrea Chapman
Anna Glechner
Andreea Dobrescu
Viktoria Titscher
Isolde Sommer
Lisa Affengruber
Christina Kien
Ursula Griebler
Jana Meixner
Gernot Wagner
Patricia Julia Harlfinger
Verena Mayr
Martin Fangmeyer
Bernd Kerschner
Ana Toromanova
Ludwig Grillich

Answering Practice-Related Questions from Nursing / Care Professionals

The Evidence-based Information Center for Nursing Staff based at the University for Continuing Education Krems was launched in October 2019. In the form of rapid reviews, the center's team provides straightforward summaries of scientific studies to answer practice-relevant questions posed by the nursing staff of Lower Austrian hospitals.

Each month hundreds of new studies relevant to the nursing sector are published. Processing such large volumes of data with varying levels of quality is virtually impossible for healthcare professionals. This is where the Evidence-based Information Center for Nursing Staff platform comes in. The center provides easy-to-access, user-specific evidence-based knowledge. Nursing staff from Lower Austria's community and university hospitals can directly submit their questions to the EbN (Evidence-based Nursing) Information Center using an online form on the website.

When a question is submitted, the center first conducts a systematic search of the literature, then evaluates relevant studies, and finally summarizes the research results in the form of a rapid review. The rapid review is then sent to the healthcare professional who originally requested the information and also published on the center's website for use by the general public.

Taking Evidence-based Decisions

The range of topics researched thus far include questions on preventive measures, hospital hygiene, use of complementary care methods and more. Rapid reviews enable

nursing professionals to undertake decisions based on the best information available. Implementing care decisions based on research results provides a peace of mind to healthcare professionals in highly demanding jobs and relieves caregivers of resource-intensive, technically-demanding research tasks which often require access to the most up-to-date databanks as well as specialized analytical skills.

This service is free of charge and is not commercially sponsored. In addition to the website, info packages and presentations on the EbN Information Center are provided to Lower Austria's community and university hospitals.

Nursing Care Information Center – ebinfo

FUNDING

Health and Social Fund of Lower Austria (NÖGUS)

DURATION

2019–2023

DEPARTMENT

Evidence-based Medicine and Evaluation

PROJECT LEAD

Martin Fangmeyer

PARTICIPATING RESEARCHERS

Andreea Dobrescu
Irma Klerings
Verena Mayr
Ana Toromanova

www.ebinfo.at

Encouraging Increased Social Activities and Contacts amongst Older People

Older people often suffer from loneliness, which is associated with an increased mortality risk of possibly up to 26 %, as well as a greater frequency of physical and mental disorders. To address loneliness amongst older people, the research project strives to identify suitable measures to encourage older people to increase their social activities and contacts.

In Austria about 37 % of the population live alone. In persons over age 65, 51 % live alone. Retirement and separation from family members and friends often comes hand-in-hand with aging and restrictions in mobility and perceptive faculties. This in turn often leads to frequent feelings of isolation and loneliness amongst elderly individuals. The risk presented by loneliness is on a par with that for the consumption of tobacco. Elderly suffering from loneliness are not only subject to an increased risk of mortality that can be up to 26 % higher than those who are not lonely but are also at greater risk of physical and mental health disorders. In light of increasing levels of life expectancy and the growing number of people over the age of 60, loneliness presents a key challenge in terms of public health policy in aging societies worldwide.

Finding and Implementing Interventions

The research project develops and implements suitable measures for encouraging increased social activities and contacts among older people. The research project identifies potentially efficacious interventions based on the best knowledge available, selects appropriate measures in a collaborative decision-making process founded on the "Evidence to Decision Framework", and assists with their adaptation and implementation at a scientific level. A final evaluation assesses the outcomes.

Social Isolation and Loneliness among Older People in Lower Austria: Steps towards Evidence-informed Health Promotion and Preventive Practice – NÖG_SozIso-EiP

FUNDING

Health and Social Fund of Lower Austria (NÖGUS)

DURATION

2020–2022

DEPARTMENT

Evidence-based Medicine and Evaluation

PROJECT LEAD

Ludwig Grillich

PARTICIPATING RESEARCHERS

Angela Kaminski-Hartenthaler
Viktoria Titscher

COORDINATION

University for Continuing Education Krems

PARTNER

»Tut gut!« Gesundheitsvorsorge GmbH

Treating Depression Correctly

In Austria over six percent of adults will suffer from a depressive disorder at some point in their lives. In America this figure exceeds 16 %. To help such people, the team at Cochrane is comparing the efficacy of antidepressants with alternative pharmacological and non-pharmacological treatments.

Depressive disorders are not only associated with increased morbidity and mortality, but also a reduced quality of life. Physical complaints, an unhealthy lifestyle, and comorbidities can negatively affect a sufferer's general state of health even more. People with depression are also 20 times more likely to commit suicide. In fact, over 50 % of suicides take place in the context of acute depressive disorders. To offer such people appropriate therapy, the team at Cochrane investigates the efficacy of different treatment options.

Investigating Therapy Options

Most persons with severe depression are offered second-generation antidepressants in primary care. Other initial therapy options include psychotherapies or complementary and alternative treatment methods, such as acupuncture. Following initial treatment however, only about 30 % of patients see remission of their symptoms. In such cases, it is recommended changing the antidepressant or adding a second drug.

The aim here is to produce a systematic review of the efficacy of antidepressants in comparison with alternative and non-pharmacological interventions. This is designed to support the development of clinical guidelines. Furthermore, the systematic review is meant to show whether alternative pharmacological and non-pharmacological options are effective in the case of patients for whom antidepressants did not work.

Pharmacological Versus Non-Pharmacological Interventions for the Treatment of Major Depressive Disorder – ACP Depression

FUNDING

American College of Physicians (ACP)

DURATION

2020–2022

DEPARTMENT

Evidence-based Medicine and Evaluation

PROJECT LEAD

Gerald Gartlehner

PARTICIPATING RESEARCHERS

Lisa Affengruber
Andrea Chapman
Andreea Dobrescu
Emma Persad
Ana Toromanova
Gernot Wagner

Further Projects

→ Effectiveness of Quarantine with COVID-19

At the request of the World Health Organization, the team at Cochrane Austria assessed the effectiveness of quarantine measures to control the COVID-19 pandemic. The results of the rapid review demonstrate the importance of quarantining individuals who have come into contact with an infected person in order to reduce the number of infections and deaths. Also, results show that quarantine was most effective, and cost less, when it started earlier. Combining quarantine measures with other prevention and control initiatives had an even greater impact.

Funding:

World Health Organization (WHO)

Project lead:

Gerald Gartlehner,
Barbara Nußbaumer-Streit, Department for
Evidence-based Medicine and Evaluation

→ Depression in Children and Adolescents

Worldwide, around three in a hundred children and adolescents are affected by depression. Many of those affected will experience a recurrence of depressive episodes in just a few years. This Health Technology Assessment compares psychotherapy to other treatments in regards to effectiveness, safety and cost-effectiveness for depression in children and adolescents. It also examines the legal, ethical, social and organizational challenges of treatment choices.

Funding:

Institute for Quality and Efficiency in Health Care (IQWiG)

Project lead:

Barbara Nußbaumer-Streit, Department for
Evidence-based Medicine and Evaluation

→ Rapid Review Methods in Comparison

Swift decisions are often essential, particularly in healthcare. Yet systematic reviews, due to their methodology, can often take up to two years to conduct. Rapid reviews, however, can be completed in a matter of weeks or months by streamlining methodological steps. This research investigates various methods in an effort to determine which methods improve the efficiency and quality of the review process and can thus contribute to the development of minimum standards for rapid reviews.

Funding:

Gesellschaft für Forschungsförderung
Niederösterreich m.b.H.

Project lead:

Lisa Affengruber, Department for Evidence-based
Medicine and Evaluation

Knowledge Transfer & Dissemination

→ Organization of ongoing workshops and seminars on methods of evidence-based medicine

(e.g.: critical evaluation of studies, systematic literature search, statistics) at the University for Continuing Education Krems and with external organizations and universities (e.g. Karl Landsteiner University of Health Sciences).

→ Dissemination of scientific findings to the scientific community and science-to-public by means of:

Scientific publications (2020: 35 publications in SCI, SSCI, A&HCI journals), presentations at scientific congresses and via self-generated project web pages (www.medizin-transparent.at, www.ebminfo.at, www.ebninfo.at, www.cochrane.at, www.wissenwaswirkt.org, www.gemeinsam-gut-entscheiden.at), and via newsletters and social media (Twitter, Facebook).

→ Regular appearances in the media:

In 2020 staff from the department made 344 appearances in the media.

Selected Publications

- Chevance A, Ravaud P, Tomlinson A, Le Berre C, Teufer B, Touboul S, Fried EI, Gartlehner G, et al. Identifying outcomes for depression that matter to patients, informal caregivers, and health-care professionals: qualitative content analysis of a large international online survey. *Lancet Psychiatry*. 2020;7(8):692-702.
- Gartlehner G, Affengruber L, Titscher V, et al. Single-reviewer abstract screening missed 13 percent of relevant studies: a crowd-based, randomized controlled trial. *J Clin Epidemiol*. 2020;121:20-28.
- Gartlehner G, Vander Schaaf EB, Orr C, Kennedy SM, Clark R, Viswanathan M. Screening for Hypertension in Children and Adolescents: Updated Evidence Report and Systematic Review for the US Preventive Services Task Force. *JAMA*. 2020;324(18):1884-1895.
- Nussbaumer-Streit B, Klerings I, Dobrescu AI, Persad E, Stevens A, Garrity C, Kamel C, Affengruber L, King VJ, Gartlehner G. Excluding non-English publications from evidence-syntheses did not change conclusions: a meta-epidemiological study. *J Clin Epidemiol*. 2020;118:42-54.
- Nussbaumer-Streit B, Mayr V, Dobrescu AI, Chapman A, Persad E, Klerings I, Wagner G, Siebert U, Christof C, Zachariah C, Gartlehner G. Quarantine alone or in combination with other public health measures to control COVID-19: a rapid review. *Cochrane Database Syst Rev*. 2020;4:CD013574.
- Sommer I, Teufer B, Szelag M, Nussbaumer-Streit B, Titscher V, Klerings I, Gartlehner G. The performance of anthropometric tools to determine obesity: a systematic review and meta-analysis. *Sci Rep*. 2020;10(1):12699.
- Viswanathan M, Kahwati L, Jahn B, Giger K, Dobrescu AI, Hill C, Klerings I, Meixner J, Persad E, Teufer B, Gartlehner G. Universal screening for SARS CoV 2 infection: a rapid review. *Cochrane Database of Systematic Reviews*. 2020(9).



The research performed by the Department for Building and Environment revolves around developing solutions to practical questions relating to construction and real estate. The environmental challenges facing this sector, above all climate change, but also those of rapid growth in land use and the effects this has on settlement structures, provide the framework for this research. Factors that need to be considered include economic, ecological and social sustainability in construction, secondly, building climate adaptation and utilization of existing buildings in the context of climate change, and thirdly, economic and ecological life cycle assessment of historical buildings. The research objective is to develop clear statements and recommendations for practical action by applying the principle of sustainability.

Pictured

(f. l. t. r. & top down)

Helmut Floegl
Christina Ipser
Alice Rutter-Lehner
Christine Rottenbacher
Richard Sickinger
Bernhard Kram
Rudolf Passawa
Daniela Trauningger
Klaus Winiwarter
Markus Winkler
Gregor Radinger
Tania Berger

Future-proof Passive Cooling of Buildings

The focus of the project is experimental thermal management of brick masses via systematic charging and discharging during the day and night. Natural night ventilation as the core function of discharge in combination with optimized control strategies is evaluated in situ. To this end, two identical brick simulation rooms are examined by means of comprehensive monitoring under identical framework conditions.

One effect of climate change, that is directly noticeable in the building sector, is the overheating of indoor spaces, which must be countered accordingly in new construction and renovation. To guarantee thermal interior comfort the whole year, it is necessary to find or utilize resource-conserving systems that are as resilient as possible in terms of passive cooling strategies. By dispensing with active cooling technology, the plan is to keep the environmental footprint over the life cycle as low as possible, which has a positive impact on the creation of affordable housing. The CoolBRICK project determines the cooling potential of natural night ventilation with different control strategies for automated windows.

Optimizing Heating and Cooling Demand

One result of the project will be a comparison of effectiveness of these different ventilative cooling strategies. These findings will be incorporated into a planning guideline to facilitate the assessment of night ventilation potential, and subsequently into the adaptation proposals of the ÖNORM B 8110-3 standard. Results derived from the storage mass management and relevant to the heating period will be brought in the normative calcu-

lation approaches for the revised version of ÖNORM B 8110-6. Furthermore, solar heat inputs via opaque building components are to be included with greater precision in the standard for calculation the heating and cooling demand, for both, residential and non-residential buildings.

CoolBRICK – Development of Normative Calculation Approaches for Passive Ventilative Night Cooling Strategies – Utilization of Brick Storage Masses

FUNDING

FFG Austrian Research Promotion Agency, Collective Research program line

DURATION

2020–2022

DEPARTMENTS

Building and Environment
Integrated Sensor Systems

PROJECT LEAD

Markus Winkler

PARTICIPATING RESEARCHERS

Daniela Trauningger
Albert Treytl

COORDINATION

Stone/ceramic research association of FV Steine-Keramik (trade association of the stone/ceramic industry), Austria

PARTNERS

Fachhochschule Salzburg GmbH
Kompetenzzentrum Bauforschung GmbH
Velux Austria GmbH
Verband Österreichischer Ziegelwerke (Austrian brickwork association)

Knowledge Transfer & Dissemination

→ Qualification seminar ClimBI:

The construction sector acts as an effective lever for making an important contribution to achieving Austria's climate objectives. It simultaneously makes it possible to address the effects of climate change, which are already clearly noticeable, and to face up to the associated challenges. With the qualification seminar sponsored by the Austrian Research Promotion Agency (FFG), the Department for Building and Environment at the University for Continuing Education Krems made systemic solution knowledge accessible to experts in building/neighborhood planning at the start of 2021. The objective: climate-resilient housing.

→ Building Resilient Urban Communities (BreUCom):

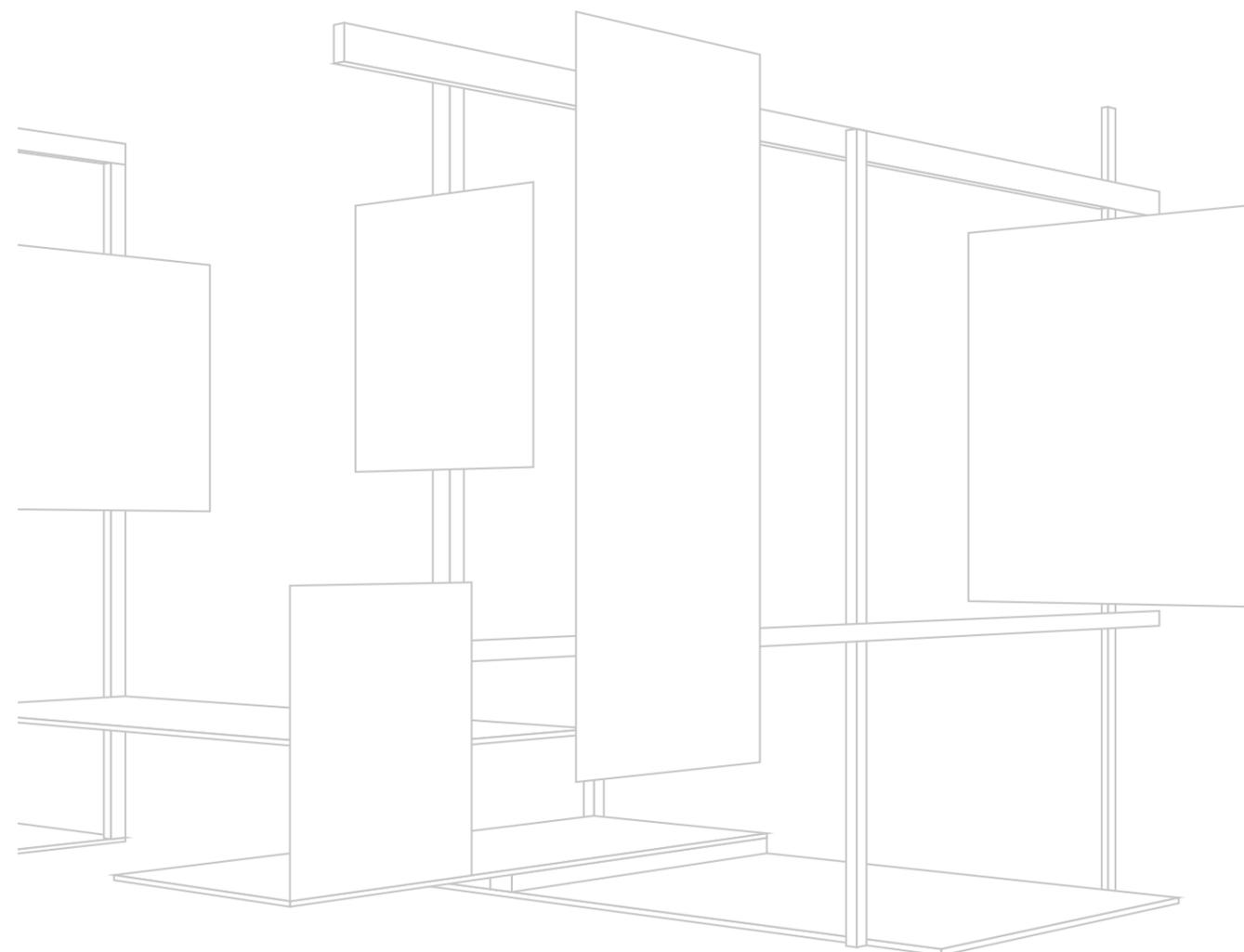
In India, marginalized urban settlements are often severely affected by natural disasters. Traditional approaches of land-use planning do not fulfill the demands made on fast-changing cities in the context of climate change. The Erasmus+ project BREUCom supports collaboration between Indian schools of architecture and develops short programs geared to urban problems aimed at professionals, practitioners and staff of NGOs.

→ Third Real-Estate Day of the Future:

With the Day of the Future, held in 2020 as an online event, the Department for Building and Environment regularly puts the spotlight on the real-estate sector from different professional and scientific perspectives. Taking place on 14 October 2020 under the motto "It could get hot...", the third Real-Estate Day of the Future, which included presentations, workshops and a panel discussion, was devoted to the effects of climate change on the property sector.

Selected Publications

- Braunisch K, Fuhrmann K, Ledl R (2021). Handbuch Immobilienbewirtschaftung, Linde Verlag, Vienna
- Höltl A, Berger T, Bates R, Desta M K, Lewis A, Semunugus D, Indorewala H (2020). The Nexus of the UN Sustainable Development Goals and their Link to Quality of Life: A Case of Urbanization in Ethiopia and India. In: Martinez J, Mikkelsen C A, Phillips R (eds.) Handbook of Quality of Life and Sustainability, pp. 113-138, Springer Verlag, Cham
- Höltl A, Brandtweiner R, Bates R, Berger T (2020). The Interactions of Sustainable Development Goals: The Case of Urban Informal Settlements in Ethiopia. International Journal of Sustainable Development and Planning 15 (3), 287-294.
- Neuhold E (Eds.) (2020). 2nd Immobilien-Zukunftstag. Lebenswerte Stadtquartiere, Edition Donau-Universität Krems
- Rottenbacher C (2020). Assessment to Negotiate Cultural Ecosystem Services of Places. In: Roque A Ch, Brito C, Veracini C (Eds.) Peoples, Nature and Environments: Learning to Live Together, pp. 220-235, Cambridge Scholars Publishing, UK
- Reisinger K, Hitthaler F, Kopeinig G, Plas C, Platzdasch V, Reiter-Benisch M, Schöfmann P, Stumpf W, Wolf B, Ziegler M (2020). Klimaneutrale Gebäude – Positionspapier der IG Lebenszyklus Bau. Vienna





Research on aquatic ecosystems is the primary mission of WasserCluster Lunz. As part of that mission, its Aquatic Lipid Research and Ecotoxicology research group (LIPTOX), established through the University for Continuing Education Krems, focuses specifically on aquatic food webs. Aquatic organisms ingest dietary nutrients, but also toxic substances. LIPTOX investigates the source and composition of the foods found in different bodies of water. Of particular interest are questions as to which foods have the most nutrient-rich and physiologically necessary compounds, especially lipids and their fatty acids, and which foods convey the fewest toxic substances. This is important not only for aquatic organisms, but also for human beings as end users at the top of the food chain. WasserCluster Lunz is a joint research center of the University for Continuing Education Krems, the University of Vienna, and the University of Natural Resources and Life Sciences, Vienna.

Pictured
(f. l. t. r. & top down)

Katharina Winter
Andras Abonyi
Libor Závorka
Margaux Mathieu-Resuge
Lena Fehlinger
Hannes Hager
Martin Kainz
Richard Adams
Nadine Ebm
Samuel-Karl Kämmer

Not Pictured

Francine Mathieu
Serena Rasconi
Lukas Vesely

Climate Change Influences Fish Development

Food quality and water temperatures have an influence on fishes' development. A lack of omega-3 long-chain polyunsaturated fatty acids (n-3 PUFA), as well as changing temperatures, can have a biochemical impact on brain and eye tissues.

In periods of climate change, fishes are often exposed to temperature fluctuations or variations in food supply. This research project therefore examines the effects of water temperature and a lack of omega-3 polyunsaturated fatty acids (n-3 PUFA). Both factors were seen to affect fishes' metabolism and the biochemical composition and morphology of fishes' brains, as well as behavior, learning ability and fitness.

Trout as Model Species

To examine the influence on fish development, the project took a closer look at trout. The fish were raised in various test series with different water temperatures and different feed. Standard behavioral studies were then used to test their ability to learn new tasks. In addition, oxygen consumption was measured at rest and after movement to determine the energy used by metabolic processes. Somatic growth, fish size and condition were also recorded. The lipid composition of liver, muscle tissue and brain were also analyzed using gas chromatography, and brain morphology was examined via image analysis.

Sustainable Food Production

The results not only provide insight into the development and impact of climate change on salmonids, but will also have a significant influence on fish farms. Among other things, it is hoped that they will contribute to developing an ecologically sustainable approach to food production for aquaculture fishes.

Consequences of Dietary Fatty Acids and Temperature on Cognitive Capacity and Fitness of Fish – SalmoPUFA

FUNDING

FWF – Austrian Science Fund – Lise Meitner Program

DURATION

2019–2021

DEPARTMENT

WasserCluster Lunz, Liptox research group

PROJECT LEAD

Martin Kainz
Libor Závorka

COORDINATION

WasserCluster Lunz/University for Continuing Education Krems

PARTNER

University of Glasgow

How Plankton Parasites Interact

Parasite infestation of plankton and its effect on diet quality for subsequent consumers have not been investigated yet. This project examines the effects of parasites on plankton biodiversity, on the biochemical nutritional quality of plankton, and on their function as a food web. The results will provide insight into the interactions between phytoplankton and parasites.

Parasites in algae, which are located at the bottom of the aquatic food pyramid, has received little scientific attention in the past; to date, most research has focused on their impact as pathogens in plants and animals such as fishes and mollusks. Molecular analyses have revealed a wide range of eukaryotic parasites in picoplankton (<5µm), which were primarily found on chytrid fungi. Alongside their disease-causing properties, parasites also have various important ecological functions which have only been described recently.

Understanding the Role of Parasites

This research project targets the interactions of phytoplankton parasites in the planktonic food web and investigates their role for the ecosystem. Plankton analyses from lakes are combined with laboratory experiments involving artificial food webs and with mathematical models to help researchers understand how infestation of phytoplankton by parasites influences host co-existence, and consequently the plankton community.

In addition, the contribution of parasites to nutritional quality and the spread of infectious spores is investigated. Finally, a model of the food network with phytoplankton parasites is

developed, focusing on the transfer of carbon by parasites. Direct and indirect effects of parasites in phytoplankton on plankton biodiversity, the biochemical nutritional quality of the plankton, and functions of the planktonic food web are also estimated.

Role of Phytoplankton Fungal Parasites in Trophic Transfer and Food Web Functioning (Effects of parasites on plankton communities – FungUp)

FUNDING

FWF – Austrian Science Fund

DURATION

2017–2021

DEPARTMENT

WasserCluster Lunz

PROJECT LEAD

Martin Kainz

PARTICIPATING RESEARCHERS

Andras Abonyi
Robert Ptacnik
Serena Rasconi

COORDINATION

WasserCluster Lunz

Nutrient Flows Across System Boundaries

Transport of organic material across ecosystem boundaries can have a decisive influence on the productivity of neighboring systems. Insects that spend their larval stage in the water make a substantial contribution to the transport of organic material from inland waters into neighboring terrestrial systems. This project investigates the quantity and quality of nutrient exchange via insects.

Current freshwater ecology research mainly takes place in rivers or lakes. Little importance is accorded to the role of aquatic organisms in the surrounding terrestrial ecosystems. Transport of organic material across ecosystem boundaries can have a decisive influence on the productivity of neighboring systems. Emerging aquatic insects, i. e., insects which spend their larval stage in the water, play an important role in this process.

The Significance of Emerging Insects

The goal of the project is to quantify the export of essential biochemical nutrients, including polyunsaturated fatty acids (PUFA), from inland waters via emerging insects. The significance of these nutrients for terrestrial consumers can then be estimated. To achieve this goal, insect traps are installed on various bodies of standing and flowing water. The number of insects can then serve as the basis for a comparative analysis of PUFA exports. Labeled substrates are also used to estimate the export, input and distribution of PUFA in neighboring terrestrial habitats and their contribution to the diet of terrestrial consumers.

In addition, laboratory experiments with spiders investigate whether the spiders have a preference for aquatic insects, and whether aquatic and terrestrial insects are distinguished in their nutritional quality as food by differences in their PUFA compositions. The results of this research will substantially improve our understanding of nutrient flows across system boundaries and their significance for neighboring habitats.

Aquatic-Terrestrial Coupling: Export of Polyunsaturated Fatty Acids from Aquatic Ecosystems via Insects and Possible Consequences for Terrestrial Consumers – AquaTerr

FUNDING

FWF – Austrian Science Fund, German Research Foundation (DFG)

DURATION

2019–2022

DEPARTMENT

WasserCluster Lunz

PROJECT LEAD

Martin Kainz

PARTICIPATING RESEARCHERS

Lena Fehlinger
Dominik Martin-Creuzburg
Margaux Mathieu-Resuge
Tarn-Preet Parmar
Matthias Pilecky
Cornelia Twining

COORDINATION

Jointly with the University of Konstanz, Germany

PARTNER

University of Konstanz, Germany

Knowledge Transfer & Dissemination

→ Science-to-Science:

Support for PhD studies at the University for Continuing Education Krems

→ Science-to-Public:

Participation in the Forschungs-Lern-Labor (FLL) project [Research Learning Lab] at the Haus der Wildnis in Lunz am See. The Haus der Wildnis is scheduled to open in the spring of 2021. Its exhibition offers unique insights into the largest ancient woodland in the Alpenbogen region. Experimental research aims to give school-age visitors a closer look at the ecosystem and the relationships within it (www.haus-der-wildnis.at).

→ **Speaker at the seminar “Water Security for People and Nature – Present to 2050”** at the European Forum Alpbach 2019. This seminar was part of the Alpbach Learning Missions and continued after the seminar week as an Alpbach Learning Mission (ALM).

Further Projects

→ Investigating Fishes’ Food Sources

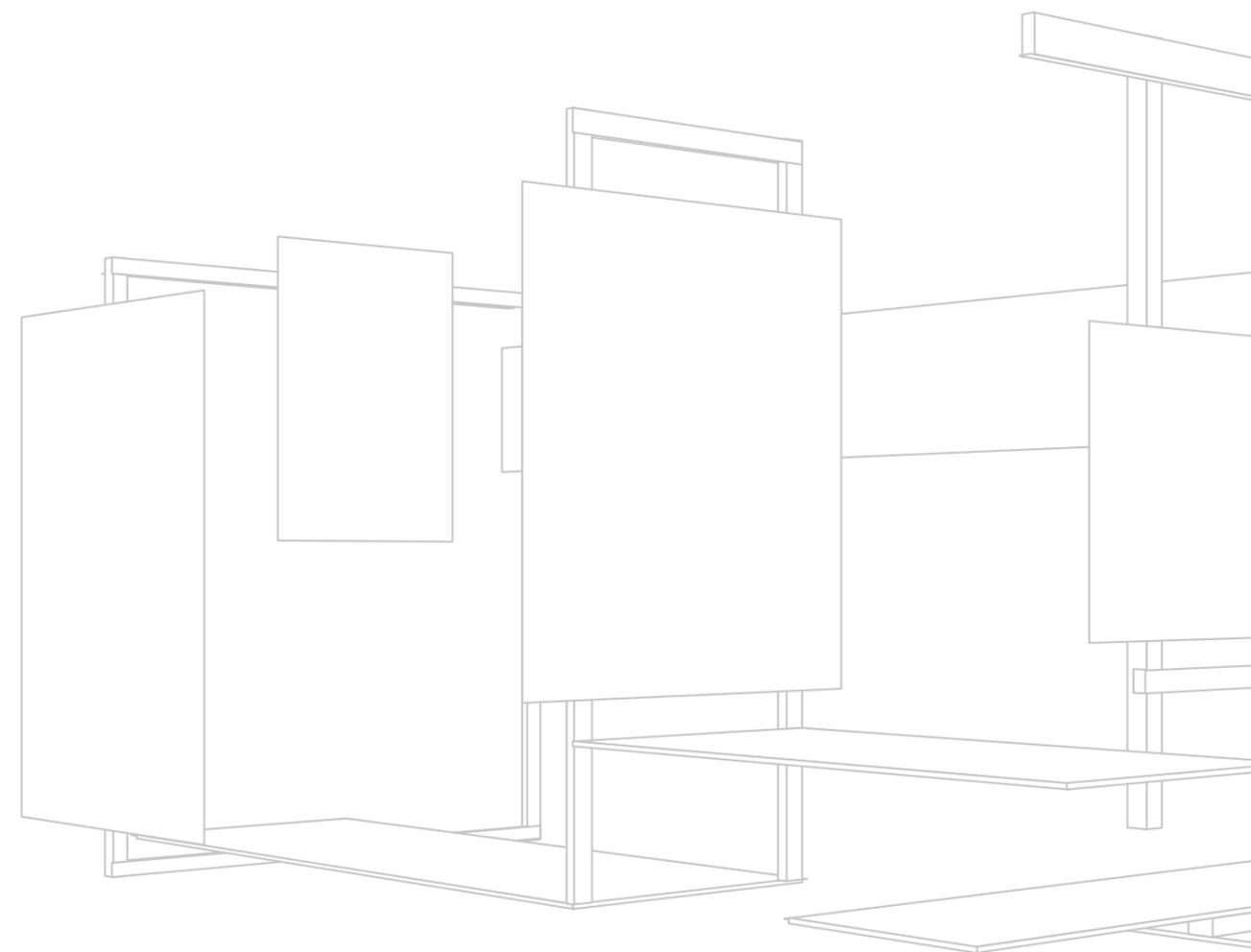
The Mitchell River is an unregulated river in northern Australia, known for the riparian forests alongside it. The focus of this research is on nutrient streams in the dry season and in the flood season. For the first time worldwide, stable hydrogen isotopes in fatty acids are used as biomarkers in fishes to identify which nutrients fishes are eating from which areas of the river. These findings contribute to biodiversity and preservation of essential nutrients in ecosystems.

Funding:

Queensland Government, Australia

Project lead:

Martin Kainz, WasserCluster Lunz, University for Continuing Education Krems



Selected Publications

- Guo F, Lee SY, Kainz MJ, Brett MT (2020). Fatty acids as dietary biomarkers in mangrove ecosystems: current status and future perspective. *Sci. Total Environ.* 735.
- Jardine TD, Galloway A, Kainz MJ (2020). Unlocking the power of fatty acids as dietary tracers and metabolic signals in fishes and aquatic invertebrates. *Phil. Trans. R. Soc. B.* 375: 1804.
- Jing M, Lin D, Wu P, Kainz MJ, Bishop K, Yan H, Wang R, Wang Q, Li Q (2020). Effect of aquaculture on mercury and polyunsaturated fatty acids in fishes from reservoirs in Southwest China. *Env. Poll.*
- Kühmayer T, Guo F, Ebn N, Battin TJ, Brett MT, Bunn SE, Fry B, Kainz MJ (2020). Preferential retention of algal carbon in benthic invertebrates – stable isotopes and fatty acids evidence from an outdoor flume experiment. *Freshw. Biol.*, 65: 1200-1209
- Parzanini C, Colombo SM, Kainz MJ, Wacker A, Parrish CC, Arts MT (2020). Discrimination between freshwater and marine fish using fatty acids: ecological implications and future perspectives. *Environ. Rev.*
- Tao J, Kennard MJ, Roberts DT, Fry B, Kainz MJ, Chen Y, Bunn SE (2020). Quality and contribution of food sources to Australian lungfish evaluated using fatty acids and stable isotopes. *Aquat. Sci.* 82:8.
- Twining CW, Taipale SJ, Ruess J, Bec A, Martin-Creuzberg D, Kainz MJ (2020). Stable isotopes and fatty acids –current and future perspectives for advancing trophic ecology. *Phil. Trans. R. Soc. B.* 375:20190641.

Overall university main field of research:
Cultural Heritage



- Revitalization and Cultural Heritage
- Collections Management and Image Science



Climate change is already making its impact felt on historic buildings and structures, be it as a result of increasingly frequent natural disasters and storm damage or other extreme weather conditions. Another challenge: Protecting cultural assets and historic centers in the event of earthquakes and from the effects of other disasters. The Department for Building and Environment has centers specializing in the protection of cultural assets and the preservation of cultural heritage. Their work focuses on studying the impacts of climate change, increasing the resilience of historic buildings, and protecting and reconstructing historic areas of human settlement and cultural assets. The Department's research consistently involves solving practical questions in cooperation with experts from the field. This ensures a high level of knowledge transfer.

Pictured
(f. l. t. r. & top down)

Petra Hammer
Florian Kerschbaumer
Elisabetta Meneghini
Anna Maria Kaiser
Patricia Engel
Marko Jelusic
Raffaella Woller
Christian Hanus
Peter Strasser
Elisabeth Resch
Darya Haroshka
Renate Prünster-Deschauer
Peter Morgenstein
Manfred Sonnleithner

Not Pictured

Roberto Pirzio-Biroli
Bernhard Schneider
Thomas Horak-Thurwachter
Fikriye Pelin Kurtul Vacek
Valeriano Vallesi

Quantifying Risks to Cultural Heritage

The STRENCH project leverages the results of several earlier projects on climate change and the conservation of cultural heritage sites which are at risk from natural disasters, developing ready-to-use climate prediction tools to enable the formulation of customized strategies for protecting cultural assets and supporting decision-making by those in positions of responsibility.

The increasing frequency of extreme weather events and related natural disasters is negatively impacting our cultural heritage and landscapes. Preserving these presents new challenges that are being addressed by this international research project STRENCH, which aims to improve the ability of the public and private sectors to mitigate the impacts of climate change and natural hazards on at-risk cultural heritage sites, structures and buildings. The project proactively targets the needs and requirements of stakeholders and policy-makers responsible for disaster preparedness and the protection of cultural assets. It also seeks to actively involve citizens and local communities in decision-making processes. As well as raising awareness for preventive protective measures, the project explores the optimal design of online decision-support tools and sustainable, transnationally applicable risk management strategies for cultural heritage and landscapes.

WebGIS Tool for Multi-Risk Assessment

The project's objectives cover a wide range, encompassing topics such as sustainable risk management strategies for safeguarding cultural heritage and the related training measures, hazard maps of extreme weather events in Central Europe to support decision-making in disaster preparedness, and a manual of guidelines for the vulnerability assessment of at-risk cultural heritage categories. The latter will contain information on preventive protection and appropriate responses to damage that

has occurred. A WebGIS Tool for the multi-risk assessment of cultural heritage in Central Europe is also being developed that includes pilot implementation at the local and regional levels in the partner countries. These tools should provide an easily-accessible overview of the anticipated risks in the coming decades and facilitate decisions on how cultural assets can best be prepared for the future.

STRENGTHening resilience of Cultural Heritage at risk in a changing environment through proactive transnational cooperation – STRENCH

FUNDING

EU – Interreg Central Europe

DURATION

2020–2022

DEPARTMENT

Building and Environment

PROJECT LEAD

Anna Kaiser

PARTICIPATING RESEARCHERS

Christian Hanus
Thomas Horak-Thurwachter
Klaus Winiwarter

COORDINATION

Institute of Atmospheric Sciences and Climate
– National Research Council of Italy (Alessandra Bonazza)

PARTNERS

Institute of Theoretical and Applied Mechanics,
Czech Academy of Sciences, Czech Republic
Villa Ghigi Foundation, Italy
SISTEMA GmbH, Austria
Lake Balaton Development Coordination Agency,
Hungary
Urban Planning Institute of the Republic of
Slovenia, Slovenia
District of Forchheim, Germany
Municipality of Dugopolje, Croatia

Use of Protected Buildings for Housing

The increased use of protected buildings for residential purposes is one of several possibilities to curb the consumption of land and resources. At the same time, using protected buildings can also contribute to preserving our architectural heritage, improving housing culture and sustainably revitalizing local and city centers.

Open spaces are increasingly being used for urban development. According to the Environment Agency Austria, 5,800 km² of land or 18 percent of the area of permanent settlement in Austria had been used by 2019. What analytical tools can be developed to motivate developers to exploit the potential of protected buildings for residential use, even though the related planning costs and uncertainties are usually higher than for construction on greenfield sites? What strategy can be used to assess the potential of protected buildings? Taking these research questions as a basis, the project “monumentum ad usum” aims to convince non-profit developers in Lower Austria to utilize unused or little-used protected monuments. Other important effects include the revitalization of historic urban spaces and a contribution to sustainability.

Promising Climate and Energy Balance

The methodological tools consist of case studies in the form of individual property analyses, basic research on energy balances and building physics, lifecycle and ecological auditing as well as impact analyses for the settlement area. The interim results suggest that the climate and energy balance for the creation and use of residential space in protected buildings is significantly better than previously assumed. The qualitative evaluation model developed in the project can be used to determine an economically and environmentally fair balance in terms of the quality of funding for new construction and renovation. Further impacts include the adjustment of

municipal energy subsidies for historic monuments and decision-making support for the improved and possibly stronger residential use of protected buildings.

monumentum ad usum – Utilization Potential of Monuments for Non-Profit Property Developers

FUNDING

Province of Lower Austria, Office of the Government of Lower Austria

DURATION

2018–2022

DEPARTMENT

Building and Environment

PROJECT LEAD

Christian Hanus
Manfred Sonnleithner

PARTICIPATING RESEARCHERS

Rainer Altmann
Helmut Floegl
Christina Ipser
Elisabetta Meneghini
Rudolf Passawa
Gregor Radinger
Elisabeth Resch
Bernhard Schneider
Richard Sickinger
Peter Strasser
Klaus Winiwarter

COORDINATION

University for Continuing Education Krems

PARTNERS

Federal Monuments Authority, Department for Lower Austria
Österr. Verband der gemeinnützigen Bauvereinigungen, Landesgruppe NÖ
Office of the Government of Lower Austria, Department General Building Service (BD1)
Office of the Government of Lower Austria, Department Science and Research (K3)

Linking and Visualizing Europe's Cultural Heritage

In recent years, many digitization initiatives and cultural heritage databases have strongly enhanced access to cultural and historical data across Europe. However, missing links and the lack of standardization or machine readability still prevent the optimal use of the existing data. The EU project InTaVia, which is coordinated by the University for Continuing Education Krems, aims to create such data links and to develop intuitive, visual interfaces to open up new cultural heritage insights.

Tangible cultural assets from European museums, archives and libraries have been made widely accessible on transnational platforms such as Europeana.eu. At the same time, intangible assets – such as narrative accounts of the lives of artists and other individuals – have been documented and shared as biographical databases on a national level. What is lacking are links between these databases to facilitate scholarly analysis and promote a better understanding of cultural historic topics among the interested public. The H2020 project InTaVia therefore seeks to develop an innovative information portal for the visual analysis and communication of tangible and intangible cultural assets in cooperation with European partners.

Visual Analysis and Communication of Cultural Heritage

The information portal developed by the project will offer new techniques of interactive visualization and narrative communication for researchers and practitioners in the cultural sector. In the spirit of the Linked Open Data initiative, the machine readability of national biographical data is first optimized and the links between such data and tangible cultural assets are strengthened. Interactive visualizations of these linked databases will enable new insights – from close-up views of individual objects and linked biographies to complete panoramas of Europe's cultural heritage

– thus opening up new ways of knowledge acquisition and transfer.

The transdisciplinary InTaVia consortium builds on successful collaborations. The team brings together computer scientists specialized in visualization, computational linguistics, and artificial intelligence with digital humanists, HCI researchers, historians and cultural experts. An extensive network of prominent European museums and cultural heritage institutions is associated with the project.

In / Tangible European Heritage – Visual Analysis, Curation and Communication – InTaVia

FUNDING

EU – Horizon 2020

DURATION

2020–2023

DEPARTMENT

Arts and Cultural Studies

PROJECT LEAD

Eva Mayr
Florian Windhager

PARTICIPATING RESEARCHERS

Anja Grebe
Nicole High-Steskal
Johannes Liem
Go Sugimoto

COORDINATION

University for Continuing Education Krems

PARTNERS

Free University Amsterdam VU, Amsterdam
Slovenian Academy of Sciences and Arts ZRC SAZU, Ljubljana
Aalto University, Helsinki
University of Southern Denmark, Odense
Austrian Academy of Sciences (OeAW), Vienna
University of Stuttgart, Stuttgart
Fluxguide Ausstellungssysteme GmbH, Vienna
University of Helsinki, Helsinki

Further Projects

→ Bringing Rural Monuments out of the Sidelines

The South Bohemia-Vysocina-Waldviertel-Mühlviertel region boasts countless architectural and natural monuments, most of which are completely neglected by visitors who flock to a small number of well-known castles, palaces, monasteries and old historical towns. A holistic, cross-border strategy, including cultural trails, aims to provide a basis for sustainable regional development based on the potential of "rural monuments" for soft cultural and educational tourism. This offers targeted support for economically weak regions in particular and facilitates an understanding of historical contexts.

Funding:

EU Interreg Austria-Czech Republic

Project lead:

Christian Hanus, Department for Building and Environment

Participating researchers:

Darya Haroshka
Gregor Radinger
Manfred Sonnleithner
Coordination:
Euregio Silva Nortica

→ Shared Heritage Danube Limes

Archeology, knowledge transfer and preserving the cultural heritage along the Danube are three key areas of the Living Danube Limes project which has 19 partners. Taking the Roman heritage along the Danube as its starting point, the project emphasizes the common bonds of the region, strengthens an awareness of the shared Roman heritage, networks museums and – in parallel with the UNESCO World Heritage Nomination of the entire Danube Limes – develops measures for sustainable local and regional value creation from tourism as well as suitable strategies for the protection and preservation of the Roman archeological heritage.

Funding:

EU Interreg Danube Transnational Programme

Project lead:

Anna Kaiser, Department for Building and Environment

Quality management:

Christian Hanus

Participating researchers:

Raffaella Woller
Marko Jelusic
Thomas Horak-Thurwachter

Coordination:

University for Continuing Education Krems

Knowledge Transfer & Dissemination

→ Scuola di Ricostruzione di Accumoli (School for Reconstruction in Accumoli, Italy):

The University for Continuing Education Krems manages and coordinates the activities of the project partners from Italy, Slovakia, the Czech Republic and Hungary, who – in consultation with the responsible authorities, local planners and the population – discuss issues related to the reconstruction of Accumoli following the destruction caused by the earthquake in 2016/17. (www.sdr.accumoli.eu)

→ Scola Telcz:

International, interdisciplinary one-week summer and winter school for students and doctoral candidates in the Czech World Heritage City of Telcz (www.scola-telcz.net)

→ Interreg Danube Transnational Programme Project Living Danube Limes Scientific Conference in Memory of Gyula Hajnóczy.

Conference of Architectural Historians and Monument Researchers III, 12.11.2020. (www.donau-uni.ac.at/de/universitaet/fakultaeten/bildung-kunst-architektur/departments/bauen-umwelt/forschung/projekte/living-danube-limes.html)

→ **Conference series COL**, most recently: #4Restaurierung und Handwerk, 11. September 2020, (<https://de.col-conference.eu>)

→ Closing conference of the EU research project proteCHt2save:

International web conference in June 2020. Focus on: Risk assessment and protection of cultural and natural heritage, impacts of climate change, emergency plans and collaborations

→ Brochure:

Industrial and Engineering Heritage in Europe / Das industrielle und technische Erbe in Europa / Le patrimoine industriel et technique en Europe – 50 Winners of the European Heritage Awards / Europa Nostra Awards, Brochure

Selected Publications

→ Boudalis G, Engel P, Mousakova E, Pinazari F, Schirò J, Tomazic J V, (eds.) (2021). Ink Corrosion – the Missing Links, Verlag Berger, Horn

→ Cacciotti R, Kaiser A, Sardella A, De Nuntiis P, Drdácý M, Hanus C, Bonazza A: Climate change-induced disasters and cultural heritage: Optimizing management strategies in Central Europe. *Climate Risk Management* 2021; 32: 1-13

→ Hanus C, Strasser P (2020). From Legislation to Implementation - Paradigm-Changes in Cultural Property Protection Through the Intentional Destruction of Cultural Heritage. In: *Protecting Civilians – A Humanitarian Obligation* (Essay Series), pp. 45-48, NATO, Brussels

→ Kaiser A (2021). Militärischer Kulturgüterschutz im 21. Jahrhundert. In: Langbrandtner H.-W., Heyer E. R., de Peyronnet-Dryden F (eds.) *Kulturgüterschutz in Europa und im Rheinland. Franziskus Graf Wolff Metternich und der Kunstschutz im Zweiten Weltkrieg*, pp. 477-494, Böhlau, Vienna, Cologne, Weimar

→ Radinger G (2020). Lernen vom Vernakulären. In: Bornberg R, Herbig U (Eds.) *Vergleichende Architektur- und Bauforschung. Ein Forschungs- und Lehrmotto. Festschrift für Erich Lehner*, pp. 302-312, IVA-Verlag, Vienna

→ Sonnleithner M (2021). New Opportunities for Increasing the Renovation Rate of Buildings. In: *ALFA STU 1/2021*, pp. 2-9, STU Bratislava

→ Windhager F, Salisu S, Leite R A, Filipov V, Miksch S, Schreder G, Mayr E (2020). Many Views Are Not Enough: Designing for Synoptic Insights in Cultural Collections. *IEEE Computer Graphics & Applications*, 40(3), Special Issue on Art and Cultural Heritage, 58-71.



Research at the Department for Arts and Cultural Studies focuses on the influence of digitalization on the arts and culture, in particular on the preservation of tangible and intangible cultural heritage and digital art, new technologies and the digital world in museums and collections, as well as on the visualization and management of cultural (research) data. Other key research areas are participation in cultural processes and opportunities for democratizing cultural constructions of meaning. In this context, questions concerning the documentation and archiving of digital arts for research and teaching present a special challenge in the realm of image science. In its work with the historical and contemporary inventories of the Lower Austrian State Collections as well as its own music, literature, architecture and film collections, the department seeks to integrate theory and practice.

Pictured

(f. l. t. r. & top down)

Eva Bauer
Gottfried Zawichowski
Günter Stummvoll
Miguel Kertsman
Eva Maria Stöckler
Edith Blaschitz
Nicole High-Steskal
Anja Grebe
Eva Mayr
Florian Windhager
Hanna Brinkmann
Johannes Liem
Natalie Denk
Alexander Pfeiffer
Thomas Wernbacher
Nikolaus König
Simon Wimmer
Carl Philipp Hoffmann
Rachel Müller
Renato Rocha Souza
Viola Rühse
Oliver Grau
Wendy Coones

Not Pictured

Carla Milena Zamora Campos

Digitizing the Wachtberg Find

In 2005 during excavations at a site in Krems-Wachtberg, archeologists recovered a rare double burial of two infants dating back more than 30,000 years. When such finds are made, digitization using high-resolution microcomputer tomography is the preferred method for their analysis, reconstruction and pictorial representation. To ensure up-to-date documentation and archiving of the data as the basis for future research, the pilot project is compiling a catalog of criteria for a long-term open-source data archive.

The digitization of the individually preserved parts of the skeletons (Natural History Museum Vienna) from the double infant burial dating back more than 30,000 years using a micro-CT and the virtual reconstruction of the entire burial are essential steps for researching this unique find. At the same time, this presents huge challenges, as the fragile skeletons have to be scanned three-dimensionally and the data then modeled for a virtual reconstruction of the finds. By the time the data from the find has been amalgamated with the archeological and museological documentation, and the 3D representations placed in a web-based database at the end of the project, the interdisciplinary research team will have made an important contribution to digitizing sensitive archeological finds in an open-source data archive.

Preventive Conservation

In future, these digital images and the digital reconstruction will make an important contribution to preventive conservation and thus to the long-term preservation of the 30,000-year-old skeletons. The micro-CT

scans and reconstructions offer an extraordinary opportunity to investigate more closely central archeological and anthropological questions, concerning, for example, the anatomy of newborns and the burial practices without having to handle the fragile finds. There is also new potential for structuring the data and making it accessible via an open-source database and for presenting this globally outstanding part of Austria's cultural heritage within the context of a museum.

Digital Reconstruction of Archeological Finds – A Pilot Study of a 30,000-Year-Old Infant Double Burial from Krems-Wachtberg

FUNDING

Gesellschaft für Forschungsförderung
Niederösterreich m.b.H., FTI Digitalisierung

DURATION

2018–2022

DEPARTMENT

Arts and Cultural Studies

PROJECT LEAD

Anja Grebe

PARTICIPATING RESEARCHER

Martin Reitschmied

COORDINATION

Karl Landsteiner University of Health Sciences
(Dieter Pahr)

PARTNERS

Karl Landsteiner University of Health Sciences
Museum of Natural History Vienna
Austrian Academy of Sciences

Mobility through the Ages

Mobility, whether forced or voluntary, is a fundamental constant of human existence. The project “Mobile Things, People and Ideas – An Ever-Moving History of Lower Austria” investigates the importance of mobility in connection with objects in six thematic areas covering periods spanning more than 7,500 years. The subproject “Mobility of Neolithic Farmers” sets out to expose the narrative of the sedentary society to a critical analysis.

Nowadays, migration and escape very often have negative connotations. In the public discourse, the “regional culture that has evolved down the centuries” is frequently compared with the culture of migration. By studying the archeological findings and features of the Linear Pottery Culture settlement in Asparn/Schletz, the sedentary narrative that is closely linked with the “Neolithic Revolution” can be questioned and the importance of mobility in a sedentary society investigated. The research team also wants to clarify who was mobile over the centuries and why certain things were transported and others were not.

Insight into the Living Environment of the Neolithic Period

Researchers from the various disciplines, from Anthropology and Ethnology, to Jewish Studies, History and Geology expect the subproject “Mobility of Neolithic Farmers” will give them new insights into migration and mobility in the Early Neolithic period and in particular, answers concerning the narrative of sedentarism versus mobility. The research project expects to close gaps in our knowledge: Although the first sedentary farmers in Central Europe belonging to the Linear Pottery Culture appear to have been highly mobile, notwithstanding the establishment of permanent settlements, it remains unclear who exactly was mobile, for what purpose and to what extent. At the end of the project, researchers will have gained

more detailed insights into the living environment and mobility of people living more than 7,000 years ago. Central locations like Asparn/Schletz are well suited to provide answers to the archeological research questions described above, as they are regarded as manifestations of long-term sedentarism although because of the large number of non-local artefacts, they are also seen as “mobility drivers”. The unexpectedly large quantity of imported ceramics suggests extensive trade links and also, arguably, social contacts with other culture groups.

Mobile Things, People and Ideas – An Ever-Moving History of Lower Austria

FUNDING

Gesellschaft für Forschungsförderung
Niederösterreich m.b.H., FTI-Programm

DURATION

2019–2022

DEPARTMENT

Arts and Cultural Studies

PROJECT LEAD

Sandra Sam

PARTICIPATING RESEARCHERS

Julia Längauer
Daniela Fehlmann

COORDINATION

Institute for Jewish History in Austria (Martha Keil)

PARTNERS

Institute for Medieval and Early Modern Material Culture of the University of Salzburg; Ilse Arit Institute for Social Inclusion Research at the University of Applied Sciences St. Pölten; Institute of Rural History; Ludwig-Boltzmann Institut für Kriegsfolgen-Forschung, Raabs an der Thaya; Museumsmanagement Niederösterreich; State Collections of Lower Austria; Department of Social and Cultural Anthropology at Goethe University Frankfurt; Institute of Social and Cultural Anthropology, University of Göttingen

Making the Digital Arts Accessible for Research and Teaching

Every day, a huge volume of digital images is produced, uploaded and shared via database systems, information visualizations and social media platforms. In fact, databases are establishing themselves as some of the most important teaching tools for works of art at universities and other educational establishments. To offer students, teachers and researchers the necessary knowledge base, the LeFo research project aims to develop and expand an innovative teaching and research infrastructure. This is based on the existing Archive of Digital Art (ADA) at the University for Continuing Education Krems.

The digital world is highly visual and has become a part of cultural heritage. The image, or visual media, are the most important online mediators of information in this context. However, correctly documenting and archiving these large amounts of data in and outside the confines of academic art disciplines, art academies and cultural enterprises presents a challenge. In addition to expanding the database, the research project within the framework of the Digital and Social Transformation Initiative of the Federal Ministry of Education, Science and Research thus aims to develop new interactive interfaces and displays as an innovative teaching and research infrastructure to enable multimodal access to databases and a multi-sensory engagement with the archived artworks. The project focuses on building up an archive, establishing an international network of media art archives and on developing prototypes of future-oriented forms of documenting digital art.

Test Case Archive of Digital Art

The Archive of Digital Art (ADA), founded in 1998 by Prof Grau and further developed since 2013 with support of FWF at the University for Continuing Education Krems is now the largest in its field. ADA is now to be expanded into a co-creative open science data infrastructure to provide the necessary knowledge base for students, teachers and researchers at universities and art academies. In addition, the expanded documentation of digital art forms will create innovative access points and lay the information foundations for the future-oriented integration of media art into museums. Virtual walkability options and immersive experiential spaces in digital archives using augmented reality and interactive 360-degree fulldome environments are being developed as part of the project.

Teaching and Research Infrastructure for Digital Arts at Universities – LeFO

FUNDING

Federal Ministry of Education, Science and Research, Innovative Digital Transformation in Higher Education

DURATION

2020–2024

DEPARTMENT

Arts and Cultural Studies, Center for Image Sciences

PROJECT LEAD

Oliver Grau

PARTICIPATING RESEARCHERS

Philipp Hoffmann
Renato Rocha Souza
Carla Milena Zamora Campos

COORDINATION

University for Continuing Education Krems

Knowledge Transfer & Dissemination

The project's results are communicated and transferred within the scientific community, Science to Public and at the interface of academic-cultural practice in the form of lectures, publications, conferences or archives, e.g.:

→ **Conferences and workshops:**

Such as "Museen in Quarantäne"; "Kurt Schwertsik und der Begriff der Moderne im Wandel".

→ **Websites, app development and science blogs:**
e.g. "MuseumsMenschen"

→ **Participative Projects:**

The orchestral academy in Accumoli, Italy; The Strauss Dynasty as Musical Ambassadors for Austria

→ **Co-Organization and hosting of the 31st Austrian Museum Day in Krems** in cooperation with Kunstmeile Krems, the Lower Austrian State Collections, the Museumsbund Österreich and the International Council of Museums (ICOM).

→ **Archive of Digital Art (ADA)** as a free, open access archive for documenting media art: ADA Artist Features, ADA exhibitions, international lectures/archive presentations, presentations at media art festivals such as the Ars Electronica.

Pictured (f. l. t. r. & top down)

Elisabeth Rammer, Eleonora Weixelbaumer, Norbert Ruckebauer, Nils Unger, Susanne Watzenboeck, Michael Resch, Dirk Schuster, Alexandra Rauchenwald, Fermin Suter, Marlies Surtmann

Not Pictured: Clara Simak, Julia Längauer



Pictured (f. l. t. r. & top down)

Brigitta Potz, Marco Hoffmann, Christine Rigler, Hanna Prandstätter, Gundula Maria Wilscher, Martina Kalser-Gruber, Barbara Pernkopf, Elisabeth Nowotny, Jakob Maurer, Helmut Neundlinger, Jutta Maria Pichler, Sandra Sam, Armin Laussegger, Franziska Butze-Rios, Jasmine Cencic, Andreas Liska-Birk, Theresia Hauenfels, Nikolaus Kratzer, Theresa Feilacher, Wolfgang Breibert, Fritz Egermann, Daniela Fehlmann, Isabella Frick, Kathrin Kratzer

Selected Publications

- **Grau O, Hinterwaldner I (ed.)** (2021). Retracing Political Dimensions: Strategies in Contemporary New Media, DeGruyter, New York.
- **Grau O, Coones W** (2020). Museum Network for Digital Arts: A Concerted collection, documentation, and conservation strategy. In: ISEA 2020, pp. 689-694, ISEA, Montreal.
- **Grebe A** (2020). Authenticity in Context. Historic Displays and Modern Museum Practice. In: Kimmel D, Brüggerhoff S (eds.) Museen – Orte des Authentischen?, pp. 225-236, Verlag des Römisch-Germanischen Zentralmuseums, Mainz.
- **Bläsi C, Blaschitz E** (2020). Kulinarische Transfers aus anderen Regionen und Kulturräumen: der Niederschlag in westdeutschen und österreichischen Kochbüchern 1950–1980. In: Ernst, M, Hinkelmanns P, Zangerl L M, Zeppezauer-Wachauer K, empowering researchers, digital humanities austria 2018, pp. 154-159, Austrian Academy of Sciences Press, Vienna.
- **Stöckler E, Brandtner A (eds.)** (2020). „... dauert ewig schön und unveraltet ...“ Johann Michael Haydn – kein vergessener Meister! Hollitzer Wissenschaftsverlag, Vienna
- **Rigler C** (2019). Diese Komödie ist eine Tragödie – Werk und Leben des Schriftstellers Peter Turrini. Biografie. Haymon, Innsbruck-Vienna.
- **Straub W (ed.)** (2020). Alpensagas und Modelldörfer. Heimatbesichtigungen in Musik und Film. Studienverlag, Innsbruck-Vienna.
- **Mayr E, Windhager F.** (2020). Vor welchem Hintergrund und mit Bezug auf was? Zur polykontextuellen Visualisierung kultureller Sammlungen. In: Andraschke U, Wagner S (eds.) Objekte im Netz. Wissenschaftliche Sammlungen im digitalen Wandel, pp. 235-245, transcript, Bielefeld
- **Sam S** (2020). Was bleibt? Zur Frage des musealen Sammelns und Bewahrens archäologischer Funde. In: Griesser-Stermscheg M, Sternfeld N, Ziaja L (eds.) Sich mit Sammlungen anlegen. Gemeinsame Dinge und alternative Archive. Schriftenreihe curating. ausstellungstheorie & praxis, Vol 5, pp. 227-236, Universität für angewandte Kunst Wien, Vienna.
- **König N, Pfeiffer A, Wernbacher T, Denk N** (2020). Game-Based Learning Research at the Danube-University Krems' Center for Applied Game Studies. In: Seychell D, Dingli A (eds.) Rediscovering Heritage Through Technology: p. 123, Springer, Cham.

Overall university main field of research:
Continuing Education Research





Digital transformation fundamentally impacts the discourse on educational and learning processes. New educational technologies enable innovative forms of learning and acquiring knowledge. The Department for Continuing Education Research and Educational Technologies therefore puts one focus of research on user-centered design of digital support tools for teaching and learning. The department also focuses on supporting the development of skills based on the needs of target groups outside the formal education system, and validation of those skills. Research topics range from didactical designs for individual and collaborative learning, over support of personal and organizational competence, to the possibilities for technology support in learning and innovation processes.

Pictured

(f. l. t. r. & top down)

Sonja Brachtl
 Martin Dobiasch
 Ulrike Kastler
 Thomas Pfeffer
 Elke Lantschik
 Klausjürgen Heinrich
 Nicola Oudejans
 Gregor Pirker
 Stephanie Nestawal
 Nilay Aral
 Andrea Schlager
 Filiz Keser Aschenberger
 Monika Petermandl
 Florian Mühlburger
 Isabell Grundschober
 Monika Kyselová
 Stefan Oppl

Not Pictured

Lucie Procházková
 Sandra Lattner

Digital Know-How at Universities

In the 21st century, digital skills are an indispensable component. DigiFit4All teaches these skills to different target groups at universities, including students, teaching and administrative staff. Needs-based learning requires a personalized, skill-oriented approach to knowledge transfer, which is implemented in this project at both the content and technical levels.

The ongoing process of digitalization is making noticeable changes in the ways we live, learn and work. As such, this technological transformation also calls for changes in our qualifications. This shift affects universities as well, both in their educational mission and in operational terms as the basic conditions underlying teaching and administrative work continue to evolve. As a result, there are three target groups at universities with very different learning needs: students, teaching staff and administrative staff. One of this project's research questions what the needs of these three groups are in detail.

The Right Learning Material for Each Target Group

Starting with a needs assessment, the project's goal is to establish a basis for teaching and learning to support the development of digital skills for diverse target groups at universities. The project also aims to develop skills-oriented and needs-targeted methods of delivering learning content through personalized learning paths. To achieve these goals, qualitative interviews and content analyses are used to determine the content. This is followed by iterative, prototype-based development of teaching and learning materials.

Through this approach, the project enables the creation of personalized learning activities that are independent of any specific time or place, thereby facilitating access to key digital skills for the target groups mentioned before. The digital learning resources are augmented with metadata and placed in a digital archive for long-term storage, where they are available as a basis for future development and a broader range of use cases.

DigiFit4All

FUNDING

Federal Ministry of Education, Science and Research

DURATION

2020–2023

DEPARTMENT

Continuing Education Research and Educational Technologies

PROJECT LEAD

Stefan Oppl

PARTICIPATING RESEARCHERS

Sandra Lattner
 Edmund Panzenböck

COORDINATION

University of Klagenfurt

PARTNERS

University of Linz
 Vienna University of Technology

www.digifit4all.at

Bringing Digitalization to SMEs

Digital transformation is also bringing major changes to the economy. Small and medium-sized enterprises (SMEs) are especially affected by these upheavals. What challenges, opportunities and risks do they face? The EU's DigiCulTS project is developing tools to support SMEs in the digitalization process, which will be accessible through the digicults.eu platform starting in May 2022.

Many SMEs do not have the necessary resources to implement new business models arising from digitalization in an optimal way. To allow these businesses to benefit from the opportunities created by digitalization, an online platform is being developed as part of the DigiCulTS project to promote digital skills for employees of SMEs in Spain, Poland, Greece and Austria. There is a great need for such resources: Currently, only 57 percent of Europeans have the digital skills they need. While nine out of ten jobs now require basic digital skills, 35 percent of employees do not have them.

Identifying and Closing Knowledge Gaps

The project offers four services for employees, employers and job seekers based on findings from economics and business IT, education science and the sociology of education. The first service raises awareness of why SMEs require digital skills. To identify the need for additional training, an assessment tool analyzes existing knowledge. Based on the results, individualized training measures are recommended. The next service expands knowledge of digital skills and digital culture in SMEs. An online course determines which skills and abilities are particularly relevant for

keeping SMEs competitive in the digital world. The logical last step is then to provide learning resources. A virtual library offers Open Educational Resources (OER) that promote the development of digital skills within SMEs.

DigiCulTS – Digital Culture for SMEs

FUNDING

EU – Erasmus+

DURATION

2019–2022

DEPARTMENT

Continuing Education Research and Educational Technologies

PROJECT LEAD

Isabell Grundschober

PARTICIPATING RESEARCHER

Gregor Pirker

COORDINATION

SMC Studien und Management Center
Saalfelden gGmbH

PARTNERS

Danmar Computers (Poland)
Militos Consulting (Greece)
Sea Teach S.L. (Spain)

www.facebook.com/digicultsforSME

Math Help, Made to Order

The project develops instruments for adaptive measurement of math skills, with the goal of providing more precise diagnoses and feedback. These skills can then be supported in an individualized and differentiated way with additional in-depth teaching and learning options based on the popular and widely available GeoGebra platform.

Degrees in science, technology, engineering and mathematics, or MINT for short, continue to be in high demand on the job market. One aspect of these fields that potential students often find intimidating is the relatively high level of math skills they require. The project targets this issue with its goal of facilitating access to the MINT disciplines. Potential students in these fields are offered in-depth teaching and learning options to increase their chances of successfully completing a program of study. The goal is to increase the public perception of the attractiveness of MINT subjects.

Users Identify their own Learning Needs

The practical dimension of the project involves providing (self-)assessment tools for the popular GeoGebra software toolkit, accessed by users around the world through the platform at [geogebra.org](https://www.geogebra.org). These assessment tools will allow users to quickly and reliably diagnose their skill level in different areas of mathematics, and to receive individual tips about their specific learning needs based on the results of the assessment. The tools use adaptive testing procedures that identify the user's levels of math skills, and can also be used for assessment in class. This will make it possible to use GeoGebra to check students'

knowledge in a school setting as well. To obtain the tasks needed for adaptive testing, the project also examines how these tasks can be generated and validated, with help from communities of practitioners.

Math-Skill-Testing for Promoting MINT-Studies

FUNDING

Federal Ministry of Education, Science and Research

DURATION

2020–2022

DEPARTMENT

Continuing Education Research and Educational Technologies

PROJECT LEAD

Stefan Oppl

PARTICIPATING RESEARCHERS

Nilay Aral
Florian Mühlburger

COORDINATION

University of Linz

Programming Basics for Universities

Basic programming knowledge is relevant in an increasing number of fields, including at universities. How can these digital skills be taught to an ever-growing number of students, with their widely varying levels of prior knowledge? CodeAbility answers this question and creates a platform that takes the wide range of learning objectives and technologies into account, and provides individual support to both teachers and students.

The need for programming skills is growing at Austrian universities as more and more disciplines, even those without an IT focus, begin to develop computer-assisted research approaches. To adapt to this changed situation, new concepts are needed to provide high-quality training in basic programming for the full range of university communities. It will be essential to take students' widely varying levels of prior knowledge, the lack of teaching staff, and the broad range of learning objectives and technologies into account.

Focus on Self-Directed Learning

CodeAbility examines how self-directed practice aimed at acquiring programming skills can be supported through automated formative feedback. For example, it looks at the question of how ongoing feedback can improve the likelihood that a student will reach their learning objective. The second research question focuses on didactics to develop ideas for integrating individualized learning paths into basic programming training for non-IT-oriented disciplines. By bundling skills, a learning platform for programming skills that is available throughout Austria will be created for teaching staff and students.

In addition to students' acquisition of new skills, discussions among teaching staff will be supported and reinforced as well. Offering networking, training and continuing education for programming teachers will ensure a high level of teaching quality and initiate a process of innovation in how programming is taught.

CodeAbility Austria – Digitally Supported Programming Education at Austrian Universities

FUNDING

Federal Ministry of Education, Science and Research

DURATION

2020–2023

DEPARTMENT

Continuing Education Research and Educational Technologies

PROJECT LEAD

Stefan Oppl

PARTICIPATING RESEARCHERS

Martin Dobiasch

COORDINATION

University of Innsbruck

PARTNERS

TU Graz
University of Klagenfurt
University of Linz
University of Salzburg
Vienna University of Technology

codeability.uibk.ac.at

Knowledge transfer and dissemination

→ **Results-oriented design and choice of media** for blended learning formats in higher education, e-lecture in the "digiPH3 University College of Virtual Teacher Education" series

→ **Cross-Border Activities in Career Counseling for VET Students**, TEAVET Final International Conference

→ **Cooperation with the School of Education at JKU Linz** on joint development of a test and self-assessment module on the GeoGebra platform used throughout the world (as part of the MathSkillTest project funded by the Austrian Ministry of Education)

→ **Implementation of Study** "Status Quo and Potentials of Corporate Continuing Education at Wiener Linien"

→ Public Outreach:

Founding member of the IFDP platform (Institute for Digital Participation), together with other Austrian universities and institutional education providers. The goal: a sustainable digital transformation in which everyone can participate (www.ifdp.at)

Selected Publications

→ **Aral N, Oppl S** (2020). Towards comprehensive technology-supported formative assessment in math education – A literature review. Proc. of the 10th Annual ERME Topic Conference on Mathematics Education in the Digital Age (MEDA 2020), pp. 411–412, Linz.

→ **Dobiasch M, Oppl S**. Modellabstraktionen und deren Wirkung im Sport – Ein Ausbildungsproblem? *Wirtschaftsinformatik & Management*. 2020; 12: 362–368, <https://doi.org/10.1365/s35764-020-00282-y>

→ **Fleischmann A, Oppl S, Schmidt W, Stary C** (2020). Contextual Process Digitalization: Changing Perspectives – Design Thinking – Value-Led Design, Springer International Publishing, Cham.

→ **Oppl S** (2020). Erstellung und Evolution offener Bildungsressourcen mit Versionsverwaltungssystemen. In: Brandhofer G, Buchner J, Freisleben-Teutscher C, Tengler K, (eds.) *Proceedings der Inverted Classroom and beyond 2020*, Graz.

→ **Keser Aschenberger F, Kil M** (2020). Welche „Benefits“ für die Lernenden hat Erwachsenenbildung nach der Teilnahme am Kursangebot von Volkshochschulen? *Die Österreichische Volkshochschule. Magazin für Erwachsenenbildung*, Heft 270/71. Jg.

→ **Leitner K H, Pausits A, Giesecke S, Scharfing D, Kalcik R, Keser-Aschenberger F** (2020). *Prospective Report on the Future of Non-Formal and Informal Learning: Towards Lifelong and Life-wide Learning Ecosystems*. Publications Office of the European Union, Publications office of the European Union, Luxembourg



As a fundamental part of the educational system, the higher education system in Austria is, like many others in Europe, affected by social developments and trends of the day. In addition to their core activities of research and teaching, universities must fulfill a wide range of other tasks. The Department for Higher Education Research focuses on leadership and management at higher education institutions, with a special emphasis on personnel and organizational development; on higher education governance and policy reforms, especially in the context of the Third Mission and the social responsibility of the institutions; and on continuing education and the role of higher education for lifelong learning. The department pursues a practice-led research approach geared to the transfer of knowledge.

Pictured
(f. l. t. r. & top down)
Filiz Keser Aschenberger
David Friedrich James Campbell
Magdalena Fellner
Florian Reisky
Attila Pausits

Connecting Universities and Society

The project Steering Higher Education for Community Engagement (SHEFCE) explores how universities can improve their community engagement within the framework of the Third Mission. With this goal in mind, robust methods for developing action plans are developed, policy-making options are considered, and new information resources and comparative resources are made available in a European context.

Universities today are far more than mere teaching and research centers; on many levels they are interwoven with society and interact with it. This extra-university engagement encompasses different communities in the public, business and civic sectors. However, the players often lack specific instruments to bridge the gap between the academic world and the concerns of society.

Concrete Approaches on Three Levels

The SHEFCE project seeks to achieve four intellectual outputs: First, the universities develop action-plans for successful community engagement at the regional level. Second, development of national recommendations for political decision-makers calling for system-level support of higher education and content-wise aimed at supporting engagement with society. The third sub-aspect targets the European level by establishing a European online platform for community engagement in higher education. Finally, the last aspect involves developing a "heatmap", a type of activity barometer, to engage the European university-community. The theoretical considerations will be subjected to practical testing monitored

by academics. At the regional level, the resources for societal interactions are being improved at least five at universities and their communities through institutional self-evaluation and action planning.

Steering Higher Education for Community Engagement – SHEFCE

FUNDING
EU – Erasmus+

DURATION
2020–2023

DEPARTMENT
Higher Education Research

PROJECT LEAD
Attila Pausits

PARTICIPATING RESEARCHER
Magdalena Fellner

COORDINATION
Institute for the Development of Education (Croatia)

PARTNERS
Association of Catalan Public Universities (Spain)
Brodoto (Croatia)
Free University of Brussels (Belgium)
Ghent University (Belgium)
National University of Ireland Galway (Ireland)
Technological University Dublin (Ireland)
University of Girona (Spain)
University of Rijeka (Croatia)
as well as an international team of advisors, dissemination partners and local partners

Trends in Non-Formal Knowledge Acquisition

The Bologna Process brought about far-reaching changes in European higher education. In this context, the validation of informal or non-formally acquired competencies is of great importance. The project investigates potential development perspectives for informal and non-formal learning and will draw up a number of scenarios and recommendations for the different stakeholders by 2030.

When people talk about education, they usually mean formal learning as it is organized, led and assessed in schools and universities. Yet, alongside this institutionalized acquisition of knowledge, other forms of learning are also playing an increasing role. Informal learning happens at the workplace, during leisure time or while performing daily activities (learning by doing), where competencies are acquired but with no official proof for the individuals concerned. Non-formal learning typically takes place, for example, in evening classes or seminars that do not lead to a qualification with formal recognition in the educational system. What both types of learning have in common is that they can be validated, certified and thus taken into account in formal learning settings.

Recommendations for Stakeholders

The project examines the development perspectives of informal and non-formal learning. Against this backdrop, a detailed view emerges of the influencing factors and drivers of developments in education science, technology, the economy and society. This project considers the role of informal and non-formal learning in the future and factors for social development such as

access to education. Finally, it will provide some approaches and recommendations for different stakeholders.

Methodologically, the project works with Horizon Scanning, an instrument for the strategic early detection of societal change, expert reviews, consistency analyses and scenario workshops. Morphological analyses, a creativity technique for exploring all possible solutions to complex problems are also used.

The Future of Non-Formal and Informal Learning: Towards Lifelong and Life-Wide Learning Ecosystems

FUNDING
EU

DURATION
2018–2020

DEPARTMENT
Higher Education Research

PROJECT LEAD
Attila Pausits

PARTICIPATING RESEARCHER
Filiz Keser Aschenberger

COORDINATION
Austrian Institute of Technology

Further Projects

→ International Study on Working Conditions in Science

As part of an international comparative study, the project "The Academic Profession in the Knowledge-Based Society (APIKS Austria)" examines working conditions in science and the attitudes of scientific and artistic staff in the fields of research, teaching, learning, knowledge and technology transfer, and university governance at Austrian higher education institutions.

Project lead:

Attila Pausits

Coordination:

Department for Higher Education Research

Knowledge Transfer & Dissemination

→ **Online conference** "Service Learning in Higher Education – What does it mean to be(come) an engaged university?" (13–15 July 2020)

→ **Online conference** "Teaching and Learning Indicators" (30 November 2020)

→ **Annual Conference of the Austrian Network for Higher Education Research** (22–23 May 2019, organized by the department)

→ **Compilation of a comprehensive dataset and indicators** for the analysis, evaluation and further development of higher education teaching within the framework of the Erasmus+ project Sustainable Quality Enhancement in Higher Education Learning and Teaching – SQELT (2017–2020)

→ **Recommendations for action and training material** for developing and implementing service learning in higher education, prepared as part of the Erasmus+ project Service Learning in Higher Education – Fostering the Third Mission of Universities and Civic Engagement of Students (SLIHE) (2017–2020).

→ **Development of education policy and an institutional framework** for dual study programs in South Africa and Mozambique as well as providing academic support for the first pilot programs in the Erasmus+ capacity building project Learning and Teaching Tools Fuelling University Relations with the Economy in Mozambique and South Africa (LATFURE) (2017–2020)

Selected Publications

→ Campbell D, Pausits A, Fellner M (2020). Universität und Innovationen: Beispiele aus der österreichischen Hochschullandschaft. Zeitschrift für Hochschulrecht, Hochschulmanagement und Hochschulpolitik, 2020 (19)1: 5-24.

→ Campbell D F J (2019). Global Quality of Democracy as Innovation Enabler. Measuring Democracy for Success, Palgrave Macmillan, Cham, New York, NY.

→ Janger J, Campbell D F J, Strauss A. Attractiveness of Jobs in Academia: A Cross-Country Perspective. Higher Education 2019; 78(6), 991-1010.

→ Pausits A (2020). University mergers in Austria. Experiences and future scenarios for organisational development in tertiary education. In: Broucker B, Borden V, Kallenberg T, Milsom C (eds.) Responsibility of Higher Education Systems. What? How? Why? pp. 111-126, Brill, Leiden.

→ Pausits A, Aichinger R, Unger, M (eds.) (2019). Quo vadis, Hochschule? - Beiträge zur evidenzbasierten Hochschulentwicklung. Waxmann, Münster.

→ Pausits A (2019) Hochschulfusionen im internationalen Trend und mögliche Szenarien in Österreich. Explorative Betrachtung zwischen Mode, Ausdifferenzierung und Rationalität in der Organisationsentwicklung, Zeitschrift für Hochschulrecht Hochschulmanagement und Hochschulpolitik zfhr, 18(1):14, 14-24.



Developing solutions to the grand challenges of our day requires research that crosses traditional boundaries between disciplines. This interdisciplinary approach is characteristic of the interfaculty research groups at the University for Continuing Education Krems. In keeping with its core identity as a public university for continuing education, all these interfaculty research groups have a clear connection to aspects of continuing education research in terms of the content of their work. The questions addressed by their projects all pertain to the main research fields of the University for Continuing Education Krems as a whole. The thematic cross-links arising from this work therefore cover a wide spectrum, ranging from questions of how different age groups learn and the impact of digitalization on continuing education and educational technologies, to medical aspects of learning and those relating to societal cohesion, and the effects of space and architectural conditions on learning performance.

Pictured

(f. l. t. r. & top down)

Arleta Franczukowska
Christina Ipser
Bernd Kerschner
Lukas Zenk
Gregor Radinger
Barbara Brenner
Birgit Feldhusen
Benedikt Lutz
Cornelia Rabl-Winter
Eva Krczal
Doris Behrens

The Ideal Space for Learning

What spatial and environmental factors influence learning and innovation processes in academic continuing education? And how do design requirements for the learning environment change as a result of societal and technological developments? The interfaculty research project Learning and Innovation Spaces for Continuing Education has developed a deeper understanding of these issues. Online teaching and learning imposed by the pandemic led to additional findings about private learning environments.

For this project, a multidisciplinary scientific basis was established for optimizing existing education spaces and designing future spaces for lifelong learning supported by technology in a socially inclusive society. This was made possible by cross-departmental and interfaculty collaboration in areas ranging from architectural and building research, to research in continuing education and innovation, to information and communication sciences. Researchers on the project looked at demographic and digital transformation, the drive toward integrative and innovative societies, and aspects of health and well-being in the design of learning spaces.

Learning under Lockdown

This project has not only improved our current state of knowledge about the impact of spatial conditions on adult learners but has also led to a deeper understanding of the specific needs of students in the academic field of continuing education. As part of a transdisciplinary case study, researchers also examined how students at Campus Krems perceive the indoor and outdoor spaces on campus, and how they actually use the available spaces.

The study on Home Learning Environments shed light on the differing physical and spatial conditions experienced by continuing education students during the COVID-19 lockdown

in the spring of 2020. For example, the study investigated what influence different spatial situations and environments had on students' well-being and learning experience in the context of online learning. The results, some of which were formulated as future scenarios, will encourage further interdisciplinary research.

Learning and Innovation Spaces for Continuing Education – [LIS]

DURATION

2019–2021

COORDINATION

Department for Building and Environment

PROJECT LEAD

Christina Ipser (project manager)
Gregor Radinger (Co-project manager)

PARTICIPATING DEPARTMENTS

BUILDING AND ENVIRONMENT

Christina Ipser
Cornelia Rabl-Winter
Gregor Radinger

HIGHER EDUCATION RESEARCH

Attila Pausits

CONTINUING EDUCATION RESEARCH AND EDUCATIONAL TECHNOLOGIES

Sonja Brachtl
Filiz Keser Aschenberger

KNOWLEDGE AND COMMUNICATION MANAGEMENT

Nicole Hynek
Günther Schreder
Gerald Steiner
Lukas Zenk

Other experts and expert groups from the Departments of Economy and Health, Integrated Sensor Systems, E-Governance and Administration, the Digital Transformation Team and the Service Center for Digital Teaching and Learning.

Stress-Free in the Digital World of Work

The digital revolution is having a profound impact on the world of work. For older workers in particular, the shift to digital working processes implies huge challenges. What do older employees expect from the digital revolution? And which learning formats are most effective in helping them acquire knowledge about digital tools. In light of an aging population, the interfaculty research project Age-Sensitive Learning set out to find solutions that would enable older workers to have a stress-free learning environment.

As Europe's population ages people are remaining in the workforce for longer. As a consequence, pressure on employees to keep up with the rapid evolution of digital work tools is growing. This trend is accompanied by political demands for greater employability of older employees in the EU and for support for mental health at the workplace. This requires continuing education and lifelong learning also for older members of the workforce. An interdisciplinary team of researchers from the University for Continuing Education Krems initially surveyed attitudes to the digitalization of the working world. In a second step, the team then explored which learning formats are most suitable for helping older employees stay abreast with digital work process without learning stress.

Positive Attitude if Work is Made Easier

The results of many interviews and focus groups shed light on the actual attitudes of older employees. In principle, they view the digital transformation positively provided it facilitates working processes, although it should be said that the attitudes of those surveyed are on the whole ambivalent and in most cases, people are undecided about the benefits and disadvantages of digitalization. Peer learning, i. e., mutual support among colleagues emerged as an important strategy

for overcoming the challenges arising from the digital revolution. Differences in digital skill levels among colleagues are not generally perceived as a problem but rather strengthen mutual learning and cooperation among colleagues. Employees favour a sensible combination of online and classroom teaching. The preferred learning format depends on the course content, previous knowledge and the learner's experience with the subject matter and the skills to be acquired. The loss of the interpersonal component and lack of interaction is viewed as the biggest disadvantage of pure online teaching.

Age-Sensitive Learning – Stress-Free Learning with Digital Media for the Older Workforce

DURATION
2019–2021

COORDINATION
Department for Economy and Health

PROJECT LEAD
Eva Krczal

PARTICIPATING DEPARTMENTS

EVIDENCE-BASED MEDICINE AND EVALUATION
Christina Kien
Isolde Sommer

MIGRATION AND GLOBALIZATION
Lydia Theresia Rössl
Isabella Skrivanek

CONTINUING EDUCATION RESEARCH AND EDUCATIONAL TECHNOLOGIES
Klausjürgen Heinrich
Filiz Keser Aschenberger

ECONOMY AND HEALTH
Arleta Franczukowska
Eva Krczal

New Interfaculty Research Groups (2021–2023)

→ Meta-Skills for Dealing with Complexity

Dealing with today's highly complex real-world challenges, such as the COVID-19 pandemic, requires new skills for dealing with uncertainty in complex environments and for addressing complexity productively and effectively. As individuals can only handle a limited amount of complexity, an expanded range of skills is needed: So-called meta-skills, which include systemic and creative abilities such as the ability to improvise. The research group's objective is to investigate these meta-skills and to develop innovative teaching designs as a university for continuing education.

→ Help Assessing the Quality of Health Information

More than fifty percent of Austrians have difficulty determining whether health information published in the media is reliable and objective. The World Health Organization has already raised concerns of an "infodemic" in connection with the COVID-19 pandemic. This research group's objective is to support the public in learning to assess the reliability of health information more effectively, especially information found online, and thus to increase the public's critical thinking skills with regard to health issues. To this end, it plans to develop a continuing education measure in the form of an online training course.

Meta-Skills for Unpredictable Situations in Complex Environments

COORDINATION

Department for Knowledge and Communication Management

PROJECT LEAD

Lukas Zenk

PARTICIPATING DEPARTMENTS

KNOWLEDGE AND COMMUNICATION MANAGEMENT

Gerald Steiner
Lukas Zenk

MANAGEMENT AND ECONOMICS

Barbara Brenner
Birgit Feldhusen

HIGHER EDUCATION RESEARCH

Attila Pausits

CONTINUING EDUCATION RESEARCH AND EDUCATIONAL TECHNOLOGIES

Sandra Lattner
Stefan Oppl

ARTS AND CULTURAL STUDIES

Eva Maria Stöckler

ECONOMY AND HEALTH

Doris Behrens

Critical Health Literacy for Empowerment in the Era of Digital Transformation

COORDINATION

Department for Evidence-based Medicine and Evaluation

PROJECT LEAD

Bernd Kerschner

PARTICIPATING DEPARTMENTS

EVIDENCE-BASED MEDICINE AND EVALUATION

Ursula Griebler
Bernd Kerschner
Christina Kien
Isolde Sommer
Viktoria Titscher

CONTINUING EDUCATION RESEARCH AND EDUCATIONAL TECHNOLOGIES

Filiz Keser Aschenberger
Sandra Lattner
Stefan Oppl

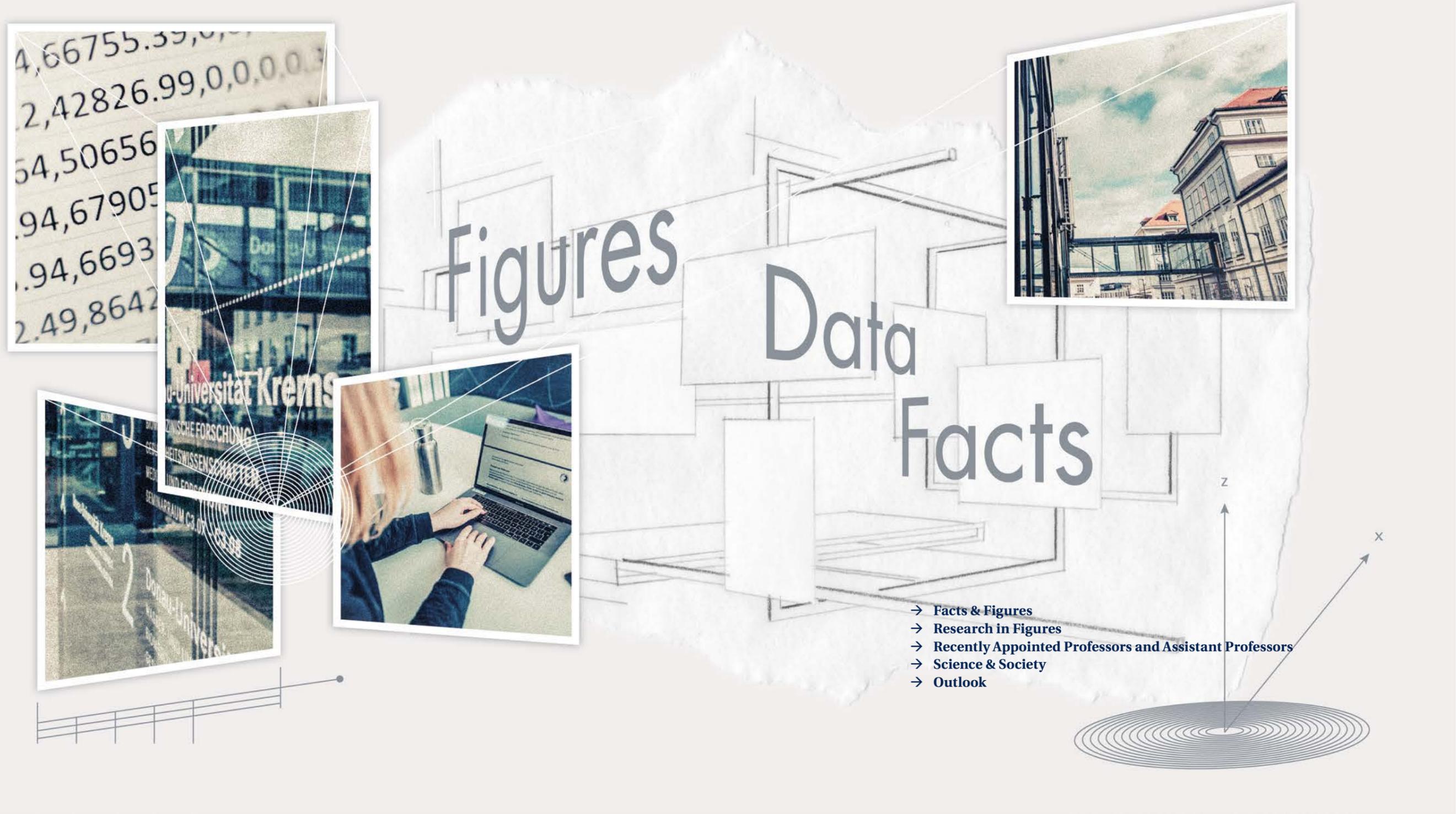
KNOWLEDGE AND COMMUNICATION MANAGEMENT

Benedikt Lutz

ECONOMY AND HEALTH

Eva Krczal

Figures, Data, Facts





Through seamless cooperation the Research Services and Grant Acquisition offices are able to deliver a comprehensive information and support service to assist researchers obtain third-party funding at the regional, national and European levels. In particular, the service provides information and advice on funding programs and support with application processes, project planning and management.

Pictured

(f. l. t. r. & top down)

Silvia Hofbauer

David Krych

Sabina Ertl

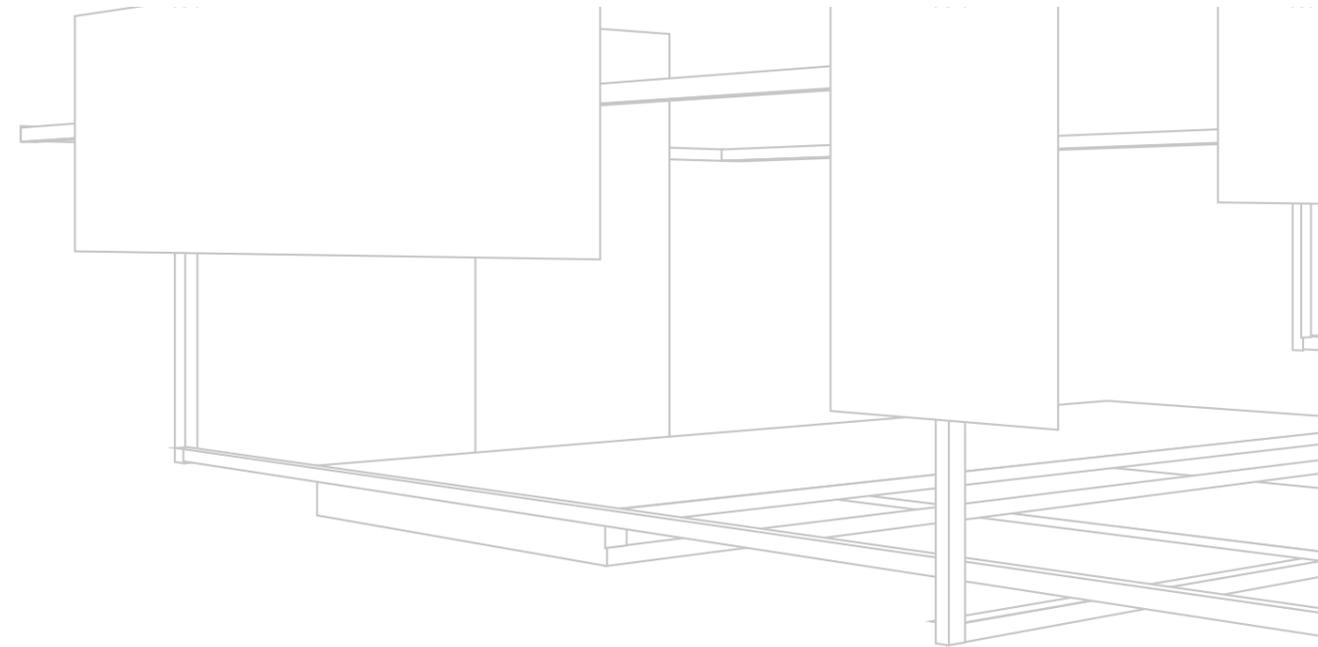
Karin Elisabeth Siebenhandl

Claudia Paulhart

Edith Huber

Katrin Kaineder

Miriam Peinhaupt



Office for Grant Acquisition

The Office for Grant Acquisition advises and supports researchers who wish to obtain funding (in European projects or other large national or international projects) and guides them through the application process.

Team:

Katrin Kaineder, Head of Office

Miriam Peinhaupt, Grant Acquisition Specialist

Office for Research Services

The Office for Research Services is the contact point for questions concerning national and international funding calls, the implementation and management of research projects and for the commercialization of research results. It oversees the university's internal research documentation system and organizes continuing education and information events for researchers.

Team:

Edith Huber, Head of Office

Sabina Ertl, Advisor

Silvia Hofbauer, Advisor

David Krych, Advisor

Claudia Paulhart, Administrative Project Manager

Karin Elisabeth Siebenhandl, Advisor

Research at the University for Continuing Education Krems is characterized by a high degree of transdisciplinarity and lively exchange between disciplines, and also between research, teaching and society. This ensures innovation and an intensive transfer of knowledge.

In its research work the University for Continuing Education Krems is guided by a desire to find answers to the major challenges facing society today. It combines basic and applied research across disciplines and integrates knowledge from outside the academic sphere.

Research is based upon a clearly defined profile with university-wide fields of research:

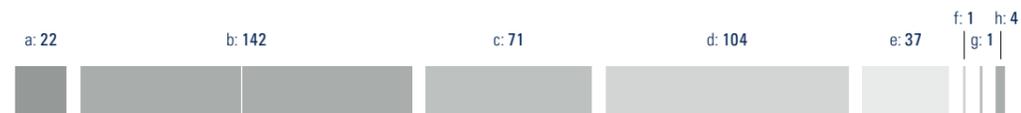
- Regenerative Medicine
- Cohesive and Innovative Societies
- Cultural Heritage
- Continuing Education Research

Reporting period 2020/21

Facts & Figures

Data collected 2020

Publications total: 382
Number of scientific/art publications



- a → First edition reference books and textbooks: 22
- b → Articles first published in SCI, SSCI and A&HCI journals: 142 including international co-publications: 73
- c → Articles first published in other scientific journals: 71
- d → Articles first published in compilations: 104
- e → Other scientific publications: 37
- f → Artistic sound, image, data carriers: 1
- g → Art catalogs and other art publications: 1
- h → Articles in art catalogs and other art publications: 4

Source: Intellectual Capital Report 2020

Research is conducted at the three faculties, their departments and research labs:

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

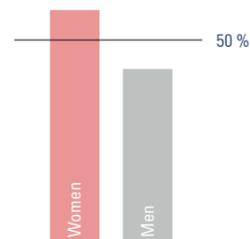
Research within the departments is complemented by the PhD programs and interfaculty research groups.

Academic Staff

Total: 348

Women: 199

Men: 149



Source: University for Continuing Education Krems (as per: 31 Dec 2020, actual persons)

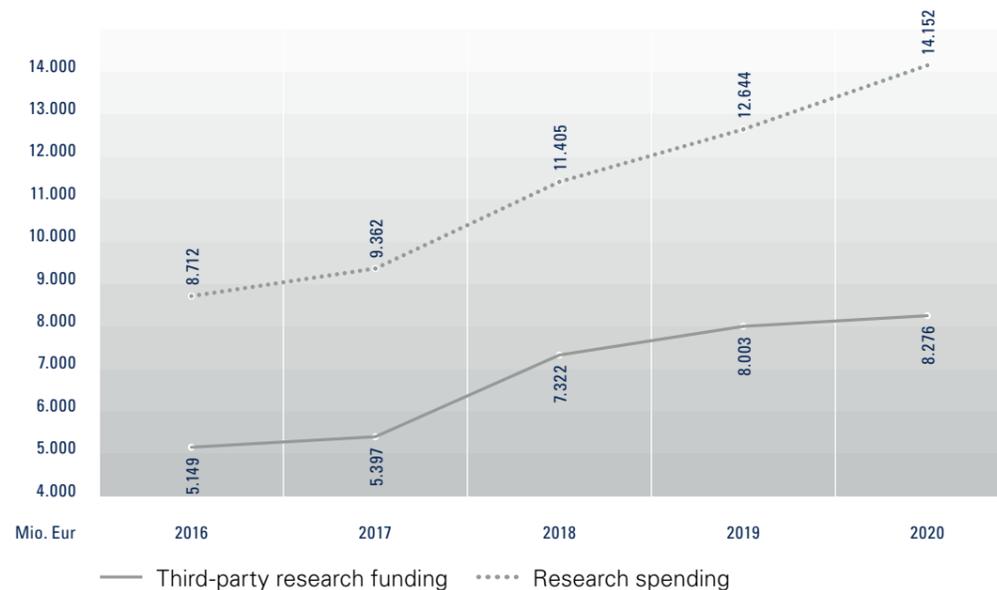
Third-party research funding in 2020

Total: 8.3 million euros

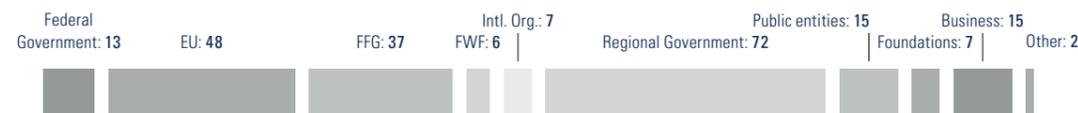
By funding organization:



Development third-party funding and cost of research



Projects by funding organization total: 222





→ Stefan Oppl

Stefan Oppl joined the University for Continuing Education Krems on 1 September 2019 following his appointment as professor of Technology-Supported Learning at the Department for Continuing Education Research and Educational Technologies at the Faculty of Education, Arts and Architecture in accordance with § 98 Universities Act. Oppl gained his habilitation in Business Informatics at the University of Linz.



→ Attila Pausits

Attila Pausits was appointed university professor of Continuing Education Research and Educational Development on 1 October 2020 in accordance with § 98 Universities Act. Pausits, who heads the Department for Higher Education Research received his habilitation in Economic and Management Studies at the University of West Hungary, Sopron.



→ Stefanie Auer

Stefanie Auer heads the Center for Dementia Studies at the University for Continuing University Krems. Following her initial appointment in 2015, she was again appointed professor for Dementia Research on 1 November 2020 in accordance with § 99 Universities Act. Auer is Deputy Dean of the Faculty of Health and Medicine, and Deputy Head of the Department for Clinical Neurosciences and Preventive Medicine.



→ Doris Behrens

Doris Behrens moved from the National Health Service (NHS) Wales to the University for Continuing Education Krems in January 2021. She took up her position as university professor for Management in Healthcare on 1 January 2021 following her appointment in accordance with § 98 Universities Act and also became Head of the Department for Economy and Health. Behrens habilitated in Operations Research at Vienna University of Technology.



→ Thomas Klestil

Thomas Klestil was appointed professor for Clinical Research in Orthopedics and Traumatology on 1 January 2021 in accordance with § 98 Universities Act. The specialist for Orthopedics and Trauma Surgery had been appointed university professor for Traumatology at the University for Continuing Education Krems in 2016 in accordance with § 99 Universities Act. Klestil works at the Department for Health Sciences, Medicine and Research.

→ Assistant Professors

Tenure track positions were offered to seven academic staff members by the beginning of 2021:

Edith Blaschitz, Assistant Professor for Transdisciplinary Art and Cultural Research

Albert Kraller, Assistant Professor for Migration Studies

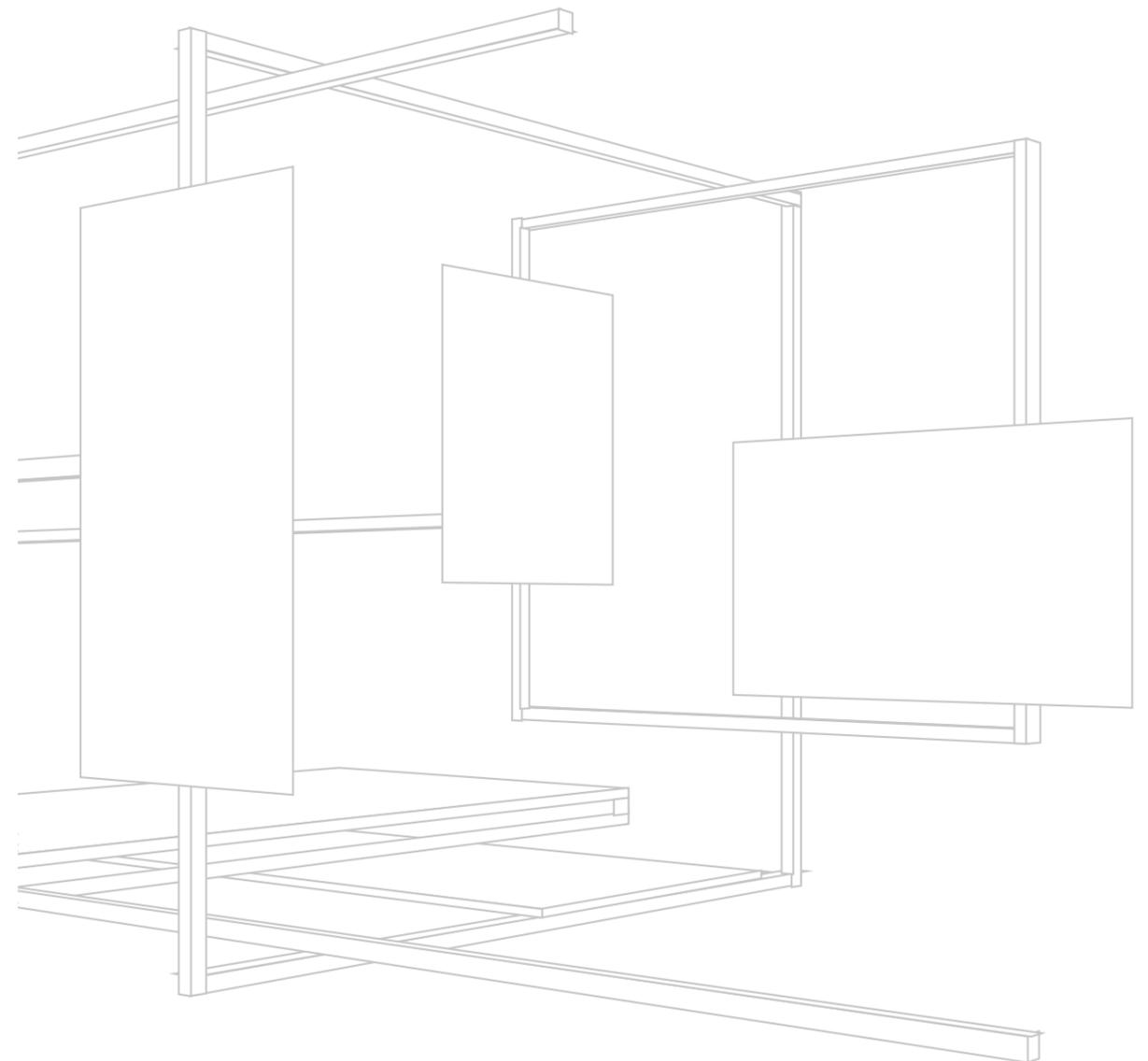
Gabriela Viale Pereira, Assistant Professor for Information Systems

Elke Humer, Assistant Professor for Biopsychosocial Health Research

Heidrun Bohnet, Assistant Professor for Quantitative Migration and Globalization Research

Daniela Trauningner, Assistant Professor for Building Climatology and Building Technology

Anna Maria Kaiser, Assistant Professor for Applied Cultural Property Protection



The University for Continuing Education Krems is committed to disseminating academic working methods, research and research processes to an interested public. Even under the difficult circumstances during the COVID-19 pandemic, the University participated in the digital version of the Long Night of Research 2020, the Austria-wide science communication format.



→ **Long Night of Research 2020 in Digital Format**

The University for Continuing Education Krems took part in the Long Night of Research between 9 October and 31 December 2020 with several virtual stations and videos especially created for the digital edition of the nationwide event. The topics covered, for example, biodiversity, sepsis, cellular communication, 3D visualizations, the effects of climate change on fish or the future of Europe. The video clips presented the researcher's work in a way that was easy to understand.

Scientific Awards and Prizes

Researchers at the University for Continuing Education Krems received numerous awards for their work between October 2019 and February 2021:

B&C Private Foundation Houska Prize 2019

→ Nomination for the project "Unkonventionelle Spin-Topologie für Magnetfeldsensoren im Auto" led by Hubert Brückl, Professor for Sensor Technology and Head of the Department for Integrated Sensor Systems.

Krems Cooperation Research Award 2019

→ to René Weiss, for the publication "Differential Interaction of Platelet-Derived Extracellular Vesicles with Leukocyte Subsets in Human Whole Blood", Scientific Reports 8: 6598 (2018).

Early Career Award of the Austrian Public Health Association (ÖGPH)

→ third place to Alexander Braun, Department for Clinical Neurosciences and Preventive Medicine, for his studies on the costs of dementia care.

tecnet accent Innovation Award 2019 presented by tecnet equity and accent-Gründerservice

→ First prize went to a research project led by Matthias Pilecky from the University for Continuing Education Krems on sepsis pathogens.

Lower Austrian Science Award 2019, Appreciation Award

→ to Oliver Grau, professor for Image Science, Department for Arts and Cultural Studies, Center for Image Sciences, in recognition of his services to Image Sciences and the field of Media Arts research.

Lower Austrian Science Award 2020

Appreciation Awards for extraordinary scientific achievements to:

- Markus Gusenbauer, Department for Integrated Sensor Systems for his research on Computational Materials Design.
- Barbara Nußbaumer-Streit, head of the Cochrane Austria center, Department for Evidence-based Medicine and Evaluation, for her research work on COVID-19 quarantine measures.
- Gabriel M. Lentner, deputy head of Department for Legal Studies and International Relations for a monograph on international law.

Science Prize 2019 of the Austrian Society for Trauma Surgery

→ to Thomas Klestil, professor for Clinical Research in Orthopedics and Traumatology at the Department for Health Sciences, Medicine and Research, for his study on the optimal timing of hip fracture surgery.

The Wissenschaft[ft] Zukunft prize 2019 awarded by Lower Austria

→ first prize in the category Dissertation/PhD for the dissertation on Flow Sensors on PCB Technology by Thomas Glatzl, Department for Integrated Sensor Systems.

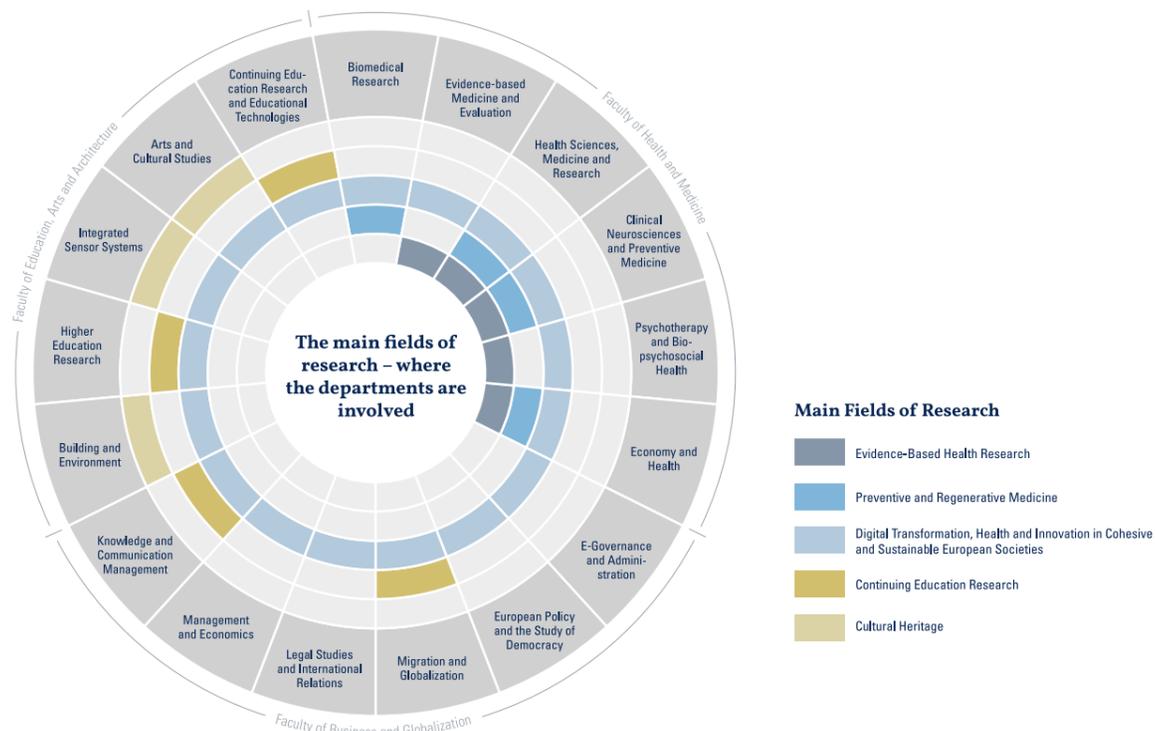
Research at the University for Continuing Education Krems focuses on current and future societal challenges. The dynamic nature of global changes requires continuous progress in research. In spring 2021, the University for Continuing Education Krems broadened and modified its main fields of research.

Our main areas of research:

- Digital Transformation, Health and Innovation in Cohesive and Sustainable European Societies
- Evidence-based Health Research
- Cultural Heritage
- Preventive and Regenerative Medicine
- Continuing Education Research

Stronger Focus on Europe

Tackling major societal challenges requires a transdisciplinary approach. The University for Continuing Education Krems aims to expand its participation in EU-funded research projects and to make the most of the opportunities offered by the new EU Framework Program Horizon Europe and other funding schemes in order to deepen existing research networks and develop new ones.



New PhD Programs

In the period covered by the current and forthcoming performance agreements, the University for Continuing Education Krems is establishing additional PhD programs in the university's main research fields to complement the two existing PhD programs. The PhD program Technology, Innovation and Cohesive Society is currently undergoing accreditation.

In the years to come, additional PhD programs will be established in the following fields:

- Continuing Education and Lifelong Learning
- Cultural Heritage
- Evidence-based Medicine
- Health Management
- Psychotherapy and Psychosomatic Research
- Sensor Systems and Sensor Networks

Increasing Support for Researchers:

By setting up the Office for Grant Acquisition, the University for Continuing Education Krems is supporting the goal of increasing research activities at the European level (see also page 122).

Furthermore, the University for Continuing Education Krems supports the publishing activities of its researchers in open access journals and is continuously expanding its range of electronic resources (e-journals and databases).



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