



# ERCIS

European  
Research  
Center for  
Information  
Systems

## ANNUAL REPORT

### 2022



AUSTRALIA AUSTRIA BELGIUM BRAZIL CZECH REPUBLIC DENMARK ESTONIA FINLAND  
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POLAND PORTUGAL SLOVENIA SOUTH KOREA SPAIN SWEDEN SWITZERLAND  
THE NETHERLANDS UKRAINE UNITED KINGDOM UNITED STATES OF AMERICA



## THE ERCIS NETWORK

ERCIS – the European Research Center for Information Systems – is an international network of scientists conducting cooperative research in the field of Information Systems (IS). The Network was founded in 2004 at the University of Münster and is funded by the German State of North Rhine-Westphalia and the University of Münster.

The Network provides new ways of thinking and multi-disciplinary approaches for finding solutions to the problems arising from an ongoing transformation of society and organisations due to the growing impact of IT. ERCIS has dedicated itself to dealing with these challenges through collaboration and exchange of information between research and practice.

ERCIS is notable for excellent communication and uncomplicated initiation of research cooperation and research projects. Among ERCIS' associated major strengths are the personal contacts between researchers, which make it a vibrant network. ERCIS covers a wide range of disciplines associated with IS and perspectives on IS research.

The Network is headed by the *Board of Directors* in Münster, which is composed of one academic director, namely Prof. Dr. Jörg Becker, and eight additional professors all active in the IS research field. Moreover, ERCIS involves numerous internationally renowned researchers from more than 20 *Associated Research Institutions, Personal Members*, as well as members of the *Advisory Board* coming from diverse industry companies.

All ERCIS research partners are experts in a wide variety of disciplines related to IS. Research conducted by ERCIS ranges from fundamental research to application-oriented research. Besides individual research activities of ERCIS members, the Network brings together and supports selected research aspects of IS in *Competence Centres* aimed at strengthening research in specific areas. The Advisory Board members come from various industry sectors, which guarantees that the research conducted at ERCIS is relevant for practice. Regular meetings of the Board of Directors with the Advisory Board members, as well as annual workshops of ERCIS' associated research institutions, ensure continuous, direct and productive exchange of knowledge.

Finally, students and young researchers also benefit from collaboration at ERCIS, as many ERCIS research partners offer exchange programs that last one or two semesters, which gives students an opportunity to acquire international experience. Joint lectures and guest talks organised by several ERCIS members contribute to the internationalisation of teaching.

If you are interested in connecting with the Network, please feel free to contact us! For further information please visit

[www.ercis.org](http://www.ercis.org)

## PREFACE

› Preface Prof. Becker [www.ercis.org](http://www.ercis.org)

### DEAR FELLOW ERCIS PARTNERS AND INTERESTED READERS OF THIS REPORT,

I was so much looking forward to see many of you this September at the 20<sup>th</sup> Business Process Management Conference in Münster. We also intentionally put the ERCIS Annual Workshop at that time so that ERCIS partners could participate at both events without having to travel twice. Great plan, but unfortunately not for me: A Covid infection made me stay in bed for the whole week so, sadly, I missed the BPM Conference and the ERCIS Annual Workshop. From the many mails that I got afterwards I would conclude that both events were a great success and all participants enjoyed being at a conference in presence. As I said, I would have loved to be there and meeting all of you! I hope that at least for the ERCIS Annual Workshop, this will be possible in 2023, when we will meet in Wrocław! Thank you, Dariusz and Ngoc, for the kind invitation and for hosting the ERCIS Annual Workshop next year!

Apart from the BPM conference, in which quite many ERCIS members were involved, we had several other activities going on in our network: The ERCIS Doctoral Consortium could e.g. again take place on Mallorca this summer. In addition, our research clusters, (1) Data Science and AI, (2) Process Science, (3) Knowledge and Learning, (4) Smart Manufacturing, and (5) Digital Public Services, which were developed and established in 2021, started working. The clusters were established to enhance the cooperation in the respective research areas and first steps were taken during the last months. Let's see, where this new structure leads us!

Furthermore, we also had several changes – good and sad - in the network in 2022: First, as most of you already know, Stanisław Wrycza, our colleague from the University of Gdansk, passed away in January 2022.

Stanisław was an ERCIS a member of the first hour (*since 2004*) and was always an active partner and valued colleague. Jacek Maslankowski will continue in his place as contact person at the University of Gdansk. Second, Paolo Spagnoletti from LUISS in Rome approached us because he felt that he could not contribute the ERCIS network as much as he would like to. He proposed that the institutional membership in Italy would move from LUISS to the University



This year, we were also able to hand over the first ERCIS Master Thesis Award! This award was initially an idea of the students in the ERCIS board; it is fantastic to see how this idea finally came to live, and we now have our first awardee: Congratulations to Leonor Ribeiro from the University of Minho for her Master thesis on the GDPR Toolkit! The award was the attendance to the ECIS conference (*flight, accommodation and attendance is covered by the Master Thesis Award*) in Romania this year, where the award was officially handed over to Leonor during the traditional ERCIS@ECIS meeting, this first after two pandemic years.

Apart from the pandemic, which still affects our daily life, also the war in the Ukraine influences all our lives, be it our private or our academic life. As a conclusion, the ERCIS network decided to stop all cooperation with our former Russian partner universities and institutions. We know that this step also creates injustices. We are aware that numerous scientists and students reject the war against Ukraine sincerely and are committed to peaceful and constitutional conditions. Nevertheless, this step is essential. The attack on the sovereignty of an independent state in violation of international law are irreconcilable with the principles of peace, democracy and human rights. As researchers, we have the obligation – and we are given many opportunities! – to strive for this. Challenges as big as the ones we currently face are difficult to approach alone – let us work together to overcome them!

of Tuscia and, this, to Alessio Braccini. Alessio has been a very active personal member for several years now and, in my opinion, this is a great solution! Thanks, Paolo, for your commitment in the last years and thanks, Alessio, for continuing and strengthening your ties with the ERCIS network! Third, we welcome four new personal members: Isabella Seeber from the Grenoble École de Management, Andre Coners from the South Westphalian University of Applied Sciences, Christian Janiesch from the TU Dortmund, and Pascal Kerschke from the Technical University of Dresden. Additionally, Eucon and adesso extend our Advisory Board. Great to have you on board!

of international law are irreconcilable with the principles of peace, democracy and human rights. As researchers, we have the obligation – and we are given many opportunities! – to strive for this. Challenges as big as the ones we currently face are difficult to approach alone – let us work together to overcome them!

All the best,

Jörg Becker

# TABLE OF CONTENTS

|  |    |
|--|----|
| <b>ERCIS NETWORK</b>   | 2  |
| <b>PREFACE</b>   | 3  |
| <b>13<sup>TH</sup> ANNUAL ERCIS WORKSHOP</b>   | 6  |
| <b>SHORT NEWS</b>  | 8  |
| <b>RESEARCH CLUSTER</b>  | 14 |
| <i>Data Science and Artificial Intelligence</i>  | 17 |
| <i>Digital Public Services</i>   | 18 |
| <i>Knowledge and Learning</i>  | 19 |
| <i>Process Science</i>   | 20 |
| <i>Smart Manufacturing</i>   | 21 |
| <b>UNIVERSITY OF MÜNSTER – GERMANY (HEADQUARTERS)</b>  | 22 |
| <i>Chair for IS and Information Management</i>   | 24 |
| <i>Digital Innovation and Public Sector (DIPS)</i>   | 26 |
| <i>Data Science: Machine Learning and Data Engineering</i>                                     | 28 |
| <i>Chair for IS and Supply Chain Management (IS&amp;SCM)</i>                                   | 30 |
| <i>Institute for Information, Telecommunication and Media Law (ITM) – Civil Law Department</i> | 32 |
| <i>Cyber Security</i>  | 34 |
| <i>Chair for IS and Interorganisational Systems</i>  | 36 |
| <i>Chair of Practical Computer Science</i>   | 38 |
| <i>Data Science: Statistics and Optimization</i>   | 40 |
| <i>Institute of Medical Informatics (IMI)</i>  | 42 |
| <i>DBIS Group</i>  | 44 |

|  |    |
|--|----|
| <b>INTERNATIONAL PARTNER INSTITUTIONS</b>          | 46 |
| <b>AUSTRALIA – BRISBANE</b>                        | 48 |
| <i>Queensland University of Technology</i>         |    |
| <b>AUSTRIA – VIENNA</b>                            | 50 |
| <i>Vienna University of Economics and Business</i> |    |
| <b>BRAZIL – SÃO PAULO</b>                          | 52 |
| <i>University of São Paulo (USP)</i>               |    |
| <b>CZECH REPUBLIC – PRAGUE</b>                     | 54 |
| <i>Charles University in Prague</i>                |    |
| <b>ESTONIA – TARTU</b>                             | 56 |
| <i>University of Tartu</i>                         |    |

|  |    |
|--|----|
| <b>FINLAND – TURKU</b>                       | 58 |
| <i>University of Turku</i>                   |    |
| <b>FRANCE – BORDEAUX</b>                     | 60 |
| <i>Kedge Business School</i>                 |    |
| <b>ITALY – VITERBO</b>                       | 62 |
| <i>University of Tuscia</i>                  |    |
| <b>PRINCIPALITY OF LIECHTENSTEIN – VADUZ</b> | 64 |
| <i>University of Liechtenstein</i>           |    |

|   |    |
|---|----|
| <b>LITHUANIA – KAUNAS</b>                           | 66 |
| <i>Kaunas University of Technology</i>              |    |
| <b>NORWAY – KRISTIANSAND</b>                        | 68 |
| <i>University of Agder</i>                          |    |
| <b>POLAND – SOPOT</b>                               | 70 |
| <i>University of Gdansk</i>                         |    |
| <b>POLAND – WROCŁAW</b>                             | 72 |
| <i>Wroclaw University of Science and Technology</i> |    |
| <b>PORTUGAL – GUIMARÃES</b>                         | 74 |
| <i>University of Minho</i>                          |    |
| <b>SLOVENIA – MARIBOR</b>                           | 76 |
| <i>University of Maribor</i>                        |    |
| <b>SOUTH KOREA – POHANG</b>                         | 78 |
| <i>Pohang University of Science and Technology</i>  |    |

|   |     |
|---|-----|
| <b>SPAIN – MADRID</b>   | 80  |
| <i>IE Business School</i>                                     |     |
| <b>SPAIN – SEVILLA</b>  | 82  |
| <i>Universidad de Sevilla</i>                                 |     |
| <b>SWITZERLAND – ST. GALLEN</b>                               | 84  |
| <i>University of St. Gallen</i>                               |     |
| <b>THE NETHERLANDS – ENSCHEDE</b>                             | 86  |
| <i>University of Twente</i>                                   |     |
| <b>THE NETHERLANDS – LEIDEN</b>                               | 88  |
| <i>Leiden University</i>                                      |     |
| <b>UKRAINE – KHARKIV</b>                                      | 90  |
| <i>Simon Kuznets Kharkiv National University of Economics</i> |     |
| <b>PERSONAL MEMBERS</b>                                       | 92  |
| <i>Daniel Beverungen</i>                                      | 94  |
| <i>André Coners</i>   | 94  |
| <i>Patrick Delfmann</i>                                       | 95  |
| <i>Marco De Marco</i>   | 95  |
| <i>Martin Dugas</i>   | 96  |
| <i>Sara Hofmann</i>   | 96  |
| <i>Pascal Kerschke</i>  | 97  |
| <i>Jan Mendling</i>   | 97  |
| <i>Christian Meske</i>  | 98  |
| <i>Oliver Müller</i>  | 98  |
| <i>Jens Pöppelbuß</i>   | 99  |
| <i>Stefan Stieglitz</i>                                       | 99  |
| <i>Stefano Za</i>   | 100 |

|                                       |     |
|---------------------------------------|-----|
| <b>ADVISORY BOARD</b>                 | 102 |
| <i>adesso</i>                         | 104 |
| <i>CLAAS</i>                          | 105 |
| <i>cronos</i>                         | 106 |
| <i>DMI Archivierung</i>               | 107 |
| <i>Eucon</i>                          | 108 |
| <i>Hilti</i>                          | 109 |
| <i>LVM</i>                            | 110 |
| <i>PICTURE GmbH</i>                   | 111 |
| <i>Provinzial Group</i>               | 112 |
| <i>SAP</i>                            | 113 |
| <i>Schwarz IT</i>                     | 114 |
| <i>viadee Unternehmensberatung AG</i> | 115 |
| <i>Westfalen Group</i>                | 116 |
| <i>zeb</i>                            | 117 |

|  |     |
|--|-----|
| <b>COMPETENCE CENTERS</b>                        | 118 |
| <i>Conceptual Modeling</i>                       | 120 |
| <i>Crisis Management (C<sup>3</sup>M)</i>        | 122 |
| <i>Digital Transformation in SMEs</i>            | 124 |
| <i>E-Government</i>                              | 126 |
| <i>Service Science</i>                           | 128 |
| <i>Smarter Work</i>                              | 130 |
| <i>Social Media Analytics (C<sup>2</sup>SMA)</i> | 132 |
| <b>COLLABORATIONS</b>                            | 134 |
| <i>Network Research Activities</i>               | 136 |
| <i>Teaching@ERCIS</i>                            | 140 |
| <i>Events in the ERCIS Network</i>               | 144 |

|                         |     |
|-------------------------|-----|
| <b>OUTLOOK FOR 2023</b> | 150 |
| <b>ERCIS TEAM</b>       | 151 |
| <b>IMPRINT</b>          | 152 |



# 13<sup>TH</sup> ANNUAL ERCIS WORKSHOP



**SAVE THE DATE**  
The 2023 Annual Workshop will take place in Wrocław, Poland, in September.



### 13<sup>TH</sup> ANNUAL ERCIS WORKSHOP

In 2022, the ERCIS Annual Workshop could finally take place in site, this year at the Headquarters in Münster, Germany. 42 participants from 26 institutions attended the meeting, that ran parallel to the workshops of the 20<sup>th</sup> International Conference on Business Process Management (*BPM 2022*), which was also organized by the ERCIS Network. Because the ERCIS Annual Workshop was hosted in Germany, for the first time a large amount of Advisory Board members participated, which lead to a fruitful academia-practice exchange.

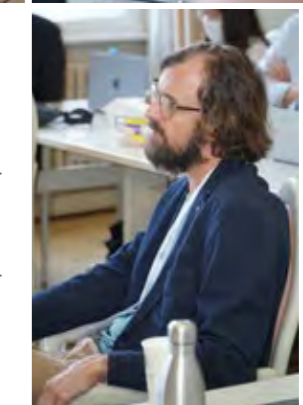
As the Workshop was limited to this one day only, most of the time was used to recap the events of the last year, which again, despite the pandemic, were a lot. In all areas – the headquarters, the partners, the competence centers, and the research clusters – the network members advanced the various areas of Information Systems Research and Practice.

We were also happy to welcoming the CLAIRE Rising Researchers Network for a presentation of the opportunities the “Confederation of Laboratories for Artificial Intelligence Research in Europe” provides to our young researchers. At least a joint PhD seminar is in the making for the upcoming years.

After the workshop, the Research Clusters used the opportunity to have in-group meetings, discussing the strategy for the upcoming year, and driving further the activities started in 2022.

After having joined the BPM Welcome Reception at Schlossgarten, the participants concluded the day during a dinner at the “Mimigernaford”, named after the ancient name of the host city, Münster.

For next year’s workshop, it has been a long journey, but we will finally make it to Wrocław, Poland! The meeting in this beautiful city has been postponed several times, but next September we will definitely meet there, thanks to our hosts Ngoc-Tanh Nguyen and Dariusz Król!



# SHORT NEWS

A variety of activities happen within the network every year: Books are published, organizational changes happen, kids are being born ... This section informs about everything going on – not only within the network, but also beyond.





# RESEARCH CLUSTER

In 2021, the ERCIS network defined five network clusters that serve as umbrella for its members to join forces. They span from method-orientation to domain-orientation, providing homes to the members' various research interests. They serve as incubators for project proposals, joint research and teaching activities, and joint policy-making in the respective areas.



RESEARCH CLUSTER

DATA SCIENCE AND ARTIFICIAL INTELLIGENCE

DIGITAL PUBLIC SERVICES

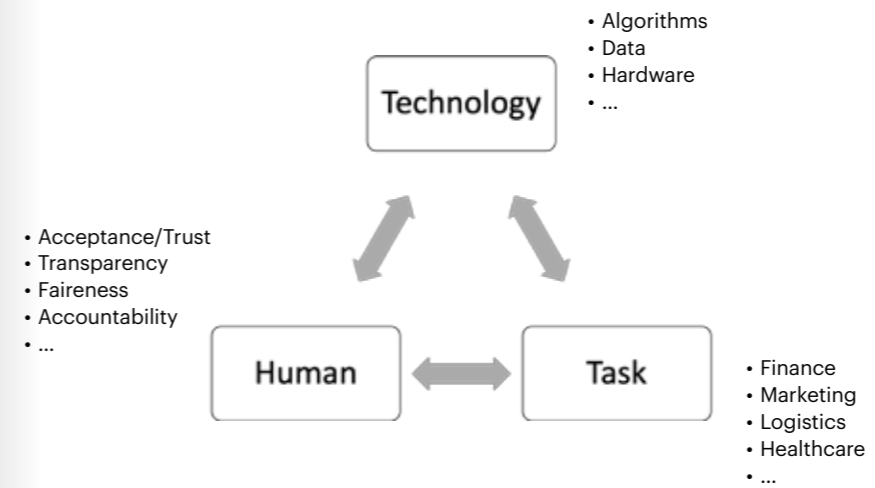
KNOWLEDGE AND LEARNING

PROCESS SCIENCE

SMART MANUFACTURING

DATA SCIENCE AND ARTIFICIAL INTELLIGENCE

### “Data Science & AI” A Socio-Technical View



#### DATA SCIENCE AND ARTIFICIAL INTELLIGENCE CLUSTER

In our networked world, data is collected in ways never seen before. Extracting knowledge from this data and leveraging it to build intelligent systems will transform the way business, government, and science are carried out. Many people believe that data science and AI will bring forth changes that will be much more profound than any other technological revolution in human history.

Digital services can adapt to individual humans and situations due to the abundance of data and the improved capabilities to learn from this data. Big steps are made in many scientific areas these times, notably in natural language processing, image recognition, and in finding complex synthesis ways, e.g., for novel drugs and materials.

However, there are also risks associated with algorithmic decision making and autonomous AI systems. They may be used

for steering very complex hacking activities, or autonomous weapon systems, or simply decide wrongly according to unknown biases in the data.

In Information Systems, humans and their interaction with technology are traditionally an important topic, and this angle is of specific relevance for enabling real-world use of Data Science and Artificial Intelligence methods, beyond pure algorithmic research. Especially when security aspects or ethical problems of these methods are under consideration, this viewpoint is highly significant.

The mission of the ERCIS “Data Science & AI” cluster is to advance research, education, and practice on human-centered data science and AI in order to augment human capabilities and improve societal well-being. We explicitly take a socio-technical perspective on data science & AI, focusing at the intersection of technologies, humans, and tasks.

The cluster Data Science and Artificial Intelligence is headed by:

**OLIVER MÜLLER** is Professor of Management Information Systems and Data Analytics at Paderborn University. His research interests focus on data-driven judgment and decision making. This includes the design and use of machine learning solutions for supporting human judgment and decision making, with a special focus on the computational analysis of unstructured data (e.g., texts, images), as well as studying the acceptance and implications of data-driven decision making in organizations.

**MIKE PREUSS** is assistant professor at LIACS, the Computer Science department of Leiden University. He works in AI, namely game AI, natural computing, and social media computing. He is well known for his works in evolutionary optimization, experimental methodology, and the pioneering drug discovery by means of an AlphaGo inspired method.

In the past year, we focused on contacting potential members of the cluster and surveying them about their understanding of Data Science and AI as well as about concrete projects they are currently engaged with. In the coming year, we plan to organize a virtual poster session as well as a physical workshop during the ERCIS annual meeting.

**DIGITAL PUBLIC SERVICE CLUSTER**

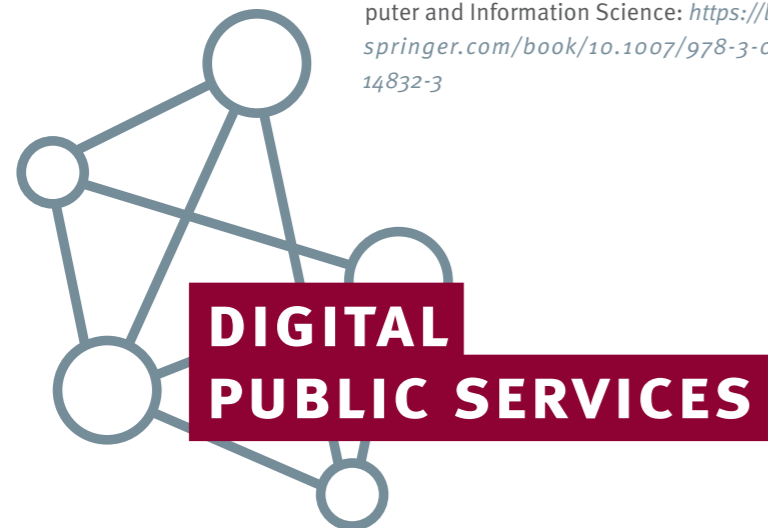
In year 2022 The Digital Public Services Cluster organized the Well-Being in the Information Society Conference, the ninth in its series, 25.–26. August in Turku, Finland. Main organizer was University of Turku, partnered with Tampere University, Åbo Akademi University and Turku University of Applied Sciences, all in Finland. Special focus this time was on mental health, with the Subtitle “When the Mind Breaks”.

Professor Harri Oinas-Kukkonen from University of Oulu, Finland, delivered a keynote speech on the topic “Supporting Health Behavior Change through Digital Interventions: Persuasive Systems Design”.

Reima Suomi was the general chair of the conference, with professor Robert Krimmer and Ph.D Jukka Kärkkäinen being program co-chairs.

The conference was run in a hybrid form, and was freely accessible for all interested.

Conference proceedings are published in Springer series Communications in Computer and Information Science: <https://link.springer.com/book/10.1007/978-3-031-14832-3>



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**KNOWLEDGE AND LEARNING CLUSTER**

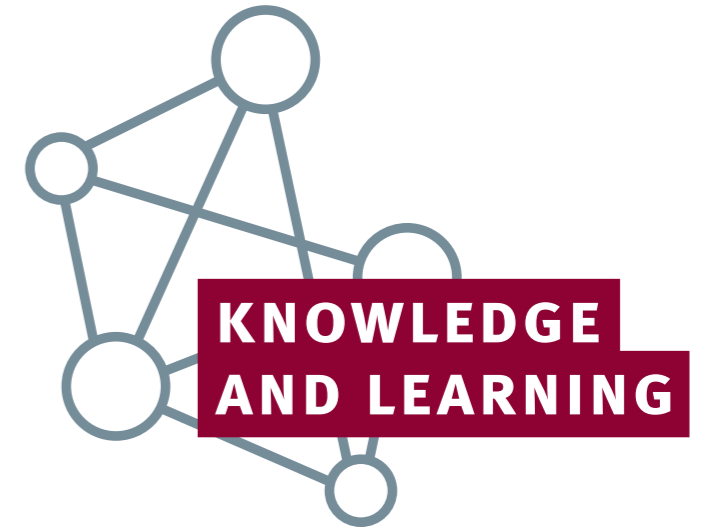
The ERCIS Cluster in Knowledge and Learning (K&L) encompasses a broad range of academic interests. It has been presented as comprising “everything related to Knowledge Management, Teaching, Learning, Education, and the likes”. For this reason, when clusters were initially presented, the K&L cluster was “put in between the other four clusters”. For similar reasons, when ERCIS “members” were asked to assign their research interests to clusters, every single member included the K&L cluster.

The K&L cluster is, therefore, a special case among ERCIS clusters. It can be a challenge to find a way for the K&L cluster to create value to the ERCIS community.

Considering that the role of clusters is open to definition, to differentiation and to evolution, it makes sense to start with caution. This means avoiding defining a vision for the cluster that is too strict or that is biased towards particular perspectives of what knowledge and learning means to the ERCIS community.

So, the initial vision for the K&L cluster is to serve as a “rose of the winds” for those that navigate in the knowledge and learning ocean. With knowledge and learning in its centre, the “rose of the winds” will indicate the different directions where the academic exploration of those topics can lead to.

Furthermore, the vision of this cluster is to become a knowledge-sharing space where participants come together to learn from one another face-to-face and/or virtually. We see the clusters as a promoter of informal undertakings that demand some coordination, facilitation, cultivation, and nurturing. Members in the cluster will decide on specific topics that are timely to address and which will relate to the research interests of the members.



**WHAT ACTIVITIES WOULD WE LIKE TO INITIATE IN OUR CLUSTER?**

- **Mapping of research interests**  
The first activity of the K&M cluster will involve the creation of a map of academic interests anchored in knowledge and learning. This map will depict the wide range of possible academic interests that, somehow, are related to knowledge and learning. The creation of the map will be carried out collaboratively, involving as much as possible the ERCIS community. The endeavour will involve activities that promote creativity in a collaborative way such as a knowledge café.

- **Expanding knowledge**  
We would like to encourage cluster members to organize mini tracks in selected conferences focusing on topics related to K&L that can contribute to the establishment of an encompassing view of K&L in information systems research.

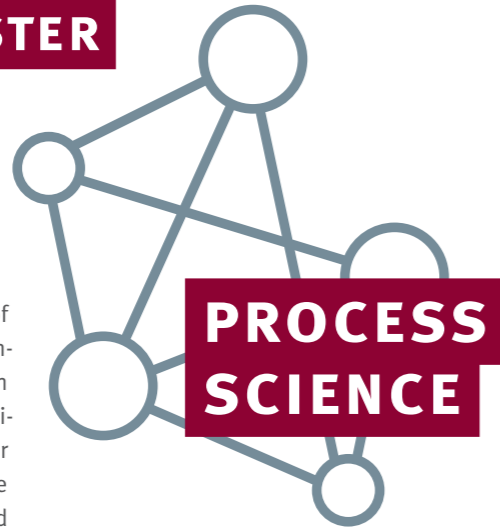
- **Connecting to other ERCIS clusters**  
Activities that aim at creating links between the other ERCIS clusters. Members act as knowledge brokers and aim to stimulate boundary-crossing activities with clusters that explore common interests.

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## RESEARCH CLUSTER



### PROCESS SCIENCE CLUSTER

Process science is an innovative field of science that intends to pull together contributions from various disciplines, such as computer science, management science and information systems, to better understand and develop processes. To be inclusive, process science follows a broad understanding of processes that is agnostic to single extant disciplines. We define processes as a coherent series of changes which evolves over time, occurs at various levels and constitutes a phenomenon of interest.

- Please also check out the keynotes and presentations and join the community on: <https://process-science.net>

Three reasons lead to the establishment of Process Science. First, processes are increasingly growing out of existing containers, and processes constitute a phenomenon of interest of themselves, specifically going beyond established units of analysis, such as application systems or organizations. Secondly, the world is increasingly changing and the study of processes helps to understand change, to deal with change and also to actively shape change. Third, the ubiquitous availability of data, combined with advanced data analytics capabilities, offers new opportunities to study processes using multiple data sources, such as digital trace data, social media data, body data and other quantitative and qualitative data.



Process Science Framework.

### RECENT PUBLICATIONS

Badakhshan, P., Wurm, B., Grisold, T., Geyer-Klingenberg, J., Mendling, J., vom Brocke, J. (2023). Creating Business Value with Process Mining. *Journal of Strategic Information Systems*.

Franzoi, S., Hartl, S., Grisold, T., vom Brocke, J. (2023). Explaining Change with Digital Trace Data: A Framework for Temporal Bracketing, 55<sup>th</sup> Hawaii International Conference on System Sciences (HICSS 54), Hawaii.

Grisold, T., Kremser, W., Mendling, J., Recker, J., Brocke, J. vom, & Wurm, B. (2022). Keeping pace with the digital age: Envisioning information systems research as a platform. *Journal of Information Technology*.

### KEY SOURCES

- The inaugural paper on “Process Science: The Interdisciplinary Study of Continuous Change” is available online: [https://www.researchgate.net/publication/354380141\\_Process\\_Science\\_The\\_Interdisciplinary\\_Study\\_of\\_Continuous\\_Change](https://www.researchgate.net/publication/354380141_Process_Science_The_Interdisciplinary_Study_of_Continuous_Change)

Grisold, T., Wurm, B., vom Brocke, J., Kremser, W., Mendling, J., & Recker, J. (2022). Managing Process Dynamics in a Digital World: Integrating Business Process Management and Routine Dynamics in IS Curricula. *Communications of the Association for Information Systems*, 51.

vom Brocke, J., Jans, M., Mendling, J., & Reijers, H. A. (2021). A Five-Level Framework for Research on Process Mining. *Business & Information Systems Engineering*, 63(5), 483–490.

Wurm, B., Grisold, T., Mendling, J., & vom Brocke, J. (2021). Business Process Management and Routine Dynamics, in: *Handbook of Routine Dynamics*: Cambridge University Press, 513–524.

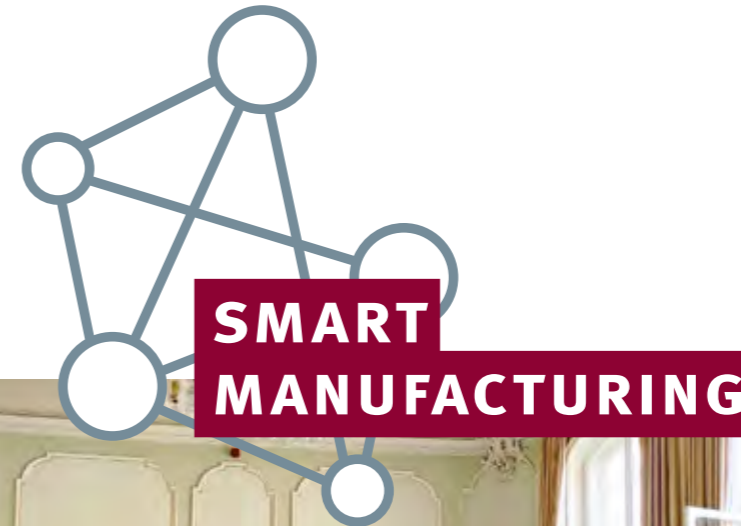
### RECENT PROJECTS

The ERCIS Cluster has successfully acquired two projects:

- **Developing Process Mining Capabilities** at the Enterprise Level, funded by the EU within the Erasmus+ Framework, since 2021.
- **Towards a Science of Processes** – Conceptual foundation for the interdisciplinary study of continuous change, funded by the Liechtenstein Research Fund, since 2021.

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### SMART MANUFACTURING CLUSTER

In the ERCIS cluster “Smart Manufacturing”, we exchange ideas on research about how firms can use digital technologies in manufacturing in order to create new ways of providing customer value. We intend to connect the information systems discipline, which is at the heart of the ERCIS network, with adjacent disciplines such as operations management, mechanical engineering, computer science, and service science, which are also represented in the network. This way, we can benefit from the multiple perspectives that exist on the digital transformation of the manufacturing industry in Europe.

In 2022, we’ve organized three online meetings and one personal meeting in Münster as part of the ERCIS Annual Meeting in which we intensively discussed our research topics covering smart products and Industry 4.0, data analytics in supply chains, as well as new smart service value propositions and business models. We are looking forward to joint research and publication projects on smart manufacturing topics (e.g., on digital platforms in industrial settings). Future activities will also include the exploration of funding opportunities for joint research projects, the organization of conference tracks and journal special issues as well as the exchange of PhD students within the ERCIS network. Please contact Alessio Maria Braccini or Jens Poepelbuss if you want to join this cluster.

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# HEADQUARTERS

The ERCIS headquarters is located in Münster, Germany. All full professors of the department of information systems at the University of Münster serve in the board of the network and are active in the fields of information systems, computer science, data science, supply chain management, medical informatics, and law. Additionally, the management team at the headquarters works with the board to organise regular meetings, joint teaching endeavours, and research proposals with the network partners.



## UNIVERSITY OF MÜNSTER CHAIR FOR INFORMATION SYSTEMS AND INFORMATION MANAGEMENT

### ABOUT THE INSTITUTION

The Chair for Information Systems and Information Management at the University of Münster, directed by Prof. Dr. Dr. h.c. Jörg Becker, currently comprises eight post-docs and seven research assistants. The courses offered by the Chair for BSc and MSc in Information Systems study programs include Application Systems, Information Modelling, and Workflow Management (*Process Modelling field*), as well as Data Management and Management Information Systems and Data Warehousing (*Data Modelling field*). Moreover, the courses Retail and Production Planning and Control cover both Process Modelling and Data Modelling in their respective domains. See our courses here: [http://www.erc.is/go/cis\\_teaching](http://www.erc.is/go/cis_teaching)

Members of the Chair are involved in research projects funded nationally and internationally. For an overview, have a look at [http://www.erc.is/go/cis\\_proj](http://www.erc.is/go/cis_proj). They publish results of their work in journals like BISE (*Business & Information Systems Engineering*), BPMJ (*Business Process Management Journal*), Electronic Markets, EMISA (*Enterprise Modeling and Information Systems Architectures*), ISeB (*Information Systems and e-Business Management*), and GIQ (*Government Information Quarterly*), as well as in conference proceedings like ICIS (*International Conference on Information Systems*), ECIS (*European Conference on Information Systems*), ER

(*International Conference on Conceptual Modeling*), and HICSS (*Hawaii International Conference on System Sciences*). For more information see [http://www.erc.is/go/cis\\_pub](http://www.erc.is/go/cis_pub)

### RESEARCH TOPICS

Conceptual modelling has become a mainstream method for describing, designing, and reorganizing Information Systems in the last decade. Many large companies use conceptual models for tasks like business process reengineering, software introduction, and compliance management.

Conceptual modelling, when being transferred into practice, supports the creation of business value for companies and governmental organizations. Retail is an area of research that is focused on organizations and application systems in the respective domain including wholesale, stationary retail, and e-commerce. Focal topics to account for interdependencies between an organization and an application system involve process management and conceptual modelling in retail, as well as Enterprise Resource Planning (ERP) systems.

E-Government deals with the aspects of administrative processes and services within governmental and inter-governmental organizations and the citizens and businesses using Information and communication Technology (ICT). E-Government links

the field of strategic management with aspects of process management and economic viability and focuses on front- and back-office.

E-Government topics can be addressed in terms of content, as well as from technical and conceptual perspectives.

Smart Cities is the field of research that uses the advances in information and communication technologies to increase the operational efficiency, information sharing, and quality of services of the four constituent areas of a city: Retail, government, mobility, and energy. A focal topic is the development of integrated and configurable reference models for retail, government, mobility, and energy that advance the scientific knowledge and yield practical value for the creation of smart cities.

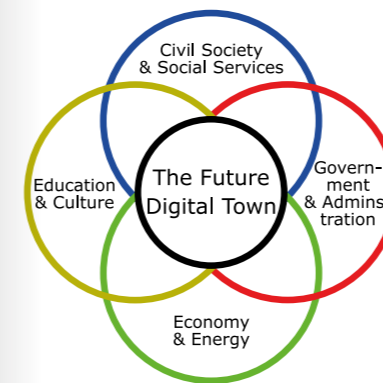
Further important topics are the theory of the citizens' digital sovereignty and its consideration and integration within these reference models.

### SELECTED CURRENT RESEARCH PROJECTS

- **Digital Medium-Sized City of the Future**  
The DFG research group "Digital Medium-Sized City of the Future" (FOR 5393) investigates how medium-sized cities meet the challenges of digitalization and develops digital tools to strengthen their liveability. The research group focuses on four central structural areas of a medium-sized city: civil society & social services, government & administration, economy & energy, and education & culture.

The research group analyses challenges and opportunities, and develops instruments so that digital medium-sized cities can evolve, preserving the identity of and identification with the city and region. Due to their manageable size and medium complexity, medium-sized cities are particularly suitable as experimental fields and real laboratories for research and development.

From the chair, Prof. Becker, Dr. Distel, and Dr. Scholta are involved in this project. More information: <https://www.digitale-mittelstadt-der-zukunft.de/>



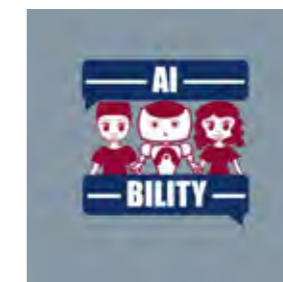
### • AI-Bility

We observe the abundance of smart toys, adaptive learning applications, and digital assistants for schoolchildren on the market. These products are artificial intelligence (AI) based conversational agents that can communicate using natural language. The current pandemic challenge probably plays an important role in promoting their adoption. The truth is, however inconvenient, that we still do not know much about how schoolchildren harness these AI-based conversational agents for their benefits. Because of the way they are designed (*i.e., real touchable physique versus digital character*), schoolchildren may have different kinds of interaction and experience with them. Moreover, they may be perceived differently because of their appearances (*i.e., pet-like and human-like characteristics*).

This project addresses a discussion that is likely to become more glaring in the next

years, due to the increasing adoption of in AI-based conversational agents for learning and leisure activities. We focus on 11 to 13 years old schoolchildren in Liechtenstein, Germany, and France. In this age group, they begin to learn abstract reasoning (*Jean Piaget's concrete and formal operational stage*) and develop belief in their own ability to solve tasks together with a sense of identity in relation to their social others.

From the chair, Dr. Bergener and Dr. Stein are involved in the project. More information: <https://ai-bility.eu>



### SELECTED PUBLICATIONS

Please see [http://www.erc.is/go/cis\\_pub](http://www.erc.is/go/cis_pub) for a complete list of publications.

Distel, B., Koelmann, H., Plattfaut, R., & Becker, J. (2022). Watch who you trust! A structured literature review to build a typology of e-government risks. *Information Systems and e-Business Management (ISeB)*, online first.

Kregel, I., Distel, B., & Coners, A. (2022). Business Process Management Culture in Public Administration and Its Determinants. *Business & Information Systems Engineering (BISE)*, 64(2), 201–221.

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Digital Transformation of SMEs: A European Perspective. In Bui, T. X. (Ed.), *Proceedings of the 55<sup>th</sup> Annual Hawaii International Conference on System Sciences* (pp. 4889–4898). Hawaii International Conference on System Sciences. Honolulu, Hawaii, USA: University of Hawai'i at Manoa — Hamilton Library.

Scholta, H., Halsbenning, S., & Becker, J. (2022). A public value-based method to select services for a no-stop shop implementation. In Bui, T. X. (Ed.), *Proceedings of the 55<sup>th</sup> Annual Hawaii International Conference on System Sciences* (pp. 2523–2532). *Proceedings of the Annual Hawaii International Conference on System Sciences*. Honolulu, Hawaii, USA: University of Hawai'i at Manoa — Hamilton Library.



## UNIVERSITY OF MÜNSTER DIGITAL INNOVATION AND THE PUBLIC SECTOR

### ABOUT THE INSTITUTION

The Digital Innovation and the Public Sector (DIPS) group was established in July 2021 after Prof. Dr. Tobias Brandt, who was previously with the Rotterdam School of Management, joined the University of Münster. At DIPS, we focus on the impact of the digital transformation at the intersection of the public and private sectors with the civic society. Being closely affiliated with the university's start-up center REACH, we put a particular emphasis on the role of innovation and entrepreneurship in this context. In addition to research and teaching, we support students and staff at the department seeking to pursue entrepreneurial ideas and link them to the REACH ecosystem.

Our research activities focus on three main themes. The first theme, Smart Cities and Regions, explores how digital technologies improve urban service delivery, change how we live with each other and participate in the public discourse, and support

the connection between urban hubs and the surrounding areas. In the second theme, the Digital Transformation of Public Sector Organizations, we investigate how public organizations, such as government agencies and schools, respond to the increasing prevalence of digital technologies, particularly in the aftermath of the Covid-19 pandemic. The third theme, Digital Innovation and Entrepreneurship, focuses on innovative digital ventures at the confluence of the public and private sectors and the civic society.

### RESEARCH PROJECTS

In August 2022, we launched the project Digital Innovation for Sustainable Development (INNO4S), which is supported by the Ministry of Culture and Science of North Rhine-Westphalia. Within this project, we will explore how digital innovation can be a critical driver for achieving the United Nation's Sustainable Development

Goals as well as obstacles and threats associated with this process. A key outcome of INNO4S will be six extensive teaching cases that will be provided as Open Educational Resources. They can be used within educational programs around the globe to raise students' awareness of the opportunities and challenges associated with digital innovation in the context of sustainable development. From a research perspective, we will investigate how such resources should be designed to offer an engaging experience to students as well as a high flexibility to be used in a variety of educational settings. INNO4S is a partnership between DIPS and colleagues at the universities in Cologne and Paderborn.

The research project The Coronavirus Pandemic as a Driver of Innovation funded by the National Competence Center for E-Government (NEGZ) explores the power of crises to jumpstart digital transformation processes within the public sector. Focusing on the context of the Covid-19

pandemic, we first investigate processes and work patterns that were digitalized ad hoc due to the external pressure induced by the pandemic. We particularly delve into the obstacles that existed before the pandemic and whether they were removed or simply ignored in its wake. Second, we explore the future of these processes and work patterns, i.e. whether they will remain digitalized, rolled back, or fine-tuned, and the underlying reasoning and dynamics driving these decisions.

In addition to these externally supported projects, we have launched several internal research streams tackling a variety of

topics at the intersection of digital innovation and public sector domains. By accompanying several early-stage startup companies focused on elderly care over the coming years, we seek to delve into the dynamics that drive the emergence of digital platforms and ecosystems within the health sector. We complement this research by a parallel stream that explores research opportunities related to the utilization of digital footprints from mobile and wearable devices to improve health outcomes and personal wellbeing. In addition, we expand on our previous research related to smart cities and urban analytics, with current projects exploring the resilience of urban populations in face of adverse events and the integration of micromobility services into the urban transportation mix.

### SELECTED PUBLICATIONS

*Abdelwahed, A., van den Berg, P.L., Brandt, T., Ketter, W., & Mulder, J. (2021). A Boost for Urban Sustainability: Optimizing Electric Transit Bus Networks in Rotterdam. IN-FORMS Journal on Applied Analytics, 51(5), 391–407.*

*Brandt, T., Dlugosch, O., Abdelwahed, A., van den Berg, P. L., & Neumann, D. (2021). Prescriptive Analytics in Urban Policing Operations. Manufacturing & Service Operations Management, 24(5), 2463–2480.*



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## UNIVERSITY OF MÜNSTER DATA SCIENCE: MACHINE LEARNING AND DATA ENGINEERING

### ABOUT THE INSTITUTION

Fabian Gieseke is head of the Machine Learning and Data Engineering group and a director of ERCIS. The group's research focus is on the development of efficient implementations for modern machine learning techniques and their application to various domains such as remote sensing or smart grids and smart cities. The group is currently involved in numerous collaborations with both national and international as well as industrial partners.

### RESEARCH TOPICS

Data volumes have been increasing dramatically in various domains over recent years. This is the case, for instance, in remote sensing, where satellites produce data volumes in the petabyte range per year. A similar "data flood" can be observed in many other disciplines as well, including medicine, social media, finance, or in the context of modern energy systems. In most cases, the sheer data volume renders a manual analysis impossible, and this necessitates the use of automatic data analysis tools.

Machine learning techniques aim at automatically extracting knowledge and have been identified as one of the key drivers for discoveries and innovation both in research as well as in industry. While machine learning methods usually signifi-

cantly reduce the time needed to analyze the data at hand, processing tera- and petabytes of data still depicts a challenging problem. A prominent example for such a computational bottleneck is the generation and application of deep neural networks: Even in case powerful compute servers are used, both the training as well as the testing phase can easily take weeks.

We work on reducing the practical runtime needed to process such compute- and memory-intensive tasks. For instance, we resort to high-performance computing and distributed computing to accelerate the overall analysis of the data. Another example is the development of conceptually new techniques, which only consume a fraction of the compute and memory resources but still yield high-quality models similar to those obtained via their original counterpart (e.g. "tiny" models that can be used on mobile phones or microcontrollers). The group is also involved in the development of models that are tailored to novel applications from a variety of domains.

### CURRENT RESEARCH PROJECTS

The group is currently involved in collaborations with geographers (e.g., *analysis of satellite time series data*), municipalities (e.g. *collaboration in the context of smart cities/grids*), and industrial partners.

### Energy and Resource-Efficient Artificial Intelligence for Modern IoT Applications (*TinyAloT*)

The project aims to adapt AI processes to the needs of modern Internet of Things (IoT) applications. Nowadays, these applications are often based on microcontrollers, which can send and receive data via special network protocols. The microcontrollers are generally equipped with various sensors to measure, for instance, temperature, humidity, or fine dust pollution. Corresponding sensor networks consist of many such microcontrollers. They represent the basis for modern IoT applications, which can already be found in a wide variety of areas (e.g. *smart cities, smart grids, agriculture, ...*). The aim of the TinyAloT project is to reduce the resource requirements of existing AI models such that they can directly be employed onboard of the microcontrollers to enable autonomous operation.



### Deep Learning for Accurate Quantification of Carbon Stocks (*DeepCrop*)

Recent technological developments in deep learning and drone-borne LIDAR scanners have paved the way for constraining the uncertainty inherent to quantify and project ecosystems' carbon stocks. With a rising demand for biomass, DeepCrop aims to precisely measure the so-called above ground biomass and to estimate carbon sinks in croplands and forests. The ambition is to bridge expertise of experimental scientists and computer scientists to develop novel tools for the automated processing of LIDAR data utilizing deep learning and drones. The project is conducted in collaboration with the University of Copenhagen and is supported by the Vilum Foundation and the Data+ program of the University of Copenhagen.



### SELECTED PUBLICATIONS

Mugabowindekwe, M., Brandt, M., Chave, J., Reiner, F. Skole, D. Kariryaa, A. Igel, C., Hironaux, P., Ciais, P., Mertz, O., Tong, X., Li, S., Rwanyiziri, G., Dushimiyimana, T., Ndoli, A., Uwizeyimana, V., Lillesø, J.-P., Gieseke, F., Tucker, C., Saatchi, S., & Fensholt, R. (2022). Nation-wide mapping of tree level carbon stocks in Rwanda. *Nature Climate Change*, accepted.

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Prager, R. P., Seiler, M. V., Trautmann, H., & Kerschke, P. (2022). Automated Algorithm Selection in Single-Objective Continuous Optimization: A Comparative Study of Deep Learning and Landscape Analysis Methods. In *Parallel Problem Solving from Nature – PPSN XVII*, pp. 3–17, Springer.

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Revenga, J. C., Trepekli, K., Oehmcke, S., Jensen, R., Li, L., Igel, C., Gieseke, F., & Friberg, T. (2022). Above-Ground Biomass Prediction for Croplands at a Sub-Meter Resolution Using UAV-LiDAR and Machine Learning Methods. *Remote Sensing*, 14(16), 3912, MDPI.

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## UNIVERSITY OF MÜNSTER CHAIR FOR INFORMATION SYSTEMS AND SUPPLY CHAIN MANAGEMENT



### RESEARCH TOPICS

Today's supply chains must cope with increasing uncertainties and complexity, e.g., due to volatile customer demand, an expanding number of actors in the value-added process, and natural or human threats. Tackling these issues is the primary objective of the Chair for Information Systems (IS) and Supply Chain Management (SCM), directed by Prof. Dr.-Ing. Bernd Hellingrath. In particular, the chair develops research contributions in SCM and Operations Management, examining the current trends of digitalised supply chains and considering the application of new technologies as well as the opportunities provided by digital transformation. In this context, research is fostered by a culture of internationalisation, illustrated by the growing number of international research partners and projects conducted.

### RESEARCH TOPICS

Our research activities can be divided into three main research areas, namely **Supply Chain Digitalisation**, **Supply Chain Integration**, and **Supply Chain Security and Crisis Management**:

- Within the research area of **Supply Chain Digitalisation**, we address the challenges of digitalising supply chains and investigate how organisations can take advantage of the emerging opportunities. To achieve this, we explore topics such as digital maturity evaluation, production planning within Industrie 4.0, predictive maintenance, and data analytics-driven performance measurement. Additionally, research is being conducted on how supply chain digitalisation can be facilitated through the means of computational intelligence and supply chain analytics.
- The research area of **Supply Chain Integration** is focused on the cross-functional integration within a company and along its supply chain. Supply Chain Integration is deemed inevitable for business success and sustainable competitive advantage. Hence, we investigate and extend state-of-the-art solutions like Sales&Operations Planning (S&OP) and develop concepts to facilitate their efficient industrial applications. This includes the application of methods from enterprise architecture management and the usage of business analytics, among others.

- The third research area **Supply Chain Security and Crisis Management** addresses challenges in uncertain and unsteady environments exposed to disruptive events. Our research activities are dedicated to understanding the use of IS to ensure a rigor and relevant solution design and evaluation. The goal is to provide reference models and procedures to assess current and future scenarios by means of modelling, visualisation, analysis, and simulation. Current research topics encompass blood supply chain management, decision support systems for epidemics prevention and response, and the design and evaluation of humanitarian IS.

### RESEARCH PROJECTS

- Within the BMBF-funded **BISKIT** project, we created a simulation-based optimization toolkit to improve the resilience and performance of blood supply chains. Additionally, we applied an enterprise architecture management approach for collaborative blood supply chain IS. The developed solutions are tested with our practitioner partners in South Africa, Ghana, and Nigeria.
- The chair intensified its research in response to the COVID-19 pandemic. Within the H2020-funded **STAMINA** project, we provided methodological support to practitioners from twelve European countries to trial potentially innovative solutions for pandemic outbreaks. Further, the BMBF-funded **EpiPredict** and **CoPredict** resulted in a testbed for understanding non-pharmaceutical interventions in infection dy-

namics. This year, three new projects are launched to carry on this domain track: The DFG-funded **SpacelImpact** extends the testbed using real-time spatial, mobility, and behavioural data. **OptimAgent** aims to develop a full-scale micro-simulation system of infections in the German population. **PROGNOSIS** targets a simulation-based decision support system for resilient hospital resource management and allocation. Both projects are funded by BMBF.

- The newly kicked-off **DigCBA** project, led by our ERCIS partners at the University of Agder, Norway, targets the design, development, and evaluation of evidence-based frameworks to support the selection of the most suitable digital technology for delivering cash-based assistance to refugees.
- Within the DAAD- and CAPES-funded **PROBRAL** project, the group of **Supply Chain Integration** addressed diverse issues for a theoretical understanding and practical implementation guidance of **S&OP**, e.g., by integrating data analytics, sustainability, and risk management. We closely collaborated with researchers from the **Pontifical Catholic University (PUC)** in Rio de Janeiro. Our results have been published in peer-reviewed academic journals and presented at international conferences.

- In collaboration with different companies, the **Supply Chain Digitalisation** group is developing a maturity model for measuring the degree of digitalisation in supply chains (**DSCM<sup>2</sup>**). The maturity model is structured in five levels, from no digitalisation to optimized digitalisation, along a business, organizational, process & method, and technological dimension extended by 18 subdimensions. The model is continuously evaluated by practitioners and researchers.

### EVENTS

- In early July, the 29<sup>th</sup> EurOMA conference was held in Berlin under the title "Brilliance in resilience: operations and supply chain management's role in achieving a sustainable future". The chair shared

current research in the areas of designing S&OP for uncertain environments, data analytics-driven SC performance measurement systems, as well as evaluation of digital SC maturity models.

- Every year, the chair organises project seminars in close collaboration with partners from the industry to offer students theoretical and practical insights. This year's seminars covered topics such as retail data management and analysis with Volkswagen, data-driven insights into transport planning with Hellmann, and data analytics for SC performance measurement with Thyssenkrupp.

### SELECTED PUBLICATIONS

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*Kreuter, T., Scavarda, L., Thomé, A., Hellingrath, B., & Seeling, M. (2022). Empirical and theoretical perspectives in Sales and Operations Planning. Review of Managerial Science, 116, 319–354. <https://doi.org/10.1007/s11846-021-00455-y>*

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### DISSERTATIONS

Performance Management in Humanitarian Logistics – Development of a Process-driven and IT-supported Performance Measurement System (*Adam Widera, 2022*)

Enabling Sales and Operations Planning through an Enterprise Architecture Management Approach – A Theoretical Understanding and Practical Implementation Guidance (*Tobias Kreuter, 2022*)



# UNIVERSITY OF MÜNSTER INSTITUTE FOR INFORMATION, TELECOMMUNICATION AND MEDIA LAW (ITM) – CIVIL LAW DEPARTMENT

## ABOUT THE INSTITUTION

The ITM is the leading Institute for Information, Telecommunication and Media Law in Germany. The Institute's work aims at exploring the legal framework and underlying policies of the information society with a particular focus on "information" as an economic and cultural good. The Institute emphasises the importance of interdisciplinary work since a proper understanding of technological or economic backgrounds is a prerequisite for successful regulation. Many activities are carried out in close cooperation with the Faculty of Economics of the University of Münster. In 2002, the ITM was appointed the Competence Centre in Information, Telecommunication and Media Law for North Rhine-Westphalia.

Dr. Thomas Hoeren is a professor of civil law at the University of Münster and has been the director of the ITM since 1997. Due to international projects such as TIM-BUS Prof. Hoeren has become recognised as a specialist in information law throughout Europe. Furthermore, the ITM has made its mark nationwide by offering the one-of-a-kind additional training course in information, telecommunication and media law to all interested jurists and students since 2021.

## RESEARCH TOPICS

Our research focuses on Information Law, Telecommunication Law and Media Law as well as related areas such as Copyright, Platform Regulation or E-Commerce and

Consumer Protection Law. Our current projects address the emerging subjects of Artificial Intelligence Law and Algorithms, Data Protection Law or the Future of Legal Professions and Institutions. Since Information, Telecommunication and Media Law is characterised as a cross-sectional matter, it cannot be fully covered by any of the traditional legal disciplines by itself. The ITM, therefore, strives for interdisciplinary research and teaching activities.

## CURRENT RESEARCH PROJECTS

Currently, the ITM is involved in several EU-funded and national projects:

- **GOAL:** The GOAL ("Governance of and by Algorithms") -Project is an interdisciplinary project funded by the Federal Ministry of Education and Research. The project partners are the University of Münster, University of Kaiserslautern, Karlsruhe Institute for Technology (KIT), Ruhr-University Bochum (RUB) and University of Hamburg. The GOAL-Project deals inter alia with the issues of algorithmic behaviour control and artificial intelligence. The aim of the project is to identify governmental, technical and regulative requirements and options for the design of comprehensive governance structures. The project ended in 2021 with the publication of the book: "Künstliche Intelligenz – Ethik und Recht" by Thomas Hoeren and Stefan Pinelli.

- **Research Center for Industrial Property Rights:** The ITM also hosts the Research

Center for Industrial Property Rights, which offers training and conducts research activities in the field of industrial property rights trying to connect science and economics. The Research Center is supported by an association of companies, lawyers and patent attorneys.

- **Art Law Clinic** is a project in cooperation with the Academy of Fine Arts Münster. Its basic idea is: "Law students for art students". Art students can seek the help of law students in senior classes to solve their basic legal problems, which occur during their academic studies. The service is entirely free and coordinated by employees coming from the ITM and the Academy of Fine Arts Münster. Additionally, a legal guideline has been provided, giving students an entry point and further information on the topic of art law. By combining the inherently different but closely connected topics of law and art, the project will increase the interdisciplinary and mutual understanding between law students and art students and their respective subjects. Due to the success of the project in Germany, a cooperation with the University of Stellenbosch was formed in 2021 to establish an art law clinic in Stellenbosch.

- **Matters of Law in the German Research Network (DFN):** The German Research Network (*Deutsches Forschungsnetz / DFN*) provides a communication network for universities and research facilities in Germany that not only connects them with one another but also with the community of research and education networks world-

wide. Increasingly, the DFN-members are facing legal questions regarding liability, telecommunications and data protection. The ITM assists in solving those difficult issues and offers general legal advice to the members.

- **Legal Information Office DH.NRW: The Legal Information Office DH.NRW (Rechtsinformationsstelle DH.NRW)** is a contact point for all those involved and interested in e-learning and digital teaching. In May 2020 it was established under the organizational umbrella of the Digital University of North Rhine-Westphalia and is located at the Institute for Information, Telecommunication and Media Law (ITM). Since then, the Office provides teachers and students legal guidance concerning e-learning and digital teaching. The main focus lies on data protection law, copyright law and examination law.

- **Blockchain Hub (Blockchain Reallabor):** The Blockchain Hub is a multidisciplinary project funded by the Ministry of Economic Affairs, Innovation, Digitalisation and Energy of the State of North Rhine-Westphalia. Its objective is to identify and analyse use cases for Blockchain and Distributed Ledger Technologies. The ITM supports the research in the area of law.

- **FAIR Data Spaces:** FAIR is the latest project at the ITM, which started in May 2021. The goal of the project is to create a common cloud-based data space in which science and industry can exchange data with each other. The development of this data room will be done in compliance with the FAIR principles (*findable, accessible, interoperable, reusable*), so that a sustainable data usability is achieved. The focus of attention is on the development of the legal framework for intellectual property rights, as well as the creation of model contracts and the clarification of liability issues.

## DISSERTATIONS 2021

*Henning Brockmeyer* - § 60d UrhG Text und Data Mining – die neue Schranke des Urheberrechts. Eine kritische Analyse

*Daniel Hußmann* - Contra Dateneigentum. Analyse der Diskussion um Eigentumsrechte an Daten unter besonderer Betrachtung des Insolvenzrechts

*Corbinian Koller* - Die Einschränkung des unionsmarkenrechtlichen Einheitlichkeitsgrundsatzes im Verletzungsverfahren und ihre Konsequenzen

*Johannes Kevekordes* - Die zivilrechtliche Einordnung von Rechtsgeschäften über Nutzungsrechte an personenbezogenen Daten am Beispiel von Automobilbildern

*Lennart Knutzen-Lohmann* - Das europäische Leistungsschutzrecht für Presseverleger. Eine rechtsökonomische Untersuchung

*Nina Roer* - Die Buchpreisbindung in Deutschland und Österreich

*Thoshihiro Wada* - Verarbeitung von Kundendaten im Wege des Asset Deals im Insolvenzverfahren

*Sabrina Seak* - Grenzen der Datenübermittlungen aus der EU in Drittstaaten – anhand des Beispiels der USA

*Karsten Müller* - Lauterkeitsrechtliche Verantwortlichkeit der Betreiber von Bewertungsportalen

*Maximilian Wellmann* - Kommerzielles Text- und Data-Mining im Urheberrecht

*Alexander Bauer* - Die effektive Einzel- und Gesamtvollstreckung von Blockchain-basierten Kryptowährungen

*Jan Niklas Di Fabio* - IPTV, OTT-TV und das Recht der Kabelweitersendung. Eine urheberrechtliche Untersuchung unter besonderer Berücksichtigung der europäischen Online-Satelliten- und Kabelrichtlinie

*Anton Frey* - Die Aufbrauchsfrist im Patentverletzungsverfahren



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## DISSERTATIONS 2022 (SO FAR)

*Nico Gielen* - Schwächen der Schiedsgerichtsbarkeit im Immaterialgüterrecht – Eine Analyse anhand des Deutschen Medienschiedsgerichts

*Thomas R. Krajewski* - Datenschutz und Auftragsdatenverarbeitung: historische Entwicklung der Gesetzgebung der Datenverarbeitung im Auftrag

*Christoph Matras* - Der rechtliche Schutz von Immobiliennamen

*Verena Vogt* - Das Netzwerkdurchsetzungsgesetz

*Julia Werner* - Der Lichtbildschutz nach § 72 UrhG



**ABOUT THE INSTITUTION**

The group for Cyber Security at the University of Münster provides research contributions in the fields of security and privacy with a focus on user systems. Constantly growing since 2018, we tackle technical and strategic security issues regarding data & information privacy, systems security, as well as network security and transfer our knowledge into teaching, e.g. by organizing a capture-the-flag hacking competition for students.

**MAIN RESEARCH TOPICS**

The ubiquity of digital systems in our world makes security designs and measures imperative. Information systems of all kinds need to be secured against malicious activities and threats, both emerging and evolving every day. Cyber attacks and exploits targeted at data and information are a significant risk, especially to the privacy of users in modern systems. Understanding these threats, empowering users for their own security, and developing strategies and countermeasures for cyber security issues are the main drivers for our research. For this purpose, we utilize methods of systems security, network security, and machine learning.

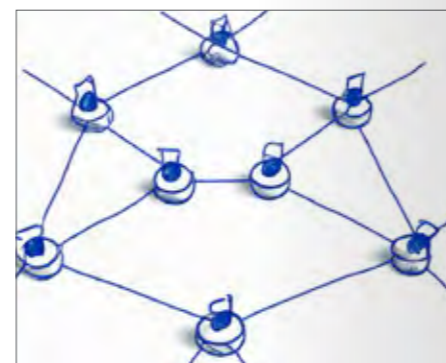
• **GDPR**

The EU General Data Protection Regulation has made a great impact on the design and use of information systems. Clicking cookie banners and consent pop-ups are the for users annoying end of this change as well as reading and understanding the privacy policies of used services. But the GDPR creates a legally clear framework for the design of modern systems and the processing of personal data which must be protected against threats and exploitation. We investigate two main research questions in this area: How can privacy policies be automatically processed and analyzed, e.g. to present it in a more understandable form to users, and how can we technically assure that a service provider only takes actions declared in its privacy policy as well as declares every action it takes?

• **Network Security**

The security of distributed systems is a particular challenge in a world of networked services and smart devices. Personal user systems as well as networked information systems hold valuable information that is potentially at risk of cyber attacks. New types of infrastructures, like the Internet of Things, allow the design of new protocols, including security and privacy by de-

sign. Our research in this field focuses on opportunistic networks, a type of wireless, ad-hoc infrastructure without a central authority, often used in computer swarms. We create designs and techniques for secure and privacy-preserving message routing and the establishment of trust in the face of network attacks.



• **Security Strategies**

Additional to technical research improving protocols and algorithms for security and privacy, it takes the right strategy and preparation for a successful IT security of information systems. Depending on the industry, there exist numerous best practices, e.g. for countermeasure deployment or incident reporting, and strategic approaches for the establishment of security. In our research, we strive to learn from

these practices and therefore combine experts' knowledge with means of security measurement to abstract and anticipate future scenarios of cyber incidents. We develop approaches for attack simulations to assess their impact on specific systems and educate strategies for security orchestration automation and responses (SOAR).

**SELECTED CURRENT RESEARCH PROJECTS**

• **Digital Towns of the Future**

The DFG-funded research unit "Digital Towns of the Future" investigates how medium-sized cities meet the challenges of digitalization, and develops digital instruments to strengthen their liveability, considering the necessary capabilities in the areas of civil society & social services, administration & politics, economy & energy, and education & culture. Digitalization is understood as part of a social process that leads to a fundamental transformation of existing structures in cities. The ever-increasing networking of information and processes affects the thinking and actions of individuals and organizations, so that digitization in this sense should not be understood solely as the conversion of analog values into digital data formats but as the sum of all the resulting consequences for a society and the actors and institutions that support it. In a total of six sub-projects, researchers from the perspectives of information systems, economics, education, political science, and sociology are working on the vision of the digital medium-sized city of the future.

• **MedMax: Preparing Hospital Environments for Future Cyber Incidents**

As a part of the graduate school "North-Rhine Westphalian Experts in Research on Digitalization" (NERD II), we run the project "MedMax: Preparing Hospital Environments for Future Cyber Incidents", together with FH Münster and the Ruhr-University Bochum. Medical institutions usually operate with scarce resources and therefore require exact planning of medical operative technologies and information systems. Recent cyber incidents have demonstrated that these systems are at risk of attacks,

ransomware exploits, and other threats with the potential to paralyze the medical environment and organization. MedMax aims to investigate these threats for hospital environments and to gain insights into the potential impairment of information systems. We strive to develop a digital twin of the whole environment with its processes and resources, to simulate cyber-attacks, investigate their effects, and learn how to brace for them.

• **KeyPwned**

Passwords as an authentication mechanism are at risk of leakage. Several times, large password dumps have been published on the Internet, immensely exposing user credentials for websites and services. A widely used alternative to password-based authentication is public key authentication, enabling remote login with a generated key pair consisting of a private key and a public key. Like passwords, private keys are required to remain confidential to prevent unauthorized access to resources. But just like passwords, these secret keys can become subject to theft or publicly exposed unintentionally by the key's owner which makes it necessary to revoke and abandon the compromised key pair. Unfortunately, it is rarely possible for users to know whether their secret keys have been publicly exposed. Our project KeyPwned aims to close this gap by providing a private key leakage checker crawling the Internet for exposed authentication keys. We offer KeyPwned as a service for every key pair owner to check our continuously updated database for their own keys' fingerprints, enabling users to check whether they might need to revoke and renew their authentication keys.

Check your own keys for leakage at <https://keypwned.uni-muenster.de>

**SELECTED PUBLICATIONS**

*Samaneh Rashidibajgan, Thomas Hupperich, "Improving the Performance of Opportunistic Networks in Real World Applications Using Machine Learning Techniques", Journal of Sensor and Actuator Networks, 2022*



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<https://www.wi.uni-muenster.de/department/it-security>

*Tamara Gunkel, Thomas Hupperich, "Discovering Vulnerabilities and Patches for Open Source Security", International Conference on Software Technologies, 2022*

*S. Arora, H. Hosseini, C. Utz, V. Kumar, T. Dhellemmes, A. Ravichander, P. Story, J. Mangat, R. Chen, M. Degeling, T. Norton, T. Hupperich, S. Wilson, N. Sadeh, "A Tale of Two Regulatory Regimes: Creation and Analysis of a Bilingual Privacy Policy Corpus", International Conference on Language Resources and Evaluation, 2022*

*Henry Hosseini, Julian Rengstorf, Thomas Hupperich, "Automated Search for Leaked Private Keys on the Internet: Has Your Private Key Been Pwned?", International Conference on Software Technologies, 2022*

# UNIVERSITY OF MÜNSTER

## CHAIR FOR IS AND INTERORGANISATIONAL SYSTEMS

### ABOUT THE INSTITUTION

Our research explores the impact of information and communication infrastructures in an organizational context. We are interested in the development of the digital organization: how do organizations and leaders respond to the challenges and opportunities of an informed society and economy. In particular we study new modes of organizing, coordination and collaboration from the micro level of work practices, to the meso level of group practices and the macro level of infrastructure development.

We aim to understand the dynamics of transformation in a historical, societal, regulatory, and economic context. Our work is theoretically and empirically grounded, we employ multiple methods and research approaches with an emphasis on qualitative, interpretative approaches.

It is our research philosophy that the implications of innovative ICT become visible and understandable in the context of (*communities of*) practices. In order to study practices in situ, we advocate approaches, which facilitate research and experimentation in complex real world settings addressing business or societal innovation. Typically multiple stakeholders and researchers from different disciplinary backgrounds are involved.

### CURRENT RESEARCH PROJECTS

- Transformation of higher education during and after COVID-19

(Prof. M. B. Watson Manheim, Prof. S. Klein)

We use Bartunek and Moch's (1987) framework of three orders of change to reconstruct and reflect the transformation of teaching and learning during 2020–2022, comparing and contrasting experiences from the US and Germany. Digitalization during the pandemic turned out to be a gigantic experiment and a revelatory crisis for the educational system. Our analysis highlights profound divides that have become visible and perhaps reinforced throughout the pandemic. It looks at long term effects on organizational culture, communication and conflict, metaphorically framed as long COVID communication effects and wonders about the innovative momentum for the education system going forward.

- Industry Research on Strategic IT/IS Management and Digitalization

(Apl. Prof. Dr. A. Teubner)

The current focus of research (*as of 2022/23*) is on the interaction and alignment of IT/IS strategy with new strategy concepts such as the "Digital Business Strategy" or the "Digital Transformation Strategy." Ongoing field research projects on this are rounded off by an exploratory data analysis of the Boston Consulting Group's DAL dataset, which provides insight into the state of digitization and the success of current management practices in this regard. The dataset includes data from more than 2,500 companies worldwide.

- Strategy-Making in Times of Uncertainty: An Organizational Improvisation Perspective

(Dr. J. Stockhinger, M. Werner)

In crafting strategy, companies often struggle to cope with volatility as the combination of fast-paced technological advancements and global crises we have witnessed recently have spawned an uncertain and volatile business environment for many firms. Since no business can plan for every eventuality in times of uncertainty, the project examines the role of organizational improvisation in strategic decision-making processes. In particular, we are interested in exploring how organizations can develop "improvisational capabilities" that allow sensing and responding to unexpected events with speed and creativity.

- How Small- and Medium-Sized IT Consulting Firms and IT/IS Departments Manage Ambidexterity

(M. Werner, Dr. J. Stockhinger)

Recent advancements in information technology have invigorated organizations to experiment, learn, and innovate with digital technologies to address new markets and customer needs (*exploration*). At the same time, they strive for higher levels of efficiency and operational excellence (*exploitation*). The ability to simultaneously manage both demands of is called ambidexterity. Within the context of small- and medium-sized IT consulting firms and IT/IS departments the project examines how these organizations pursue ambidexterity, the simultaneous pursuit of exploration and exploitation.

- Information Privacy Decision-Making: Explaining and Enabling Individual Privacy Management Through Social and Contextual Norms.

(Dr. K. Dassel)

Privacy is a difficult topic. The need for privacy is a facet of the human condition, it is a human right protected in many countries by law, but it is also ambivalent, reflecting a fluid boundary of entrusting others with private information and protecting one's privacy. Digitalization has profoundly and irrevocably changed the privacy landscape. Privacy behavior and specifically privacy decision making poses intriguing intellectual, conceptual and practical riddles. The thesis explores privacy decision making in three different domains information systems use: setting passwords, selecting communication tools, and sharing information in the context of a health care platform.

- Making Sense of Leadership Practices in Self-Organizing Teams

(Dr. R. Thapa)

The widespread diffusion of the internet in the early 1990s has led to the proliferation of peer-to-peer teams that self-organize and operate following the peer-to-peer principles. Although the ideology of self-organizing teams is rooted in rejecting masters and kings, insights from the leadership literature suggest the existence of leaders and leadership in these teams. The PhD thesis explores forms of leadership in Drupal and Bitcoin. It underscores that leadership in these communities is needed not only to achieve the shared project goals but also to accommodate the interests of all engaging members.

### SELECTED PUBLICATIONS

Dassel, K. S. (2022). Information Privacy Decision-Making: Explaining and Enabling Individual Privacy Management Through Social and Contextual Norms. Dissertation at the Universität Münster.

Klein, S., & Watson-Manheim, M. B. (2022). The (re-)configuration of digital work in the wake of profound technological innovation: Constellations and hidden work. Information and Organization.

Klein, S., Schellhammer, S., & Mitev, N. (2022). Sensemaking about HRV data of high performing individuals: Crafting a mixed methods study. In R. D. Galliers & B. Simeonova (Eds.), Qualitative Methods in the Age of Digitalization. Cambridge University Press.

Stockhinger, J., & Werner, M. (2022). Reconciling Deliberateness and Emergence in Digital Transformation Strategy Formation – An Organizational Improvisation Perspective. In ICIS 2022 Proceedings, Copenhagen, Denmark.

Werner, M., Feldmann, J., Montealegre, J., & Stockhinger, J. (2022). Team Ambidexterity and its Prerequisites: An Exploratory Study of an IT Service Management Team. In AM-CIS 2022 Proceedings, Minneapolis, USA.

Werner, M., & Feldmann, J. (2022). HR practices and ambidexterity in small- and medium-sized consulting firms: An exploratory multi-case study. In Proceedings of the Strategic Management Society Special Conference, Milan, Italy.

Thapa, R. (2022). Making Sense of Leadership Practices in Self-Organizing Teams. Dissertation at the Universität Münster.

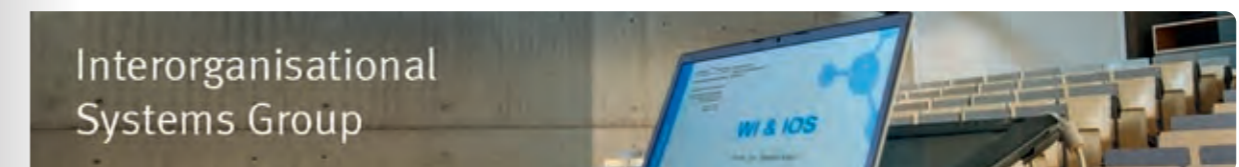


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## UNIVERSITY OF MÜNSTER CHAIR OF PRACTICAL COMPUTER SCIENCE

### ABOUT THE INSTITUTION

Prof. Dr. Herbert Kuchen is leading the Practical Computer Science group since 1997. He teaches in the area of software engineering, programming languages, and programming. Maintaining close collaborations with several local companies, his group is offering students the chance to write bachelor and master theses with high practical relevance.

### RESEARCH TOPICS

The research of the group focuses on selected aspects of Software Engineering and Programming. Fields of research are Testing, Model-Driven Software Development, Domain-Specific Languages, Process-Driven Applications, the Integration of Programming Paradigms, Parallel and Distributed Programming, Swarm Intelligence Algorithms, and Machine Learning.

### CURRENT RESEARCH PROJECTS

We work on different applications of Model-Driven Software Development techniques within various fields. Currently, we are collaborating with best practice consulting AG to extend our previous work on model-driven ERP system customization to interface development in SAP ERP. In

addition, there is ongoing research in cooperation with the research group for Clinical Biomechanics at the Institute of Sport and Exercise Sciences. After having presented a prototype of a medical information system for personalized rehabilitation after ankle inversion trauma, we currently prepare a field study evaluating this prototype with a larger group of patients. Furthermore, we collaborate with the Institute of Medical Informatics to ease the analysis of clinical study data.

We have developed a new symbolic execution engine for the Münster Logic-Imperative Language (*Muli*) which we call ‘Mulib’. Mulib is not based on a custom symbolic Java Virtual Machine (*JVM*). Instead, it employs a bytecode transformation to enable *Muli*’s functionalities. The execution speed of the new engine vastly outperforms the original implementation of *Muli*. Furthermore, since program code can be executed on usual high performance *JVMs*, obstacles for using constraint-logic object-oriented programming as a language paradigm were removed. Our next line of work includes investigating the purely symbolic representation of complex-typed arrays, objects, and aliasing.

Moreover, a tool named *DACITE (Data-flow Coverage for Imperative Testing)* was developed to automatically identify data-flow relations in form of def-use chains for Java programs. This was achieved by instrumenting the Java Bytecode of the program to dynamically derive the relevant information during the execution. The corresponding data-flow coverage can be utilized to optimize a given set of JUnit tests for a program as this type of coverage has shown to be more effective than other approaches like branch coverage. Currently, the derived data-flow information is being visualized based on the Language Server Protocol to enable an easy adaption for various programming editors.

Our research on Parallel Programming still focuses on the development of high-level frameworks which abstract from the low-level details required to create efficient parallel programs. Our framework *Muesli* is a C++ library that is based on the combined usage of OpenMP, MPI, and CUDA following an approach based on so-called algorithmic skeletons, i.e., typical parallel programming patterns. *Muesli* is tailored to heterogeneous computing environments, using multiple nodes, GPUs, and CPUs.

Our research in multimedia systems explored emerging standards for ingesting live media streams. We further started work around new approaches for video processing and delivery control systems. Our work will be practically evaluated and applied in *educast.nrw*, a new video platform for higher educational institutes in the state of North Rhine-Westphalia.

Finally, we are working on testing so-called process-driven applications (*PDA*). i.e., (typically *BPMN*-based) executable process models with nested (e.g. *Java*) applications. After having developed an approach for the semi-automatic creation of test cases for *PDA*s, we have now extended this approach in such a way that existing test cases can be semi-automatically updated after changes in the process model have occurred.

### EVENTS

- On October 12, the **Jobhub IT**, the IT job fair of the University of Münster, was organized in the palace of Münster, 16 companies from the Münsterland region participated.
- The award **ceremony for celebrating the best theses in applied computer science** was organized at the Chamber of Industry and Commerce (*IHK*), Münster.
- Our student My Linh Phan received the **REACH Thesis Award** for her bachelor thesis “Model-driven Development of Mobile Applications for Questionnaires – A use case of a support tool for individualized rehabilitation after ankle inversion trauma”. Her interdisciplinary thesis was co-supervised by Dr. Rosemary Dubbeldam from the Institute of Sports Science.

### PUBLICATIONS

Gomes, P. d. L. M., de Andrade, A. N. H., Ludermit, T., Kuchen, H., Buarque, d. L. N. F. (2022). Towards a Parameterless Out-of-the-box Population Size Control for — Evolutionary and Swarm-based Algorithms for Single Objective Bound — Constrained Real-Parameter Numerical Optimization. *Applied Soft Computing Journal* 123:108920, Elsevier, doi 10.1016/j.asoc.2022.108920.

Neugebauer, J., Kuchen, H. (2022). Model-Driven Customizing of ERP Systems: A Case Study. In Proceedings of the The 37<sup>th</sup> ACM/SIGAPP Symposium on Applied Computing (*SAC*), 1276–1279, Virtual Event, doi 10.1145/3477314.3507166.

Neugebauer, J., Dubbeldam, R., Pham, M.L., Beser, L., Gerlach, L., Lee, Y.Y., Kuchen, H. (2022). A Medical Information System for Personalized Rehabilitation after Ankle Inversion Trauma. In Proceedings of 17<sup>th</sup> International Conference on Software Technologies (*ICSOFT*), Lisbon, Portugal, 319–330, doi 10.5220/0011295800003266.

Neugebauer, M. (2022). Nagare media ingest: a server for live CMAF ingest workflows. 13<sup>th</sup> ACM Multimedia Systems Conference (*MMSys*), Athlone, Ireland, 210–215, doi 10.1145/3524273.3532888.

Troost, L., Kuchen, H. (2022). A Comprehensive Dynamic Data Flow Analysis of Object-Oriented Programs. In Proceedings of the 17<sup>th</sup> International Conference on Evaluation of Novel Approaches to Software Engineering (*ENASE*), virtuelle Konferenz, 267–274, doi 10.5220/0010984800003176.

Schneid, K., Thöne, S., Kuchen, H. (2022). Semi-automated Test Migration for BPMN-Based Process-Driven Applications. In Proceedings of 26<sup>th</sup> International Conference Enterprise Design, Operations, and Computing (*EDOC*), 237–254, Springer, LNCS 13585, doi 10.1007/978-3-031-17604-3\_14.



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Winkelmann, H., Kuchen, H. (2022). Constraint-Logic Object-Oriented Programming on the Java Virtual Machine. In Proceedings of the 37<sup>th</sup> ACM/SIGAPP Symposium On Applied Computing (*SAC*), Virtual Conference, 1258–1267, doi 10.1145/3477314.3507058.

Winkelmann, H., Troost, L., Kuchen, H. (2022). Constraint-Logic Object-Oriented Programming for Test Case Generation. In Proceedings of the 37<sup>th</sup> ACM/SIGAPP Symposium On Applied Computing (*SAC*), Virtual Conference, 1499–1508, doi 10.1145/3477314.3507015.



## ABOUT THE INSTITUTION

Heike Trautmann is head of the Data Science: Statistics and Optimization group as well as a director of ERCIS. Together with Christian Grimme she leads the ERCIS Competence Center “Social Media Analytics”. Since 2021, she is also Adjunct Professor of Data Science in the Data Management & Biometrics Group at the University of Twente, The Netherlands. Her team contributes to the research areas of data science, artificial intelligence, social media analytics, (multi-objective) optimization, evolutionary computation as well as automated algorithm selection and configuration in international and industrial collaborations.

## RESEARCH TOPICS

Some of the most challenging real-world problems involve the systematic and simultaneous optimization of multiple conflicting objectives. As most of those **Multi-Objective Optimization** problems cannot be solved exactly, we apply optimization techniques from Evolutionary Computation to approximate optimal compromises with special focus on multimodality.

In the context of **Algorithm Benchmarking**, the group evaluates the performance of nature-inspired techniques and contributes to algorithm design from an empirical as well as a theoretical perspective. Algorithm Selection deals with the selection of the best-suited algorithm for a given problem in an automated fashion. Methodologically, identified problem properties are matched to known algorithms’ perfor-

## UNIVERSITY OF MÜNSTER DATA SCIENCE: STATISTICS AND OPTIMIZATION

mance (*Exploratory Landscape Analysis*). Artificial Intelligence and machine learning techniques, in particular deep learning and classification approaches, play a fundamental role in constructing accurate and efficient selection models. Together with the Configuration and Selection of Algorithms (*COSEAL*) research group, the team is strongly involved in this area focusing on vehicle routing and continuous black-box optimization. Moreover, **we focus on multi-objective automated (hyper-) parameter configuration and algorithm selection** in collaboration with the University of Twente, NL, and RWTH Aachen.

Moreover, the group is highly interested **Data Stream Mining**. Specifically, textual streaming data is analyzed by Janina Pohl, Lena Clever, Moritz Seiler and Christian Grimme with the aim of propaganda and disinformation campaign detection in online media (*Projects DemoRESILdigital, ERCIS Competence Center Social Media Analytics, Topical Program Algorithmization and Social Interaction*).

Since recently, the group also concen-

trates on advancing the field of **Trustworthy Artificial Intelligence**, specifically regarding robustness of ML and optimization techniques as well as the AI & Law domain.

## CURRENT RESEARCH PROJECTS

- **Hybrid – Real-time detection of disinformation campaigns in online media** (<https://algorithmization.org/?p=607>), 2021–2024: The aim of the BMBF-funded joint project is to develop methods and tools, which enable experts to better assess disinformation campaigns. The partners from computer science, social science, journalism, and practice combine computational analysis with human expertise to detect, analyze, and classify disinformation campaigns.
- **DemoRESILdigital** ([www.demosil.digital.uni-muenster.de](http://www.demosil.digital.uni-muenster.de)): “Democratic resilience in times of online-propaganda, fake news, fear- and hate speech”. This junior research group is supported by the Digital Society research program funded by the Ministry of Culture and Science of the German State of North Rhine-Westphalia. It is associated with the Department of Communication at WWU Münster and the Data Science: Statistics and Optimization Group.
- **WWU Topical Program “Algorithmization and Social Interaction”** ([www.algorithmization.org](http://www.algorithmization.org)): The topical program is an interdisciplinary and international collaboration of researchers in computer science, information systems, management, economics, social and political sciences, law and communication science. It specifically investigates how algorithmization affects individuals and society at large. A special focus currently is on “Social Influence Analysis” in online media.

## CLAIRE Confederation of Laboratories for Artificial Intelligence Research in Europe

- The group strongly supports the joint European initiative **CLAIRE (Confederation of Laboratories for Artificial Intelligence Research in Europe)**, ([www.claire-ai.org](http://www.claire-ai.org)) that seeks to strengthen European excellence in AI research and innovation.

## EVENTS

- **Theme Development Workshop on AI: Mitigating Bias & Disinformation** jointly organized by CLAIRE, ERCIS and other European AI initiatives, May 2022
- **16<sup>th</sup> International AAAI Conference on Web and Social Media**, June 2022, Atlanta, US. Janina Pohl presented her work on Artificial Social Media Campaign creation at the NEATClass Workshop.
- **Genetic and Evolutionary Computation Conference (GECCO)**, July 2022, Boston, US. Heike Trautmann served as tutorial chair and the group presented current research results.
- **Parallel Problem Solving from Nature (PPSN)**, September 2022, Dortmund, Germany. Heike Trautmann and Christian Grimme served as Tutorial and Workshop Chairs. The group presented several research papers and was involved in tutorial and workshop organization.



- **ERCIS Annual Workshop**, co-located with BPM conference, September 2022, Münster, Germany.



## SELECTED PUBLICATIONS

Heins, J., Bossek, J., Pohl, J., Seiler, M., Trautmann, H., & Kerschke, P. (2022). A Study on the Effects of Normalized TSP Features for Automated Algorithm Selection, Theoretical Computer Science, to appear

Aspar, P., Steinhoff, V., Schäpermeier, L., Kerschke, P., Trautmann, H., & Grimme, C. (2022). The Objective that Freed Me: A Multi-Objective Local Search Approach for Continuous Single-Objective Optimization. Natural Computing

Clever, L., Pohl, J.S., Bossek, J., Kerschke, P., Trautmann, H. (2022). Process-Oriented Stream Classification Pipeline: A Literature Review. Applied Sciences 2022, 12, 9094.

Heins, J., Rook, J., Schäpermeier, L., Kerschke, P., Bossek, J., & Trautmann, H. (2022). BBE: Basin-Based Evaluation of Multimodal Multi-Objective Optimization Problems. PPSN XVII Conference, Dortmund, Germany

Prager, R., Seiler, M., Trautmann, H., & Kerschke, P. (2022). Automated Algorithm Selection in Single-Objective Continuous Optimization: A Comparative Study Of Deep Learning and Landscape Analysis Methods. PPSN XVII Conference, Dortmund, Germany

Assenmacher, D., & Trautmann, H. (2022). Textual One-Pass Stream Clustering with Automated Distance Threshold Adaption. ACIIDS Conference, Ho Chi Minh City, Vietnam

Schneider, L., Schäpermeier, L., Prager, R., Bischl, B., Trautmann, H., & Kerschke, P. (2022). HPO × ELA: Investigating Hyperparameter Optimization Landscapes by



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Means of Exploratory Landscape Analysis. PPSN XVII Conference, Dortmund, Germany

Seiler, M. V., Prager, R., Kerschke, P., & Trautmann, H. (2022). A Collection of Deep Learning-based Feature-Free Approaches for Characterizing Single-Objective Continuous Fitness Landscapes. GECCO '22, Boston, US

Pohl, J., Assenmacher, D., Seiler, M. V., Trautmann, H., & Grimme, C. (2022). Artificial Social Media Campaign Creation for Benchmarking and Challenging Detection Approaches. ICWSM Conference, Atlanta, US

Schäpermeier, L., Grimme, C., & Kerschke, P. (2022). Plotting Impossible? Surveying Visualization Methods for Continuous Multi-Objective Benchmark Problems. IEEE Transactions on Evolutionary Computation. (online first)



### ABOUT THE INSTITUTION

The Institute of Medical Informatics (IMI) is dedicated to research and teaching the full range of informatics applications in medicine. It was founded in 1973 and belongs to the Medical Faculty. From 2009 – April 2021 it was headed by Martin Dugas. Since May 2021 Julian Varghese is acting director and received his professorship for medical informatics in January 2021 at the IMI. The IMI provides lectures, seminars and courses in small groups regarding Medical Informatics for medical as well as informatics students. The institute has a long tradition regarding research on information systems in healthcare. Nowadays, the future of information systems in healthcare, specifically regarding electronic health records (EHRs), is a key research focus. Precision medicine is built upon clinical and molecular data. The IMI's research focus is on data mining and pattern recognition techniques for genomic data, in particular derived from next-generation sequencing of cancer tissue or clinical data from electronic health records or mobile health systems.

### RESEARCH TOPICS

The institute consists of three working groups: Medical Data Integration, Digital Health and Biomedical Informatics. Due to the digital revolution, the relevance of informatics within all fields of medicine is constantly rising. There is a wide scope of applications, ranging from molecular biology over clinical medicine to public health and methods from medical information systems, Machine Learning in medical data and bioinformatics in high throughput data.

The integration of clinical and molecular data, especially analysis of next-genera-



tion sequencing (NGS) in cancer research, is a well-established focus of the institute with national and international cooperations for many years. The rapid increase in data volumes of high-throughput sequencing in molecular medicine poses constant challenges from an informatics point of view.

To foster clinical data integration of routine primary hospital systems, the IMI is part of the nationwide Medical Informatics Initiative and established the Medical Data Integration Centre (MeDIC) of the University of Münster. To promote interoperability of different systems the Institute applies and researches data standards, meta data standards with utilization of medical terminologies and ontologies. The newly established professorship for the working group Digital Health focusses on Clinical Data analyses with Machine Learning and several Deep Learning methods in a broad spectrum of medical data types, including structured clinical data, free-text, imaging and genomic sequencing data.

### CURRENT RESEARCH PROJECTS

#### • Digital Health & AI in Medicine

The Smart Device System (<https://smart-devices.uni-muenster.de/>) utilizes smart-watches, smartphones, tablets and advanced AI-algorithms for time-series analyses for digital neurological examination of Movement Disorders. The study has been finished and final evaluation is on the way to assess classification accuracy of our implemented AI algorithms. In addition, new clinical use cases are being implemented with our clinical partners in cardiology (ECG-based identification of arrhythmias), radiology (linescans of mice).

#### • IT-Infrastructure in Medicine

IMI and its MeDIC is part of the HiGMed Consortium ([www.higmed.org](http://www.higmed.org)), which is funded by the Federal Ministry of Education and Research. As of September 2022 we are delighted that this infrastructure is going to receive continuous funding in 2025 as part of Network of Medicine (NUM) in Germany, which shows how important this research infrastructure is for sustained

cross-site medical research.

#### • New Use Cases within the Medical Informatics Initiative

The IMI will participate in several use cases to show scientific and/or clinical impact by the activity of the MeDIC research work. These include cardiovascular diseases, involvement of patient reported outcomes, cancer research, annotation for natural language processing, medical device consultation an own coordinated use case – called EyeMatics – which will focus on eye disease research that will combine clinical data and novel imaging sources such as OCT-scans to unravel new biomarkers of retinal diseases.

#### • Biomedical Informatics

The IMI participates in the DFG clinical research group “Male Germ Cells: from Genes to Function” (CRU 326), taking care of all OMICs data analyses. The project studies male infertility by means of genomics and transcriptomics analyses, including humans as well as model organisms like zebrafish or marmoset. The project is currently applying for a promising DFG CRC (Sonderforschungsbereich).

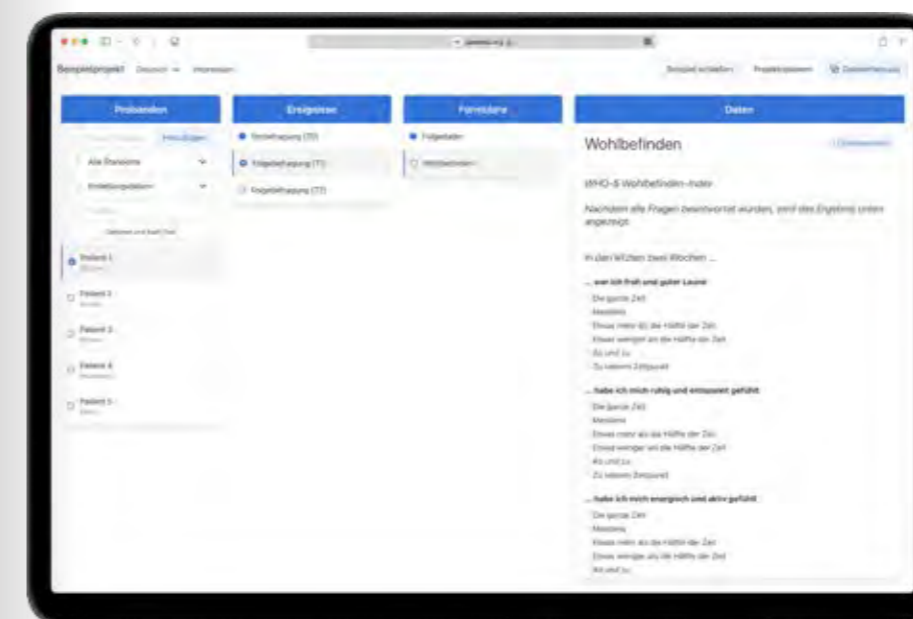
### AWARDS

Alexander Brenner: Best Paper award for interpretable machine learning analyses of EEG data: <https://pubmed.ncbi.nlm.nih.gov/36073486/>

Prof. Julian Varghese, together with Prof. Dugas: Best national working group of the German Association for Medical Informatics, Biometry and Epidemiology. For their work and impact on teaching medical informatics and digital competences in medicine.

### EVENTS

The IMI has been certified by the TÜV SÜD for its quality management system and passed the external surveillance audit of 2021 in order to develop software systems for clinical decision support, genomic analyses and medical data integration.



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Our researcher Leonard Greulich has built a team, which received funding for their start up openEDC that will be hosted, mentored and later spun off from our institute. The team develops a novel easy-to-use electronic data capture system for clinical researchers.



# UNIVERSITY OF MÜNSTER

## DBIS GROUP

### DISSERTATION

„Fundamental Data Mining Techniques for Declarative Process Mining”

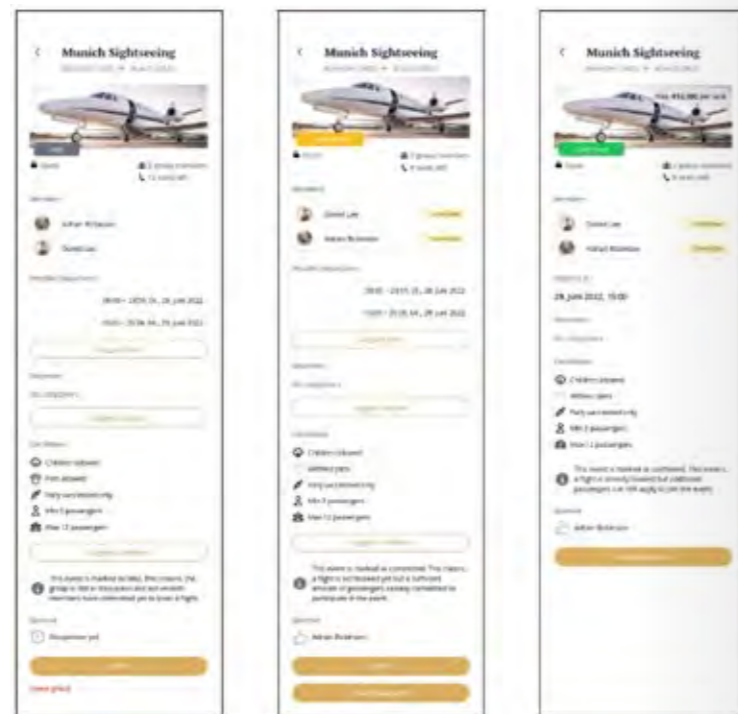
Process mining is a technology at the intersection of Business Process Management (BPM) and Data Mining. The basic idea is to use traces of process executions supported by information systems for process analysis. Thus, it represents a reverse approach compared to process modeling and the as-is analysis of a process is based on factual event data. Nearly all academic and commercial process mining tools (<https://www.processmining-software.com/>) use process models in form of graphs like BPMN or Petri nets. This thesis has studied the declarative paradigm where a process is described through constraints and conditions it has to meet and all other behaviour that is not touched by any constraint is allowed. Declarative modeling is especially useful for complex and loosely structured processes with many variants whose process graph representations may be large and confusing. Suitable notations like Declare already exist. Nico Grohmann’s work deals with the application of fundamental data mining techniques like association rule and sequential pattern mining to process event data for declarative process discovery.

### PROJECT SEMINAR

“Samadaay – Community Sharing Platform for Private Planes”

During winter semester 2021/2, six students of the master IS programme did their project seminar in cooperation with Ximea GmbH in Münster. The goal was to develop a prototype of the platform “Samadaay” which provides a trusted community to share or pair private planes for a benefit, such that their utilization is maximized. The interest in using private planes for individual transportation has risen considerably during Corona times, mainly for the obvious reason that regular air traffic was reduced considerably and, if available, became unpopular due to infection risks. In Samadaay, users, who can register by invitation or recommendation only, can book an “event” (i.e., a flight). In order to amortize the typically high cost of such an event, users can then publish it to the closed community and hence look for other people who want to join and share the cost.

The following figure shows details for three events:



There are various features of an event that the interested parties can negotiate on, and ultimately payment is processed via an encrypted currency. The project work involved various user interviews, interface design, platform programming and documentation, all in close connection with Ximea GmbH which plans to launch the platform in the not-too-distant future.

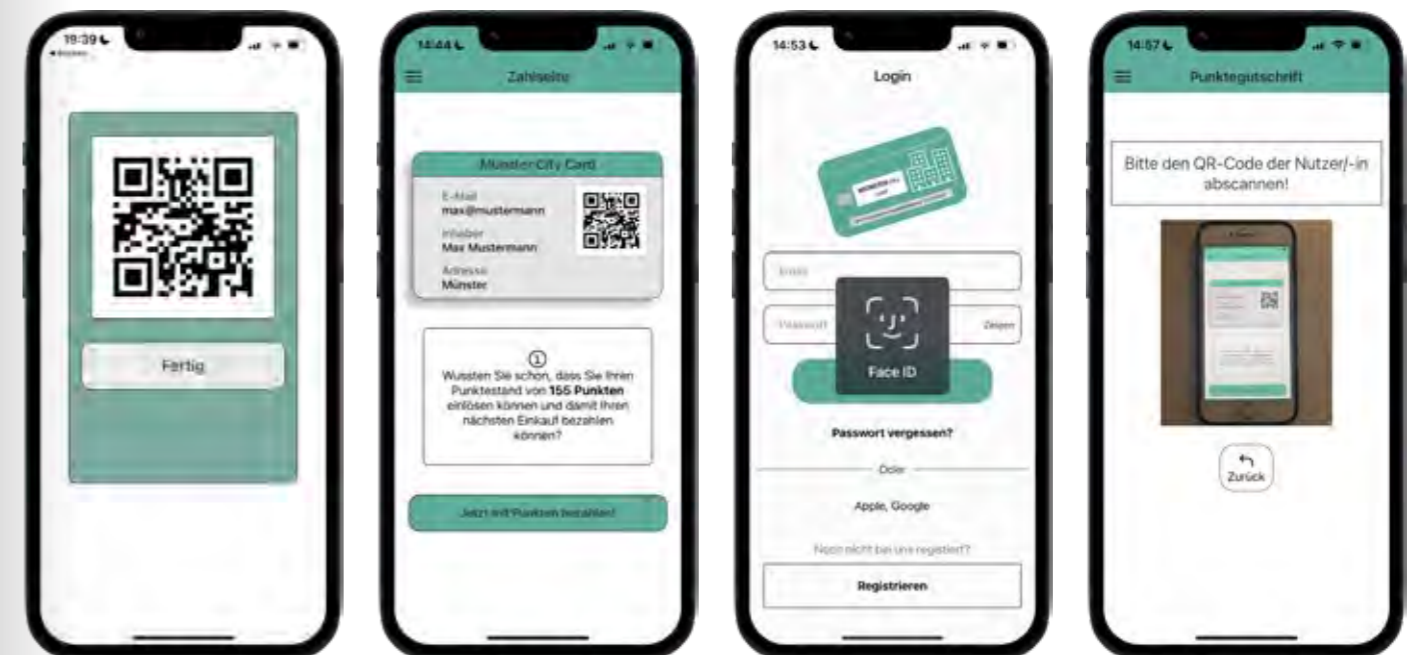
### PROJECT SEMINAR

“CICO – the Regional Community Card”

During the past summer semester 2022, a project seminar of our bachelor’s degree program developed a community card app for Münster. Six students were involved. The project was supported by the two companies, Janus Innovation GmbH and Springboard GmbH, which are based near Münster. They helped by providing conceptual input as well as guiding the development process for the students who were new to this type of work.

Based on the concept of a classic cashback card, this card is designed to enable the collection and use of points while shopping. Not only retailers are included, but also the entire commercial and tourist offer of a city – for example, also hairdressers or local destinations. The app intends to digitize city centers and make them more attractive for citizens.

For the development of this business model, the project seminar worked on topics such as business development, development of data models and the programming of an app. The result is shown in the presented images. It achieves the goal of the seminar by providing a fully functional payment process using points via QR codes. The app has been developed using the popular cross-platform development framework React Native as a hybrid for both Android and iOS phones. The secure payment processes were executed using the Microsoft Azure platform. This way, the students learned current best practices in app and web development. Apart from programming and conceptual development, soft skills such as communication, feedback and self-reflection were trained effectively. The students were supervised by Simon Schimpe and Philipp Käfer from the young company Springboard as well as Prof. Dr. Gottfried Vossen and Andreas Banger from Janus Innovation.



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# INTERNATIONAL PARTNERS

The associated partners are research institutions mainly from Europe, but also from around the world, that have long-standing connections with the network. All associated members are outstanding Information Systems institutions, and, more importantly, the personal relations and close ties between the researchers lead to short communication lines and reliable structures for joint research endeavours.





## QUEENSLAND UNIVERSITY OF TECHNOLOGY CENTRE FOR FUTURE ENTERPRISE

### ABOUT THE INSTITUTION

The Centre for Future Enterprise (CFE) is one of QUT's 12 tier 1 research centres consolidating research expertise across five faculties. CFE is investing its research capacity into the purpose of providing capabilities that matter for future enterprises. The focus is on those emerging attributes of organisations, and their leaders, that have not seen sufficient professionalisation. Dedicated to demand-driven, rigorous research exploring and testing possible futures for enterprises of all sizes ranging from large incumbents to emerging start-ups, from the internationally listed corporation to the regional nonprofit charity, CFE works closely with industry partners across various sectors.

CFE research inspires, informs and enables navigation in a fast-emerging new world, differentiating essential requirements from distracting noise. Based on the fundamental hypothesis that an increasingly opportunity-rich environment will require new enterprise capabilities, CFE research focuses on three themes and the nexus between these:

#### 1. Robust Enterprise

Robustness is a much-needed characteristic of future enterprises as they increasingly have to master digital, pandemic and other forms of disruption. Headed by Prof. Kevin Desouza, related research takes place in these four streams, (1) the management of contradictions, (2) digital resilience and transitivity, (3) design of adversarial robustness, and (4) robust transformations (e.g., green transitions). A specific feature of this theme is its 'Paradox

Moonshot' initiative in which a cross-disciplinary team of CFE researchers consolidates and examines various mechanisms for dealing with conflicting aims.

#### 2. Algorithmic Enterprise

Headed by the Chair in Digital Economy, Prof. Marek Kowalkiewicz, this group studies the characteristics and potential of the emerging economy of algorithms. Research within this theme is organised in these four streams, i.e. (1) business models of algorithmic enterprises, (2) human-algorithm interaction models, (3) governance models for algorithmic enterprises, and (4) innovation models of algorithmic enterprises. A comprehensive set of executive courses, also as part of QUT's Digital MBA, makes research from this theme accessible to current and future leaders.

#### 3. Trusted Enterprise

As our societies and economies are becoming more trust-intensive, the conscious design, management and measurement of trust-aware products, services and business processes is of increasing importance. In our research, we break down trust into the management of uncertainty, vulnerability, confidence and benevolence, and develop operational, validated practices and principles for these. The newly appointed Cisco Chair in Trusted Retail is exploring how technologies can facilitate new, trusted solutions and with this unlock previously unseen sources of competitive advantage. The Brisbane Trust Alliance is a community of (trust) professionals which brings 40+ executives across multiple sectors together on a monthly base to collectively develop higher levels of trust literacy.

CFE cultivates an ambitious, proactive, global research community, characterised by mutual support and collective curiosity, nurturing young talent, valuing diversity and connecting researchers with competitive grant funding and reputable industry partners from leading enterprises, charities and governments.

CFE's research capability is bundled in 'The Lab' which builds scientific and research management capabilities for CFE members to conduct not just rigorous, real-world research, but also to build the mindsets, skillsets and toolsets for effective and efficient research processes. 'The Hub' is CFE's industry engagement centre. Called Innovation Central Brisbane (ICB) and headed by Mrs Gemma Alker, ICB is an open innovation hub that connects students, researchers and industry with global technology giant Cisco with a purpose to accelerate digital transformation and skills through rapid prototyping projects. Embedded in Cisco's National Industry Innovation Network and is CFE's one-stop engagement point. A key value proposition is the engagement of multidisciplinary coursework students in industry-funded projects providing development capacity which meaningfully extends CFE's research.

### SELECTED CURRENT RESEARCH PROJECTS

#### • Digital Industrial Platforms

This project studies digital industrial platforms in the context of manufacturing and Industry 4.0. These platforms facilitate transactions and innovation by leveraging industrial asset data fuelled by Industrial IoT, cloud computing, edge computing, data analytics, and artificial intelligence. While digital platforms have been a prominent research topic, their use for industrial,

B2B applications is quite distinct. This requires new theoretical and empirical insights. As such this project targets developing the research agenda and conducting case studies of digital industrial platforms.



This project is a collaboration between Dr. Erwin Felt, Senior Lecturer at QUT's School of Information Systems and member of the Centre for Future Enterprise, and Prof. Dr. Martin Matzner, Chair of Digital Industrial Service Systems at the Friedrich-Alexander University Erlangen-Nürnberg. It is part of the ERCIS Research Cluster on Smart Manufacturing. Dr Erwin Felt presented his research on Business Model Innovation for Manufacturing in 2022 as part of a Cluster meeting.

The Co-Leader of the ERCIS Smart Manufacturing Cluster, Prof. Dr. Jens Pöppelbuß visited QUT's Centre for Future Enterprise for two weeks in October 2022 and presented on Multi-Actor Smart Service Innovation. Leandro Jesus, PhD candidate at CFE, conducted his final PhD seminar on Digital Platforms in the Automotive Industry.

### SELECTED PUBLICATIONS

Matzner, M., Pauli, T., Marx, E., Anke, J., Pöppelbuß, J., Felt, E., Gregor, S., Sun, R., Hyde, K. M., Aas, T. H., Aanestad, M., Gordijn, J., Kaya, F., Wieringa, & Roel. (2021). Transitioning to Platform-based Services and Business Models in a B2B Environment. *Journal of Service Management Research*, 5(3), 143–162.

Pauli, T., Felt, E., & Matzner, M. (2021). Digital Industrial Platforms. *Business & Information Systems Engineering*, 63(2): 181–190.

#### • Innovation Systems

The transformational performance of organisations in the context of innovation tends to be under-developed. Whereas transactional information systems have matured, innovation systems are at infan-

cy. CFE's related research is dedicated to the design of systemic approaches for innovation. This includes patterns for explorative process design, ideation frameworks and the role of abductive approaches driven by a sense of ambition (as opposed to sense or urgency).

### SELECTED PUBLICATIONS

Buck, C., Kreuzer, T., Oberländer, A., Röglinger, M and M. Rosemann (2022). Four Patterns of Digital Innovation in Times of Crisis. *Communications of the AIS*, 50.

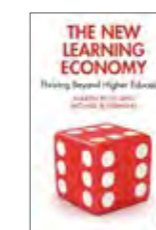
Grieshold, T., Groß, S., Stelzl, K., vom Brocke, J., Mendling, J., Röglinger, M. and M. Rosemann (2022). The Five Diamond Method for Explorative Business Process Management. *Business & Information Systems Engineering*, (64) 149–166.

Kölbl, A. and M. Rosemann (2022). The Early Process Catches the Weak Event: Process Latency and Strategies for Its Reduction. *Proceedings of the Business Process Management Forum, Münster*, 11–16 September, 55–69.

Röglinger, Maximilian, Plattfaut, Ralf, Borghoff, Vincent, Kerpedzhiev, et al. 2022, 'Exogenous Shocks and Business Process Management: A Scholars Perspective on Challenges and Opportunities. *Business and Information Systems Engineering*, (64) 669–687.

Chasin, F., Kowalkiewicz, M., & Gollhardt, T. (2022). How SME Watkins Steel Transformed from Traditional Steel Fabrication to Digital Service Provision. *MIS Quarterly Executive*, 21(3), 4.

### NEW LEARNING ECONOMY



The current model of learning has three deficiencies. First, knowledge depreciates faster making ongoing learning more relevant than ever. Second, experience increasingly is becoming counter-productive. Third, there is no consciousness for one's state of educa-



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CRICOS No 002131

tional well-being. Studying the business models of organisations such as Amazon, Google, Tesla and Spotify, led to six new strategic options (e.g., personalisation, scalability) for the New Learning Economy that we describe as options for leaders with a sense of ambition in our new book launched this year. As part of his visit to the BPM Conference in Münster in September 2022, Prof Dr Michael Rosemann discussed the idea of continuous educational well-being and upgradeable, subscription-based degrees as described in this book with representatives of the executive education department ('Weiterbildung') of the University of Münster.

M. Betts and M. Rosemann: *The New Learning Economy. Thriving Beyond Higher Education*. Routledge (2022).



# VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS DEPARTMENT OF INFORMATION SYSTEMS AND OPERATIONS MANAGEMENT

## ABOUT WU VIENNA

Since 2015, Vienna University of Economics and Business (*WU Vienna*) has held triple accreditation by EQUIS, AACSB, and AMBA; fewer than 1% of universities worldwide can claim triple accreditation from these organizations. WU Vienna is working to strengthen its global profile by offering a range of English-taught programs and by continuously emphasizing internationalization in its research activities.

## ISOM

The Department of Information Systems and Operations Management (*ISOM*) consolidates the know-how and reputation of ten distinctive chairs – with yet a new endowment chair joining next year. Additionally, Jan Mendling rejoined the department as double affiliated professor at Humboldt-Universität zu Berlin and WU Vienna. Further, the ISOM faculty comprises eleven associated professors and more than 90 affiliated researchers and lecturers, conducting research and teaching with their own specific focuses, providing a broad representation of IS and OM topics.

The ISOM department contributes to WU's bachelor's program with a major in Information Systems as well as a variety of IS related specializations available for all branches of study. In addition, the department has the lead for two master's programs:



- The interdisciplinary **Master's Program in Digital Economy** (launched in 2021) equips students with the expertise and methodological skills they need to help steer the path of digitalization, so they will be able to distinguish themselves in creating and maintaining digital ecosystems, designing new digital business areas in companies, and contributing to digitalization-driven social change.
- The high quality of our well-established and prestigious transdisciplinary **Master's Program in Supply Chain Management** is also confirmed by the SCM specific QS ranking, which ranks it 2022 for the second time in a row as 1<sup>st</sup> in Europe and 2<sup>nd</sup> in the world.

## ISOM RESEARCH TOPICS

The ISOM chairs are incorporated in seven institutes:

- The **Institute for Data, Process and Knowledge Management** (Axel Polleres) conducts research in the area of business-

and technology-driven innovations with a specific focus on data management and knowledge management. In March 2022 Marta Sabou filled the vacant chair for Information Systems and Business Engineering at the institute. She is focusing on information systems based on artificial intelligence techniques, in particular neuro-symbolic systems that combine both semantic technologies and machine learning. She investigates novel applications of these systems, the business models they enable as well as their socio-technical aspects.

- The **Institute for Digital Ecosystems** (Verena Dorner) is focusing on the digitalization of decision making in different ecosystems as well as developing algorithms and systems to support decision makers.

- The **Institute for Distributed Ledgers and Token Economy** (Davor Svetinovic) was newly founded in January 2022, with a research focus on the cutting-edge research in the fundamentals of blockchain technology and its applications to economics, law, business, and social sciences.

- The **Institute for Information Management and Control's** (Edward Bernroider) focus is on the needs of organizations and societies in regard to managing and controlling digital transformation, especially considering opportunities and risks.

- The **Institute for Information Systems and New Media** (Gustaf Neumann) emphasize two major research areas: new media, especially computational media, active media, polymorphic media, and information systems, in particular highly flexible systems and application engineering.

- The **Institute for Information Systems and Society** (Sarah Spiekermann) aims to be a think tank for business as well as society and to contribute to the development and design of sustainable information technology.

- The **Institute for Production Management** (Gerald Reiner, Alfred Taudes) is focusing on research in the area of supply-chain management. Miriam Wilhelm joined the institute as chair for Sustainable Supply Chain Management, which was established in October 2022. Her main aim is to provide novel research insights on how global supply chains can be made more sustainable, both from an environmental and social perspective.

## A SELECTION OF CURRENT RESEARCH PROJECTS

- **KnowGraphs – Knowledge Graphs at Scale** (lead: Kirrane, S.; 2019–23; EU Horizon 2022): This project investigates how citizens can be enabled to protect their privacy and to make informed decisions regarding their actions with privacy implications.

- **HONest – Human-centric Ontology Evaluation** (lead: Sabou, M.; 2020–24; FWF Elise Richter Grant): This project is investigating Human Computation methods for the evaluation of knowledge structures, such as ontologies and knowledge graphs. Further, the project aims to make important contributions towards creating trustable and unbiased AI Systems.

- **APPETITE – AI-driven collaborative supply and demand matching platform for food waste reduction in the perishable food supply chain** (lead: Reiner, G.; 2022–25; FFG): This project's overall goal is to re-

duce food waste by 10% by 2030, achieved by collaboration and the use of advanced data-driven technologies by integrating AI-driven forecasting and logistics optimization methods.

Furthermore, several department members are actively contributing the following COMET K1-centres: Austrian Center for Digital Production (CDP), Austrian Blockchain Center (ABC) as well as SBA Research (Secure Business Austria).

## SELECTED PUBLICATIONS

Felsberger, A., Qaiser, F. H., Choudhary, A., Reiner, G., 2022: The impact of Industry 4.0 on the reconciliation of dynamic capabilities: evidence from the European manufacturing industries. *Production Planning and Control*, 33(2–3), 277–300.

Suhail, S., Svetinovic, D., 2022: Towards situational aware cyber-physical systems: A security-enhancing use case of blockchain-based digital twins. *Computers in Industry*. 141, 103699.

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Görnemann, E. & Spiekermann-Hoff, S., forthcoming: Emotional Responses to Human Values in Technology: The Case of Conversational Agents. *Human-Computer Interaction*.

K. Kueffner, M. Strembeck, 2021: Toward a generalized notion of discrete time for



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modeling temporal networks. *Network Science*, 9(4).

Limaj, E., & Bernroider, E. W. N., 2022: A taxonomy of scaling agility. *The Journal of Strategic Information Systems*, 31(3), S. 1–19.

Kurniawan, K., Ekelhart, A., Kiesling, E., Quirchmayr, G., Tjoa, A. M., 2022: KRYSTAL: Knowledge Graph-based Framework for Tactical Attack Discovery in Audit Data. *Computers and Security*, 121, 102828.

Gomes Jr., J., Chrispim de Melo, R., Ströele, V. & De souza, J. F., 2022: A study of approaches to answering complex questions over knowledge bases. *Knowledge and Information Systems*, 64, S. 2849–2881.

# UNIVERSITY OF SÃO PAULO SCHOOL OF ARTS, SCIENCES AND HUMANITIES

## ABOUT THE INSTITUTION

The University of São Paulo (USP), founded in 1934, is the leading institution of higher education and research in Brazil. USP is a free public university with open access to students selected for an entrance exam. USP forms a large part of Brazilian masters and PhDs and alone accounts for over 20% of all national research production, delivering on average almost 50 research papers per day. There are seven university campi in the state of São Paulo; the main campus is in the city of São Paulo, the state capital. The university has nearly 50 schools and institutes covering all areas of knowledge. There are about 250 undergraduate programs and 250 graduate programs serving almost 100,000 students.

The School of Arts, Sciences and Humanities (EACH), created in 2005, is an interdisciplinary unit at USP that brings together 11 undergraduate and 11 graduate programs in different areas of knowledge. Of these, we act in the Bachelor's in Information Systems undergraduate program, with nearly 40 faculty members, and in the Master of Science and PhD in Information Systems graduate program, with nearly 25 faculty members. Our graduate program in information systems has two broad research lines – “systems management and

development” and “systems intelligence” – both with strong appeal in applied computing.

Two other USP units with a strong presence in the information systems and applied computing area are: the Institute of Mathematical and Computer Sciences (ICMC), in the campus of São Carlos, with nearly 50 faculty members, and the School of Philosophy, Science and Literature (FFCLRP) with the Department of Computing and Mathematics, in the campus of Ribeirão Preto, with nearly 15 faculty members.

## RESEARCH TOPICS

With a total of over 100 researchers in the computing field, USP contributes research in a variety of areas, including some focused specifically on information systems. Some important research topics are: **artificial intelligence; big data; bioinformatics; bio-inspired computing; biometrics; business process management; chemistry; complex networks; computational intelligence; computational neuroscience; concurrent programming; databases; distance learning; distributed systems; economics; education; e-government; embedded systems; enterprise environments; functional genomics; games; graphics processing; health; interface human-computer; internet; internet of things; it management; linguistics; machine learning; medical**

**images; mobile devices; mobile robotics; multimedia interactive systems; natural language; pattern recognition; process mining; robotics; serious games; smart toys; social networks; software engineering; systemic biology; web systems.**

## CURRENT RESEARCH PROJECTS

### • Process Mining

The quality of business processes running in organizations is of utmost importance in achieving the organization's strategic goals. This project aims to explore key machine learning and computational intelligence techniques to discover advanced process knowledge for process and organizational improvement. Specific works under development currently involves process discovery, concept drift, legal compliance, legal process mining, educational process mining, interpretability and explainability with visualization, trace clustering, iterative clustering.

### • Social Robots

Social robots can assist human beings in different activities through social interactions. They can be used, for example, to aid older adults by diagnosing depression and anxiety in their homes and proposing activities to reduce these states, providing a better quality of life. This project aims to investigate social robotics in assisting groups of individuals with specific needs

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in particular contexts of development and social interaction, such as lonely older people, children with autism spectrum disorder, and patients isolated in hospitals.

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## CHARLES UNIVERSITY FACULTY OF MATHEMATICS AND PHYSICS – DEPARTMENT OF SOFTWARE ENGINEERING

### ABOUT THE INSTITUTION

The natural sciences have been a part of the research teaching at the Charles University since its founding in 1348. The Faculty of Mathematics and Physics has been created by separating a part of the Faculty of Natural Sciences on 1 September 1952. It means that the faculty celebrates its 70th anniversary this year. Now, it is composed from three schools: School of Physics, School of Mathematics, and School of Computer Science.

The School of Computer Science includes eight prestigious teaching and scientific workplaces. Members of the School of Computer Science achieve outstanding scientific results based on discrete mathematics, especially graph theory and its application in intelligent systems, optimization, programming methods, Web semantics, and bioinformatics. Traditional areas include building large software systems, natural language processing, and many others.

- The Department of Software Engineering focuses on teaching and research in the field of software and database systems and their applications. Its members work on topics ranging from multimedia retrieval, data on the Web, knowledge graphs,

data integration, Big Data, bioinformatics applications, to high-performance parallel systems. Research is conducted within national and European basic research, applied and contract research projects. The department provides courses for undergraduate and graduate students in software and data engineering programs.

### RESEARCH TOPICS

There are seven research areas in the department:

- **Multimedia Retrieval**

It includes meeting multimedia data in social media applications, video streaming services, digital libraries as well as in specialized medical or industrial fields. As multimedia data are produced using sensors, their primary representation is semantically unstructured. Hence, recognition of what is inside a particular multimedia document and subsequent retrieval is a hard task that requires advanced techniques for feature extraction, object detection, similarity modelling, etc. Many of these techniques are based on machine-learning models.

- **Data on the Web**

Working with data on the Web is difficult due to numerous issues which an interested data consumer can come across, the

main ones being data interoperability issues on various levels of abstraction. To support the ecosystem of data exchange on the Web, the research is focused on a set of techniques and tools for proper publishing and consumption of data on the Web, which include data cataloguing, transformation, querying and visualization tools.

- **Multi-model databases**

Relatively recently emerged NoSQL and other modern DBMS allows to deploy databases based on other logical models than just the traditional relational ones. Unfortunately, the number of available models, formats, implementations, and query languages the existing systems exploit, often proprietary, is not sustainable from a longer perspective. Therefore, the research is focused on various aspects of efficient and unified management of multi-model data, including conceptual modelling, schema inference, unified querying, or evolution management.

- **Bioinformatics**

The research in bioinformatics focuses on the development of software tools applicable mainly in the domain of structural bioinformatics and visualization. These include tools for protein binding site detection, with the application in computational

drug discovery, or tools for visualization of the structure of macromolecules. All our methods are implemented as software solutions used by thousands of users all over the world.

- **Compilers**

Our research activities include specialized code generators for performance-critical code, compiler support for dynamic languages, languages for Big Data processing, and translation between domain-specific languages.

- **High performance computing (HPC)**

HPC research activities and topics of interest include multi-core CPUs and NUMA servers, many-core GPUs and GPGPU computing, emerging parallel architectures, distributed computing on tightly coupled clusters, parallel data processing and concurrency in database systems, as well as languages (*and compilers*) for parallel processing.

- **Research Software Engineering (RSE)**

RSE helps scientists improve and speed up their code by up to several orders of magnitude, making it possible to process much larger volumes of data in the same amount of time. As a result, many new findings can be found and produced that would have been unattainable without RSE.

### CURRENT RESEARCH PROJECTS

The department members are involved in several research projects funded by the Czech Science Foundation and the Technology Agency of the Czech Republic. For example, bioinformatics group is focused mainly on the development of structural bioinformatics software solutions in the projects:

- **P2Rank** – a state-of-the-art machine learning-based method for ligand binding sites prediction based on protein structure.

- **Traveler** – an RNA secondary structure visualization tool implementing a template-based approach enabling to lay out even the largest RNA structures in the standard orientation.

- **MolArt** – a responsive, easy-to-use JavaScript plugin which enables users to view annotated protein sequence and overlay the annotations over a corresponding experimental or predicted protein structure.

The research of data on the Web includes the projects:

- **STIRdata** – an EU project focused on improving interoperability of data about companies and organizations coming from business registries in individual European countries. In the project we apply our know-how in data modelling and data standardization.

- **KGBrowser** – a web-based tool for visualizing knowledge graphs distributed in different data sources. It provides highly configurable framework which enables to define various browsing configurations tailored to domain specifics of given source data.

- **LinkedPipes ETL** – an open-source extract-transform-load tool focused on publication and consumption of data on the Web, including linked data. It is already deployed in multiple organizations worldwide, and we have plenty of ideas of how to improve it further.

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# UNIVERSITY OF TARTU

## JOHAN SKYTTE INSTITUTE OF POLITICAL STUDIES



## UNIVERSITY OF TARTU

### ABOUT THE INSTITUTION

ECePS ERA Chair of E-governance and digital public services at the University of Tartu in the Center of IT Impact Studies (CITIS) set out, headed by professor Robert Krimmer, in October 2020. CITIS focuses on research on e-governance, public e-services and data-driven public innovation and is part of Johan Skytte Institute of Political Studies. The research conducted in the Skytte Institute in turn, encompasses the main subfields of political science (*comparative politics, international relations and political theory*).

The University of Tartu (UT), founded in 1632, is one of the oldest universities in Northern and Eastern Europe. The UT belongs to the top 1.2% of the world's best universities by ranking 296<sup>th</sup> in the QS World University Rankings 2023 and within the 201–250 range in the Times Higher Education (THE) World University Rankings 2023. It is placed 4<sup>th</sup> in the QS University Rankings: Emerging Europe and Central Asia (QS EECA University Rankings 2022). The university has four faculties – Arts and Humanities, Social Sciences, Medicine, Science and Technology – annually teaching around 13,000 students (*including around 1,700 international students from 90 countries*).

### RESEARCH TOPICS

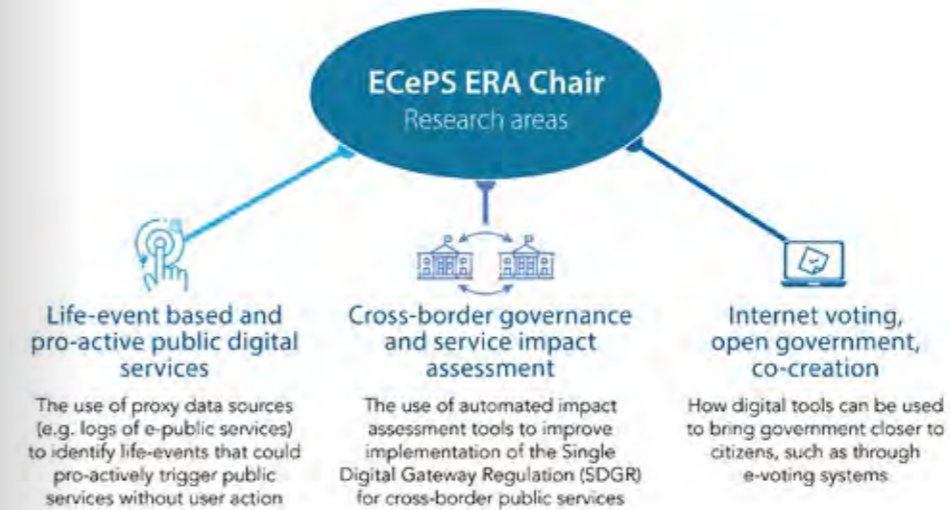
The ECePS ERA Chair in CITIS is an interdisciplinary research team that focuses on three main research streams:

1. Life-event based and pro-active public digital services: concentrating on the use of proxy data sources, e.g. logs of e-public services consumed to identify life-events that could pro-actively trigger public services without user action.
2. Cross-border governance and service impact assessment: Research focused on the use of automated impact assessment tools to improve implementation of the Single Digital Gateway Regulation (SDGR) which mandates cross-border access to a range of public services by the end of 2023.
3. Internet voting, open government and co-creation: The ECePS team will conduct research on how digital tools can be used to bring governments closer to citizens, e.g. through e-voting systems.

Our research contributes to solving the most pressing long-term challenges for Estonia and the EU, as well as to achieving the UN's Sustainable Development Goals.

### CURRENT RESEARCH PROJECTS

- **ECePS ERA Chair in E-Governance and Digital Public Services** sets out to strengthen the Center of IT Impact Studies (CITIS) at the UT, so that the research unit can act as a world leader in the field of e-governance, public e-services and data driven public innovation.
- **mGov4EU – Internet Voting as Part of Mobile Cross-Border Government Services for Europe** is developing inclusive mobile Government services in Europe, bringing those in line with EU citizens' expectations for safe, resilient and sustainable mobile communication. Key elements: innovating electronic identity management, storage of data and the exchange of electronic documents.
- **NIIS (Nordic Institute for Interoperability Solutions) European Interoperability Landscape research 2022** aims at mapping the key cross-border data-exchange solutions and initiatives, clarifying their status quo and analysing the European landscape of cross-border services



- **Machine learning and AI driven services** develops machine learning (ML) and artificial intelligence (AI) powered automated decision-making support models in four societal domains – labour market, internal security, health and cybersecurity. Including: 1) designing and creating four data driven applications in the form of minimum viable products (MVP); 2) evaluating the impact of the MVPs on the business process of the selected public institutions; 3) evaluating the general readiness of the state IT infrastructure to enable ML and AI decision support tools in the public sector; 4) giving a legal opinion on the usability of ML and AI tools in the public sector.

Based on this work, the CITIS team won the competition for the best app in the Estonian national digital public services in 2022 with the Decision Support Tool OTT for the Estonian Unemployment Insurance Fund.

### EVENTS

- ECePS ERA Chair in cooperation with the European Commission hosted the 3<sup>rd</sup> Eastern Partnership Conference ‘Disinformation in the Digital Age’ in May, 2022. Top-level researchers and practitioners came together to discuss how the problems of disinformation – divide in public opinion, filter bubbles – can be mitigated and AI used to solve the issue endangering our democracies in the digital age.
- In August, 2022, we organized a two-week Summer University on Building Digital Governments, hosted by the University

of Tartu, in collaboration with the University of Konstanz, Harvard University, Erasmus University Rotterdam and KU Leuven. Our visiting professor ‘Governance in the Digital Age’ Vincent Homburg was also among the teaching staff. Vincent will play a more active role in the teaching and supervision work at the Skytte Institute in the current academic year.

- ECePS ERA-Chair will also host the 24<sup>th</sup> Annual International Conference on Digital Government Research – DG.O 2023 – ‘Building Safe and Secure Digital Public Services’ in June, 2023, in Tartu. The call for papers is to be launched in October 2022 and colleagues are most welcome to join.

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# UNIVERSITY OF TURKU TURKU SCHOOL OF ECONOMICS – INSTITUTE OF INFORMATION SYSTEMS SCIENCE

## ABOUT THE INSTITUTION

The roots for the Institute for Information Systems Science were established in year 1971. Nowadays the Institute is a part of the Department of Management and Entrepreneurship at the University of Turku. The mission of the Institute is to educate professionals who master both general management as well as Information Systems skills. In research, the Institute focuses on supporting companies and public organizations as well as the third sector in their Information Systems management. Issues at individual, industry, national and international level are not neglected. The Institute has been a pioneer in English-speaking education even at the whole university level, running three international master programs.

## RESEARCH TOPICS

Information System Science completes the sphere of Information Sciences at the University of Turku adding to the more technically/natural science-oriented work at the Department of Computing at the Faculty of Technology. Research covers widely the topic spectrum of Information Systems Science, with a gravity point in Governance of ICT, ICT ethics, consumer behavior in ICT, and ICT exploitation in organizational settings.

## CURRENT RESEARCH PROJECTS

The institution runs a rich portfolio of projects in different areas. The AIGA project (2020–2022) explores how to execute responsible artificial intelligence (AI) in prac-



tice. The DigiReactor project (2021–2023) supports the digitalisation of small businesses by developing competences for digital product development together with designing regional operating models. The main sponsor of the project is the European Social Fund.

The following doctoral thesis was published in year 2022:

*Kimmo Syrjänen*

Determining the Cost of Business Continuity Management – A Case Study of IT Service Continuity Management Activity Cost Analysis

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## KEDGE BUSINESS SCHOOL DEPARTMENT OF OPERATIONS MANAGEMENT AND INFORMATION SYSTEMS (MOSI)

### ABOUT THE INSTITUTION

Founded in 1874, KEDGE is a leading French business school with four campuses in France (Paris, Bordeaux, Marseille and Toulon), three abroad (Shanghai, Suzhou and Dakar) and three partner campuses (Avignon, Bastia and Bayonne). The KEDGE community is made up of 15,000 students (including 25% international), 207 professors (43% coming from abroad), 275 international academic partners, 300 company partners and more than 75,000 alumni around the world. KEDGE Business School is AACSB, EQUIS and AMBA-accredited, and is a member of the Conférence des Grandes Ecoles. It is also recognised by the French government, with labelled programmes, and has obtained the EESPIG label. KEDGE's Master in Management was ranked 46<sup>th</sup> worldwide, the Executive MBA 39<sup>th</sup> worldwide and 15<sup>th</sup> in Europe by the Financial Times and. KEDGE Business School is ranked 2<sup>nd</sup> among all business schools in Shanghai ranking.

Kedge Business School offers variety of degree programs (including Undergraduate, Short-Term, Exchange, PhD, and Post-graduate programmes) performed by its core faculty of five departments: Management, Operations management and information system, Marketing, Strategy, and Accounting, Finance, Economics. Kedge also covers areas such as global responsibility, supply chain management, wine and spirits management, arts & culture management and innovation in SME. Its faculty also support students participating in Thesis Lab, Game lab, and Case Lab.

The “Operations Management and Information Systems” (MOSI) department is valued for its competency in the area of Information and Decision Science, Supply Chain Management, Knowledge Management, Serious games, e-business, and Organizational Learning. The main objective of the department of MOSI at Kedge Business School is to develop applied research within the following fields: information systems management, procurement and supply chain management, and quality management.

### RESEARCH TOPICS

Majority of research topics currently conducted by the faculty of MOSI department includes multiple disciplines, given in the following: IS in operations management, purchasing and IS, innovation capacity, e-distribution, e-commerce, e-business, supply chain and operations management, decision-making & decision analysis, digital transformation in supply chain, organizational learning/ knowledge management/ competences – communities of practices; gamification in supply chain, supply chain network design, sustainable supply chain and manufacturing, humanitarian logistics, simulation and optimization in supply chain management, maritime transportation and port management.

Our department has a close collaboration with the four Centres of Excellence of Kedge Business School: Excellence in Supply Chain, Excellence for Sustainability, Marketing and New consumption, Food, Wine and Hospitality Management as well

as with the three Centres of Expertise on Innovation & Health Management, on Finance Reconsidered, and Creative Industries & Culture expertise.

### CURRENT RESEARCH PROJECTS

#### 1) Establishing a trustworthy AI

With the university of Bordeaux, Kedge Business School participate to the creation of a chair entitled “Trustworthy AI”. This chair brings together researchers from computer science and mathematics, researchers from social sciences to reflect on the concept of trust associated with artificial intelligence and several companies developing projects in artificial intelligence. Trust is a versatile word and can be understood as something “objective” that can be established via mathematical proofs (*we can prove that the algorithm does what it says and says what it does*). It can also be understood as something “subjective” arising from the multiple interactions between humans and between humans and machines. In that case, the nature of interactions and the exchange of signals would be critical to the establishment of trust. The chair is now live and about to launch its first research projects.

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#### 2) Reconfigurable – design and management of sustainable and reconfigurable production systems

Funded by the French National Research Agency (ANR) in 2022 this research project aims on the design of sustainable reconfigurable manufacturing systems. The goal of this project is to develop efficient tools for decision-making support for the design,



reconfiguration and real-time control while considering uncertainties. The techniques used will be based on multi-scale modeling, process modeling, combinatorial optimization and robust optimization as well as on stability analysis of the obtained solutions, discrete events simulation, and machine learning techniques.

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#### 3) SMART CITY LOGISTICS – In partnership with group LA POSTE – Tomorrow's urban logistics

Conception of new logistics decision-making models, inspired by Hyperconnected scenarios, allows to achieve ecological and operational efficiency in line with the service level expected in the future. This project is three-folded and studies:

- Hyperconnected city delivery (*inspired by the Physical Internet representing the combination of digital transportation networks that are deploying to replace actual road networks*) to assess and evaluate the impact of recent technological innovations, new logistic solutions for city networks
- Collaborative and shared organization of logistics with an objective to assess and evaluate the impact and the benefits of this new complex logistics systems in a city
- Sustainable supply chain and green logistic flow with an objective to assess the environmental impact of a parcel from a drop to final delivery

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#### 4) Innovation oriented clusters in knowledge intense industries: an example from wine region.

We explore how hub-firms in a regional industrial cluster orchestrate resources to enhance the innovation capabilities of member firms. The clusters can drive the collaboration process, support the development of member capabilities and achieve desired outcomes. We use exploratory case studies within an innovation cluster, where a hub-firm brings together different players for specific innovation

projects and analyse several project cases to reveal the shifting roles and activities related to structuring, bundling and leveraging different resources for innovation capabilities particularly associated with improved quality and reputation for the firms and region.

We focus on a wine industry though there are implications for the success orchestration of other regional industrial clusters. Also, the lack of hub-firm interaction during the project process provides an opportunity to consider mechanisms for better guidance of the project team. Policymakers can benefit from this research as the required practices for stimulating innovation capabilities and economic development are discussed.

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### PUBLICATIONS

VALAEI, N., S. REZAEI, G. BRESSOLLES, M. M. DENT, “Indispensable components of creativity, innovation, and FMCG companies’ competitive performance: a resource-based view (RBV) of the firm”, *Asia-Pacific Journal of Business Administration*, 2022, vol. 14, no. 1, pp. 1–26

KUMAR, M., M. PULLMAN, T. BOUZDINE-CHAMEEVA, V. SANCHEZ RODRIGUES, “The Role of the Hub-firm in Developing Innovation Capabilities: Considering the French Wine Industry Cluster from a Resource Orchestration Lens”, *International Journal of Operations and Production Management*, 2022, vol. 42, no. 4, pp. 526–551

MOHRI, S. S., M. NASROLLAHI, A. PIRAYESH, M. MOHAMMADI, “An Integrated Global Airline Hub Network Design with Fleet Planning”, *Computers & Industrial Engineering*, 2022, vol. 164, pp. 107883

KANDIL, N., R. HAMMAMI, O. BATAIA, “Insourcing versus outsourcing decision under environmental considerations and different contract arrangements”, *International Journal of Production Economics*, 2022, vol. 253, pp. 108589

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## UNIVERSITY OF TUSCIA DEPARTMENT OF ECONOMICS ENGINEERING SOCIETY AND BUSINESS ORGANISATIONS (DEIM)

### ABOUT THE INSTITUTION

Located in the northern part of the Lazio Region (*centre of Italy*), the University of Tuscia is a medium-sized public university that currently enrolls about 8,000 students. The University offers 22 bachelor's degrees, 24 master's degrees, and 8 PhD courses. The University of Tuscia comprises six departments spanning the disciplinary areas of economics, finance, management, statistics and mathematics, engineering, physics, forestry, natural resources, agricultural economy, biology, chemistry, cultural heritage, political sciences, arts and humanities, and law. The University has a long-standing tradition of applied interdisciplinary research.

The Department of Economics Engineering Society and Business Organisations (DEIm) concentrates most teaching and research competencies on digital transformation. Amongst the others, the department offers one PhD course in Economics Management and Quantitative Methods with a curriculum on Digital Transformation of SMEs (*international*), a II level master in Artificial Intelligence for Business and Security (*international*), a master's degree in Amministrazione Finanza e Controllo with a curriculum in data analytics, and a master's degree in Marketing e Qualità with a curriculum in digital transformation and data mining.

Teaching and research on digital transformation engage an interdisciplinary group of professors and researchers covering computer science and management disciplines. Prof. Dr Alessio Maria Braccini coordinates the group. It comprises one full professor, three assistant professors, and three PhD students.



### RESEARCH TOPICS

In the DEIm department, the group does research on the following topics:

- **The role of social media in communication, coordination, and decision-making processes in collective action**
- **The exploration of the impact of Industry 4.0 technologies on manufacturing organisations**
- **The exploration of the impact of 4.0 technologies in smart agriculture**
- **The investigation of citizen science applications in the domain of hydrology**
- **The study of cybersecurity aspects of artificial intelligence-based systems**

### CURRENT RESEARCH PROJECTS

Among the many research projects run by the department, the following ones primarily focus on digital technologies and digital transformation.

- **BePrepared:** “SMEs: Be Prepared for supply chain risks!” (*funding agency: Erasmus+*). The project is coordinated by the Tallinn University of Technology (TalTech, Estonia) and partnered by the University of Graz (Austria), Rhein-Main University of Applied Sciences (Germany), University of Minho (Portugal), Institute of Entrepreneurship Development (Greece), COTEC (*Portugal*), and University of Tuscia (*Italy*). The project's main objective is to develop a VET measure to prepare SMEs for identifying and handling supply chain risks.
- **Giustizia Agile** (*funding agency: Italian Ministry of Justice*). The project is coordinated by the University of Tuscia and partnered by the University of Firenze, University of Perugia, University of Rome La Sapienza, University of Rome Tor Vergata, University of Cassino, University of Roma Tre, University of Siena, University of Pisa, Scuola Superiore Sant'Anna di Pisa, and Scuola IMT Alti Studi di Lucca. The project's main objective is to develop organisational capacity in tribunals by implementing new organisational models and digital technologies.



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- **CybersecH:** Cybersecurity hardening for AI solutions (*funding agency: National Competence Center Cyber 4.0*). The project is coordinated by a private company named 3rdPlace, Datrix |AI solutions Group with one research unit of the University of Tuscia. The project's main aim is to design, develop, and validate a software solution to contrast Artificial Intelligence Attacks to automate the hardening of AI-based systems.

Norway), and Polyxeni Vassilakopoulou (*University of Agder, Norway*), and Robert Winter (*University of Sankt Gallen*).

### PUBLICATIONS

Solari, L., Martinez, M., Braccini, A.M., Lazzarara, A. eds: Do Machines Dream of Electric Workers? Springer International Publishing, Cham (2022).

Braccini, A.M.: When Weber goes Digital During a Pandemic. Reflections on the Digitalisation of Bureaucratic Public Sector Organisations. In: Bednar, P., Isind, A.S., Hult, H.V., Nolte, A., Rajanen, M., Zaghoul, F., Ravarini, A., and Braccini, A.M. (eds.) Socio-Technical Perspectives on Information Systems. pp. 135–146. CEUR Workshop Proceedings, Reykjavik (2022).

Spasiano, A., Nardi, F., Grimaldi, S., Braccini, A.M.: Engagement of online communities within a citizen science framework for improving innovative participation models: insights from hydrology and environmental monitoring. In: Exploring digital resilience. Challenges for people and organisations. Lecture Notes in Information Systems and Organisation. Spring (2022).

I. Benedetti, M. Barone, V. Panetti, J. Taborri, T. Urbani, A. Zingoni, G. Calabrò, Clustering analysis of factors affecting academic career of university students with dyslexia in Italy. *Sci Rep* 12, 9010 (2022). <https://doi.org/10.1038/s41598-022-12985-w>

- **Cyber 4.0:** National Competence Center Cyber 4.0 (*funding agency: Italian Ministry of Economic Development*). The competence centre is a non-profit organisation partnered by 43 entities, including eight universities (*among which the University of Tuscia and the LUISS Guido Carli University*) and several SMEs. The competence centre delivers capacity building, research, and innovation actions in cybersecurity in aerospace, automotive and e-health.

### EVENTS

The 2022 edition of the annual chapter of AIS (*ItAIS*) took place in Catanzaro on October 14 – 15, hosted by the University of Magna Grecia. This edition was co-located with the Mediterranean Conference on Information Systems (*MCIS*) and preceded by a junior faculty doctoral consortium. Several ERCIS members participated in the edition of the conference and specifically: Álvaro Arenas (*IE Business School, Spain*), Øystein Sæbø (*University of Agder, Norway*), Ilias Pappas (*University of Agder,*

Salvi, A., Spagnoletti, P., & Noori, N. S. (2022). Cyber-resilience of Critical Cyber Infrastructures: integrating digital twins in the electric power ecosystem. *Computers & Security*, 102507.

Satwekar, A., Volpentesta, T., Spagnoletti, P., & Rossi, M. (2022). An Orchestration Framework for Digital Innovation: Lessons from the Healthcare Industry. *IEEE Transactions on Engineering Management*.

D. Melloni, A. Zingoni, A. Morachioli, G. Calabrò, Recognition of Recurrent Movement Patterns of Football Players via Machine Learning, *Proceedings of IEEE MetroXRaine 2022*, Rome, Oct. 2022.





## UNIVERSITY OF LIECHTENSTEIN INSTITUTE OF INFORMATION SYSTEMS – HILTI CHAIR OF BUSINESS PROCESS MANAGEMENT

### ABOUT THE INSTITUTION

The Institute of Information Systems at the University of Liechtenstein was founded in the early 1990s and has grown continuously ever since. It is represented by the Hilti Chair of Business Process Management, held by Prof. Dr. Jan vom Brocke. The institute hosts two further chairs, the Hilti Chair for Data and Application Security, held by Prof. Dr. Pavel Laskov as well as the Chair for Technology and Innovation, held by Prof. Dr. Stefan Seidel.

Members of the institute have published in leading information systems journals, including MISQ, ISR, JAIS, JMIS, JIT, EJIS, ISJ, JSIS, Communications of the ACM, MIT Sloan Management Review, and Management Science. The institute offers a master's degree in Information Systems with three subject areas (*Business Process Management, Data Science, and Data and Application Security*), a Ph.D. program in Information and Process Management, and a bachelor's degree in Business Administration majoring in Information Management & Information Technology. The current three years (2019–2021) AIS Research Performance Ranking lists the institute #8 in the DACH region (*Germany, Austria, Switzerland*), #26 in Europe, and #128 worldwide.

The institute is also a co-founder of the Hilti Fellowship Program, which provides ER-CIS students with the opportunity to combine an internship at the Hilti Corporation with a semester abroad at the University of Liechtenstein. The institute represents the

Association for Information Systems (AIS) in Liechtenstein through the Liechtenstein Chapter of the AIS (LCAIS), which was recognized as Outstanding Chapter of the AIS for the eight consecutive year in 2021.

### RESEARCH TOPICS

Our research addresses information systems from four complementary perspectives (*in alphabetical order*):

- **Data** – Data science focuses on capabilities to harvest and analyze data as a key enabler for improving and innovating processes as well as services, products, and business models.
- **Innovation** – Digital innovation focuses on the transformative power of digital technologies to create new IT-enabled products, processes, and business models.
- **Processes** – Business process management takes an innovation-driven and value-oriented perspective on business processes to identify and evaluate the business potential of information and communication technologies in contemporary organizations. In 2021, the cluster Process Science, ie. the interdisciplinary study of processes, has been initiated together with many ERCIS partners.
- **Security** – Data and application security focuses on the development of reactive and proactive security mechanisms.

### CURRENT RESEARCH PROJECTS

**Erasmus+ Project:**

**Developing Process Mining Capabilities at the Enterprise Level**

Together with the University of Bayreuth, and the Vienna University of Economics

and Business, the University of Liechtenstein is working together on the Erasmus+ funded project on process mining. The outcomes of this project intend to support practitioners, and future students, in understanding, estimating, and managing the implications of process mining.

**Erasmus+ Project:**

**Broadening the Recognition Ecosystem in VET with Micro-Credentials**

Together with the Ministère de l'Éducation nationale, de l'Enfance et de la Jeunesse, Reconnaître – Open Recognition Alliance, Medienstimmreich GmbH, and Web2Learn, the University of Liechtenstein has initiated a project dealing with skills recognition. This project aims to facilitate the use of the three recent EU developments in the skills recognition and accreditation systems, namely: I) micro-credentials (*and specifically open accreditation systems like badges*), II) the multilingual classification of European Skills, Competences, Qualifications and Occupations (ESCO) and III) Europass, the European CV infrastructure.

**Liechtenstein Research Fund:**

**Towards Trustworthy AI: Validating & Explaining AI Models and Decisions**

Digitalization and innovation promise to make our daily lives easier. Both trends are significantly driven by technologies, models and algorithms from the field of artificial intelligence (AI). Despite the success of AI, it still suffers from serious shortcomings, among them its “black box” as well as its statistical nature. This project aims to contribute to the field explainable AI



(XAI) by investigating three specific problems, two of which are closely related to existing projects with regional companies.

**Erasmus+ Project:**

**AI-bility: Cultivating AI Awareness in Schoolchildren**

Together with partners from the University of Münster and Grenoble Ecole de Management, the University of Liechtenstein conducts a project dealing with schoolchildren's perception and use of AI. The project pursues two main objectives: 1. To explore and understand how schoolchildren interact with different types of AI-based conversational agents and how they perceive these conversational agents compared to their existing social others (such as family, friends, and teachers). 2. To equip schoolchildren as digital natives and their caregivers with hands-on knowledge in dealing with the rapid advancement of smart technologies.

**AWARDS**

**AIS Outstanding Chapter Award 2021**

In 2022, the Liechtenstein Chapter of the AIS (LCAIS), received the AIS Outstanding Chapter Award 2021 for achievements in research, teaching, and knowledge transfer. The LCAIS is among the 36 AIS Communities to earn the designation of Outstanding SIG, College or Chapter for 2021.

**Schöller Senior Fellowship 2022**

Prof. Dr. Jan vom Brocke was named Schöller Senior Fellow by the Dr Theo and Friedl Schöller Research Center for Business and Society at the Friedrich-Alexander-Universität Erlangen-Nürnberg in February 2022. The fellowship is associated with a research grant to further establishing process science as a new field of science to study continuous change.

**Liechtenstein-Prize for early career researchers**

Dr. Janine Hacker and Dr. Joshua Handali were awarded the Liechtenstein-Prize for early career researchers of the University of Liechtenstein for the publication „Virtually in this together-how web-conferencing sys-

tems enabled a new virtual togetherness during the COVID-19 crisis” (*co-authored with Jan vom Brocke, Johannes Schneider, and Markus Otto*).

### PUBLICATIONS

- *Miranda, S., Berente, N., Seidel, S., Safadi, H., & Burton-Jones, A. (2022)*. Editor's Comments: Computationally Intensive Theory Construction: A Primer for Authors and Reviewers. *MIS Quarterly*, 46(2), III–XVIII.
- *Grisold, T., Kremser, W., Mendling, J., Recker, J., Brocke, J. vom, & Wurm, B. (2022)*. Keeping pace with the digital age: Envisioning information systems research as a platform. *Journal of Information Technology*.
- *Chandra Kruse, L., & Drechsler, K. (2022)*. Digitalization of Multisensory Collective Activity: The Case of Virtual Wine Tasting. *Journal of Information Technology*.
- *Grisold, T., Wurm, B., vom Brocke, J., Kremser, W., Mendling, J., & Recker, J. (2022)*. Managing Process Dynamics in a Digital World: Integrating Business Process Management and Routine Dynamics in IS Curricula. *Communications of the Association for Information Systems*. 51.
- *Chandra Kruse, L., Pura, S., & Seidel, S. (2022)*. How Designers Use Design Principles: Design Behaviors and Application Modes. *Journal of the Association for Information Systems*, 23(5), 1235–1270.
- *Grisold, T., Groß, S., Stelzl, K., vom Brocke, J., Mendling, J., Röglinger, Maximilian, & Rosemann, M. (2022)*. The Five Diamond Method for Explorative Business Process Management. *Business & Information Systems Engineering*, 64, 149–166.
- *Zampou, E., Mourtos, I., Pramataris, K., & Seidel, S. (2022)*. A Design Theory for Energy and Carbon Management Systems in the Supply Chain. *Journal of the Association for Information Systems*, 23(1), 329–371.
- *Weinmann, M., Mishra, A., Kaiser, L., & vom Brocke, J. (2022)*. Attraction Effect in Crowd-funding: Evidence from Eight Studies. *Information Systems Research*.
- *Watson, R., Ketter, W., Recker, J., & Seidel, S. (2022)*. Sustainable Energy Transition: Intermittency Policy Based on Digital Mirror Actions. *Journal of the Association for Information Systems*, 23(3).



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### DISSERTATIONS

*Christoph J. Frick*: “The Role of the State in Digital Transformation: Value Creation with Emergent Technology. Liechtenstein's Token Economy Case” (*Supervisor: Jan vom Brocke, Axel Winkelmann, Julius Maximilian University of Würzburg*)

*Joshua Peter Handali*: “Human and Artificial Intelligence Systems. Transfer of Knowledge” (*Supervisor: Jan vom Brocke, Michalis Vlachos, HEC Lausanne*)

*Rene Abraham*: “Conceptualization and Application of a Framework for Data Governance” (*Supervisor: Jan vom Brocke, Axel Winkelmann, Julius Maximilian University of Würzburg*)

*Valentin Holzwarth*: “Extended Reality in Industrial Processes” (*Supervisor: Jan vom Brocke, Andreas Kunze, ETH Zürich*)

# KAUNAS UNIVERSITY OF TECHNOLOGY DEPARTMENT OF INFORMATION SYSTEMS/ CENTRE OF INFORMATION SYSTEMS DESIGN TECHNOLOGIES

## ABOUT THE INSTITUTION

The Department of Information Systems at the Kaunas University of Technology (KTU) was founded in 1993 as a result of more than 20 years of research in the field of information systems (IS). Since then, we have grown to become one of the leading departments in the KTU Faculty of Informatics. In 2012, the Department's Laboratory of Information Systems and Databases Design was restructured into the Centre of Information Systems Design Technologies (headed since by prof. R. Butleris). In 2014, the Center has been expanded as part of the move to the newly established Integrated Science, Studies and Business Valley "Santaka". As of autumn 2022, the Department and Centre combined employed over 30 researchers and teachers. Over the years, we established good relationships with the local IT companies and accumulated valuable research experience with Lithuanian and international partners.

Our academic work is about providing quality education on fundamental and advanced subjects in the field of information systems. It is worth noting that in 2022, the second cycle study programme we are curating was renewed renaming it to "Digital Transformation and System Architectures". For the 2022–2023 study year, 29 new students were admitted to the

Bachelor study programme "Information Systems", and 13 – to the aforementioned Master's. There were also 8 PhD students in the Department.



## RESEARCH TOPICS

The KTU Department of Information Systems/Centre of IS Design Technologies specialize in areas related to Information Systems and Software Engineering, namely:

- Model driven development, model-to-model transformations
- Computer aided software engineering (CASE) technologies
- Conceptual modeling and databases
- Modeling of business processes, business vocabularies, and business rules
- User needs analysis and requirements modeling
- Ontologies and solutions for the Semantic Web
- Big data and business intelligence

- Knowledge based systems
- Model-driven testing of information systems
- Project management
- Information systems user interface and usability
- Machine learning
- Blockchain technologies

## SELECTED RESEARCH AND DEVELOPMENT PROJECTS

- Modernization and Development of the Lithuanian State Forest Inventory Information System (2021–2022). Funded by the Lithuanian State Forest Survey Service.
- The Model for Estimation of Feasibility of Resource Recovery from Landfills and its Evaluation in Lithuanian Conditions (2021–2022). Commissioned by the Kaunas Region Waste Management Center.
- Enterprise Financial Performance Data Analysis Tools Platform (AIFA) (2020–2022). Funded by the EU Structural Funds, Investment Action Programme measure "Smart FDI", project coordinator – JSC "Intellerts".
- Development of Measures to Increase Efficiency of the Public Sector Buildings Life-Cycle by Applying Building Information Modeling – BIM-LT (2019–2023). Funded by EU structural funds. The project is carried out in cooperation with the Vilnius



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Gediminas Technical University as well as several Lithuanian public institutions and coordinated by the Ministry of Environment of Lithuania.

- Smart homes and intelligent agents for improved physical and mental well-being (SOAR) (2020–2022). Funded by the European Regional Development Fund. Coordinated by the Chalmers University of Technology and carried out in partnership with Halmstad University and University of Oslo.

- National Information Impact Identification and Analysis Ecosystem (NAAS) (2020–2022). Funded by the European Union Funds Investment Operational Program and coordinated by the National Agency for Science, Innovation and Technology (MITA).

- Modeling of the System for Financial Data Analytics, Business Rules, and Decision Management in Enterprises (2020–2022). Commissioned by JSC "Kvantas".

## EVENTS

The 28<sup>th</sup> International Conference on Information and Software Technologies took place on October 13–15, 2022, in Kaunas, Lithuania. ICIST is organized annually by the Faculty of Informatics of Kaunas University of Technology and is chaired by professor Audrius Lopata of the Department of Information Systems.

## PUBLICATIONS

*Germanaitė, I., Zaleckis, K., Butleris, R. (2022). SPDIAM: methodology for describing and solving spatial problems in territorial planning. Sustainability, Basel : MDPI, vol. 14, iss. 17, p. 1–23.*

*Jurgelaitis, M., Čeponienė, L., Butkienė, R. (2022). Solidity code generation from UML state machines in model-driven smart contract development. IEEE Access, Piscataway, NJ : IEEE, vol. 10, p. 33465–33481.*

*Magylaitė, K., Kapočius, K., Butleris, R., Čeponienė, L. (2022). Towards high usability in gamified systems: a systematic review of key concepts and approaches. Applied sciences, Basel : MDPI, vol. 12, iss. 16, 1–18.*

*Rudžionis, V., Lopata, A., Gudas, S., Butleris, R., Veitaitė, I., Dilijonas, D., Grišius, E., Zwitterloot, M., Rudžionienė, K. (2022). Identifying irregular financial operations using accountant comments and natural language processing techniques. Applied sciences, Basel : MDPI, vol. 12, iss. 17, art. no. 8558, p. 1–15.*

*Vaičiukynas, E., Andrijauskienė, M., Danėnas, P., Benetytė, R. (2022). Socio-eco-efficiency of high-tech companies: a cross-sector and cross-regional study. Environment, development and sustainability, Dordrecht : Springer, Early access, p. 1–30.*



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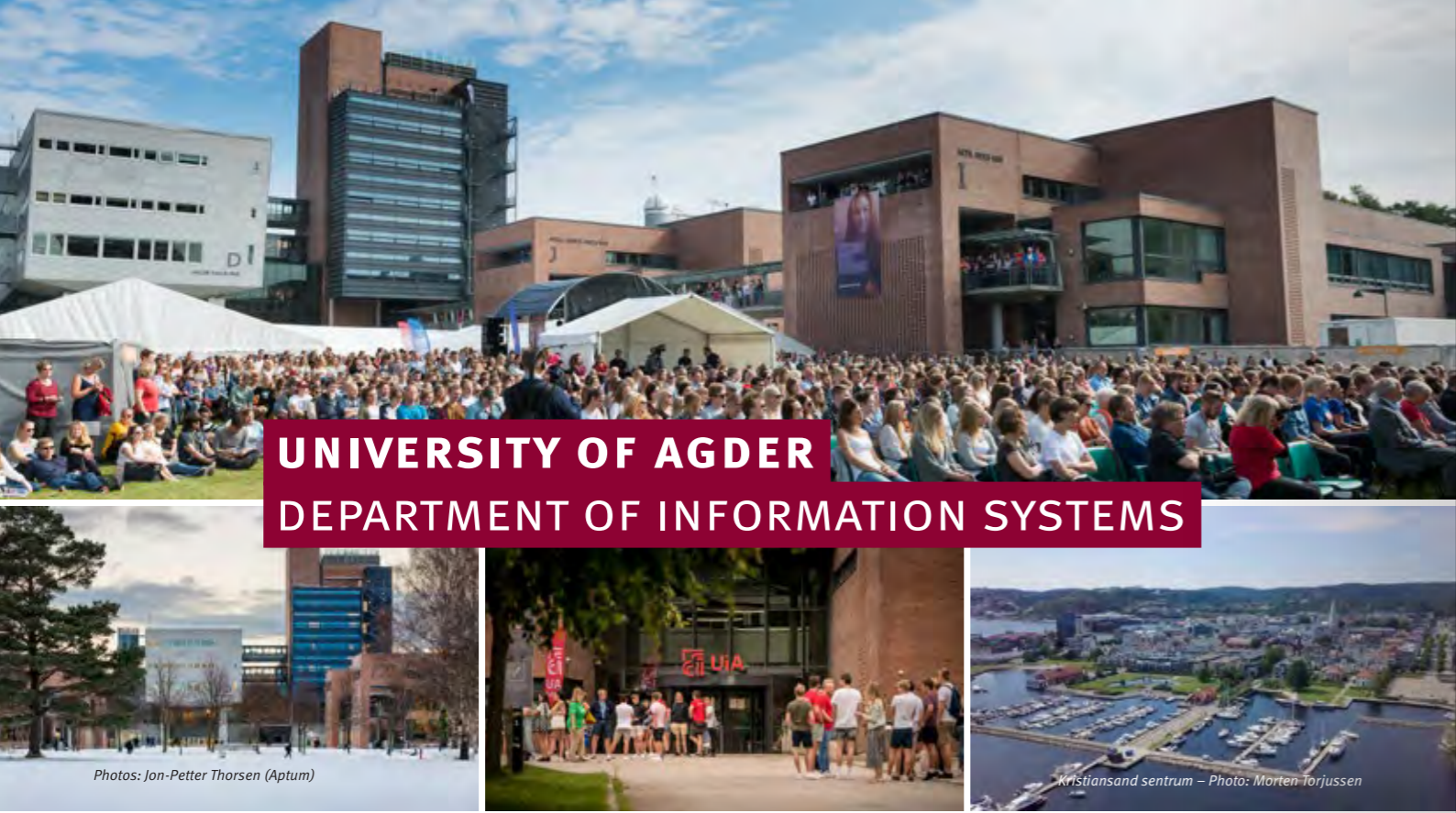
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*Skersys, T., Danėnas, P., Mickevičiūtė, E., Butleris, R. (2022). Transforming BPMN processes to SBVR process rules with deontic modalities. Applied sciences, Basel : MDPI, vol. 12, iss. 18, p. 1–27.*

## DISSERTATIONS

*Indraja Elžbieta Germanaitė (2022): Research of spatial patterns description, identification and application solving spatial analysis tasks.*



## UNIVERSITY OF AGDER DEPARTMENT OF INFORMATION SYSTEMS

Photos: Jon-Petter Thorsen (Aptum)

Kristiansand sentrum – Photo: Morten Torjussen

### ABOUT THE INSTITUTION

The Department of Information Systems (IS) is one of four departments within the Faculty of Social Sciences at the University of Agder (UiA). With an academic staff of 25 permanent positions, six adjunct professors, and two adjunct associate professors, this is one of the largest IS departments in Norway.

The department offers a three-year bachelor programme in IT and Information Systems, a one-year undergraduate study in IT and Information Systems, and a two-year master's programme in Information Systems, which started in 1999 as the first IS master programme in Norway. In addition, a two-year joint master's programme in Cybersecurity was established in 2019. The department does also offer a three-year PhD programme in Information Systems, which currently has 14 research fellows enrolled.

The Department of Information Systems contributes actively to the IS community by publishing in leading IS journals, and hosting and participating in international conferences.

### RESEARCH TOPICS

The research in the Department of IS is mainly organized in three interdisciplinary centres:

- **Centre for Digital Transformation (CeDiT)** conducts advanced social science research on the relationships between digital technologies and societies, organizations, and individuals. CeDiT applies disciplinary, multidisciplinary, and interdisciplinary approaches and draws on a wide range of theories from social science.
- **Centre for eHealth** focuses on digital solutions that contribute to prevention, health promotion and coping in relation to health issues. The centre conducts interdisciplinary, user-oriented, and practical research and development studies. New digital solutions are developed through collaboration between users, the health service, business partners and academia.
- **Centre for Integrated Emergency Management (CIEM)** focuses on technology-based innovation for societal resilience. CIEM conducts research in collaboration with emergency responders, in the areas of community resilience and crisis communication, information sharing for situational awareness, technological advancements



to support humanitarian aid, cybersecurity, and new technologies for emergency management operations (e.g., *drones, robotics and augmented reality*).

### CURRENT RESEARCH PROJECTS

The Department of IS at UiA is involved in several research projects. The following describes a few examples of current projects led by researchers at the department.

- **Digitalizing public welfare services in Scandinavia (2021–2025)** is a project funded by the Research Council of Norway. The project focuses on what public services are suitable for digital communication channels.
- **Al4Users (2020–2024)** is a project funded by the Research Council of Norway addressing the “black box” problem contributing to responsible use of AI when digitalizing public services.
- **Sharing incident and threat information for common situational understanding (INSITU) (2019–2022)** is a project funded

by the Research Council of Norway. INSITU develops knowledge and solutions for effective information sharing among emergency responders.

- **Systemic pandemic risk management (SPRM) (2020–2023)** is a project funded by the Research Council of Norway. The project develops methods for systemic analysis and management of interdependent risks, using the COVID-19 pandemic as a case.
- **From isolation to inclusion (I2I) (2020–2023)** is a health project funded by the Interreg North Sea Region (NSR). The aim is to facilitate innovation in public service delivery by developing digital solutions to avoid social isolation and/or loneliness.

### EVENTS

- The 7<sup>th</sup> IFIP WG5.15 2022 Conference on Information Technology in Disaster Risk Reduction (ITDRR-2022) was hosted by CIEM, UiA in October 2022. The conference is especially focused on the various IT aspects and challenges of coping with disaster risk reduction.
- **Nokobit 2022** is a national conference in information science and information systems in Norway and was hosted by UiA in November 2022. It focuses on topics related to development, implementation, and use of ICT in organizations, including sustainability and societal issues.

### PUBLICATIONS

- Andreasen, J. K., Tømte, C. E., Bergan, I., & Kovac, V. B. (2022).* Professional Digital Competence in Initial Teacher Education: An Examination of Differences in Two Cohorts of Pre-Service Teachers. *Nordic Journal of Digital Literacy*, (1), 61–74.
- Danielsen, F., Flak, L. S., & Sæbø, Ø. (2022).* Understanding Digital Transformation in Government. In *Scientific Foundations of Digital Governance and Transformation (pp. 151–187)*. Springer, Cham.

*Danilova, K. B., Ulfsten, A., Eikebrokk, T. R., Iden, J., Johannessen, T. V., & Johanson, D. (2022).* Explaining Individual Job Performance in Work from Home (WFH) Arrangements. *Information Technology & People, (ahead-of-print)*.

*Dennehy, D., Griva, A., Pouloudi, N., Mäntymäki, M., & Pappas, I. (2022).* Artificial Intelligence for Decision-Making and the Future of Work. *International Journal of Information Management*, 102574.

*Herrera, L. C., & Gjørseter, T.* Community Segmentation and Inclusive Social Media Listening. *Proceedings of the 19<sup>th</sup> ISCRAM Conference – Tarbes, France May 2022.*

*Järveläinen, J., Niemimaa, M., & Zimmer, M. P. (2022)* Designing a Thrifty Approach for SME Business Continuity: Practices for Transparency of the Design Process. *Journal of the Association for Information Systems (forthcoming)*.

*Magutshwa, S., Aanestad, M., & Hausvik, G. I. (2022).* Beyond Crisis Response: Leveraging Socio-Technical Transformability. *Proceedings of 13<sup>th</sup> Scandinavian Conference on Information Systems (SCIS2022)*, Helsingør, Denmark.

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*Safari, M. C., Wass, S., & Thygesen, E. (2022).* Motivation of People with Intellectual Disabilities in Technology Design Activities: the Role of Autonomy, Competence, and Relatedness. *Behaviour & Information Technology*, 1–19.



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*Salvi, A., Spagnoletti, P., & Noori, N. S. (2022).* Cyber-Resilience of Critical Cyber Infrastructures: Integrating Digital Twins in the Electric Power Ecosystem. *Computers & Security*, 112, 102507.

*Vassilakopoulou, P., Haug, A., Salvesen, L. M., & O. Pappas, I. (2022).* Developing Human/AI Interactions for Chat-Based Customer Services: Lessons Learned from the Norwegian Government. *European Journal of Information Systems*, 1–13.

### DISSERTATIONS

*Steen-Tveit, Kristine (2022).* From Common Operational Picture to Common Situational Understanding: A Framework for Information Sharing in Multi-Organizational Emergency Management.



## UNIVERSITY OF GDANSK DEPARTMENT OF BUSINESS INFORMATICS



### ABOUT THE INSTITUTION

With more than 20 thous. students, 11 faculties and 1,8 thous. academic staff members, the University of Gdansk is the largest institution of a higher education in the Pomeranian, Poland. It offers the opportunity to study in 89 different fields of studies with more than 270 specializations.

The Department of Business Informatics (BI) of the University of Gdansk is involved in research and teaching in the field of Business Informatics on the Bachelor, Master, Post-Diploma and Doctoral levels. For 20 years, the Department of Business Informatics has been running the Pomeranian Regional Academy Cisco, educating hundreds of computer network administrators with professional skills confirmed by international Cisco certificates.

As regard teaching, some of Departments' academic manuals are bestsellers in Poland, like 896 pages book "Business Informatics. Theory and Applications.", PWN, 2019 (*in Polish*). This book was awarded in the Competition of Polish Society for Informatics, for the best informatic book of 2019. The Department is also active internationally, organizing conferences including the 10<sup>th</sup> European Conference on

Information Systems (*ECIS 2002*) entitled "Information Systems and the Future of the Digital Economy", The 7<sup>th</sup> International Conference on Perspectives in Business Informatics Research (BIR 2008), The 8<sup>th</sup> International Conference on European Distance and E-learning Network (*EDEN 2009*) and the series of events rebranded now as EuroSymposium on Digital Transformation. The Department is the associate partner of the European Research Center for Information Systems (*ERCIS*) consortium, from 2004.

In years 2013–2017, Department of Business Informatics of University of Gdansk participated in the World IT Project (*S. Wrycza and D. Gajda*), regarding ITOC – Occupational Culture of IT in various civilization areas, coordinated by University of North Carolina, USA. In 2019 the summarizing publication 552 pages book entitled "The World IT Project. Global Issues in Information Technology", World Scientific-Now Publishers, 2020. In the succeeding chapters, the outcomes of research from 37 countries are presented.

The Department is involved in the following international and research initiatives:



Polish Chapter of Association for Information Systems – PLAIS was awarded five times by AIS as the outstanding chapter – in 2014, 2016, 2017, 2018 and 2019. Polish Chapter of AIS – PLAIS

was established in 2006 as the joint initiative of Prof. Claudia Loebbecke, University of Cologne, Germany, former President of AIS and Prof. Stanisław Wrycza, University of Gdansk, Poland. PLAIS co-organizes international and domestic conferences on Business Informatics and now on Digital Transformation. There is a very dynamic and creative Gdansk AIS Student Chapter at the Department of Business Informatics, one of only few European AIS Student Chapters. Student teams of this branch are awarded annually in the global AIS Competition for students for their projects and works in 2015–2020, successively at: University of Alabama (2015), Indiana University (2016), Birgham Young University (2017), University of Texas in Dallas (2018), Illinois State University (2019 – 1<sup>st</sup> place). Gdansk AIS Student Chapter gained the title of Best New Chapter Award for years 2015–2016 and in 2017 the title of Outstanding Fundraising Award for AIS Student Chapter. Each yearly Student Competition is connected with the advanced Annual AIS Student Chapter Leadership Conference.

**NTiE** (*Naukowe Towarzystwo Informatyki Ekonomicznej*) – Polish Society for Business Informatics Research.

### RESEARCH TOPICS

The areas of research interest at Department of Business Informatics cover the following theme:



### IN MEMORIAM OF PROFESSOR STANISŁAW WRYCZA, LONG-TERM MEMBER OF ERCIS

Professor Stanisław Wrycza passed away at the age of 71 on 13<sup>th</sup> of January 2022. During nearly 50 years of his research career, he was the head of the Department of Business Informatics at University of Gdańsk (*since 1991*). He was the initiator and first president of Polish Society for Information Systems (1995–2000), president of the Polish Chapter of Association for Information Systems (*since 2006*), member of ERCIS (*since 2004*)

- Agility
- Big Data
- Business Informatics
- Business Processes Modeling
- Digital Transformation
- ERP, CRM, SCM, WFM, BI Systems
- Information Systems Development
- ICT Global Development
- IT Acceptance Research
- SCRUM
- Social Media Analytics
- UML and SysML

### CURRENT RESEARCH PROJECTS

Development and launching of Master Studies on Business Informatics (*in English*) at Faculty of Management of University of Gdansk in academic year 2021–2022 in intensive cooperation with SUA – SAP University Alliance including alliances, its rich educational e-learning resources.

### PUBLICATIONS

#### Journal articles

Kowalczyk Michał, Marcinkowski Bartosz, Przybyłek Adam (2022), Scaled agile framework. Dealing with software process-related challenges of a financial group with the action research approach, *Journal of Software-Evolution and Process*, 2022, vol.

and many others. He was recognized as AIS Distinguished Member for demonstrated commitment to the Association for Information Systems (2021).

He was author and co-author of over 200 scientific publications, including over 40 books. Member of over 100 program committees of international conferences in the field of computer science. He was supervisor of over 20 doctoral dissertations and about a thousand master's and bachelor's theses. He organized many conferences, including ECIS 2002, BIR 2008 and EuroSymposium series.

34, no. 6, pp.1–21, Article number:e2455. DOI:10.1002/smr.2455

#### Conference materials

*Krauze-Maślankowska P. (2022)*, Smart government and smart citizens as a smart cities building blocks. A survey, In: Information systems: 18<sup>th</sup> European, Mediterranean, and Middle Eastern Conference, EMCIS 2021, virtual event, December 8–9, 2021: proceedings / Themistocleous Marinou, Papadaki Maria (eds.), Lecture Notes in Business Information Processing, 2022, no. 437, Cham, Springer, pp.617–625, ISBN 978-3-030-95946-3. DOI:10.1007/978-3-030-95947-0\_43

*Marcinkowski Bartosz, Soja Piotr, Rupino da Cunha Paulo [et al.] (2022)*, Is blockchain actually any... good? In: AMCIS 2022 Proceedings, 2022, Association for Information Systems, pp.1–5, Article number:1671, ISBN 978-1-958200-00-1

*Maślankowski J., Brzezicki L. (2022)*, Evaluation of machine learning methods for the experimental classification and clustering of higher education institutions In: Information systems: 18<sup>th</sup> European, Mediterranean, and Middle Eastern Conference,



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EMCIS 2021, virtual event, December 8–9, 2021: proceedings / Themistocleous Marinou, Papadaki Maria (eds.), Lecture Notes in Business Information Processing, 2022, no. 437, Cham, Springer, pp.31–45, ISBN 978-3-030-95946-3. DOI:10.1007/978-3-030-95947-0\_3

*Maślankowski J., Majewicz D. (2022)*, Multi-language sentiment analysis – lesson learnt from NLP case study, In: Information systems: 18<sup>th</sup> European, Mediterranean, and Middle Eastern Conference, EMCIS 2021, virtual event, December 8–9, 2021: proceedings / Themistocleous Marinou, Papadaki Maria (eds.), Lecture Notes in Business Information Processing, 2022, no. 437, Cham, Springer, pp.46–54, ISBN 978-3-030-95946-3. DOI:10.1007/978-3-030-95947-0\_4



# WROCLAW UNIVERSITY OF SCIENCE AND TECHNOLOGY DEPARTMENT OF APPLIED INFORMATICS

## ABOUT THE INSTITUTION

The Department of Applied Informatics (DAI), chaired by Professor Ngoc Thanh Nguyen, is a part of the Faculty of Information and Communication Technology at the Wrocław University of Science and Technology. The Faculty of Information and Communication Technology (FICT), the largest institution of this type in Poland, was officially opened on 15 September 2021 at Wrocław University of Science and Technology. FICT consists of 12 fields of study and as many as nearly 5 thousand students, 8 departments and 500 scientists and academic teachers.

Our department currently consists of 51 computer science scientists and 10 Ph.D. students. We regularly co-organize three international scientific conferences: Asian Conference on Intelligent Information and Database Systems (ACIIDS), International Conference on Computational Collective Intelligence (ICCCI), and International Conference on Multimedia and Network Information Systems (MISSI). We also teach students of the Faculty of Information and Communication Technology at two levels of education: three-and-half-year bachelor's degree and one-and-half-year master's degree



## RESEARCH TOPICS

Our main objective is to carry out basic and applied research in the field of Applied Informatics (AI). Due to ERCIS classification the following clusters have been identified: (1) Data Science and Artificial Intelligence, (2) Process Science, (3) Knowledge and Learning, (4) Supply Chain Management and finally (5) Digital Public Services. The major issues, perspectives and challenges are as follows:

- **Computational Collective Intelligence**, mainly established in cluster (1), understood as an AI sub-field dealing with soft computing methods that enable making group decisions or processing knowledge among autonomous units acting in distributed environments. Web-based systems, social networks and multi-agent systems very often need such tools for working out consistent knowledge states, resolving conflicts and making decisions.
- **Knowledge Management Systems**, referred to any kind of ISs from cluster (3) that store and retrieve knowledge, improve collaboration, locate knowledge sources, mine repositories for hidden knowledge, capture and use ubiquitous knowledge.
- **Agents and Multi-Agent Systems** related to cluster (1) for constructing autonomous, complex and intelligent systems including the specification of agent communication languages and formalization of ontologies. Agent communication languages provide standard declarative mechanisms for agents to communicate knowledge, whereas ontologies are meant for conceptualization of the knowledge domain.

- **Recommendation and Personalization Methods** applied in all ERCIS clusters and several domains, such as net-news filtering, web recommender, personalized newspaper, sharing news, movie recommender, e-commerce, travel recommender, e-mail filtering, music recommender, user interface recommendation, negotiation systems, etc.
- **Ensemble and Hybrid Models** resulted in all ERCIS clusters that combined linear and non-linear features of existing models of Computational Intelligence. To the methods of ensemble learning, we classify bagging, boosting, stacking, subsampling, random subspaces, mixture of experts, and others.
- **Semantic Information Retrieval** ranged from link structure analysis to using social network relationship semantics and come up in cluster (3). We use and research paradigms and technologies like Semantic Web, linked data, Web ontologies, and Web data aggregation.
- **Multimedia Information Processing** covering clusters (1), (3) with the following aspects: audio signal processing, image recognition and video clustering, loss and lossless compression.
- **System Performance Analysis** merges clusters (2), (4), and (5) with content caching techniques, usability testing, content indexing algorithms, and Web-based optimization techniques.
- **E-Learning Methodologies** focused on applications from cluster (3) of online col-



Wrocław University of Science and Technology

Wrocław University of Science and Technology (WUST) – Department of Applied Informatics <https://kis.pwr.edu.pl/en/>

laboration paradigms, like wiki and video conferencing, Learning Management Systems and Learning Content Management Systems, digital documentation techniques.

## CURRENT RESEARCH PROJECTS

The Department of Applied Informatics, as in the previous year, was involved in two international projects.

1) Joint Polish-Vietnamese research agreement led by the Ho Chi Minh City International University and the Department of Applied Informatics at the Wrocław University of Science and Technology. Duration: 2020–2022. Contact: Prof. Ngoc Thanh Nguyen ([Ngoc-Thanh.Nguyen@pwr.edu.pl](mailto:Ngoc-Thanh.Nguyen@pwr.edu.pl))

2) Polish-Norwegian research project on “Highly accurate and autonomous programmable platform for providing data services on air pollution to drivers and public entities” (HAPADS) funded by the National Center for Research and Development. Duration: 2020–2023. Contact: Dr. Krystian Wojtkiewicz ([Krystian.Wojtkiewicz@pwr.edu.pl](mailto:Krystian.Wojtkiewicz@pwr.edu.pl))

## AWARDS

- **Graduate From Our Faculty Becomes World Champion in Public Speaking.** Cyril Junior Dim graduated with a second degree in Applied Computer Science in English from our Department in February 2022, and in August 2022 he won the world championship in public speaking in Nashville, USA.
- **Applied Computer Science** – 15 candidates per place, is the most popular fields of study in the recruitment in 2022 for first-cycle studies at Wrocław University of Science and Technology.
- **Dr. Adrianna Kozierekiewicz was promoted to the position of Professor** of WUST by the Rector of the Wrocław University of Science and Technology.
- **Prof. Dariusz Krol received the Polish Medal of the Commission of National Edu-**

cation for outstanding services to schooling and education.

## PUBLICATIONS

Barbara Kitchenham\*autor spoza PWR, Lech Madeyski, Giuseppe Scanniello\*, Carmine Gravino\* The importance of the correlation in crossover experiments. IEEE Transactions on Software Engineering. 2022, vol. 48, nr 8, s. 2802–2813.

Marcin Maleszka. Divergence of an observed user profile and a simulated real state of user due to social communication. W: Computational Science – ICCS 2022 : 22<sup>nd</sup> International Conference London, UK, June 21–23, 2022 : proceedings. Pt. 2 / eds. Derek Groen [i in.]. Cham : Springer, cop. 2022. s. 624–637.

Maksymilian Piechota, Mikołaj Nowak, Dariusz Król. Development of an event-driven system architecture for smart manufacturing. W: Computational Science – ICCS 2022 : 22<sup>nd</sup> International Conference London, UK, June 21–23, 2022 : proceedings. Pt. 3 / eds. Derek Groen [i in.]. Cham : Springer, cop. 2022. s. 455–468.

Phu Pham, Loan T. T. Nguyen, Ngoc Thanh. Nguyen, Witold Pedrycz, Unil Yun, Bay Vo. ComGCN: community-driven graph convolutional network for link prediction in dynamic networks. IEEE Transactions on Systems, Man and Cybernetics: Systems. 2022, vol. 52, nr 9, s. 5481–5493.

N. T. Tung, Loan T. T. Nguyen, Trinh D. D. Nguyen, Philippe Fournier-Viger, Ngoc Thanh. Nguyen, Bay Vo. Efficient mining of cross-level high-utility itemsets in taxonomy quantitative databases. Information Sciences. 2022, vol. 587, s. 41–62.

## DISSERTATIONS/HABILITATIONS

The Council of Scientific Discipline for Information and Communication Technology positively voted on the application for the award of the habilitation (Doctor of Science) for Dr. Adrianna Kozierekiewicz on February 16, 2022.

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## UNIVERSITY OF MINHO DEPARTMENT OF INFORMATION SYSTEMS

### ABOUT THE INSTITUTION

The Department of Information Systems is located in the Campus de Azurém of University of Minho, in the city of Guimarães, the cradle city of Portugal. The Department was established in the late 1990s, after a graduation program in Information Systems was created. The Department of Information Systems currently offers an integrated master (5 years degree program) in Engineering and Management of Information Systems, a master in Information Systems and a doctoral program on Information Systems and Technologies. All programs involve the collaboration between two schools of the University of Minho: School of Engineering and the School of Economics and Management.

The research done by the Department's researchers (faculty and fellows) is integrated into a R&D unit – ALGORTIMI. ALGORTIMI encompasses research activities in various areas, including information systems, computer science, computer networks and pervasive computing, industrial electronics, industrial engineering, and optimization.

The Department of Information Systems promotes academic work that focuses on themes at the intersection of information technologies, information, and human and social endeavors. Particular importance is given to design activities addressing phenomena that embrace that intersection to solve enterprise problems

or seize opportunities where information technology plays a central role. Research activities combine engineering and technology research methods with those used in organizational studies, management, economics, and social sciences. Therefore, within the departments' research projects, it is possible to find interpretive, positivist and design science perspectives and a wide range of research methods and techniques appropriate to the study of the particular Information Systems phenomena being addressed.



University of Minho  
School of Engineering

### RESEARCH TOPICS

The research performed by the Department's faculty is consolidated in the IST (Information Systems and Technologies) research group of ALGORTIMI. This stream includes three leading research labs:

- **Intelligent Data Systems** that deals with technologies, tools, models and techniques related to Data Mining and Data

Warehousing Systems. The main objective is the research in knowledge areas such as Adaptive Business Intelligence, Intelligent Decision Support Systems, Data Mining, Intelligent Data Analysis, Data Warehouse And OLAP.

- **Information Systems and Technology for the Transformation of Organizations and Society.** The researchers in this lab adopt interdisciplinary approaches and research methods originated in the social sciences and engineering. The main research focus is on understanding the adoption, use and exploration of Information Technology (IT) in organizational/social contexts and on developing grounded design knowledge (e.g., methods, techniques, tools) for the activities of Information Systems and Technologies (IST) professionals (mainly, designers of human activity systems and managers of IT-related resources). The final goal is to ensure that IT resources contribute to the well-being of the embracing human activity systems.

- **Software Engineering and Management group** is devoted to the develop state-of-the-art of software-based information systems. This group focuses on both the engineering and management dimensions of the following research topics: (I) analysis and design of information systems; (II) business and location-enhanced database systems; (III) metadata and ontologies for the semantic Web; and (IV) process and project management life-cycles.

### CURRENT RESEARCH PROJECTS AT UMINHO

In 2022, the IST research was funded by new projects, including:

- **Literacy for the digital transformation of family farming.** Development of a digital literacy plan for family farmers (specific objectives: understand family farmers' digital asymmetries; develop family farmers' digital literacy, especially that of disadvantaged groups; develop a data collection tool using crowdsourcing techniques; promote the use of technological tools to make family farmers' work more efficient). Lead by João Eduardo Quintela Alves Sousa Varajão.

- **Be.Neutral.** The BE. Neutral Agenda aims to accelerate the development and industrialization of a new generation of zero carbon mobility products and services from Portugal [zero carbon buses; BEN4Us light vehicle; 6E Microcar; modular 2-wheeled vehicle], connected with data and connectivity platforms and energy systems. Lead by Ricardo Jorge Silvério Magalhães Machado.

- **Collaborative development of AI capabilities in SMEs (CoDeAI)** – ERASMUS+ KA220-HED – Cooperation partnerships in higher education. The project aims to build upon the VOIL platform, by proposing further development and providing added value to SMEs. The existing VOIL platform will be extended by a training package for AI in SMEs providing the basic knowledge of AI. Based on an AI deployment study in SMEs using recent productivity tools, which are designed to increase human productivity, like AutoML, use cases and success stories will be provided. Based on these use cases and the success stories a benchlearning framework taking the AI capabilities into account will be developed. An innovation environment supporting the collaboration between HEIs, SMEs, and LEs will be established, taking (among the technologies from VOIL) also the specific needs of AI into account. Lead by Isabel Ramos.

- **CRISIS - Competences for Resilient Smart Cities' Staff** – RASMUS+ KA220-HED – Cooperation partnerships in higher education – 2021-1-EL01-KA220-HED-000032257. The project aims to develop a new job profile for Smart City Resilient Officers (SCROs) and deliver a pilot training program to certify the first cohort of SCROs. The project is coordinated by University of Thessaly (Greece) and includes 4 partners from different European countries. Lead by Isabel Ramos.

### PUBLICATIONS

Araújo Machado, I., Costa, C., & Santos, M. Y. (2022). Advancing Data Architectures with Data Mesh Implementations. In International Conference on Advanced Information Systems Engineering (pp. 10–18). Springer, Cham.

Araujo, W. S., Soares, D., & Carvalho, J. (2022). Towards a Method for the Formulation of an EGOV Strategy Considering International Rankings. In International Conference on Electronic Government and the Information Systems Perspective (pp. 49–62). Springer, Cham.

Barros, V. F., & Ramos, I. (2022). Organizational mindfulness to innovation at an organization in the cork sector. Information Technology & People.

Hak, F., Oliveira e Sá, J., & Portela, F. (2022). Thoughts of a Post-Pandemic Higher Education in Information Systems and Technologies. In Third International Computer Programming Education Conference (ICPEC 2022). Schloss Dagstuhl-Leibniz-Zentrum für Informatik.

Pereira, T. C., Soares, F., Costa, E., & Santos, H. (2022). Virtual Lab Virtues in Distance Learning. In Perspectives and Trends in Education and Technology (pp. 935–944). Springer, Singapore.

Varajão, J., Marques, R. P., & Trigo, A. (2022). Project Management Processes–Impact on the Success of Information Systems Projects. Informatica, 33(2), 421–436.



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Ramos, I., Aramburu, N.; Hermann, A., Gräslund, K., Cordes, AK., Barros, V., (Under Review). Digital transformation of SMEs: developing advanced e-competencies for the workplace. Information Systems Journal

Reascos, I., & Carvalho, J. A. (2022). Successful Implantation of Enterprise IT Applications in SMEs: A TOE-Based Framework of Influencing Factors. Digital Technologies and Transformation in Business, Industry and Organizations, 197–219.

### DISSERTATIONS/HABILITATIONS

Fernanda Bigolin (09/06/2022). Doctoral Program in Information Systems and Technology. "Impact of Technology Use on Organizational Mindfulness: Proposal of a Theoretical Model". Supervisor: Isabel Ramos



# UNIVERSITY OF MARIBOR FACULTY OF ORGANIZATIONAL SCIENCES

## ABOUT THE INSTITUTION

The Faculty of Organizational Sciences is a founding member of the University of Maribor and has more than 60 years of tradition in the field of organizational and information systems science. The Faculty provides three main study programs related to the management of information systems, human resources and educational systems, and business and work systems. During this period, the Faculty provided more than 20.000 graduates. The research area of the Faculty covers complex dynamic management systems, covering aspects of human resources, information systems, business processes and general management. Research is organized in several laboratories and the eCenter. All of them are involved in research projects, prototyping, consulting, education and training at national and international levels. Their activities have been organized and are run following the LivingLab approach, with strong involvement of business and government organizations, IT providers and universities. The resulting eLivingLab is the Slovenian founding member of the European Network of Living Labs (EnoLL). The Faculty has a wide range of experiences from many EU, national and industry projects. The Faculty has established connections with numerous institutes, faculties and universities around the world and strives to enhance its internationally renowned reputation.



## Faculty of Organizational Sciences

### RESEARCH TOPICS

The research area of the Faculty of Organizational Sciences is focused on the investigation of complex dynamic organizational systems, covering various aspects from human resources, information systems, business processes and general management. The significant focus is on the digital transformation of organizations and society. In particular, we investigate the implementation of the newest ICT and their impact on the evolution and design of (digital) business models achieving sustainable performance from an economic, social and environmental perspective.

The majority of our research and development activities are carried out within the following research topics:

- Business models and business model innovation
- Digital business and digital transformation
- Data Science
- eHealth
- Social media and social CRM
- Cloud computing and HPC

- Internet of things
- Decision support systems
- Management of information systems
- Business processes management
- Simulation systems and models
- Organizational learning
- Quality and asset management
- Enterprise sustainability and sustainable development

### CURRENT RESEARCH PROJECTS

#### EU projects and Bilateral projects:

- European Universities and SMEs fostering the creation of sustainable business ventures by pairing innovators from academia with industry players (ENVISION-Alliances) (Erasmus +)
- Business Informatics Programme Reengineering (Erasmus +)
- Impact of the COVID-19 pandemic on the digital transformation of SMEs (Bilateral project)
- Development of a cyber-physical system for stress control for individuals and groups at-risk – (Bilateral project)
- Bee with Apex – Better Employability for Everyone with APEX (Erasmus +).
- Building next-generation competencies for logisticians and supply chain managers
- Hospitals and faculties together for pros-

perous and scientific-based healthcare (ProCare), Erasmus +

- Remote working management skills for HR professionals

### National Research programme:

- Decision support systems in digital business, Research programme, P5-0018
- Impact of management, organizational learning and knowledge management in modern organizations, Research programme, P5-0364-0586



### EVENTS

35<sup>th</sup> Bled eConference – Digital Restructuring and Human (Re)action, June 26–29, 2022, Bled, Slovenia and online (hybrid event) <https://bledconference.org>

41<sup>st</sup> International Conference on Organizational Science Development – Society's Challenges for Organizational Opportunities, 23<sup>rd</sup>–25<sup>th</sup> March 2022, Portoroz, Slovenia <https://konferenca.fov.um.si/en/homepage/>

Education in Information Society, October 14, 2022, Institut Jožef Stefan, Ljubljana <http://vivid.fov.uni-mb.si/>

### SELECTED PUBLICATIONS

KLJAJIČ BORŠTNAR, Mirjana, PUCIHAR, Andreja. Multi-attribute assessment of digital maturity of SMEs. Electronics, ISSN 2079-9292, 2021, vol. 10, iss. 8 (885)

FERENCEK, Aljaž, KOJJAČ, Davorin, ŠKRABA, Andrej, SAŠEK, Blaž, KLJAJIČ BORŠTNAR, Mirjana. Deep learning predictive models for terminal call rate prediction during the warranty period. Business systems research, ISSN 1847-9375, 2020, vol. 11, no.2.

TIJAN, Edvard, JOVIČ, Marija, AKSENTIJEVIČ, Saša, PUCIHAR, Andreja. Digital transformation in the maritime transport sector. Technological forecasting and social change, ISSN 1873-5509. [Online ed.], Sep. 2021, vol. 170.

VIDMAR, Doroteja, MAROLT, Marjeta, PUCIHAR, Andreja. Information technology for business sustainability: a literature review with automated content analysis. Sustainability, ISSN 2071-1050, 2021, vol. 13, iss. 3 (1192)

ŽIBERT, Maja, PREVOLŠEK, Boris, PAŽEK, Karmen, ROZMAN, Črtomir, ŠKRABA, Andrej. Developing a diversification strategy of non-agricultural activities on farms using system dynamics modelling : a case study of Slovenia. Kybernetes : the international journal of systems & cybernetics, ISSN 0368-492X, 2021.

KRHAČ ANDRAŠEC, Eva, SENEGAČNIK, Marjan, URH, Benjamin, KERN, Tomaž. Implementation of the digital sales channel in the coatings industry. Processes, ISSN 2227-9717.

MALETIČ, Matjaž, GOMIŠČEK, Boštjan, MALETIČ, Damjan. The missing link : sustainability innovation practices, non-financial performance outcomes and economic performance. Management research review, ISSN 2040-8277, 2021.

LEVSTEK, Aleš, PUCIHAR, Andreja, HOVELJA, Tomaž. Towards an adaptive strategic IT governance model for SMEs. Journal of theoretical and applied electronic commerce research, ISSN 0718-1876, 2022, vol. 17, iss. 1.

### DISSERTATIONS/HABILITATIONS

#### Finished dissertations:

Doroteja Vidmar: Effects of Information Technologies on Sustainability Performance of Organizations

#### Dissertations in progress:

Aleš Levstek: Development of a flexible model for strategic IT management in me-



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dium-sized enterprises

Hrčica Rok: Development of maturity model for evaluation of readiness of public administration for co-creation of public services

Blaž Kavčič: Strategic alignment maturity between information technology and business – modeling with cellular automaton

Aljaž Ferencek: Development of open government data impact areas taxonomy using machine learning method



## POHANG UNIVERSITY OF SCIENCE AND TECHNOLOGY (POSTECH)

### ABOUT THE INSTITUTION

Industrial and Management Engineering is an academic discipline that involves the study of the design, development, and the management of integrated systems of people, material, equipment, and information in a variety of sectors. Therefore, Industrial and Management Engineering provides excellent opportunities to create new values and innovations in today's dynamic global environment.

We are pursuing an understanding of engineering technology and management by combining the contents of business administration with the existing industrial engineering field. While Industrial Engineering deals with the systematic planning, design, and optimization of complex industrial systems, Industrial and Management Engineering extends its coverage to more comprehensive fields, including the service industry, information industry, and management science.

The mission of the Department of Industrial and Management Engineering is to cultivate creative leaders in the era of convergence and innovation based on the core competencies of Pohang University

of Science and Technology (POSTECH). To achieve this mission, we focus on providing specialized education and research programs based on the unique strengths of the Department; conducting research that significantly contributes to the academia and to the industry; and fostering the development of young talents with systems thinking capability, passion, and humanity.

## POSTECH

### RESEARCH TOPICS

There are three research groups and two research centers at the department. **The Business Analytics research group** studies quantitative analysis techniques based on statistical techniques and optimization techniques to support corporate decision making and strategy formulation. BA research group extracts information from data and uses it to derive knowledge and finally wisdom. BA research group's main research topics are (1) data mining and graphical modeling techniques, (2) process mining and social network analysis techniques, and (3) large-scale sustainable system analysis.

**The Smart Service System Research Group** studies technologies that optimize the architecture, processes, and operations of the service system to meet the needs and context of stakeholders. Examples of smart service systems include smart home and smart health care, Smart transportation system, and smart factory. Smart Service System research group's main research topics are (1) Human-centered system UI / UX design, (2) Smart healthcare service system, and (3) Smart transportation / energy / information network system.

**The SRM Research Group** conducts research on systemic risk management that takes into account the interdependencies of risk factors, from a more diverse perspective on risks at the national, social, and enterprise levels that may arise in modern society. SRM Research Group's major research topics include (1) management of future forecast responses and disaster responses to various crisis situations at the national level, (2) enterprise-wide risk management measures, and (3) desirable financial systems for the aging society.

### Future City Open Innovation Center (FOIC) and Open Innovation Big Data Center (OIBC)

FOIC focuses on the development of innovative future and smart city technologies, including retrofitting existing infrastructures with the latest technological advances for the efficient establishment and proliferation of a smart city. OIBC focuses on developing platform technologies from big data gathered from the implementation of FOIC-led initiatives. Both centers are based on a foundation of open cooperation: the Open Innovation Centers aim to create socioeconomic value by attracting companies and startups to foster their growth through collaboration with the University's advanced research infrastructures.

### CURRENT RESEARCH PROJECTS

- Basic Research Lab for Smart Signal System Operation in the Era of Transition to Autonomous Vehicle (*National Research Foundation of Korea, Jun. 2022 – May 2025*)
- Development of AI-based Recommendation System for Curated Retailing Services (*Samsung C&T, Jan. 2022 – Nov. 2022*)
- Clinical Digital Twin Model Mining and Process Redesign Method based on the OMOP Common Data Model (*National Research Foundation of Korea, Mar. 2021 – Feb. 2025*)
- Industrial AI Professional Master and Ph.D Program (*Ministry of Trade, Industry and Energy, Mar. 2019 – Feb. 2024*)
- The revolutionary athlete data integration technology for national football performance innovation (*Korea Football Association, Dec. 2018 – Dec. 2022*)
- Blockchain platform with business models towards cross-domain interoperability (*Ministry of Science and ICT, Jun. 2018 – Dec. 2023*)

### AWARDS

*Dr. Minseok Song* won Mooeunjae Chair Professorship at POSTECH, 2021.

*Mr. Minchul Jung* won SPIK Young Investigator Award at the Science & Football International Conference, 2021.

*Shinyum Park*, won Minister of MTIE (*Ministry of Trade, Industry and Energy*) award (*the 1st prize*) at the First Korea Industrial Research Project Challenge, Dec. 2020.

### SELECTED PUBLICATIONS

*Park, K., Lim, J., Hwang, W., Park, J., Song, M., Kim, B., Park, J., Choi, D.*, "Ridesourcing in manufacturing sites: a framework and case study", *International Journal of Industrial Engineering*, Vol. 29, No. 5, pp. 702–717, 2022.

*Kim, S., Lee, D., and Kim, K.*, "EWMA-PRIM: Process optimization based on time-series process operational data using the Exponentially Weighted Moving Average and Patient Rule Induction Method," *Expert Systems with Applications (ESWA)*, Vol. 195, 116606, 2022.

*D. Kim, H. Cheon, D.G. Choi, S. Im*, "Operations Research Helps the Optimal Bidding of Virtual Power Plants" *INFORMS Journal on Applied Analytics (INTERFACES)*, Vol. 52, No. 4, pp. 344–362, 2022.

*Lim, J., Kim, K., Song, M., Yoo, S., Baek, H., Kim, S., Park, S., Jeong, W.*, "Assessment of the feasibility of developing a clinical pathway using a clinical order log", *Journal of Biomedical Informatics*, Vol. 128, 104038, 2022.

*Moon, K., Lee, K., Chopra, S., Kwon, S.*, "Bi-level integer programming on a Boolean network for discovering critical genetic alterations in cancer development and therapy," *European Journal of Operational Research* Vol.300, No. 2, pp. 743–754, 2022.

*Ko, Y. and Byon, E.*, "Optimal budget allocation for stochastic simulation with importance sampling: exploration vs. replication," *IIE Transactions (on Data Science, Quality and Reliability)*, Vol. 54, No. 9, pp. 881–893, 2022.



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"The hand of coexistence" at Homigot Beach.

### DISSERTATIONS/HABILITATIONS

*Hyunjoon Kim*, The Multi-Profit Orienteering Problem and Its Variants.





## IE BUSINESS SCHOOL INFORMATION SYSTEMS AND TECHNOLOGY DEPARTMENT

### ABOUT THE INSTITUTION

IE Business School is one of Europe's top providers of management education and a laboratory for new entrepreneurial ventures. IE's Information Systems and Technology Department (ISTD) is responsible of all technology-related courses and pursues research on the transformative use and impact of digital technologies in today's world.

Faculty at ISTD teaches courses on Digital Innovation and Technology Management in the MBA and the Tech MBA programs, manages the concentration on Digital Business in the Master in Management, and supervises the major on Information Systems in the PhD in Management and the Doctorate in Business Administration. Members of the Department have published in leading IS journals, including MIS Quarterly, Information Systems Research, European Journal of Information Systems, International Journal of Information Management, and Decision Support Systems, among others.

### RESEARCH TOPICS

Research work within ISTD includes several research lines. One research line focuses on Digital Innovation, studying the interplay between organizational capabilities and digital innovation, value co-creation in digital platforms, and digital competences. A second line of research is Information Security and Privacy, investigating topics such as cybersecurity behaviour of Spanish households, hacker behaviour analysis, computational reputation applied to cybersecurity, and the interplay among trust management, security risks and compliance. Another line of research focuses on Business Intelligence, Analytics and Machine Learning; work in this line have concentrated on applying machine learning in key areas such as sustainability, Green IS, education and e-health. A final research line is Economy of Information Systems, focusing on IT outsourcing and Cloud Computing, organizational networks and the Sharing Economy, and valuation of digital innovations.



### CURRENT RESEARCH PROJECTS

**DIGYMATEx** is an EU-funded project that aims to provide evidence-based tools to assist in understanding and determining children's digital maturity. The project wishes to provide clear evidence on how digital maturity impacts Information and communication technologies (ICT) behaviour of children at the ages of 9–16, by maximising risks (*risk factors*), minimising risks (*resilience factors*), and maximising benefits (*enhancing factors*). The main two outputs of the project are two tools: The Digital Youth Maturity Index (DYMI) and the DIGyou3 program. The DYMI is an innovative tool that will establish and implement a comprehensive understanding and taxonomy of children's digital maturity. The DYMI will precisely measure and predict

harmful and beneficial ICT-related behaviour and consequences for specific user groups. The DIGyou3-program is a technology-related solution and recommendation program, which supports the application of the DYMI on three levels – individual, social and national. The program will help to improve relevant dimensions of children's digital maturity, the development of ICT-related competencies and support the more beneficial influence on components of child development.

For more information, please visit <https://digymatex.eu>

### SELECTED PUBLICATIONS

*Arenas, A.E., & Yazdi, P. (2022).* Towards a Model of Technology Usage and Digital Maturity in Children: A Grounded-Theory Approach. In Proceedings of ECIS 2022, European Conference on Information Systems.

*Benitez, J., Arenas, A.E., Castillo, A., & Esteves, J. (2022).* Impact of digital leadership capability on innovation performance: The role of platform digitization capability. *Information & Management*, 59(2), 103590.

*ElBandary, H., & Arenas, A.E. (2022).* Analyzing Resistance to Technology Use: Insights from the Consumer Goods Industry in the Middle East. In Proceedings of MENACIS 2022, Middle East and North African Conference on Information Systems.

*Illia, L., Colleoni, E., Ranvidran, K., & Ludovico, N. (2022).* Mens rea, wrongdoing and digital advocacy in social media: Exploring quasi-legal narratives during# deleteuber boycott. *Journal of Public Affairs*, e2805.

*Ketter, W., Schroer, K., & Valogianni, K. (2022).* Information Systems Research for Smart Sustainable Mobility: A Framework and Call for Action. *Information Systems Research*.

*Rauschenberger, M., Baeza-Yates, R., & Rello, L. (2022).* A Universal Screening Tool for Dyslexia by a Web-Game and Machine Learning. *Frontiers in Computer Science*, 111.

*Rello, L. (2022, April).* The story behind Dytective: how we brought research results on dyslexia and accessibility to spanish public schools. In Proceedings of the 19<sup>th</sup> International Web for All Conference (pp. 1–3).



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[www.ie.edu/business-school](http://www.ie.edu/business-school)

*Schallehn, F., & Valogianni, K. (2022).* Sustainability awareness and smart meter privacy concerns: The cases of US and Germany. *Energy Policy*, 161, 112756.

*Siddiqui, A., & Valogianni, K. (2022).* Understanding Children's Digital Maturity: A Socio-Technical Perspective. In CIST 2022, INFORMS Conference on Information Systems and Technology.

*Valogianni, K., & Padmanabhan, B. (2022, July).* Causal ABMs: Learning Plausible Causal Models using Agent-based Modeling. In The KDD'22 Workshop on Causal Discovery (pp. 3–29). PMLR.



# UNIVERSIDAD DE SEVILLA SMART COMPUTER SYSTEMS RESEARCH AND ENGINEERING LAB

## ABOUT THE INSTITUTION

The Universidad de Sevilla (US) was established in 1505 and, with more than 70,000 students and 6,800 staff, is the third largest university in Spain. US embraces academia, industry, engineering and science and, with a relevant educational and technological infrastructure, is an intellectual reference in the South of Europe. More than 10,000 students are following post-graduate courses, enrolled into 86 master programs and 152 doctoral programs. US holds academic partnerships with 850 institutions throughout the world.

US is also devoted to research and innovation; therefore, in addition to its 4,300 academic staff, there are 1,600 researchers and over 470 scientific groups associated to the university who research in economic, social and human sciences, law, technological activities, life sciences, physics, chemistry, mathematics and the environment. Research is carried out within academic departments, in 8 research centers and 9 university research institutes.

The Smart Computer Systems Research and Engineering (SCORE) lab at US is led by Antonio Ruiz-Cortés and composed of 21 members. Its research is focused on the development and operation of intelligent systems applied to a wide variety of domains. Currently, it spans four major research areas, namely: Natural Computing, Neuromorphic Engineering, Software and Systems Engineering, and Information Systems. The research on Information Systems is led by Manuel Resinas, and it occupies 5 lab members, 4 collaborators, and 4 PhD students.

## RESEARCH TOPICS

In the field of performance management, the group has a strong experience in the monitoring of business processes based on process performance indicators (PPIs). The current interests involve improving the modelling, monitoring and prediction of PPIs. Regarding modelling, the research is focused on making the definition of PPIs and the whole process to develop a PPI dashboard easier for non-expert users. Concerning monitoring, new techniques and methodologies for the definition and monitoring of decisions and unstructured processes are being devised. Finally, in predictive monitoring of PPIs, the research targets problems that appear when a predictive model is deployed in a production system, such as the reliability of the models or the evolution of the predictive model.

The research on human resources covers several different angles. One stream of research focuses on the application of methodologies to improve personal productivity. This includes the analysis of the effect of techniques like mindfulness to perform cognitive-intensive tasks like conceptual modelling, and the development of novel methodologies for time management and work organization. Another research stream is focused on the configuration and use of workstream collaboration tools and other related technologies to improve the collaboration and productivity of people in a context of digital transformation. Finally, the third research stream tackles the organizational perspective of business processes pursuing the optimization of the management of human resources along with process modelling, execution and analysis.

Finally, we have recently started a research line focused on how to develop chatbots that can automate certain aspects of the process management or support the interaction of customers and participants with a given business process.

## CURRENT RESEARCH PROJECTS

- **MEMENTO.** Software tools for the collaboration and decision-making in knowledge-intensive processes. US-1381595. Funded by University of Seville and Andalusian Government (FEDER 2020). 01/01/2021 – 31/05/2023. 90.000€. The aim of MEMENTO is to develop new models and techniques that enable the design and development of software tools to improve the management of people, their collaboration, and the decisions they make.
- **ORCHID.** Digital Transformation of the Public Administration Driven by Intelligent Contracts. TED2021-131023B-C22. Funded by Spanish Government. 01/12/22 – 30/11/24. 206.655€. Part of project LOTUS. ORCHID seeks to contribute to the digital transformation of the public administration by improving the efficiency and tamper-proof monitoring of digital services regulated by intelligent contracts (*i-contract*).
- **BUBO.** Bots and human collaboration for improving the development and operation of digital services. PID2021-126227NB. Funded by Spanish Government. 01/09/22 – 30/08/25. 399.905€. Composed of sub-projects PERSEO and ATENEA. Our goal at BUBO is to develop techniques, models, and tools to increase the level of automation in the development and operation of digital services while supporting human interaction as a key part of their functioning.



## AWARDS

- Carlos Capitán-Agudo, María Salas-Urbano, Cristina Cabanillas and Manuel Resinas received the Best Student Paper Award at BPM conference 2022 with their paper: “Analyzing How Process Mining Reports Answer Time Performance Questions”.
- Alberto Martín López, Sergio Segura and Antonio Ruiz-Cortés were awarded a Distinguished Paper Award at ESEC/FSE 2022 with their paper: “Online Testing of RESTFUL APIs: Promises and Challenges”.
- María Salas Urbano won the “XIX Certamen Universitario Arquímedes”, a competition organized by the Spanish Ministry of Universities, to which 567 projects from 65 different universities were submitted.
- María Salas-Urbano, Carlos Capitán-Agudo, Cristina Cabanillas and Manuel Resinas received the Best Ongoing Research Paper Award at JCIS conference 2022 with their paper: “A Query Language for Exploring Directly-Follows Graph Collections”
- Manuel Resinas received the Best Reviewer Award at ICPM 2021.

## EVENTS

- Adela del-Río-Ortega was PC chair of the Management Track of the BPM 2022 conference that took place in Münster, Germany. She together with Claudio di Ciccio, Remco Dijkman and Stefanie Rinderle-Ma were the PC chair team of the 20th edition of the most prestigious forum for researchers and practitioners in the field of Business Process Management.
- Cristina Cabanillas, together with Agnes Koschmider y Niels Frederik Garmann-Johnsen, was Workshop Chair of the BPM 2022 conference that took place in Münster, Germany.
- Adela del-Río-Ortega and Manuel Resinas, together with Han van der Aa (University of Mannheim, Germany), and Henrik Leopold (KLU, Germany) organized the First Workshop on Natural Language Processing for Business Process Management (NLP4BPM) at the BPM 2022 conference in September 2022 in Münster, Germany.

## SELECTED PUBLICATIONS

- Alfonso E. Márquez Chamorro, Isabel A. Nepomuceno-Chamorro, Manuel Resinas, Antonio Ruiz-Cortés: Updating Prediction Models for Predictive Process Monitoring. CAiSE 2022: 304–318. [https://doi.org/10.1007/978-3-031-07472-1\\_18](https://doi.org/10.1007/978-3-031-07472-1_18)
- Carlos Capitán-Agudo, María Salas-Urbano, Cristina Cabanillas, Manuel Resinas: Analyzing How Process Mining Reports Answer Time Performance Questions. BPM 2022: 234–250. [https://doi.org/10.1007/978-3-031-16103-2\\_17](https://doi.org/10.1007/978-3-031-16103-2_17)
- Cristina Cabanillas, Manuel Resinas, Antonio Ruiz-Cortés: A Mashup-Based Framework for Business Process Compliance Checking. IEEE Trans. Serv. Comput. 15(3): 1564–1577 (2022). <https://doi.org/10.1109/TSC.2020.3001292>
- Joaquín Peña, Alfonso Bravo, Manuel Resinas: BPM in Digital Transformation: New Tools and Productivity Challenges. BPM 2022: 21–26. [https://doi.org/10.1007/978-3-031-16103-2\\_2](https://doi.org/10.1007/978-3-031-16103-2_2)
- Giray Havur, Cristina Cabanillas, Axel Polleres: Benchmarking Answer Set Programming systems for resource allocation in business processes. Expert Syst. Appl. 205: 117599 (2022). <https://doi.org/10.1016/j.eswa.2022.117599>
- Bedilia Estrada-Torres, Adela del-Río-Ortega, Manuel Resinas: Defining Process Performance Measures in an Object-Centric Context. Data-Driven Business Process Optimization (BPO) Workshop at BPM 2022.
- Maximilian Röglinger, Ralf Plattfaut, Vincent Borghoff, Georgi Kerpedzhiev, Jörg Becker, Daniel Beverungen, Jan vom Brocke, Amy Van Looy, Adela del-Río-Ortega, Stefanie Rinderle-Ma, Michael Rosemann, Flavia Maria Santoro & Peter Trkman: Exogenous Shocks and Business Process Management. Bus & Inf Syst Eng (2022). <https://doi.org/10.1007/s12599-021-00740-w>

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 **UNIVERSITY OF ST. GALLEN**  
**INSTITUTE OF INFORMATION MANAGEMENT**

Institute of Information Management



University of St. Gallen

**ABOUT THE INSTITUTION**

For 30 years, the Institute of Information Management at the University of St. Gallen (IWI-HSG) has been dedicated to applied and design-oriented research at the interface between business and IT. Founded in 1989, the institute pursues a mixed funding approach from both public and private sources. Privately funded research at IWIHSG is usually organized in the form of research consortia (“competence centers”). These centers, each of which includes between four and eighteen corporate partners, fall under the responsibilities of different chaired professors. In addition to its research activities, IWI-HSG lecturers engage in executive education, offering degree and non-degree programs in areas such as Business Engineering or IT Business Management. Being one of the largest research units at a top business school, the IWI-HSG’s contributions focus on business innovation, including

methods, reference models, and innovative prototypes. Prof. Andrea Back, Prof. Ivo Blohm, Prof. Walter Brenner, Prof. Reinhard Jung, Prof. Jan Marco Leimeister, and Prof. Robert Winter are heading six research groups comprising eleven assistant professors or postdocs, nineteen research assistants, ten research affiliates, sixteen student assistants and thirteen support staff members.

**RESEARCH TOPICS**

The Chair of Prof. Back focuses on innovative applications of new technologies covering topics such as agile innovation, cybersecurity, digital maturity and transformation, digital strategy and transformation, new work and learning, smart IoT and mobile business as well as sports digitalisation.

The Chair of Prof. Brenner focuses on information management, industrial services and enterprise systems, and digital consumer business (e.g., *consumer and big data analytics*). Another focal field of interest is design thinking.

The Chair of Prof. Jung investigates IT-enabled service, and business innovation with a focus on health IS and wearable technology. It also covers business engineering

and the use of data-driven services by individuals.

The Chair of Prof. Leimeister works on designing, implementing, and managing IT-enabled means of organisation and innovation. Research activities focus particularly on the future of work, service engineering and management, digital business, data-driven organisations and digital learning.

The Chair of Prof. Winter focuses on understanding and design of enterprise-wide integration, coordination and transformation problems. Major projects in this field deploy simulation, experiments, and action design research.

**CURRENT RESEARCH PROJECTS**

A list of competence centers and current projects can be found at: <http://www.iwi.unisg.ch/?id=1202>

• **Agile Transformation:** The Competence Center Agile Transformation offers a unique mix of exchange, collaboration, academic expertise, and advisory services to support the agile transformation of companies. Further information: <https://agile.iwi.unisg.ch/>

• **Ambidextrous Digital Platforms:** This project is expected to provide a thorough description of the dynamics, determinants, and design configurations through which platform owners simultaneously manage and legitimate a balanced co-existence of top-down control and bottom-up emergence. Further information: <https://www.alexandria.unisg.ch/id/project/247758>

• **Cognitive Automation:** The Competence Center Cognitive Automation combines academic insights from the forefront of cognitive automation research and advisory expertise in a platform of exchange and collaboration for practitioners. Members are enabled to seize the vast potential of cognitive automation to improve operational efficiency and effectiveness. Further information: <https://cognitive.iwi.unisg.ch/>

• **Crowdsourcing:** The research goals of the Competence Center Crowdsourcing include the development of models and instruments for systematic design, introduction as well as usage of crowdsourcing approaches for digital work and IT-based innovations. Further information: <http://crowdsourcing.iwi.unisg.ch>

• **Data Management & Analytics Community:** The Data Management & Analytics Community (DMAC) establishes networking between data & analytics leaders from large financial institutions for discussing current issues and workable solutions. Further information: <https://iwi.unisg.ch/en/projects/dmac/>

• **Design Thinking:** The Design Thinking Group is focused on embedding human-centric innovation tools into corporate structures. The research team strives to improve the capability of corporate IT and to reduce costs and risks in innovation projects. Further information: <http://dthsg.com/>

• **Digital Service Innovation:** Research conducted in the context of the CC Digital Service Innovation revolves around service

and business innovation. It also seeks to understand the acceptance and usage of digital services by individuals and enhance their user experience through digital nudging. Further information: <https://iwi.unisg.ch/projects/dienstleistungssysteme/>

• **Digital Strategy and Transformation:** The CC Digital Strategy and Transformation is developing management instruments and tools for strategy work in the digital age. A next focus area for relevant research is intrapreneurship methods. Further information: <https://iwi.unisg.ch/projects/digital-strategy-maturity-transformation/>

**PUBLICATIONS**

The following list is a limited extract of the IWI-HSG publication list in 2021 and 2022. A complete list of publications with full texts of many papers is available at: <http://www.iwi.unisg.ch/publikationen>

Beese, J., Aier, S., Haki, K., Winter, R. (2022). The Impact of Enterprise Architecture Management on Information Systems Architecture Complexity. *European Journal of Information Systems*, published online first.

Beese, J., Haki, K., Schilling, R., Kraus, M., Aier, S., Winter, R. (2022). Strategic Alignment of Enterprise Architecture Management – How a Decade of Corporate Transformation shaped the Portfolio of Control Mechanisms at Commerzbank. *European Journal of Information Systems*, published online first.

Yetton, P., Henningsson, S., Böhm, M., Leimeister, J.M., Krcmar, H. How IT carve-out project complexity influences divestor performance in M&As. *European Journal of Information Systems*, published online first.

Zierau, N., Hildebrand, C.A., Bergner, A.S., I Segui, F.B., Schmitt, A., Leimeister, J.M. (2022). Voice bots on the frontline: Voice-based interfaces enhance flow-like consumer experiences & boost service outcomes. *Journal of the Association of*



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Marketing Science, published online first.

**ERCIS COOPERATION**

Our long-term cooperation with our neighboring ERCIS partner in Liechtenstein was successfully continued. Jan vom Brocke is lecturing in two courses of the HSG Doctoral Programme in Business Innovation together with IWI-HSG professors. Together with Robert Winter, Jan vom Brocke also continued to offer the “Design Science” Doctoral Seminar in the VHB ProDok international Doctoral Programme. Another highlight in the past year was Prof. Winter’s visit at Korean’s ERCIS partner Pohang University of Science and Technology in September.



# UNIVERSITY OF TWENTE CENTER FOR TELEMATICS AND IT – DIGITAL SOCIETY INSTITUTE



## ABOUT THE INSTITUTION

The University of Twente is a multicultural community of talented, ambitious people:

- An innovative and vibrant campus with world-class facilities for crossing boundaries and solving complex problems – including state-of-the-art facilities
- An engineering approach to societal challenges, merging fundamental technological and social science research with systematic solution designing.
- Core technologies, among the world's best, in fields such as IT, robotics and geo-information science.
- Highly personal education, applying student-driven learning and project-based teamwork.
- An outstanding track record in value creation, starting up and spinning off new businesses (with some 1,000 successful ventures to date)

The UT has ICT and Information Systems Research among its focus areas. At the Digital Society Institute, we strive to engineer digitalization toward systems that allow for well-informed, even accountable decision-making.

## RESEARCH TOPICS

### Data Science and Artificial Intelligence

Various groups at the University of Twente conduct research on data science and artificial intelligence, including work on fundamental understanding of machine learning, sensors, efficient realisation of artificial

intelligence in hardware, to development and application of artificial intelligence

### Creating Intelligent Manufacturing Systems

Smart innovations in manufacturing are key to securing the welfare and wellbeing of society. Smart industry is the way forward for industry. Using Smart Industry means personalized and smart products, optimizing human-machine interaction, yielding faster, cheaper, and more sustainable production.

### Improving Healthcare with E-Health

It becomes more and more evident that the current approach to healthcare is not sustainable, especially when considering the increasing volume and demands of chronic diseases, requiring a rethinking of strategies towards innovative solutions.

More information on the centers can be found via <https://www.utwente.nl/en/digital-society/>

## CURRENT RESEARCH PROJECTS

DSI is active in dozens of research projects financed at the national and European level and directly by industry. Departments directly related to ERCIS research themes are the IEBIS (*Industrial Engineering and Business Information Systems*) group and the SCS (*Services, Cybersecurity and Safety research group*).

The IEBIS group is concerned with studying novel ways of managing business processes and supply chains using innovative techniques such as simulation, (social) data mining, multi-agent coordination and

gamification. Researchers in IEBIS use design science methods to develop Decision Support Systems and Inter-Organizational Systems connecting networks of businesses and governments.

The goal of the SCS group is to develop methods and techniques for developing IT-based services that balance service levels with safety- and security levels, and to develop methods and techniques that make existing IT-based services more secure.

## SELECTED RESEARCH PROJECTS INCLUDE

**Control Tower for Construction Logistics** – This consortium project is aimed at designing a Data driven architecture for coordinating construction activities in maintenance and renewal of historical cities.

**Autonomous Logistics Miners** – This project investigates the application of AI to autonomous logistics

**Circular Performance Management** – This project was completed in spring 2022. Dennis Vegter, PhD researcher in the project, could contribute results related to circular business processes and circular performance management in a SCOR working group. We are proud to have contributed to the new version of the SCOR model through this project.



IEBIS is a partner in the EsportsLab, that has been recently established at our campus. The esportslab, situated in the designlab of the University of Twente is the spot where professional gamers come to improve their play. It is the place where novel insights for the player, the coach, the audience, but also for the growing number of casual gamers and society are created.



## AWARDS

- The Dutch Science Foundation (*N.W.O*) funded several projects for PhD and post-doc positions in the IEBIS department.
- In October 2022, our bachelor and master programme Industrial Engineering and Management (*IEM*) have been awarded with a medal for being 'Best Programme' in the Netherlands by Elsevier.

## EVENTS

In August 2022, the [financecom2022.nl](http://financecom2022.nl), International Conference took place in Twente organized by the IEBIS department. The conference run over three days and hosted keynotes and paper presentations discussing Advancements in Information and Communication Technologies in the financial industry. The sessions addressed new business models, markets, networks, services and players in the financial services industry ([www.financecom2022.nl](http://www.financecom2022.nl)).

## PUBLICATIONS

Yu, Y., Yazan, D. M., Junjan, V., & Iacob, M. E. (2022). Circular economy in the construc-

tion industry: A review of decision support tools based on Information & Communication Technologies. *Journal of cleaner production*, 131335.

Wijnhoven, F. (2022). Organizational learning for intelligence amplification adoption: Lessons from a clinical decision support system adoption project. *Information systems frontiers*, 24(3), 731–744.

Plant, O. H., van Hillegersberg, J., & Aldea, A. (2022). Rethinking IT governance: Designing a framework for mitigating risk and fostering internal control in a DevOps environment. *International Journal of Accounting Information Systems*, 100560.

Zuidema-Tempel, E., Effing, R., & van Hillegersberg, J. (2022). Bridging the Gap Between Process Mining Methodologies and Process Mining Practices. In *International Conference on Business Process Management* (pp. 70–86). Springer, Cham.

Bode, M., Daneva, M., & van Sinderen, M. J. (2022). Characterising the digital transformation of IT consulting services—Results from a systematic mapping study. *IET software*.

Koot, M., & Wijnhoven, F. (2021). Usage impact on data center electricity needs: A system dynamic forecasting model. *Applied Energy*, 291

## DISSERTATIONS

Fostering practical wisdom in executive education in a business school setting, Amann, W. C., 25 Jun 2022, 1 ed. Enschede: University of Twente. 380 p., PhD Thesis

Realizing Traceability between the Enterprise Architecture and Business Value, Engelsman, W., 20 Jan 2022, 256 p., PhD Thesis

An Industry Platform for Data-driven Logistics in Small and Medium-sized Enterprises, Piest, J. P. S., 3 Jun 2022, Enschede: University of Twente. 244 p., Pd Eng Thesis



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DSI – Scientific Director:  
Prof. Dr. Maarten van Steen  
<https://www.utwente.nl/en/digital-society/>

Constructing the Service Control Tower, Harmelink, R. L. A., 26 Jan 2022, Enschede: University of Twente. 131 p. Pd Eng Thesis

Publications are available at [doc.utwente.nl](http://doc.utwente.nl)



# LEIDEN UNIVERSITY LEIDEN INSTITUTE OF ADVANCED COMPUTER SCIENCE (LIACS)

## Universiteit Leiden The Netherlands

### ABOUT THE INSTITUTION

The Leiden Institute of Advanced Computer Science (LIACS) is a center of excellence for multidisciplinary research and education in computer science and artificial intelligence (AI). LIACS features a wide range of research, from theory to algorithms to applications, with a strong focus on artificial intelligence and data science. Within the Dutch university landscape in computer science, LIACS has positioned itself with the motto: AI4LIFE, basically meaning that make use of modern AI methods (from optimization, deep learning, reinforcement learning, quantum computing, machine learning) for solving problems in other scientific domains, predominantly from the Life Sciences. This aim is pursued by LIACS researchers in leading roles in the SAILS program, the CCLS initiative, and the European initiative for excellence in AI research and innovation, CLAIRE. We also cooperate with knowledge institutes, governments and companies.

As a consequence of our broad and international working field, we offer complete and outstanding education. LIACS is a major institute in education for computer science. It features BSc, Master, as well as PhD programs and a broad variety of study tracks, some of which are in collaboration with other scientific domains such as Biology and Economics. The institute has rapidly grown in the last years and is continuing this trend. In 2022, LIACS has around 90 staff members, 95 PhD students, and 40 non-scientific personnel. For the study programs of the institute, more than 500 master students, and more than 780 bachelor students are registered, including our newly opened bachelor study on Data Science and AI.

### RESEARCH TOPICS

Artificial Intelligence has become a major focus of LIACS research recently. To accomplish a stronger momentum and to exploit synergies among fields, networking initiatives have been established across the faculty of science (center for computational life science, CCLS) and across the entire university (Society Artificial Intelligence and Life Science, SAILS). These instruments stimulate collaboration within the university on artificial intelligence topics and bring these topics to new application domains. Moreover, with its participation in European and International research networks ERCIS and CLAIRE, the research in LIACS is integrated in a wider community of researchers.

**Applied Data Science Lab:** exploratory projects with companies, governments and NGOs generate ample opportunities in terms of societal challenges, science strategy, valorization and research collaboration. In the LIACS Applied Data Science Lab, our master's students and graduates carry out short-term exploratory studies. The applied Data Science Labs' prime purpose is to help clients explore their opportunities in data science whilst gaining working experience for the student.

**Collaboration for Smart Industry:** we have a strong focus on providing Smart Computing for Science & Industry, which materializes in longstanding cooperations with industrial partners and governments. These help us to focus on the applicability of research results and at the same time generate new directions for our research in computer science. Our collaborations include partners such as Honda Research, Zorginstituut Nederland, Tata Steel, Greenchoice, BMW, KLM, General Electrics Aviation, Young Capital, Qualogy, Ministry of Foreign Affairs, National Police, Woonconnect, Stabiplan, Naturalis Museum, and De Nederlandsche Bank.

### CURRENT RESEARCH PROJECTS

**HORIZON 2020 Research and Innovation Staff Exchanges (RISE) project RISE\_SMA "RISE Social Media Analytics"**, with University Duisburg-Essen (ERCIS Partner), Agder University, Kristiansand (ERCIS partner), and others. LIACS is currently (1) working on a prototype tool for network and text analytics by social scientists; (2) LIACS employees are currently visiting project partners in Sydney, Berlin and Kristiansand; and (3) has recently hosted the visit of a scholar from Indonesia, Setiawan Hadi.

**LIACS participates in the ERCIS competence center** (see <https://www.ercis.org/about-us/competence-centers>) on **"Social Media Analytics: Identification and Analysis of Disinformation, Propaganda, and Manipulation via Online Media"**. Leiden is active in two different focus groups and leader of two work packages. LIACS also participated in an international course on AI, Human Rights & Ethics provided by the competence center.

**Center for Computational Life Science (CCLS):** About 10 presentations of researchers in LIACS and external speakers took place. Two flagship projects have been defined: "Applied machine learning in drug discovery", and "Retrosynthesis and Reinforcement Learning Combined with Mode-of-Action Prediction".

**The Benchmarking Network** (<https://sites.google.com/view/benchmarking-network>) is supported by ERCIS members Münster (Heike Trautmann) and Leiden (Mike Preuss, Thomas Bäck, Anna Kononova, Hao Wang). Since 2019 it aims at consolidating and stimulating activities on benchmarking iterative optimization heuristics, and now has around 40 members from all over the world. The network has organized a well attended Lorentz workshop: (<https://www.lorentzcenter.nl/benchmarked-optimization-meets-machine-learning-2022.html>) on benchmarking in the context of machine learning and optimization from May 30 to June 3.

In a cluster of 14 academic and commercial partners doing research in Chemistry, LIACS is part of the **Advanced machine learning for Innovative Drug Discovery (AIDD) EU ITN project** (<https://cordis.europa.eu/project/id/956832>) that is tasked with educating the next generation of computational Chemistry researchers.

### EVENTS

The mandatory 6 year research evaluation confirmed the high value of LIACS research and its status within the Dutch research landscape, especially praising its achievements in increasing diversity.

As the institute grows, parts of it are moving out to other buildings. An Easter brunch was held in the new media tech rooms in the Huygens building to present the location and consolidate a sense of togetherness.



On June 2, the LIACS institute held a full day celebration for its 25 year anniversary with its current members and alumni. A number of talks and games were hosted, ending in a big party in the Corpus building.



For a list of current SAIL events, e.g. the SAIL lunch time seminar talks and the AI and ethics series which both are available online, see here: <https://www.universiteit-leiden.nl/en/sails/events>.



### DISSERTATIONS

The full list of recent dissertations is available at: <https://theses.liacs.nl/>. Up to October 2022, 6 graduations took place, the total number for 2022 is expected to be 13.

### PUBLICATIONS

Plaat, A. (2022). Deep Reinforcement Learning. Springer, ISBN 978-981-19-0637-4

Grimme, C., Pohl, J., Cresci, S., Lüling, R., Preuss, M. (2022). New Automation for Social Bots: From Trivial Behavior to AI-Powered Communication. MISDOOM 2022: 79-99

Congleton, C., van der Putten, P., Verberne, S. (2022). Tracing Political Positioning of Dutch Newspapers. MISDOOM 2022: 27-43

Brinkmann, G., Rietveld, K., Verbeek, F., Takes, F. (2022). Real-time interactive visualization of large networks on a tiled display system. Displays 73: 102164

de Bruin, G., Pereira Barata, A., van den Herik, J., Takes, F., Veenman, C. (2022). Fair automated assessment of noncompliance in cargo ship networks. EPJ Data Sci. 11(1): 13

Huisman, M., Plaat, A., van Rijn, J. (2022). Stateless neural meta-learning using second-order gradients. Mach. Learn. 111(9): 3227-3244

Liscio, E., van der Meer, M., Cavalcante Siebert, L., Jonker, C., Murukannaiah, P. (2022). What values should an agent align with? Auton. Agents Multi Agent Syst. 36(1): 23

Falcón-Cardona, J., Emmerich, M., Coello Coello, C. (2022). On the Construction of Pareto-Compliant Combined Indicators. Evol. Comput. 30(3): 381-408

Wang, H., Vermetten, D., Ye, F., Doerr, C., Bäck, T. (2022). IOAnalyzer: Detailed Performance Analyses for Iterative Optimization Heuristics. ACM Trans. Evol. Learn. Optim. 2(1): 3:1-3:29



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Nguyen, D., Kononova, A., Menzel, S., Sendhoff, B., Bäck, T. (2022). An Efficient Costing Procedure for AutoML Optimization. IEEE Access 10: 75754-75771

Proença, H., Grünwald, P., Bäck, T., van Leeuwen, M. (2022). Robust subgroup discovery. Data Min. Knowl. Discov. 36(5): 1885-1970

Chen, W., Liu, Y., Pu, N., Wang, W., Liu, L., Lew, M. (2022). Feature Estimations Based Correlation Distillation for Incremental Image Retrieval. IEEE Trans. Multim. 24: 1844-1856

Gemeinboeck, P., Saunders, R. (2022). Moving beyond the mirror: relational and performative meaning making in human-robot communication. AI Soc. 37(2): 549-563



## SIMON KUZNETS KHARKIV NATIONAL UNIVERSITY OF ECONOMICS INFORMATION SYSTEMS DEPARTMENT

### ABOUT THE INSTITUTION

Simon Kuznets Kharkiv National University of Economics (*KhNUE*) is the biggest education center in the city of Kharkiv and one of the leading higher education institutions of Eastern Ukraine. It provides a full range of educational services, carrying out multistage training, retraining and raising the level of experts' skills in 22 specialties, such as Economics and Entrepreneurship, Management and Administration, Informatics and Computer Engineering, Publishing and Printing Business, Service and State Administration.

The Information Systems Department has 31 professors, more than 300 students on Bachelor level and more than 100 on Master level. The department is an active member of IT Ukraine Association and Kharkiv IT cluster. 12 professors are Microsoft certified specialists. Microsoft IT Academy works since 2009, collaboration with IBM in the frame of IBM Academic Initiative program has been ongoing since 2012.

The Master Double Diploma Programme MBA "Business Informatics" with University Lumiere Lyon-2, France was established in 2005. According to research of SMBG Consulting Group, the Programme is included in the top 10 Master Programmes in Business Intelligence in France in 2012–2020. The Programme graduated more than 300 students.

Simon Kuznets Kharkiv National University of Economics has 7065 students (*including 950 foreign students from 43 countries*), 7 faculties, 700+ faculty members and offers training primarily structured around the new teaching architecture of the higher education. Having a considerable experience in training Ukrainian students, KhNUE influences HR, scientific, technical and economic policy of industrial enterprises and

organizations in the country. The University trains highly skilled specialists familiar with modern information technologies and innovative model of behavior.

The University has experience in managing EU-sponsored projects (*TEMPUS, Erasmus+ CBHE – 5 projects, Erasmus + KA 107, Horizon 2020, AUF, DAAD*).

### RESEARCH TOPICS

The majority of Simon Kuznets Kharkiv National University of Economics Information Systems Department research activities are carried out within the following topics:

- Mobile technologies in operative management of an enterprise
- System of monitoring in scientific researches in higher education
- Fuzzy logic and modelling in logistic and marketing
- Information security
- Distributed data warehouses
- Knowledge base and artificial intelligence
- Innovative computer technologies in higher education
- Program support of economic analysis



### CURRENT RESEARCH PROJECTS

• ERASMUS 2022 AFID – Providing of Academic Freedom and Inclusion through Digitalization. Project AFID aims to build an inclusive environment for students and teachers using an inclusive virtual campus, which will be accessible to a wide range of consumers of educational services through digital tools.

• DAAD "FAU-Help: FAU digital education helping Ukraine" Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany, 2022.

• The project "Ukraine Digital: Ensuring Academic Success in Times of Crisis" supports Ukrainian universities in maintaining, implementing and offering their digital courses so that students in Ukraine have the prospect of completing their studies despite the restrictions caused by the war.

• Modern methods and means of analysis and development of information systems. The purpose of the research is the development of basic research in the field of intellectual and information-computer technologies in various spheres of human activity.

### EVENTS

The International Scientific and Practical Conference "Information Technologies and Systems", April 14–15, 2022.

International Scientific Conference of Young Scientists and Students "Information technology in the modern world: the research of young scientists", February 17–18, 2022.

### PUBLICATIONS

Gryzun L. Computer modeling of the tournament of game algorithms in the process of learning of basics of algorithmization and programming by pre-service IT-specialists / Liudmyla E. Gryzun, Oleksandr V. Shcherbakov, Svitlana H. Lytvynova // CTE 2021: 9<sup>th</sup> Workshop on Cloud Technologies in Education, December 17, 2021, Kryvyi Rih, Ukraine

Zadachyn V.M. Higher-order optimality conditions for degenerate unconstrained optimization problems // Journal of Optimization, Differential Equations and Their Application, 30 (1) (2022), 88–97.

Y. Skorin, I. Zolotaryova, Introduction of the distance learning information systems into the teaching of computer subjects / Computer systems and information technologies. – Khmelnytskyi: Khmelnytskyi National University, 2022. – № 1 (6). – P. 6-10.

Ushakova I., Plokhа O., Skorin Yu, Approaches to web application performance testing and real-time visualization of results // Bulletin of Kharkiv national automobile and highway university. Collection of Scientific Works. – 2022. – Issue 96. – P. 71–80.

Losev M. Assessment of the value and degree of information ageing in a centralized way of controlling the network. // Information processing systems: collection of scientific papers. – Kharkiv: Kharkiv National Air Force University, 2021. – Issue. 2(43).

Golubnychy D., Tretiak V., Zapara D., Demenko M., Novichenko S., Doska O., Saveliev A. Analysis of Modern Threats in Information Systems by Threat Components: Cyber Security, Information Security and Information Security // Scientific Collection "InterConf", (45): with the Proceedings of the 3<sup>rd</sup> International Scientific and Practical Conference "Scientific Community: Interdisciplinary Research" (March 16–18, 2021). Hamburg, Germany: Busse Verlag GmbH, 2021. – Pp. 541–550.

O.V. Sevierinov, O.V. Kolomitsev, D.Y. Golubnychy, G.V. Aloshin, V.F. Tretiak, A.V. Vlasov, A.O. Lisitsya. An analysis of systems for analyzing the behavior of corpus delicti // Scientific Collection "InterConf", (44): with the Proceedings of the 8<sup>th</sup> International Scientific and Practical Conference "Scientific Research in XXI Century" (March 6–8, 2021). Ottawa, Canada: Methuen Publishing House, 2021. – Pp. 750–759.



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# PERSONAL MEMBERS

Personal members in the ERCIS network are experts in their field of research and have strong personal connections within the network. To become a personal member, one should already have worked with partners from the network in the context of research projects, joint courses, or publications.



## ABOUT ME

My research interests comprise service science, business process management, information modeling, and the socio-technical design of information systems. A particular focus is designing information systems that enable innovative service-oriented business models. I am an academic head of the Service Science Competence Center at ERCIS and the spokesman of the Software Innovation Campus Paderborn (SICP). Besides other editorial roles, I serve as a conference and program chair for the WI conference 2023, hosted in Paderborn.

## SELECTED PUBLICATIONS

*Bartelheimer, C.; zur Heiden, P.; Lüttenberg, H.; Beverungen, D. (2022):* Systematizing the Lexicon of Platforms in Information Systems: A Data-Driven Study. *Electronic Markets* 32, pp. 375–396.

*Beverungen, D.; Hess, T.; Köster, A.; Lehrer, C. (2022):* From private digital platforms to public data spaces: Implications for the digital transformation. *Electronic Markets*, 32, pp. 493–501

*Weinzierl, S.; Wolf, V.; Pauli, T.; Beverungen, D.; Matzner, M. (2021):* Detecting Temporal Workarounds in Business Processes – A Deep Learning-Based Method for Analysing Event Log Data. *Journal of Business Analytics* 5(1), pp. 76–100



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## ABOUT ME

Patrick Delfmann is a full professor of Information Systems and head of the Research Group Corporate Communication Systems at the University of Koblenz-Landau. He holds a Diploma Degree (MSc) in Information Systems and a Ph.D. from the School of Business and Economics at the University of Münster. Patrick's research focuses Business Process Management Technologies and covers Process Mining, Predictive Process Analytics, Business Rules Management, Process Query, Conceptual Modeling, Ontologies, and Compliance. Currently, he supervises the three research projects "Supporting Business Process Modeling with Pattern-oriented Recommender Systems" "Social Process Mining" and "Context-aware Predictive

Process Analytics", all funded by the German Research Foundation (DFG). Patrick's research has been published in Journals such as *Management Information Systems Quarterly*, *Information Systems, Communications of the Association of Information Systems*, and *Information Systems Frontiers*, amongst others.

## SELECTED PUBLICATIONS

*Amann, E.; Corea, C.; Drodt, C.; Delfmann, P.:* A Dashboard Creator Suite for Simultaneous Predictive Process Monitoring. In: *Proceedings of the Demonstration Track at BPM 2022*. Münster, 2022

*Nagel, S.; Delfmann, P.:* Investigating Inconsistency Understanding to Support Interactive Inconsistency Resolution in Declarative Process Models. In: *Proceedings of the 30<sup>th</sup> European Conference on Information Systems (ECIS 2022)*. Timisoara 2022.



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## ABOUT ME

I am a Professor of Management Accounting and Process Management and Head of the Research Group "Laboratory for Experimental Process and ERP Research" at the University of Applied Sciences South Westphalia in Hagen. I am also a certified Lean Six Sigma Master Black Belt.

for benchmarking of content and competence orientation of university teaching. To date, we are additionally working on the project "KEBAP," which is funded by the German Federal Ministry of Education and Research until 2026. This project concentrates on the reuse of automation solutions and building blocks (e.g., *Robotic Process Automation, Artificial intelligence*) in different organizations.

## SELECTED PUBLICATIONS

*Kregel, I., Stemann, D., Koch, J., Coners, A. (2021),* "Process Mining for Six Sigma: Utilising Digital Traces", *Computers & Industrial Engineering*, Volume 153, p. 107083.

*Koch, J., Vollenberg, C., Matthies, B., Coners, A. (2022),* Robotic Process Automation Flexibilization in the Term of Crisis: A Case Study of Robotic Process Automation in a Public Health Department, *European Conference on Information Systems (ECIS)*, Timisoara, Rumänien.



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## ABOUT ME

Marco De Marco is full professor of Organization and Information Systems at Università Telematica Internazionale UNINETTUNO in Rome where he serves also as Dean of the Faculty of Economics. He is the author of several books and numerous essays and articles; mainly on the development of information systems, the impacts of technology on organizations and e-government. He is a member of the editorial board of several academic journals. In 2008 and 2009 he was a Board committee member of the Association for Information Systems, representing Europe, Africa, and the Middle East. His main research interests have included information systems development and performance measurement methodologies, while bank informa-

tion systems and their specificities were a particular study and focus. He has been serving as officer of the major conference on Information Systems ICIS, ECIS, MCIS and he was cofounder of the Italian chapter of the AIS. At ICIS 2010 he was awarded the AIS Fellow Prize for his contribution to the IS discipline. In 2020, he has been serving as Program Chair at PACIS conference. Recently, he is focused on smart working as well as on the digital learning research field.

## SELECTED PUBLICATIONS

*Veglianti E., Li Y., Magnaghi E., De Marco M. (2022).* Understanding artificial intelligence: insights on China. *Journal of Asia Business Studies-Emerald Publishing Limited*. Vol 2, 16(2), pp. 324–339 <https://doi.org/10.1108/JABS-10-2020-0391>



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## PERSONAL MEMBERS



### ABOUT ME

Since May 2021, I have been director of the Institute of Medical Informatics at Heidelberg University Hospital. From 2009 to 2021 I headed the Medical Informatics team at the ERCIS headquarter in Münster. My research and teaching focuses on informatics for personalized medicine, specifically information systems in healthcare regarding electronic health records (EHRs). There is a wide scope of applications, ranging from molecular biology over clinical medicine to public health. My specific field of interest is data modelling in medicine. I'm the principal investigator of the MDM portal (<https://medical-data-models.org>), Europe's largest collection of medical data models. The MDM portal also sup-

ports model-driven software development for medical databases. These data models are available in 20 download formats, in particular CDISC ODM and HL7 FHIR. Due to the COVID-19 pandemic, several projects in the past year addressed SARS-CoV-2 related topics. In 2021 a multi-center study regarding the role of OC43 infections in COVID-19 was published. Personalized medicine is built upon clinical and molecular data. Therefore I'm interested in data mining and pattern recognition techniques for genomic data, in particular regarding tumour diseases.

### SELECTED PUBLICATIONS

*Dugas M, et al.* Lack of antibodies against seasonal coronavirus OC43 nucleocapsid protein identifies patients at risk of critical COVID-19. *J Clin Virol.* 2021 Apr 24;139:104847. doi: 10.1016/j.jcv.2021.104847



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### ABOUT ME

In March 2021, I moved to the "Friedrich List" Faculty of Transport and Traffic Sciences at TU Dresden, Germany, to establish a new professorship for Big Data Analytics in Transportation (*within the Institute of Transport and Economics*). Shortly after, I also joined the Center for Scalable Data Analytics and Artificial Intelligence "ScaDS.AI" Dresden/Leipzig (*one of Germany's six national centers of excellence for AI research*), as well as the Boysen-TU Dresden-Research Training Group.

My team currently consists of four Ph.D. candidates and our research focusses on various topics in the context of (*big*) data analytics, statistical and machine learning, and optimization. For instance, we con-

duct methodological research on automated algorithm selection and configuration, benchmarking, evolutionary computation, single- and multi-objective continuous optimization, as well as route optimization. In addition, we apply AI methods to applications and problems from practical domains such as transportation and traffic sciences or the energy sector.

### SELECTED PUBLICATIONS

*Schäpermeier, L., Grimme, C., Kerschke, P. (2022).* MOLE: Digging Tunnels Through Multimodal Multi-Objective Landscapes. In: Proceedings of the Genetic and Evolutionary Computation Conference (GECCO), Boston, MA, USA, ACM.

*Heins, J., Bossek, J., Pohl, J., Seiler, M., Trautmann, H., Kerschke, P. (2022).* A Study on the Effects of Normalized TSP Features for Automated Algorithm Selection. In: Theoretical Computer Science, Elsevier.



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### ABOUT ME

I am an associate professor in Information Systems at the University of Agder, Norway, where I am member of the Centre for digital transformation (CeDiT). My research focuses on the adoption of e-government both by government employees and by citizens. Furthermore, I analyse how governments interact with their various stakeholders via different communication channels. I am currently working on two projects in collaboration with the Norwegian Welfare and Labour Organisation (NAV) where we analyse what public services are actually suitable for digitalisation and what services should rather be offered offline.

### SELECTED PUBLICATIONS

*Ida Heggertveit, Ida Lindgren, Christian Østergaard Madsen, Sara Hofmann (2022).* Administrative Burden in Digital Self-Service: An Empirical Study About Citizens in Need of Financial Assistance. Proceedings of the electronic government conference: Lecture Notes in Computer Science.



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### ABOUT ME

Jan Mendling is the Einstein-Professor of Process Science with the Department of Computer Science at Humboldt-Universität zu Berlin, Germany. His research interests include various topics in the area of business process management and information systems. He has published more than 500 research papers and articles, among others in *Management Information Systems Quarterly*, *ACM Transactions on Software Engineering and Methodology*, *IEEE Transactions on Software Engineering*, *Journal of the Association of Information Systems* and *Decision Support Systems*. He is a department editor for *Business and*

*Information Systems Engineering*, member of the board of the Austrian Society for Process Management, one of the founders of the Berlin BPM Community of Practice, organizer of several academic events on process management, and a member of the IEEE Task Force on Process Mining. He is co-author of the textbooks *Fundamentals of Business Process Management*, Second Edition, and *Wirtschaftsinformatik*, 12<sup>th</sup> Edition, which are extensively used in information systems education. These books have been translated to German, Greek, Indonesian, Persian, Spanish (*BPM*) and Dutch (*Wirtschaftsinformatik*). BPM-translations to French, Japanese, Italian, Polish, and Ukrainian are in the making.



### CONTACT DETAILS

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Germany

RUB

## ABOUT ME

Since September 2021, I have been Full Professor of Socio-Technical System Design and Artificial Intelligence at Ruhr-Universität Bochum, Institute of Work Science as well as Faculties of Mechanical Engineering. Before that, I completed my doctorate at the University of Münster in 2015 and took on the coordination of the DFG graduate school “User-Centred Social Media” at University of Duisburg-Essen (2015-2017), followed by an assistant professorship of Information Systems at Freie Universität Berlin funded by the Einstein Center Digital Future (2017-2021).

My research is focused on the design and management of innovative information and communication technology (ICT), including artificial intelligence-based deci-

sion support systems and conversational agents, and their impact on individuals as well organizations. In that context, I examine the role of explainability in AI-systems and its influence, for instance, on users’ (*calibrated*) trust or skill formation. Further topics refer to design and management of digital twins, the future of work and digital nudging.

## SELECTED PUBLICATIONS:

*Osmundsen, K., Meske, C. and Devinder, T. (2022).* Familiarity with digital twin total-ity: Exploring the relation and perception of affordances through a Heideggerian perspective. *Information Systems Journal (ISJ)*, online first, pp. 1-28.

*Meske, C. and Bunde, E. (2022).* Design Principles for User Interfaces in AI-Based Decision Support Systems: The Case of Explainable Hate Speech Detection. *Information Systems Frontiers (ISF)*, online first, pp. 1-31.



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RUHR  
UNIVERSITÄT  
BOCHUM

# RUB

## ABOUT ME

I am head of the Chair of Industrial Sales and Service Engineering in the Mechanical Engineering Department at the Ruhr-Universität Bochum. My main research interests are in the area of digital servitization in manufacturing. For instance, my team and I investigate how enterprises innovate with product-service systems and smart services. Together with the ERCIS Personal Member Stefan Stieglitz and our colleagues Frederik Ahlemann, Reinhard Schütte, and Manuel Wiesche, we conducted the second run of our joint PhD Course on Research Methods in Information Systems in the Ruhr area in 2022. This year, we also launched our Ruhr School of Design Thinking ([www.ruhrschoole.de](http://www.ruhrschoole.de)) and officially opened our new Research Centre

for the Engineering of Smart Product Service Systems (ZESS; <https://www.lps.ruhr-uni-bochum.de/zess/>) in Bochum. Alessio Maria Braccini and I lead the ERCIS Cluster Smart Manufacturing.

## SELECTED PUBLICATIONS

*Ebel, M., Jaspert, D., & Poeppelbuss, J. (2022).* Smart already at design time—Pattern-based smart service innovation in manufacturing. *Computers in Industry*, 138, 103625.

*Fischer, H., Seidenstricker, S., & Poeppelbuss, J. (2022).* The triggers and consequences of digital sales: a systematic literature review. *Journal of Personal Selling & Sales Management*, 1–15.

*Poeppelbuss, J., Ebel, M., & Anke, J. (2022).* Iterative uncertainty reduction in multi-actor smart service innovation. *Electronic Markets*, 32(2), 599–627.



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**PADERBORN UNIVERSITY**  
The University for the Information Society

## ABOUT ME

Oliver Müller is Professor of Management Information Systems and Data Analytics at Paderborn University. He holds a BSc, MSc, and Ph.D. in Information Systems from the University of Münster’s School of Business and Economics. His research interests focus on data-driven judgment and decision making. This includes the design and use of machine learning solutions for supporting human judgment and decision making, with a special focus on the computational analysis of unstructured data (*e.g., texts, images*), as well as studying the acceptance and implications of data-driven decision making in organizations. Areas of application include marketing and sales (*e.g., pricing, customer service, e-commerce*),

finance (*e.g., credit scoring, asset pricing*), human resource management (*e.g., recruitment, training*), and sports (*e.g., performance analysis, sports economics*).

## SELECTED PUBLICATIONS

*Shollo, A., Hopf, K., Thiess, T., & Müller, O. (2022).* Shifting ML Value Creation Mechanisms: A Process Model of ML Value Creation. *The Journal of Strategic Information Systems*, 31(3), 101734.

*Müller, O., Caron, M., Döring, M., Heuwinkel, T., & Baumeister, J. (2022).* PIVOT: A Parsimonious End-to-End Learning Framework for Valuing Player Actions in Handball Using Tracking Data. In *International Workshop on Machine Learning and Data Mining for Sports Analytics (pp. 116–128)*.



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UNIVERSITÄT  
DUISBURG  
ESSEN

Open-Minded

## ABOUT ME

I am head of the research group “Digital Communication and Transformation” (*digicat*) at the University of Duisburg-Essen. My research focuses on the digital transformation, especially on the effect of novel communication and collaboration technologies on enterprises and organizations as well as on society and individuals. Based on interdisciplinary research and advanced methods of data analytics me and my group perform excellent research and contribute to theory and practice. We are working with selected partners from academia and industry in several projects funded by the European Union, German

Research Foundation, Federal Ministry of Education and Research, industry, and private foundations. My work has been published in reputable journals such as the *Journal of Management Information Systems (JMIS)*, *Journal of Information Technology (JIT)*, or *European Journal of Information Systems (EJIS)*.

## SELECTED PUBLICATIONS

*Stieglitz, S., Hofeditz, L., Brünker, F., Ehnis, C., Mirbabaie, M. & Ross, B. (2022).* Design principles for conversational agents to support Emergency Management Agencies. *International Journal of Information Management*, 63, 102469.

*Mirbabaie, M., Stieglitz, S. & Marx, J. (2022).* Digital Detox. *Business and Informations Systems Engineering*, 64, 239–246.



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### ABOUT ME

I'm Associate Professor at University "G. d'Annunzio" Chieti-Pescara (Italy), where I teach "Digital Business Organization" and "Digital Transformation". I am member of the board of advisors of the PhD program in "Accounting, Management and Business Economics". I am the President of the Italian chapter of Association for Information Systems (AIS) (<http://www.itaais.org>).

My research is focused on digital and business transformation affecting people and organizations. Currently I am also interested in the use of machine learning approaches and social network analysis

technics applied to bibliometric data for performing literature analysis.

### SELECTED PUBLICATIONS

*Cipriano M. and Za S., (2022), "Which Digital Transformation Strategy for Non-profit Organisations". ECIS 2022 Proceedings, June 22–24, Timisoara, Romania,*

*Smacchia M. and Za S., (2022), "Artificial Intelligence in Organisation Studies: A Computational Literature Review", ICIS 2022 Proceedings, December 12–14, Copenhagen, Denmark*



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# ADVISORY BOARD

The ERCIS network has strong connections to local, national, and international companies working with us on various fields of expertise. Aside from sponsoring the network, the feedback of those companies during regular meetings, round tables, or during one-to-one talks, as well as their inclusion in research projects and studies, ensures that we work on practically relevant topics.

## ADVISORY BOARD



› Advisory Board [www.claas.org](http://www.claas.org)



# adesso

### ABOUT THE COMPANY

#### Business. People. Technology.

Founded in 1997 at the heart of the Ruhr-area, adesso SE is one of the leading IT providers in the German-speaking market. With more than 6.800 employees on 57 sites within the adesso group, we strive to fulfill one simple mission: to help our customers make the most out of their business and the newest technologies. To optimize their core business processes by combining technological competence with sector-specific know-how. Our work is based on strong customer orientation, flexibility and proven methods when implementing software projects. adesso work from diverse fields of expertise in interdisciplinary teams – and they do it with heart and soul in an open, employee-oriented company culture.

We help shape tomorrow's solutions through our research activities. We deal with the latest technologies on behalf of and with our customers, covering the entire value chain. To do so, we rely on various forms of cooperation in terms of technology, science and research. Our research results benefit both us and our customers.

For further information, please visit [www.adesso.de](http://www.adesso.de)

### TOPICS OF INTEREST

- Java
- Javascript
- Microsoft
- Cloud Technologies
- ServiceNow
- PHP
- Google
- Mobile
- SAP
- Salesforce

For more information, please visit [www.adesso.de/de/technologien/technologie-radar/index.jsp](http://www.adesso.de/de/technologien/technologie-radar/index.jsp)

### OUR SECTORS/INDUSTRIES

- Automotive
- Banks/Financial Services
- Healthcare
- Retail
- Life Sciences
- Lottery
- Manufacturing Industry
- Media and Entertainment
- Exhibition corporation
- Food industry
- Sports
- Public authorities
- Public transportation
- Insurance



### JOB OPPORTUNITIES

At adesso we are looking for people who are enthusiastic about a job in the following areas:

- Software Development
- IT-Consulting
- Account Management
- Central Services
- User Experience
- Online Marketing

If you are interested in working with an ever-growing first-class employer, please check out our job offers: [www.adesso.de/de/jobs-karriere/unsere-stellenangebote](http://www.adesso.de/de/jobs-karriere/unsere-stellenangebote)

# CLAAS

### ABOUT THE COMPANY

What started in 1913 with the manufacture of powerful straw binders has become one of the world leaders in the production of agricultural technology. The company is well-known for its highest quality standards, leading technologies as well as their market leaderships in combines and self-propelled harvesters. Machine-to-machine communication, intelligent networking, the improvement of the harvesting process as a whole – industry 4.0 is already the company's reality and sustainability is its principle.

CLAAS products ensure efficiency in agricultural production and they go easy on natural resources as they continuously reduce energy consumption. More than 11,000 employees are engaged in this task in 140 countries; talented people from all professions, who make their daily contribution towards feeding the world.

### TOPICS OF INTEREST

- Connected machines
- Farming 4.0
- Omni-channel customer experience
- Precision Farming
- Data Management
- Big data & AI/ML Engineering

Today the harvest chain is seeing many innovations coming through, especially in drive technology, machine intelligence and networking. "Efficient Agriculture

Systems", abbreviated as "EASY", is the CLAAS collective term, which encompasses machine control and performance optimization, steering systems, precision farming and monitoring, software solutions and services. However, digital transformation has changed much more than just the technology of our machines. New product features, different license models and data driven business models require our business unit for sales and service to reinvent our traditional way of doing business.

At CLAAS, we are striving to digitize all traditional customer touchpoints for each and every farmer. Our online and offline world is emerging into one Omni-channel customer experience. CLAAS is heavily investing in its digital future. In addition to the development center for electronics on the machines in Dissen, massive investments are being made in the customer and dealer systems. As an example CLAAS connect, as the holistic digital touchpoint, delivers integrated functionalities, services and shops to their customers in order to link the customer's processes seamlessly with ours.

To further centralize sales processes, as well as dealer and customers systems we've created a new location – the CLAAS Campus Herzebrock. The well-known positive customer experience from our physical dealer touchpoints will be ensured for our digital touchpoints through the integration of state-of-the-art systems e.g. Salesforce, SAP hana, Tableau and modern IT architectures. This modern IT landscape also enables us to generate new solutions for internal processes and our customers based

on data and with the use of AI. These are intended to support us in improving our products and increasing availability. Our data analytics team works closely with all departments to find new opportunities for the use of AI.

### JOB OPPORTUNITIES

CLAAS is special because it is a family owned enterprise with a long-term, forward-looking approach which is based on the commitment of its employees. At CLAAS, you will face the challenging task of continuously improving harvesting performance through innovative technology.

#### Selected vacancies in Germany for professionals:

- Head of Cloud Innovation
- Full Stack Developer Service-Platform
- Application Consultant SAP Commerce Cloud
- Mobile Developer Android

#### Selected vacancies in Germany for students:

- Working student position: Mobile Developer Android
- Working student position: Corporate IT – Software Testing/Tracking
- Internship: Business Process Management

Usual procedure: 3 months internship + 3 months joint thesis project. If you have any questions about our current international vacancies, our contacts at the respective locations are happy to help.



[www.claas.jobs](http://www.claas.jobs)  
Instagram: @claas\_careers



**ABOUT THE COMPANY**

With a pioneer spirit and start-up attitude, cronos was founded in 1991 in Münster, Germany. Our core area of consulting is IT and process optimization for utility companies. We support our customers in the process of digitization and the development of new business fields.

**TOPICS OF INTEREST**

- software engineering
- project management
- portals
- app development
- SAP HANA
- process automation
- CRM
- SAP Customer Experience
- analytics
- online marketing
- HTML5, JAVA
- SAP BTP
- SAP Fiori
- Machine Learning
- strategy consulting
- AI
- SAP UI5
- Celonis Process Mining
- Robotic Process Automation

cronos is an official SAP, UiPath, Celonis and Microsoft partner. We have longstanding partnerships with universities and a combined experience of over 1000 customer projects. Drawing from this experience and based on the latest technological trends, like Blockchain, SAP S/4HANA, Robotic Process Automation, Process Mining and Machine Learning, we are able to develop innovative and approved solutions for the utilities industry.

We make an active contribution to the success of the energy transition in Germany, Austria and Switzerland. With over 300 permanent consultants in 5 locations, we are the biggest independent SAP consulting firm for the utilities industry in GSA. Our success is the result of a well-balanced team bringing together young and experienced IT specialists, who are among the most sought-after consultants in the industry.

**FACTS**

- market leader as biggest independent IT consultancy for the utility sector
- 300+ consultants
- 200+ active customers
- 1000+ successful projects
- 30 years of experience
- SAP Partner Energy of the year 2020, 2021 and 2022
- UiPath Diamond Partner
- Celonis Gold Partner

**MORE THAN CONSULTING**

**JOB OPPORTUNITIES**

Think outside the box – especially in IT! Driven by innovative and creative young people, digitization accelerates the development of new technologies and challenges. Granting young professionals the freedom to explore ideas and assume more responsibilities is part of our credo. We maintain a strong academic network and offer attractive programs for students and graduates. Our regular workshops, graduate programs and extensive onboarding system jumpstart a career in IT development and consulting.

**WE ARE LOOKING FOR TALENTS**

- Junior IT consultant
- Junior RPA developer
- Junior app developer
- Junior cloud developer
- Junior ERP consultant
- Working Student
- Bachelor-/Master-Thesis

Find out more about our student and graduate programs:

[www.cronos.de/campus](http://www.cronos.de/campus)  
[www.cronos.de/cronologewerden](http://www.cronos.de/cronologewerden)



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**ABOUT THE COMPANY**

DMI takes responsibility for the digital archiving of patient records and provision in client software systems. Since 1966, the specialised service provider has been providing hospitals with continuous support in the optimisation of information-based processes and with fully compliant archiving throughout constant changes in technology and framework conditions. In production centres and at clients' locations, DMI staff digitise, qualify, integrate and archive every second patient record for in-patients based on certified information security and data protection guidelines and ensure seamless integration into health IT systems. Through its interface expertise with all data management HIS architectures, DMI enables the consolidation of digitised paper-based patient records with electronic documents and data, as well as medical image documentation, in audit-proof long-term archives. Interoperability (the ability of systems to interact with one another), including on a data level, is the basis for the integration and sustainability of our solutions.

DMI provides its clients with lean, secure, efficient processes through consolidated patient records.

Our relationships with our clients are shaped by commitment, respect and fairness. The quality of our service business is based on the professional and social skills of our employees.

# D·M·I

**TOPICS OF INTEREST**

- Digitalising and consolidating medical records including electronic and digitized documents
- Certified service portfolio "Archivar 4.0"
- Over 1.400 clients, approx. 1.000 employees at 3 locations in Germany
- Interoperable IT architectures based on current standards
- Audit-proof digital archiving for compliance
- Deep integration of archived documents into administrative and clinical work-flows for enabling effective clinical processes for best patient outcomes
- The link between medical informatics and medical research as well as routine practice in healthcare

**DMI AS AN EMPLOYER**

DMI is not your typical medium-sized company: it is an owner-managed organization of roughly 1,000 highly motivated staff and a flat hierarchy. Its approach is long-term and sustainable, with continuing education of employees as a key ingredient. With a focus on the German healthcare market and additional activities in banking, insurance, general business, and the public domain, DMI offers high-value services:

- digitization, qualification, consolidation, presentation, and archiving of documents
- integration into information-based processes
- analysis of documentation process landscapes and support for optimization aiming at effectiveness and compliance.

Company headquarters are situated in the pulsating university city of Münster in North Rhine-Westphalia (NRW); service centers are located in the castle town of Leisnig near Leipzig (Saxony) and Essen (the "Green Capital", NRW).

**JOB OPPORTUNITIES**

Are you up to this challenge? DMI's team members are committed to achieving results for customers in a dynamic ecosystem of evolving technologies and continuously changing customer demands. A multitude of benefits make DMI an attractive employer.

- Selected open positions in Germany for professionals: (senior) software developers for applications, information systems specialists, experts for IT infrastructures and networks.
- Selected open positions in Germany for students: thesis students (business IT, information systems, IT, software development) for innovation in documentation and archiving enabled by state-of-the-art IT and by digital transformation.

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## ADVISORY BOARD

DRIVEN BY DATA.  
GUIDED BY EXPERTS.



### ABOUT THE COMPANY

Always one step ahead and keeping an eye on innovative technologies – that was the guiding principle of the founding team 25 years ago. This gave rise to the initial idea for what is known today as Eucon, the digital trailblazer for data and process intelligence. At the time, the project involved creating the first electronic auto parts database, which four years later was already in use in 12,500 workshops across Germany: a pioneering achievement for data-driven automation.

Eucon owes today's extended focus on the insurance and real estate industries to its visionary founders, who believed that in addition to the automotive sector, their product could also be of interest to other industries. And so Eucon began to diversify, focusing on modern technologies such as human-machine collaboration in augmented intelligence and AI solutions, as well as robotic process automation. Headquartered in Münster, the expert for process digitalization and data-based decision-making is now active in locations from Atlanta to Berlin and Shanghai, with over 450 employees serving more than 250 customers in 80 countries.

### TOPICS OF INTEREST

Eucon has established itself as a digital pioneer, an enabler and a provider of solutions. Making processes easier, more transparent and faster was the idea 25 years ago – and still is today. As a digitali-

zation partner, the Eucon Group continues to support companies from the key industries seeking to digitalize their processes, make valuable use of data treasures, and implement digital business models. The Automotive aftermarket benefits from best-in-class market information and data-based systems for effective product management.

Eucon uses intelligent solutions to analyze, automate, and accelerate the entire claims process for Insurance companies: from claims reporting to AI-supported control and checking with optimized black box processing to case-by-case final negotiation. For Real Estate companies, Eucon delivers substantial process acceleration thanks to a platform for data-driven property management, thus creating added value by moving towards a digital twin of the building. This is particularly relevant with regard to ESG aspects. With its recently launched SmartSustain software solution, Eucon supports real estate companies as they move into professional sustainability management.

### JOB OPPORTUNITIES

If you are keen on further developing your talents and becoming a digital trailblazer, Eucon is the right choice for you, whether you are a student, graduate or expert! We would like to get to know you and look forward to your application or a casual first contact. Feel free to get in touch with Jens Brunk or Teresa Weber directly.

### Possibilities to join the company:

- Product Manager (m/f/d)  
Focus Data Science
- (Junior) Data Scientist (m/f/d)
- Data Analyst (m/f/d)
- DevOps Engineer (m/f/d)
- Innovation Manager (m/f/d)  
Product Portfolio & New Products

We also mentor bachelor's and master's theses in various areas and are regularly looking for interns and working students.



### CONTACT

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For more information, visit us at  
<https://www.eucon.com/jobs/>  
<https://www.eucon.com/>

or follow us on  
<https://www.linkedin.com/company/eucon-group/>



### ABOUT THE COMPANY

At Hilti we create and design leading-edge technology, software and services, which power the professional construction industry. Hilti stands for quality, innovation and direct customer relationships resulting in about 250,000 individual customer contacts each day. Based in Schaan, Liechtenstein, the company has 30,000 employees in more than 120 countries around the world who contribute to making construction work simpler, faster and safer while inspiring customers every single day with technologically leading products, systems, software and services.

Many ideas for improvements are developed directly on construction sites while talking to customers. If there is an on-site challenge for which no Hilti solution exists, one will be developed. This is why the company invests approximately 6 percent of sales each year in research and development. We run our own research and design labs, working with top technical universities and partners, all over the world. We make our own products in Hilti factories and with external partners, making sure all our products match the same high quality and standards.

We are particularly motivated by the possibilities that digital technology can bring to a traditional sector like construction. Right now, we have a unique opportunity to solve real-world problems and lead the way in revolutionizing our industry. As a company whose lifeblood is innovation, we give our customers the next level of digital offerings on an impressive global scale. For you, it means unrivalled opportunities to work in a 'start-up within' environment,

develop an international career and really have an impact on the shape of things to come.

### ABOUT GLOBAL IT IN HILTI

It's an incredibly exciting time to join Hilti, especially if you work in the digital space. We've always been a company at the forefront of engineering hardware solutions, and today we're investing more than ever in software technologies as digital transformation is a big priority for us.

Hilti is a great place for you to show your worth as you learn, grow and carve-out your career in Information Technology. Global IT within Hilti is a truly global team with main hubs in Buchs (Switzerland), Kuala Lumpur (Malaysia), and Plano and Tulsa (USA). All locations have highly competent teams who work very closely together and in profound partnership with their business counterparts. Hilti's Global IT team is known for their focus on sustainable business enablement by translating latest IT innovations into value creating solutions and services.

So, have a career with the best! Become a valuable member in a highly professional and international team of IT experts and meet the challenges of a global multinational company using latest technologies.

### TOPICS OF INTEREST

- Business applications – where we run a fully consolidated global SAP S/4 HANA system landscape.
- Digital workplace – where we connect our 30,000 Hilti people and make them an information-enabled team.

• Cloud application platform – where we build our common platform for all digital and software offerings to our customers.

• Enterprise computing – where we design, build and operate our network and computing capabilities

Our Global IT roles range from data analysts, project managers and system engineers to cyber security experts, user experience designers and enterprise architects.

### JOB OPPORTUNITIES IN OUR STRATEGIC IT OFFICE IN BUCHS, SWITZERLAND:

- Interns or thesis students
- Hilti Fellowship program (in cooperation with University of Liechtenstein)
- Graduate positions

Take a look at the open positions on <https://careers.hilti.group> or get in touch with us directly.

SCAN ME



### CONTACT

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We have been recognized as one of best workplaces on the 2022 Fortune 100 Best Companies to Work For® list and 2019 Best place to Work by Glassdoor, and were ranked among the top employers by the Great Place to Work® Institute multiple times. Further, the snow-draped mountains, crystal-clear lakes and marvelous landscapes in the so-called Happy Valley invite for lots of outdoor activities and allow you to work where others spend their holidays.





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## ABOUT THE COMPANY

LVM Versicherung is one of the top 20 insurance groups and one of the top five car insurance companies in Germany. The group has a product range for private and commercial customers and together with cooperation partners it offers other insurance and financial services products. The products are offered exclusively through about 2,230 agents, whose agencies and their about 4,800 employees are spread throughout Germany. Together with the about 3,900 employees at the headquarters in Münster, the primary goal is to achieve a high level of customer satisfaction through personal and fast service, which is made tangible for the customer by a service unit consisting of office and field staff.

This service promise is supported in the daily work by an own IT system, the “LVM-Agentensystem”. The central mapping of all relevant business data and processes ensures efficient and reliable work. This system is operated and further developed



by the about 650 IT employees at the Münster site. IT is part of the corporate strategy with corresponding importance. It is divided among three departments with a wide variety of activities ranging from Java, web or full-stack development to the company's own infrastructure with its own data centers.

LVM is regularly awarded as a great-place-to-work (e.g. *kununu*). Among other things, also due to the strong corporate culture and high security through a corporate form that focuses on all LVM customers and LVM employees instead of short-term profit realization or profit maximization.

For more information, visit [www.lvm.de](http://www.lvm.de)

## TOPICS OF INTEREST

- Software Development
- Software / Cloud Architecture
- BPM and Process Automation
- IT Security and Governance
- Enterprise Architecture
- Digital Transformation and Innovation
- BI / Data Science

## JOB OPPORTUNITIES

With over 650 colleagues, IT@LVM is making our company fit for the digital future. In doing so, we consistently rely on self-developed solutions, the latest technologies and intensive teamwork. The future is created together: Be part of it from the very beginning when something new is created and implemented. We also offer Internships, Working Student Activities and support Bachelor and Master Theses.

For more information, visit [karriere.lvm.de/it](http://karriere.lvm.de/it)



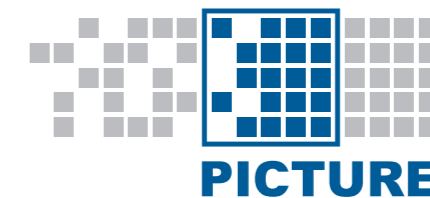
## ABOUT THE COMPANY

We combine a methodical approach, technical support and considerable process expertise with new ideas. This integrated approach helps to achieve success in process management. The PICTURE GmbH is a spin-off of the University of Münster, founded in 2007 by Lars Algermissen and Thorsten Falk. In the ERCIS network we stay connected with the university and still benefits from a transfer of knowledge. The core business segment of the PICTURE GmbH is process consulting, process analysis and organizational design. The PICTURE GmbH is a consulting firm as well as a software company with consultants and developers specialized in process consulting. The company is well known for the PICTURE method and the PICTURE platform, which in combination allow describing, analyzing and optimizing business processes within organizations.

## THE PICTURE METHOD – easy, effective, efficient.

Based upon 24 semantic building blocks the allows the construction of BPMN 2.0 process models for administrative processes in a quick and easily understood way.

This method of process modelling lays the foundation for extensive business process reengineering, as it offers a target-oriented and efficient way to analyze the elements of a company's organizational structure and business procedures.



Prozessmanagement. Einfach. Machen.

The following bullet points give a brief overview about the PICTURE method:

### Self-Explanatory

Simplified process modelling due to easy-to-use and intuitive components.

### Standardized Process Description

Increased comparability and analyzability due to a formal and contextual standardization of the description level.

### Instruction and Integration of Employees

Due to its simplicity it enables employees to adopt this model quickly and fosters staff acceptance.

### Flexibility in Process Description

The PICTURE method can be personalized according to the individual requirements of organizations.

### Efficient Process Modelling and Activity Analysis

The 24 building blocks enable to filter essential information for further analysis.

## THE PICTURE PLATFORM

The PICTURE method is embedded in the web-based PICTURE platform. This platform serves to support process management within organizations as well as between different levels of the state. The PICTURE platform is tailored to the special needs of organizations and aims to provide a vivid, precise and easily understood methodology to improve through customized processes.

Visit our website [www.picture-gmbh.de](http://www.picture-gmbh.de)

## JOB OPPORTUNITIES

Job Opportunities at the PICTURE GmbH:

- (*Junior*) Consultant
- (*Senior*) Consultant
- Software Developer

## TOPICS OF INTEREST

- Process management and optimisation
- Quality Management and Risk Management
- Organizational review
- Knowledge Management
- Task and Product Review
- Software implementation
- Process Benchmarking
- Change Management
- Process-oriented Budget Consolidation
- Implementation of Document Management
- Reorganisation



# PROVINZIAL

## ABOUT THE COMPANY

The Provinzial Group is the second largest public insurance group in Germany and belongs to the Savings Banks Finance Group – Germany’s leading and most successful financial network. We insure what is dear to our customers: their belongings, their home, their vehicle, their working power, their leisure activities, partly their health and even their lives. We are also happy to help with retirement planning.

For more than 300 years, we are where our customers are. Today, more than five million private and corporate customers place their trust in us. What makes us special is our regionality and proximity. Our advisors are at most a few minutes away from our customers and can be reached through our many digital channels at any time.

Headquartered in Münster, the Provinzial Holding AG comprises four regional indemnity and casualty insurers as well as two life insurers with locations in Münster, Düsseldorf, Kiel, Hamburg and Detmold.

## OUR IT DEPARTMENT

Within the IT department, our almost 1,000 colleagues ensure that all systems in our 1,300 agencies are running. Based on process automation and machine learning, we know faster what our customers want and are able to react appropriately. We currently process more than 40,000 individual documents per day, record more than 2,500,000 automated processes per week and execute around 35,000,000 decisions within these processes.

Our cross-functional teams range from the Baltic Sea to the Rhineland and drive our IT with agility and experience. As a financial service provider, we fulfill the highest security requirements for IT security and infrastructure according to the KRITIS standard, the critical infrastruc-



ture of the Federal Office for Information Security. With our corporate start-ups such as Apato ([www.apato.de](http://www.apato.de)) or andsafe ([www.andsafe.de](http://www.andsafe.de)) we take innovative paths and use data analytics to develop new innovative solutions for our customers.

## SELECTED ACTIVITIES

### Start-up ideas @ #gamechanger Ladies’ Dinner

An evening full of inspiration, fun and energy: Many strong women came together at the #gamechanger Ladies’ Dinner as part of Startup Week Düsseldorf. Female founders, entrepreneurs and Provinzial colleagues met to exchange ideas and enjoyed an exciting event with a guest talk by Kati Ernst, founder of ooa, as a great example of #femaleempowerment.



### Process automation @ BPM 2022

The connection between research and practice is indispensable, especially in the IT sector. As part of the International Conference on Business Process Management 2022, Provinzial hosted a workshop on process automation for students from various universities. We taught the participants the basics of process automation and explained how our productive process automation works.



## TOPICS OF INTEREST

Our IT department is a full-service provider for the Provinzial Group. We focus on:

- Business Process Management and Automation
- Data Analytics and Artificial Intelligence
- IT Security and Governance
- Enterprise Architecture
- Software Engineering
- Digital Transformation and Innovation
- Insurance and Financial Services
- Risk Management

## JOB AND COOPERATION OPPORTUNITIES

We search regularly Java developers, business analysts, IT architects and IT infrastructure specialists. We offer direct entries, trainee programs, internships as well as working student activities. You can also write your Bachelor or Master thesis with us, and we are open for research and development cooperations, co-creation, guest lectures or joint courses. Just get in contact with us.

## CONTACT

[it-perspektiven@provinzial.de](mailto:it-perspektiven@provinzial.de)

Get more information:

[www.provinzial-konzern.de](http://www.provinzial-konzern.de)

[www.provinzial-konzern.de/content/karriere](http://www.provinzial-konzern.de/content/karriere)

or follow us on 



SAP’s purpose is to help the world run better and improve people’s lives with sustainability at the core.

## ABOUT THE COMPANY

SAP’s strategy is to help every business run as an intelligent, sustainable enterprise. As a market leader in enterprise application software, we help companies of all sizes and in all industries run at their best: SAP customers generate 87% of total global commerce. Our machine learning, Internet of Things (IoT), and advanced analytics technologies help turn customers’ businesses into intelligent enterprises. SAP helps give people and organizations deep business insight and fosters collaboration that helps them stay ahead of their competition. We simplify technology for companies so they can consume our software the way they want – without disruption. Our end-to-end suite of applications and services enables business and public customers across 25 industries globally to operate profitably, adapt continuously, and make a difference. With a global network of customers, partners, employees, and thought leaders, SAP helps the world run better and improve people’s lives.

For more information, visit [www.sap.com](http://www.sap.com)

## TOPICS OF INTEREST

- Business Technology Platform
- Database & Data Management
- Intelligent Technologies
- Application Development
- Predictive Analytics
- Artificial Intelligence / Machine Learning
- Blockchain
- Cyber Security / Quantum Technologies

## Intelligent Suite

- Digital Supply Chain
- Industrie 4.0 / IoT
- Employee Experience Management
- Sustainability Footprint Management

## JOB OPPORTUNITIES

At SAP, we grow, we lead, we innovate. As colleagues, we support, challenge, and inspire one another every day. Whether connecting global industries, people, or platforms, we help ensure every challenge gets the solution it deserves. We build breakthroughs, together.

For more information, visit [jobs.sap.com](http://jobs.sap.com)

SCHWARZ



ABOUT THE COMPANY

The Schwarz Group is a leading international trading company with 550,000 employees in 32 countries and 13,450 stores worldwide. Based in Neckarsulm, Baden-Württemberg, Germany, the Group's pillars in food retailing are Lidl and Kaufland.

In addition to the retail business, the Schwarz Group has continuously expanded its portfolio: The Schwarz Production produces own brands for example in the beverages, baked goods, confectionery and ice cream sector.

The Schwarz Group has been involved in the collection, sorting and recycling of recyclable materials for many years. PreZero is the disposal and recycling service provider for the entire group.

Schwarz IT is the powerful technology partner of the entire Schwarz Group. As a central IT service provider, Schwarz IT is responsible for the selection and provision of IT infrastructure, IT platforms and business applications.

By continuously considering current technological developments, Schwarz IT identifies innovative courses of action. In close cooperation with the departments, Schwarz IT develops professional, efficient IT solutions. In total, Schwarz IT is responsible for IT at more than 13,450 locations throughout the Schwarz Group in 32 countries en-route to "Trading 4.0".



The guiding principles of the Schwarz IT are enthusiasm for innovation, proximity to people and understanding the business. As a leading technology partner, the Schwarz IT is the digital heartbeat of the Schwarz Group: **efficient, fast and flexible.**

TOPICS OF INTEREST

Digital Transformation and Innovations, Business Transformation, extensive service processes, IT architecture, Cloud Data, Informatics, Master Data Management, SAP HANA, Big Data, Business Intelligence, Artificial Intelligence & Analytics, SAP Retail/EWM/CAR, Salesforce, CRM, SuccessFactors, GK Software, Hybris, Solution Development, Design Thinking and Conversational Commerce (Chatbot, VoiceBot).

JOB OPPORTUNITIES

In a wide range of exciting tasks and global projects, employees work in a dedicated, independent and cheerful way towards providing optimum business support to Europe's largest retail company in terms of assisting global business processes, and designing, developing and rolling out systems. Furthermore, they ensure a highly-available IT system and application landscape as well as ultra-modern, high-end technologies.

Goals: The Schwarz Group is among the top retailers worldwide with annual sales of over 133,6 billion euros. The digitization of the world offers many previously unimaginable possibilities for the further development of existing business models and for the establishment of completely new concepts. For this to succeed, we create the decisive technological prerequisites.

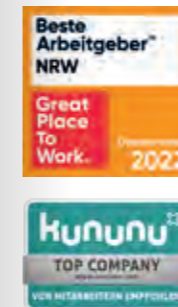
The Schwarz IT secures the diverse, global daily business of the Schwarz Group. Through the forward-looking development of innovative solutions, the Schwarz IT enables new business ideas to be put into practice.

Become part of Schwarz IT, the powerful technology partner of Schwarz Group. The Schwarz IT offers a variety of opportunities from internships to permanent positions for go getters, who want to become part of the digital heartbeat.

**Schwarz IT – more IT than you might think!** Find out about attractive job offers at

- [www.it.schwarz](http://www.it.schwarz)
- [www.xing.com/companies/schwarzitkg](http://www.xing.com/companies/schwarzitkg)
- [www.linkedin.com/company/schwarz-it-kg](http://www.linkedin.com/company/schwarz-it-kg)
- [www.kununu.com/de/schwarz-it](http://www.kununu.com/de/schwarz-it)

viadee®  
IT-Unternehmensberatung



ABOUT THE COMPANY

viadee Unternehmensberatung AG is a German IT-Company with more than 190 employees including our interns. Our company culture is dedicated to caring for each one individually, maximizing our potential. Applying this principle, we have come a long way since 1994 to offer great individual solutions to our customers.

viadee currently has an office in Münster, as well as an office in Cologne and Dortmund. We focus a regional customer base in North-Rhine Westphalia. Projects are seldom far away from our employee's home location, which proudly makes us say that most of our consultants have the chance to sleep at home. This contributes to our flexibility, family lives as well as to our CO<sub>2</sub> footprints.

The industry sectors, in which our consultants are active, include banking, electric power industry, trade, IT and service companies, logistics, public service, telecommunications, insurers, and supply plants.

TOPICS OF INTEREST

We share a passion of technological and methodical expertise. Keeping up to date with the ever-changing world of IT, there are various opportunities to grow within viadee.

Bringing BPMN (*business process model notation*) models to life is currently one of



our core activities. Prominent mention should be given to our Open Source contributions on GitHub, as well as our confluence BPMN-Modeler on the Atlassian Marketplace. Work often is organized in agile projects leveraging Java- or Cloud-based technologies, be it newest technologies like Quarkus and Micronaut or Spring Boot, or established practices like WSDL or REST. Java and SAS have accompanied us through almost all our company history and with most customers. However, we emphasize our undogmatic view on technologies and methods and use whatever is appropriate, such as Python and R in the Data Science domain.

To keep up with the scientific discussion we enjoy cooperation, both with ERCIS, and other research institutions.

Test automation is great to ensure software quality. We feel it is even greater with a tool developed here called mateo, the viadee test automation and RPA framework: An opportunity to create cross-platform integration tests, be it web-based, or on the level of an operating system.

Areas of expertise and consulting products, such as these, are invented and supported like internal start-ups by using lean methods.

Employees contribute their topics of interest as part of our research and devel-

opment activities. Right now, this is happening with IT-Security, Cloud Architecture, Process Mining, Agile Leadership, ML-Ops, and several other topics.

JOB OPPORTUNITIES

Interested in our topics and ready to take the next step? If you see yourself in a technical role, while being open and interested in the social components of everyday business life, we would love to welcome you on board.

- IT-Consultants for
- Software Development
  - Software / Cloud Architecture
  - BI / Data Science
  - BPM and Process Automation

To find out about our benefits and further job listings make sure to visit our website [www.viadee.de/karriere](http://www.viadee.de/karriere).

For a closer look at our field of interest, you are invited to follow along at [blog.viadee.de](http://blog.viadee.de) – a blog to which every employee can add content.

FOR MORE INFORMATION, PLEASE CONTACT:

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[www.viadee.de](http://www.viadee.de)



## Westfalen

### ABOUT THE COMPANY

The Westfalen Group is an expert in gases, heating and refrigeration and sustainable mobility. For almost 100 years, the family-owned company, founded in 1923, has been ensuring the safe use of gaseous and liquid hazardous substances for its customers. Westfalen's products and services support customers on the road to sustainable progress. Headquartered in Münster, Germany, the company has more than 20 production sites and numerous subsidiaries and affiliates throughout Europe. Its business areas are Industrial Gases & Services, Energy Solutions and Mobility. With around 1,800 employees, the Westfalen Group generated a turnover of around €1.9 billion in fiscal year 2021.

### Industrial Gases & Services

The Westfalen Group produces and distributes approximately 300 technical gases and gas mixtures for almost every application in industry and trade, food production, laboratories, pharmaceuticals, medicine and homecare.

### Energy Solutions

Under its Westfalengas brand, the Westfalen Group is one of Germany's leading

liquid gas supply companies. There are more than 2,000 possible applications for Westfalengas: as off-grid thermal energy for heating factories and agricultural buildings, for thermal processes in industry and commerce, or as an environmentally friendly propellant for passenger cars or forklift trucks.

### Mobility

With around 260 stations, the Westfalen Group has the largest branded-independent filling station network in Germany, primarily in North-Rhine Westphalia and Lower Saxony. In addition to conventional fuels, Westfalen and Markant stations also offer the alternative energies of LPG, charging current and hydrogen.

### A family owned company

The Fritsch-Albert family ensures continuity of the family company: Since July 2018, Wolfgang Fritsch-Albert has been Chairman of the Supervisory Board at the Westfalen Group. Prior to this, he led the company as CEO from 1977 to 2018. Renate Fritsch-Albert joined the Supervisory Board in April 2017. She was previously a member of the Executive Board.

### Climate protection with hydrogen

The Westfalen Group supports regional and nationwide environmental protection initiatives. In 2018, for example, it entered into a cooperation with Stadtteilauto Car-Sharing Münster GmbH. Both companies offer an emission-free hydrogen vehicle to rent. In October 2021, the Westfalen Group presented the mobile hydrogen filling station, a future technology that it intends to bring to the German market together with its cooperation partner NanoSun.

### Systematic energy and environmental management

The Westfalen Group has, for many years, continued to pursue a rigorous energy and environmental management system. In 2018 the effectiveness of this system was proven once again by the company's successful certification to internationally recognized standards DIN EN ISO 14001 (*Environmental Management Systems*) and DIN EN ISO 50001 (*Energy Management Systems*). In addition, more than 700,000 kilowatt hours of electricity have been saved over the past three years.

### TOPICS OF INTEREST

- Industry 4.0
- IoT in Logistics
- Data Analytics and Machine Learning
- Mobile Solutions
- Business Process Excellence
- Digital business models

Westfalen is constantly looking for new business fields and technologies in order to develop new markets and products. By strengthening entrepreneurship, the first start-up ideas have been put into practice, including the mobile payment app fillibri and the sustainability platform Sustayn.

### JOB OPPORTUNITIES

If you are interested in working with great people at the Westfalen Group, take a look at our website:

<https://westfalen.com/de/de/karriere/>



### ABOUT THE COMPANY

zeb is one of the leading strategy, management and IT consultancies specializing in financial services in Europe. We support banks, insurance companies and (tech) service providers in dealing with all the challenges and opportunities arising from transformation in the industry. As an employer, we rely on people who like to try new things, take responsibility and inspire others through their actions.

### TOPICS OF INTEREST

As a partner for change, it is our aim to improve the performance and competitive strength of our clients. The success of our consulting services is based on wellfounded methodology, combined with indepth expertise and excellent knowledge of the sector. The focus of our work lies in strategy & organization, finance & risk and IT. We intend to continue our growth path in the future. Our thematic growth focus is on management and IT consulting.

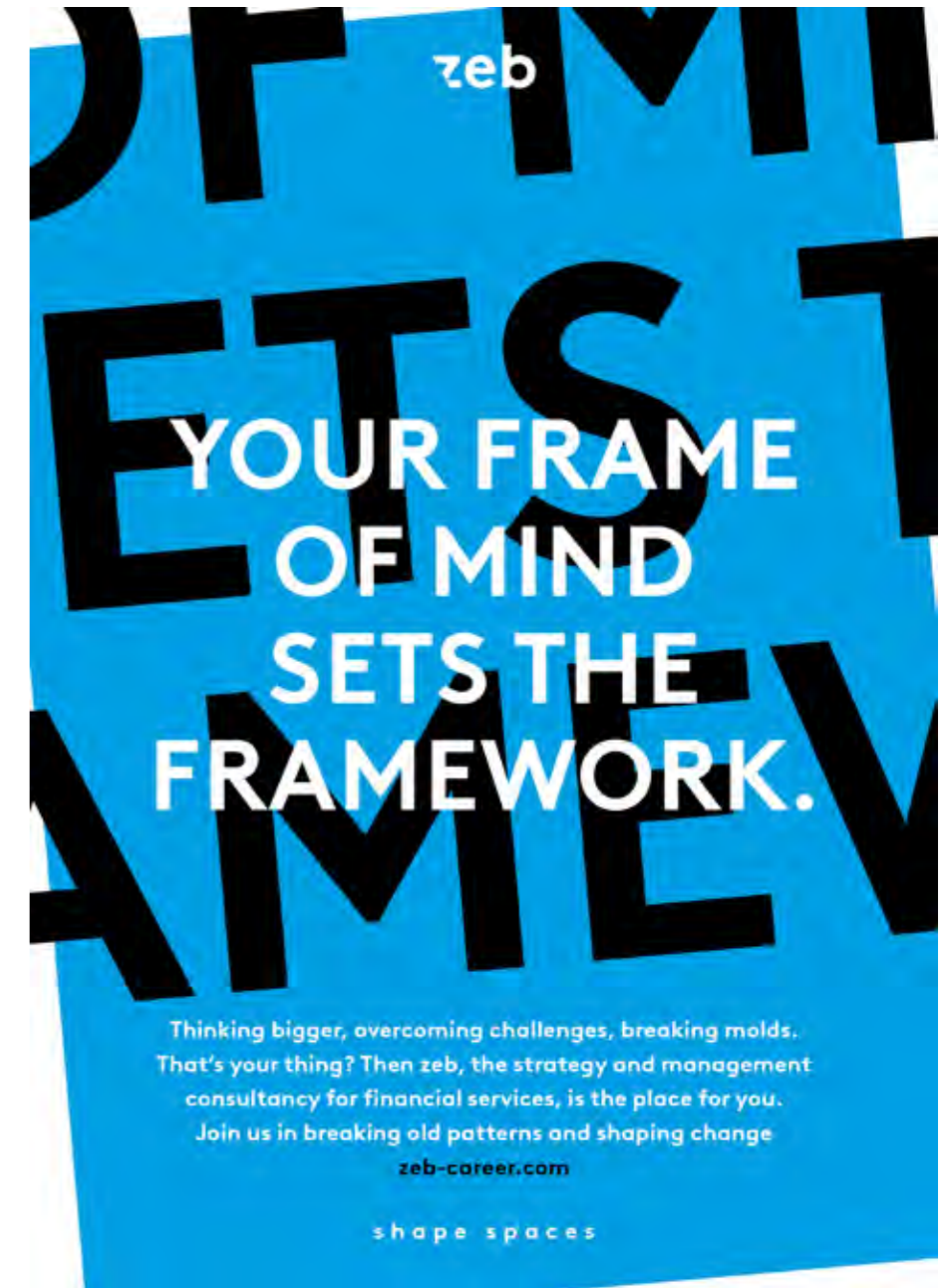
### ADDITIONAL INFORMATION

#### ABOUT THE COMPANY

#### #ShapeSpaces

Entering new spaces, shaping and designing them, grasping and changing the unknown. That's our thing. We love to discover new things, try them out and develop them further—and we love to infect others with our enthusiasm for doing so.

Shape Spaces expresses the key element of the zeb culture: shaping things. With expertise, courage and creativity, we drive the transformation of the financial sector forward. We love to discover new things, try them out and develop them further. We are looking for people who overcome boundaries, shape the future and infect others with their enthusiasm.



Shape your professional future with us.

#### Stay and grow

“Stay and grow” is our motto. zeb promotes long-term careers—with a focus on your personal career path. We are looking for people with an excellent university education and team spirit. Our principle at zeb: reasoning beats hierarchy. This means that your opinion matters. Get involved in the dialog that gives rise to something new. Listening well is just as important as arguing convincingly. Question the familiar and inspire others with your ideas. Create new solutions in a team and dive deep into the topic.

#### JOB OPPORTUNITIES

**Required specializations:** business administration, economics, (business) informatics, (business) mathematics, applied physics

#### Possibilities to join the company:

- Internship
- Student assistant
- Theses and dissertations
- zeb.bachelor.welcome
- Direct start

[www.zeb-career.com/de/](http://www.zeb-career.com/de/)  
[www.zeb-career.com/en/](http://www.zeb-career.com/en/)

Corporate headquarters of the Westfalen Group at Industrieweg in Münster.



# COMPETENCE CENTERS

The ERCIS network bundles certain areas of expertise in several competence centers. Competence centers are multi- and interdisciplinary consortia consisting of partner institutions from research as well as from practice to focus on distinct topics.

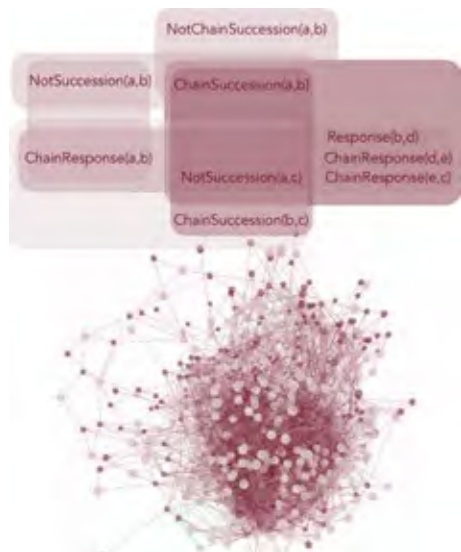
# COMPETENCE CENTERS

## CONCEPTUAL MODELING

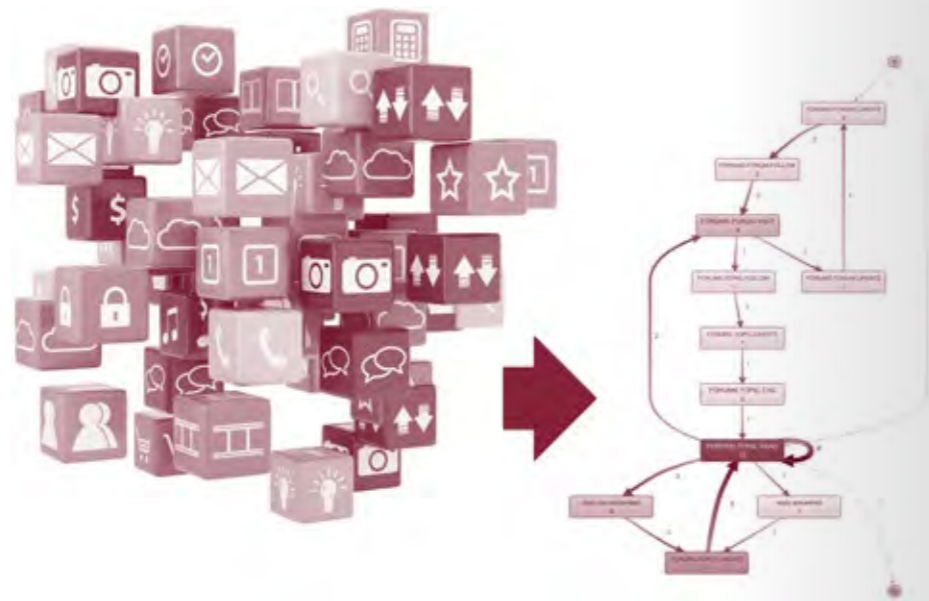
The Competence Center for Conceptual Modeling focuses on the development of novel methodologies, providing automatic support for the design, enactment and analysis of process models in different business domains. Our research is mainly based on formalisms, models and algorithms from graph theory, machine learning, propositional logic, natural language processing, ontologies, and software engineering.

## RESEARCH

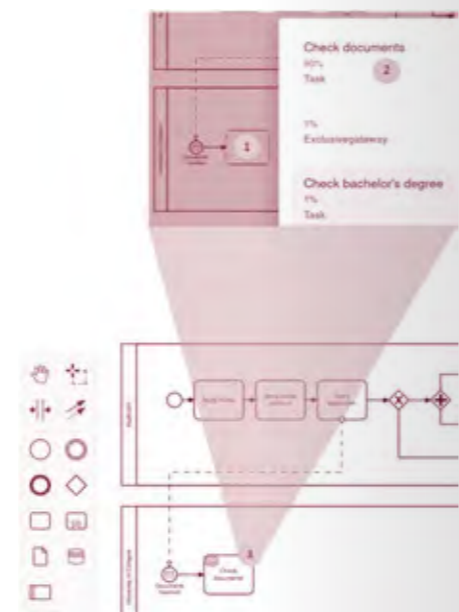
**Business Rules Management:** Business rules are formal prescriptions that a company has to comply with in order not to face negative monetary or legal effects. Business rules are used to control the execution of business processes, and they are often maintained in business rule repositories as part of process-aware application systems such as business process management software and/or workflow management systems. An important task of Business Rules Management is to maintain said repositories in order to cope with inconsistencies, for instance. In our recent research project “Handling Inconsistencies in Business Process Modeling (HI<sup>2</sup>BPM)”, which was funded for two years by the German Research Foundation (DFG, DE 1983/9-1), we have developed a methodology that can identify such inconsistencies automatically and support analysts in resolving them with corresponding inconsistency measures and visualizations.



- **(Social) Process Mining:** Process Mining is a popular research stream in the realm of Business Process Management. It develops approaches to learn the structure and behavior of a business process automatically from log files of business software. Traditional Process Mining focuses on highly structured processes as they are typically executed in enterprise systems or semi-structured processes, which are supported, for instance, by case handling systems. A new research field in Process Mining, which we initiated with our research project “Social Process Mining (SPM)”, focuses on unstructured processes as we find them in Enterprise Social Software (ESS). The goal of the SPM-project, which is funded for three years by the German Research Foundation (DFG, DE 1983/12-1), is to develop Process Mining algorithms that consider the special character of unstructured ESS processes and to apply them to large ESS log data to automatically detect typical collaboration scenarios in ESS.
- **Predictive Process Monitoring:** Predictive Process Monitoring (PPM) is used to learn the structure and behavior of a business process automatically from log files of business software and predict the future behavior of currently running process instances. The prediction results can be used to proactively influence process instances, for example, to assure beneficial behavior and avoid unfavorable one. We are happy that we could acquire a funded research project on PPM named “Context-aware Predictive Process Analytics”, which is funded by the German Research Foundation (DFG, DE 1983/13-1) for 2½ years, and which has started in November 2022.



- **Process Modeling Recommender Systems:** Recommender Systems provide automatic support for process modelers by recommending next and/or previous process activities and annotation elements during the modeling process. The recommendation is made based on the information found in the process modeled so far and based on a repository of process models and/or process ontologies commonly used in the domain. To calculate recommendations we make use of ML methods that were transferred from the field of Predictive Process Monitoring (see above). To avoid ambiguities in the naming of process elements, we use terminological standardization based on Natural Language Processing (NLP). A corresponding research project “Supporting Business Process Modeling through Pattern-based Recommender Systems (ProPoneRe)”, which we currently work on, is funded for two years by the German Research Foundation (DFG, DE 1983/11-1).



**DFG** Deutsche Forschungsgemeinschaft  
German Research Foundation



## TEACHING ACTIVITIES

We are very happy that we could offer our annual winter school, called the Ski Seminar, in January 2022 despite the pandemics. The seminar was offered for bachelor and master students, and it was organized by the University of Koblenz and the ER-CIS headquarters. The winter school took place in the Austrian Alps, so we could offer skiing as a social event

## SELECTED PUBLICATIONS

*Amann, E.; Corea, C.; Drodt, C.; Delfmann, P.:* A Dashboard Creator Suite for Simultaneous Predictive Process Monitoring. In Proceedings of the Demonstration Track at BPM 2022 co-located with the 20<sup>th</sup> International Conference on Business Process Management (BPM 2022). Münster, 2022.

*Corea, C.; Grant, J.; Thimm, M.:* Measuring Inconsistency in Declarative Process Specifications. In: Proceedings of the 20<sup>th</sup> International Conference on Business Process Management (BPM 2022). Münster, 2022.

*Corea, C.; Mansour, R.; Delfmann, P.:* Advanced Auditing of Run-Time Conflicts in Declarative Process Models using Time Series Clustering. In Proceedings der 17. Internationalen Tagung der Wirtschaftsinformatik (WI 2022). Nürnberg, 2022.

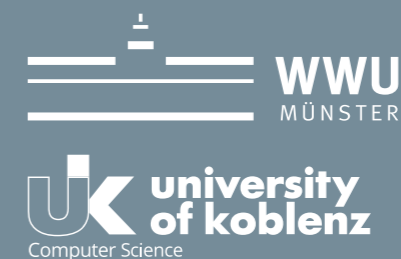
*Delfmann, P.; Riehle, D. M.; Höhenberger, S.; Corea, C.; Drodt, C.:* The Diagrammed Model Query Language 2.0: Design, Implementation, and Evaluation. In: Polyvyanyy, A.: Process Querying Methods. Springer International Publishing, pp. 115–148.

*Nagel, S.; Delfmann, P.:* Investigating Inconsistency Understanding to Support Interactive Inconsistency Resolution in Declarative Process Models. In: Proceedings of the 30<sup>th</sup> European Conference on Information Systems (ECIS). Timisoara 2022.



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Germany

# COMPETENCE CENTERS



## CRISIS MANAGEMENT

The Competence Center for Crisis Management (C<sup>3</sup>M) integrates the research efforts of the ERCIS network in the domain of crisis management (CM) and humanitarian logistics. Our main objective is to identify relevant challenges in practitioner realities and to design appropriate socio-technical solutions. C<sup>3</sup>M integrates a collaborating network of different practitioner and research organisations from the CM and humanitarian logistics domain.

## CURRENT RESEARCH PROJECTS

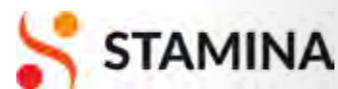
- Within this year the C<sup>3</sup>M team has intensified its research activities in response to the COVID-19 pandemic. In the two projects “EpiPredict: User-oriented Extension and Automation of Agent-based Software for Pathogen-specific Modelling of Epidemics” and “CoPredict: Covid-19 – Evaluation of prevention strategies by agent-based simulations”, both funded by the Federal Ministry of Education and Research, we developed a testbed to evaluate non-pharmaceutical intervention strategies for deeper understanding of infection dynamics. The received results certainly helped us to be granted with three new research projects in this application domain: Within the project **SpaceImpact**, funded by the German Research Foundation, we are extending the Epi-/CoPredict testbed using real-time high-resolution spatial, mobil-

ity, and behavioral data to better predict SARS-CoV-2 infection dynamics in Germany. Additionally, two inter-linked research projects, funded by the Federal Ministry of Education and Research, kicked off in May 2022: (1) the project **OptimAgent** aims at the development of a full-scale German population- and infectious disease micro-simulation system, supporting the ongoing public health decision-making as well as strengthening pandemic preparedness; (2) the project **PROGNOSIS** targets a simulation-based hospital decision support system for an improved resource management and allocation. We are grateful for joining our IS forces with over 25 domain expert- and research organizations as well as policy makers.



- While the above-described projects develop and evaluate pandemic decision support systems on a national level, our H2020 funded demonstration project “**STAMINA: Demonstration of Intelligent Decision Support for Pandemic Crisis Prediction and Management within and across European Borders**” takes a European perspective into account. Here, the role of C<sup>3</sup>M is to support pandemic management practitioners from twelve European countries in the methodological design and analysis of so-called trials to assess a potential impact of different pandemic management innovations. This year, not only several on-site trials have been executed, but the

C<sup>3</sup>M team has also represented by Michael Middelhoff as co-host of the PREPARE cluster track at the first international Pandemic Management Summit in Valencia, Spain.



- Our project “**BISKIT: Blood Information System for Crisis Intervention and Management**”, funded by the Federal Ministry of Education and Research, is slowly entering its finalization state. We have developed a simulation-based optimisation toolkit to identify and analyse different strategies improving blood supply chain performance. Additionally, we applied an enterprise architecture management approach to design a collaborative information system for blood supply chains. Currently, we are testing the developed solutions with our practitioner organizations, mainly national blood services, in South Africa, Ghana, and Nigeria. Given our emphasis on resilience of blood supply chains during crisis events, we are happy to receive further interest on our solution approaches from German blood services to getting prepared for high demand fluctuations or shortages in blood supplies.



- Last but not least, we are very excited about the kick-off of the project “**DigCBA: Responsible Use of Digital Cash Based Assistance**”, funded by the Research Council

# C<sup>3</sup>M

in Norway, and led by our **ERCIS partners at the University of Agder, Norway**. The objective is to design, develop and evaluate evidence-based frameworks to support the selection and use of the most suitable digital technology for delivering cash-based assistance to refugees. The project objective is not only perfectly matching with our past and ongoing research on humanitarian logistics but is also a stronger integration of the C<sup>3</sup>M within the ERCIS network.



## TEACHING AND OTHER ACTIVITIES

In the year 2022 C<sup>3</sup>M offered several recurring and new lectures and teaching activities. While the course “Logistics in Humanitarian Action” for the **Network on Humanitarian Action (NOHA)** at the group of *Prof. Dr. Dennis Dijkzeul*, Institute for International Law of Peace and Armed Conflict (*Ruhr Universität Bochum*), was again offered in a hybrid mode, we were very happy to run the specialization course on “Quantitative Methods and Simulation in Humanitarian Logistics” to our Münster IS students in a physical setup. It was also a pleasure having Michael Middelhoff and Dennis Horstkemper in Berlin presenting our BISKIT project at the **Innovation Forum for Civil Society** of the Federal Ministry of Education and Research. Also, our epidemics modeling expert Johannes Ponge hosted a hands-on workshop on agent-based infectious disease modeling with the German Society for Epidemiology (*DGEpi*) and the German Association for Medical Informatics, Biometry and Epidemiology (*gmds*). Finally, we would like to emphasize our intensified collaboration with the **Institute for Fire Services of North Rhine-Westphalia**. We were invited to further disseminate the results of the joint project seminar on virtual command and control systems for fire fighters within the practitioner community during the so called “blue hour”. One of the follow-up highlights was certainly being invited to contribute to a joint assessment and analysis of the German floodings in the year 2021 with the City of Erfstadt.

More to come next year!

We are very thankful for all the exchanges and in particular the trust of our practitioner organizations in the contributions of C<sup>3</sup>M. We would like to thank our partners for all the different initiatives and interest in our work and are looking forward to the next endeavours.



Blue Hour Talk at the Institute for Fire Services of NRW

## SELECTED PUBLICATIONS

*Fonio, C.; Widera, A.; Zwęgliński, T. (Ed.; forthcoming in March 2023) Innovation in Crisis Management, Routledge.*

*Horstkemper, D.; Reuter-Oppermann, M. (2022) Bloodchainsim – A Simulation Environment to Evaluate Digital Innovations in Blood Supply Chains. Winter Simulation Conference 2022, Singapore.*

*Neubauer, G.; Ignjatovic, D.; Schimak, G.; Peham, J.; Bürger, B.; Widera, A.; Middelhoff, M.; Gehre, F.; Affara, M.; Blazun Vosner, H.; Završnik, J.; Jus, A.; Rainer, K.; Leidwein, A.; Kokol, P. (2022) Perspectives on the Future Cross-border Pandemic Management, IDIMT 2022.*

*Sahlmüller, Till; Hellingrath, Bernd (2022): Measuring the Resilience of Supply Chain Networks. ISCRAM 2022.*

*Widera, A. (2022) Performance Management in Humanitarian Logistics Development of a Process-driven and IT-supported Performance Measurement System. Logos.*

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# DTM for SMEs

**DIGITAL TRANSFORMATION MANAGEMENT FOR SMES**

Please remark a slight change in the title with the introduction of the word ‘management’ as in Digital Transformation Management for SMEs (*Small- and Medium-sized Enterprises*). With this small change we want to emphasise the strategic aspect of the research and innovation work.

SMEs (*small and medium-sized enterprises*) account for 60 to 70 per cent of jobs in most OECD countries. Throughout they also account for a disproportionately large share of new jobs created. So, helping SMEs to grow helps the whole economy growing and provide a distribution of welfare in society.

Digital transformation is challenging for most firms who struggle with effectively understanding the opportunities and consequences of digitalization to their business and how they should transform. This struggle is especially true for small- and medium size enterprises, who may not have the financial resources needed to source the capabilities for managing this transformation. Here is where this competence centre comes in.

**PROJECTS AND ACTIVITIES**

The Competence centre for Digital Transformation Management for SMEs vision is to do action- and design research into how SMEs may acquire the needed capa-



Supply chains and value chains (illustration Colourbox)

bilities to succeed. Central research questions here will be what capabilities are most needed, and how these capabilities can they be sourced. A central proposition is that SMEs may benefit from co-creating such knowledge, skills and capabilities, with their business partners and customers, with one-another through business networks, and with academia and higher education.

The CCDT network is open for all interested ERCIS members, but also other researchers, organizations and institutions may join this network, though «snowballing», e.g., recommendations by members that thinks that this or that actor may contribute to our vision and mission (see [ccdt.ercis.org](http://ccdt.ercis.org) and contact data on this page).

Members of the CCDT-network has contributed to several projects aimed at fulfilling the networks vision, and provide insight, knowledge and learning material aimed at improving digital transformation capabilities in SMEs. The VOIL-project, Virtual Open Innovation Lab, was co-funded with the EU’s Erasmus plus program, and completed in 2021. the portal that was created can be accessed through Home | Voil Platform ([voil-platform.eu](http://voil-platform.eu)).

In 2022 members from the network have contributed together with other partners, in projects like «Be Prepared» (SMEs:

*Be Prepared for Supply Chain Risks!* see <https://beprepared-project.eu/>), also this project is co-funded with the EU’s Erasmus Plus program.

«Supply chains have become more and more connected and globalized. Data exchange has increased over the years due to the ICT advancements. Even though this increased data exchange can contribute to certain benefits such as improved processes and planning it also bears several risks such as the loss of proprietary knowledge or unintended revelation of crucial business insights to other actors» (Source <https://beprepared-project.eu/> , accessed October, 2022).

In connection with the «Be prepared» project and following up the VOIL-platform’s Transformation and Co-creation Lab, members have also contributed to the Wiesbaden Business School – Research Summer School (17.–24.07.2022). In the summer school that was organized as a seminar, onsite and online, a case-study regarding an SME preparing for complying with the new supply chain transparency laws coming in Germany and several other European companies was disseminated.

The new transparency laws says that companies may provide open data on social responsibility and sustainability for all suppliers throughout their supply chain. The

German SME that provided the case study co-create a blockchain-based information system, for this purpose, with another SME, a technology-company (Gräslund, 2022).

The Competence centre for Digital Transformation Management for SMEs and its members wish to continue to contribute to similar value-chain or supply chain related projects and activities in future, as the ones described here!

Members of CCDT have had roles as organizers, chairs, written articles or in other ways contributed to the Business Process Management: 20<sup>th</sup> International Conference, BPM 2022, Münster, Germany, September 11–16, 2022. CCDT now has a channel on ERCIS’ chat-system, Mattermost, so feel free to use this channel! We appreciate ideas and initiatives from our members! Gräslund, G. (2022) Blockchain, SMEs, Supply Chain Risks. Research Summer School 2022 @ Wiesbaden Business School. Summer School und Forschung zur Digitalisierung des Mittelstands in unserer Research Summer School! Research Summer School – Hochschule RheinMain ([hs-rm.de](http://hs-rm.de)), accessed October 2022.

**PUBLICATIONS**

Example publications within the field of interest with contributions by members:

Ramos, I., North, K., Thalmann, S., Aramburu, N., Hermann, A., Gräslund, K., & Barros, V. (2022, June). Using Simulation to Leverage Digital Transformation of SMEs: A European Perspective. In HICSS (pp. 1–10).

Barros, V. F., & Ramos, I. (2022). Organizational mindfulness to innovation at an organization in the cork sector. Information Technology & People.

Acilar, A., Håkon Olsen, D., Garmann-Johnsen, N. F., & Eikebrokk, T. R. (2021). Factors Contributing to the Business Digital Divide: A Systematic Literature Review.

Kabudi, T., Pappas, I. O., & Olsen, D. H. (2022). Deriving Design Principles for AI-Adaptive Learning Systems: Findings from Interviews with Experts. In Conference on e-Business, e-Services and e-Society (pp. 82–94). Springer, Cham.



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**GET IN TOUCH!**

If you are interested in our work, have ideas, or you would like to collaborate with us, please do not hesitate to get in touch with us!

## E-GOVERNMENT

The E-Government Competence Center brings together members in the ERCIS network working on digitalization in the public domain. Our research covers a broad range from individuals' use of e-government technology to e-participation to process management.

### Future Digital Towns

Pushed by colleagues from the Competence Centers headquarters, the application to establish a research group funded by the German Research Council (DFG) focussing on different aspects of digital towns was successful and we are more than happy to start in 2023 with our collaborative research. The research group **Future Digital Towns** will investigate how mid-sized cities, i.e. towns, meet the challenges of digitalisation and develop digital instruments to strengthen their liveability. The project focuses on the four central structural areas of a town: government & administration, economy, labour & energy, civil society & social services and, finally, education & culture.

The digital transformation as an ever-increasing networking of information and processes offers enormous potential for all areas of life and work. Many of today's most pressing problems can be addressed through digitalisation, e.g. through the more sustainable use of existing resources. At the same time, digitalisation also poses major challenges for actors, especially if, for example, financial or material resources to implement digitalisation projects in a sustainable way are lacking. In this context, current research often discusses the transformation of cities, mostly metropolitan areas, through digitalisation, referred to as 'Smart Cities'. Proposed concepts are often based on the given, very narrow local structures, large administrations, and the associated large pool of resources.

However, towns outside of metropolitan regions, which have similar structural problems as large cities, but at the same time have specific characteristics that prevent a

one-to-one transfer of smart city concepts, are out of sight. As a rule, mid-sized cities have 20,000 to 100,000 inhabitants, and it is precisely in rural areas, where there is an increasing number of cities of this type, that they have an important social, political and economic significance as a centre for even smaller towns and municipalities in the surrounding area.

In six sub-projects, the research group analyses specific challenges of towns and develops instruments with which these can be met, so that digital towns can be developed that preserve the identity of and identification with the town and region. Participating from the field of Information Systems are Jörg Becker, Thomas Hupperich, Bettina Distel, and Hendrik Scholta, from Educational Science Marcelo Parreira do Amaral, from Sociology Matthias Grundmann, from Political Science Norbert Kersting, and from Economics Andreas Löschel, now Ruhr University Bochum. The research group is funded with about 2.2 million euros. Its spokesperson is Jörg Becker.



**eGov-Campus at the University of Münster**  
Public service delivery becomes increasingly digital, making e-government endeavours more and more important. However, the public sector still faces a lack of personnel with sufficient IT competence to master this enormous challenge. To overcome this problem, the research project "eGov-Campus" started in 2020 intending to build up a nationwide e-learning platform for e-government, enabling public officials to develop such IT competences.

The first course to go online in 2021 was about process management in the public sector held and managed by semester Jörg Becker and the CC eGov. So far, more than 1.600 participants from all over Germany participated in the online course and rated it very positively. Also, there are now 13 additional courses by the different partnering institutions on the platform. The number of courses offered on the eGov-Campus platform (<https://egov-campus.org>) is continuously increasing so that we will reach a considerable impact on public sector digitalisation in Germany. To further increase this impact, we have held the process management course in hybrid form together with Speyer University, responsible for administrative sciences in Germany, this year for the first time. The CC eGov also takes over a coordinating role in the project. The project is funded by the German IT planning council and lasts until 12/2022. The Hessian State Chancellery serves as the project administrator. A follow-up project to organise the long-term continuation of the eGov-Campus service is planned for 2023.



### Activities at Agder

Researchers from the University of Agder are currently working on several research projects in collaboration with the Norwegian Welfare and Labour Organisation (NAV). In their project "AI4 Users", Xenia Vassilakopoulou, Ilias Pappas, and their team contribute to the responsible use of AI for the digitalisation of public services. They analyse how to design AI intelligibility and accountability tools for non-experts facilitating meaningful human control. In cooperation with researchers from Denmark, Sweden, and Norway, Sara Hofmann, Øystein Sæbbø, and colleagues challenge the paradigm that all public services should be digitalised. Through broad empirical data collection with citizens and public sector employees, they identify what public services are actually suitable for digitalisation.

## SWEG

In February 2022, the University of Agder hosted the Scandinavian Workshop on E-Government with 25 participants. The aim of SWEG is to present work in progress and receive constructive feedback for the future development.

### Master's Program Public Sector Innovation and E-Governance (PIONEER)

PIONEER is a joint master program organized by the KU Leuven, the University of Münster and TalTech University Tallinn providing the students with interdisciplinary expertise. The fifth cohort has attended the summer semester in Münster. After two years of virtual studies, we were more than happy to welcome the cohort also physically in Muenster. While the fifth cohort has moved to Tallinn now the sixth cohort with 19 students started in Leuven – and we are awaiting them in April 2023 in Münster. Furthermore, we were able to successfully apply for new ERASMUS funding so that PIONEER will be an ERASMUS Master again from 2023 on!

### Three papers from students accepted at EGOV-Conference

In the winter semester of 2021/22, students of one of Muensters master seminars examined the European Commission's current digital program "European Digital Decade" from various perspectives and with different thematic focuses. The program provides comprehensive digitization measures in all areas of life, and the seminar focused on topics related to the digitization of public administration.

The aim of the seminar was to approach the topic from a scientific perspective and to design and carry out research projects on digital change in Europe in small teams and subsequently prepare them in the form of a conference article and a scientific poster.

Five of the six participating groups submitted their papers to the IFIP EGOV conference. Three of the submissions were accepted as full papers!

The following papers were accepted:

- *Simon Schimpe & Sophie Maierhofer*: Design Principles for EU Cross-Border Services
- *Irisa Murataj & Maximilian Schulte*: No-Stop Government: Expected Benefits and Concerns of Young Adult German Citizens
- *Christian Gutowski & Jing-Heng Kao*: Investigating Trust and Risk Perceptions in a Hybrid Citizen Journey

### Federal Information Management

The Federal Information Management (FIM) aims to unify and standardize information on public services throughout Germany. In order to be able to successfully realize this endeavour, a clean and well-structured data management regarding the services and data is a necessity. With the goal to improve the data management in FIM, the FIM@Dataport project was started. A team of the CC eGov analysed the current state of the services' keys and created proposals for the adaptation of the key concept, addressing found irregularities.

### SELECTED PUBLICATIONS

*Ida Heggertveit, Ida Lindgren, Christian Østergaard Madsen, Sara Hofmann (2022)*. Administrative Burden in Digital Self-Service: An Empirical Study About Citizens in Need of Financial Assistance. Proceedings of the electronic government conference: Lecture Notes in Computer Science.

*Kregel, I., Distel, B., & Coners, A. (2022)*. Business Process Management Culture in Public Administration and Its Determinants. Business & Information Systems Engineering (BISE), 64(2), 201–221.

*Koddebusch, M., Halsbenning, S., Kruse, P., Räckers, M., & Becker, J. (2022)*. The Increasing e-Competence Gap: Developments over the Past Five Years in the German Public Sector. In Fui-Hoon, N. F., & Siau, K. (Eds.), HCl in Business, Government and Organizations. HCII 2022 (pp. 73–86). LNCS: Vol. 13327. Cham, Switzerland: Springer Nature.

# eGov

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## Service Science at the European Research Center for Information Systems

### SERVICE SCIENCE

The Service Science Competence Center is ERCIS' primary unit for conducting research and industry projects in the area of service management and service engineering. The team currently consists of two professors, one executive, and 17 research assistants. The proliferation of the Service Economy has changed the way in which the creation of value is perceived throughout various industry sectors and societies. Selling products is increasingly replaced by customized service offerings and alternative revenue streams (e.g., *power-by-the-hour*). Research in the academic discipline of Service Science, Management and Engineering is focused on understanding and facilitating the creation of value in service systems, involving interactions of service providers and service customers. The mission of the ERCIS Service Science Competence Center is twofold. On the one hand, we strive to understand the nature and impact of service orientation on commercial businesses, the public sector, and society in general. On the other hand, we contribute to further shaping the course of the service economy by designing new business solutions and software artefacts. Our research is equally dedicated to research excellence and to providing results that companies can utilize to further shape their businesses in the service society. We achieve this goal based on a network of excellent researchers in the ERCIS network.

### SELECTED RESEARCH PROJECTS

- **Context-aware Predictive Process Analytics**

The goal of the project is to develop a context-aware predictive process monitoring approach that is based on probabilistic models from the field of Dynamic Bayesian Networks (DBN). The approach will be able to forecast what activity of a currently running process instance will be likely seen next. By including context information of a process, we seek to achieve a high prediction accuracy. Context can significantly influence the behavior of a process, so we can expect that being aware of what context has been present in a process instance can increase the prediction accuracy of a predictive process monitoring approach (e.g., *the amount of a loan in a loan approval process may have a considerable influence onto the subsequent decisions made in the process and thus influences its behavior*).

- **Workaround Mining**

In a series of joint research papers, we have designed and evaluated new methods for workaround mining. Workarounds are goal-driven deviations from standard operating procedures to overcome obstacles constraining day-to-day work. Since workarounds are not the same as process deviations, we must establish different methods for identifying workarounds from event logs. Service processes, in particular, are subject to workarounds since they

are subject to value co-creation by service providers and customers. Different value propositions offered to customers can lead to the need to adapt a process, causing workarounds. Our research shows how workarounds diffuse through an organization, changing the very nature of the underlying business process.

- **ChangeWorkaround: Using Workarounds for Adaptable Business Processes in Industry**

In our new research project, ChangeWorkaround, we establish new methods and tools that industrial companies can use to translate workarounds into process innovation. The project consortium includes research institutions and companies, some of which are part of the ERCIS network. We will document workarounds and their causes in three different industrial companies. Then, we will design new methods that process managers can use to identify, analyze, evaluate, and implement workarounds as regular process innovation. Our approach includes new Information Systems approaches and innovative personnel and change management methods that will enable workers and decision makers to innovate their processes based on workarounds. Our vision is to reduce the time required for implementing a workaround as a bottom-up process innovation from several years to several months, improving the agility and resilience of the companies involved.

### ACADEMIC ACTIVITIES

- Martin Matzner and the Chair of Digital Industrial Service Systems at FAU co-organised the 17<sup>th</sup> Internationale Tagung Wirtschaftsinformatik in 2022 in Nuremberg. Starting from 2023, Martin is editor-in-chief of the Journal of Service Management Research.

- Daniel Beverungen is the spokesman of the Software Innovation Campus Paderborn (SICP). The SICP is a network of more than 27 professors and more than 25 companies that cooperate in designing software innovations for our digital society. Besides other editorial roles, he is a conference and program chair for the 18<sup>th</sup> Internationale Tagung Wirtschaftsinformatik in Paderborn. In 2022, Daniel edited a special issue on digital transformation for the journal Electronic Markets and co-chairs an AMCIS Track on Digital Platforms in 2023.

- Christian Bartelheimer is a postdoc at Paderborn University and serves as a treasurer and secretary for the AIS Special Interest Group on Services (SIGSVC). He will co-organize a track on digital services for a human-centered society 5.0 at AMCIS 2023 and a workshop on intelligent services and information systems at ICIS 2022.

### SELECTED PUBLICATIONS

*Bartelheimer, C.; zur Heiden, P.; Lüttenberg, H.; Beverungen, D. (2022): Systematizing the Lexicon of Platforms in Information Systems: A Data-Driven Study. Electronic Markets 32, pp. 375–396.*

*Röglinger, M.; Plattfaut, R.; Borghoff, V.; Kerpedzhiev, G.; Becker, J.; Beverungen, D.; vom Brocke, J.; Van Looy, A.; del Rio Ortega, A.; Rinderle-Ma, S.; Rosemann, M.; Santoro, F.M.; Trkman, P. (2022): Exogenous Shocks and Business Process Management: A Scholars' Perspective on Challenges and Opportunities. Business & Information Systems Engineering.*

*Pauli, T.; Fielt, E.; Matzner, M. (2022): Digital Industrial Platforms. Business & Information Systems Engineering 63(2), pp. 181–190.*

*Beverungen, D.; Kundisch, D.; Wunderlich, N.V. (2021): Transforming into a Platform Provider: Strategic Options for Industrial Smart Service Providers. Journal of Service Management, 32(4), pp. 507–532.*

*Matzner, M.; Pauli, T.; Marx, E.; Anke, J.; Pöppelbuß, J.; Fielt, E.; Gregor, S.; Sun, R.; Hyde, K.; Aas, T.H.; Aanestad, M.; Gordijn, J.; Kaya, F.; Wieringa, R. (2021): Transitioning to platform-based services and business models in a B2B environment. SMR-Journal of Service Management Research, 5(3):143–162.*

*Weinzierl, S.; Wolf, V.; Pauli, T.; Beverungen, D.; Matzner, M. (2021): Detecting Temporal Workarounds in Business Processes – A Deep Learning-Based Method for Analysing Event Log Data. Journal of Business Analytics 5(1), pp. 76–100*



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# COMPETENCE CENTERS



## SMARTER WORK

Modern organizations increasingly use digital technologies to perform and organize work, transforming workplaces in multiple ways. Digital technologies facilitate communication and collaboration among workers and, thus, enable work in distributed teams with flexible working hours and locations (*i.e., virtual or hybrid work*). Digital technologies can also help to manage and investigate work patterns using insights from data on people and processes (*i.e., people analytics*). Furthermore, technological developments in artificial intelligence allow to support and automate an increasing number of tasks and to establish collaboration between human workers and IT systems. These developments affect what, when, where, and how people work. Managing this transformation of work poses a major challenge for organizations. “Smarter Work” describes an approach to designing these new ways of working with a strong emphasis on the well-being and productivity of all actors involved.

The **Competence Center Smarter Work** is a cooperation platform for researchers and practitioners who seek to investigate the transformation of work and to support organizations with the introduction, use, and management of digital technologies at the workplace. For this purpose, we build on years of experience with transformation processes and help exploit the potential of new working modes using conscious and coordinated use of technologies. We integrate individual and organizational perspectives in our research, characterized by pursuing long-term improvements. To this end, we seek a nuanced understanding of underlying organizational problems as a basis for actionable suggestions. We combine a broad repertoire of methods (*e.g., surveys, interviews, physiological measurements, digital forensics*) with traditional and innovative theories, enabled by our interdisciplinary team of scientists from business, computer science, psychology, and sociology, as well as practitioners from the IT industry.

## NEWS FROM THE COMPETENCE CENTER

- With the beginning of the winter term 2022/23, Prof. Dr. Benedikt Berger has joined the competence center as academic director. Together with Prof. Dr. Stefan Klein, Benedikt Berger will lead the center. Benedikt Berger is Junior Professor for Digital Transformation and Society at the School of Business & Economics at the University of Münster.
- From January 2023 onwards, Prof. Dr. Julia Backmann will join the competence center as an academic member. Since August 2022, Julia Backmann holds the Chair for Transformation of Work at the School of Business & Economics at the University of Münster.

## SELECTED RESEARCH PROJECTS

- **Enhancing Knowledge Management with Speech-Based Systems**  
(*B. Berger in cooperation with A. Koslow and T. Hess*)  
Knowledge management remains a challenge for most organizations despite considerable efforts by researchers and practitioners to advance this domain. A particular problem is the capture and storage of tacit knowledge (*i.e., knowledge externalization*), which people often transfer verbally. However, recent technological advances in speech recognition and natural language processing open new avenues to support knowledge externalization. In this research project, we follow a design science approach to investigate how speech-based systems may help capturing and storing tacit knowledge. For this purpose, we design and evaluate a high-fidelity prototype that facilitates the creation of meeting protocols. The results shed light on how digital assistants, such as speech-based systems, change knowledge work.
- **Adapting Voice Assistants' Complexity to Their Users Cognitive Abilities**  
(*B. Berger in cooperation with C. Rzepka and T. Hess*)  
Technological advancements in the domain of artificial intelligence have led to the proliferation of voice assistants, which

can process speech inputs and provide spoken outputs. However, we know little about which tasks, users, and contexts could profit from speech interaction. In this research project, we examine whether users' cognitive abilities affect speech interaction's efficiency. Since voice assistants request and present information sequentially, their users need to memorize the requested or presented information, which causes pressure on users' cognitive resources. These resources decline with age, questioning the applicability of speech interaction for older users. Because older workers constitute an increasing share of the workforce in developed countries, we investigate whether older workers profit from an adapted speech interaction that eases cognitive pressure.

## Individual Work Tactics

(*Pls S. Lansmann, L. Strahringer, R. Haines*)  
**LVM** **VERSICHERUNG** Concentrated and uninterrupted individual work is crucial for the productivity of knowledge workers. Yet, finding sufficient time for individual work is becoming increasingly difficult, especially for knowledge workers simultaneously involved in several teams or projects. Building on the experience gained during the COVID-19 pandemic, we investigate how multi-team knowledge workers engage in individual work. We shed light on the question why knowledge workers need individual work and what problems they encounter to make time for uninterrupted work. We further capture different degrees of effort to plan and defend individual work episodes in three patterns we conceive as individual work tactics. These tactics exhibit how individuals draw boundaries against meetings and interruptions. We argue that individual work should not be treated as a residual value that gets pushed to the boundaries of the workday. Instead, multi-team knowledge workers need to craft and subsequently defend individual work against the demands of collaborative work.

## SELECTED PUBLICATIONS

*Rühr, A., Berger, B., & Hess, T. (2022).* Intelligente IT-Systeme im Unternehmen. In: Knappertsbusch, I., Gondlach, K. (eds) Arbeitswelt und KI 2030. Springer Gabler, Wiesbaden.

*Rzepka, C., Berger, B., Tams, S., & Hess, T. (2022).* The Complex Role of Complexity in the Use of AI-based Technologies: Evidence from Voice Assistants. In Proceedings of the Workshop “Conversational Customer Interaction: Dialog zwischen Praxis und Wissenschaft” at the 17<sup>th</sup> International Conference on Wirtschaftsinformatik (WI), Nuremberg, Germany.

*Lansmann, S., Strahringer, L., & Pullar, L. J. (2022).* Show Me the Meaning of Working Lonely: Conceptualising the Interrelation between Individual and Collaborative Work. In Proceedings of the 30<sup>th</sup> European Conference on Information Systems, Timisoara, Romania

*Mattern, J., & Klein, S. (2022).* Online, On Call, On Your Mind? Coping with Extensive Connectivity to Work. Communications of the Association for Information Systems, 51(1), pp. 256–280.

*Hüllmann, J. A. (2022).* Reconciling the Debate on People Analytics in Academia and Practice. In Proceedings of the 35<sup>th</sup> Bled eConference, Bled, Slovenia.

*Hüllmann, J. A. (2022).* Media Choice in the Digital Era: A Replication Study using Digital Traces. In Proceedings of the 35<sup>th</sup> Bled eConference, Bled, Slovenia.

*Hüllmann, J. A. (2022).* Explainable AI in Farming: Configurations of Human-AI Joint Decision-Making. Proceedings of the AI@Work Track at Reshaping Work 2022 Conference.

*Dassel, K. S. (2022).* Information Privacy Decision-Making: Explaining and Enabling Individual Privacy Management Through Social and Contextual Norms. Dissertation at the Universität Münster.

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*Thapa, R. (2022).* Making Sense of Leadership Practices in Self-Organizing Teams. Dissertation at the Universität Münster.



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## COMPETENCE CENTERS



### SOCIAL MEDIA ANALYTICS

The Competence Center Social Media Analytics (CC SMA) continues – and since last year in close collaboration with the Topical Program on Algorithmization and Social Interaction ([www.algorithmization.org](http://www.algorithmization.org)) – to deal with challenges due to the rapid and often disruptive evolution of social media technology. The main research focus of the CC SMA is the misuse of social media technology for disinformation, propaganda, and fake news distribution. The (*international*) partners approach the topic from the different angles of their respective disciplines: computer science, psychology, statistics, journalism and media, communication science, as well as mathematics.

### RESEARCH, NETWORKS, AND COLLABORATIONS

In close cooperation with the BMBF-funded joint research project HybriD, which focusses on the detection and classification of disinformation patterns in social media the CC-SMA observed campaigning activities in social media platforms. Since the outbreak of the Russian war in Ukraine on February 24, 2022, disinformation campaigns and cyber activities accompanying this conflict have been a major focus of interest in the research field. Members of CC-SMA were able to record and publish a rare Twitter streaming dataset of the conversation regarding the keywords “Russia” and “Ukraine” in a period from one week before to two weeks after the start of the Russian invasion of Ukraine. These data are also used as input for methodological development in the HybriD project and for research collaborations within the CC-SMA.

In addition, members of CC-SMA in cooperation with a major developer and provider of a European content (*text and images*) generating model (*MAGMA by Aleph Alpha*) were able to publish a paper showing perspectives of future automation and potentials of future social bot implementations. This follows other research activities by members of CC-SMA in the context of disinformation campaign detection, the use of social bots in the context of counter-speech, or network analysis.

With regard to networking and collaboration, two different network activities grew out of the context of the Competence Center and the Topical Program ‘Algorithmization and Social Interaction’ in 2022, which are closely related to the research of SMA: Members of the CC-SMA from Germany and the Netherlands played a leading role in founding the Social Influence Analysis (SIA) Network. This network is dedicated to researching various aspects of social influence from a methodological perspective. The established research focus (*also in economic application*) deals with the new and even more extensive meaning of influence in the context of social networks. The spread of disinformation and the manipulation of users’ thoughts and behavior are closely linked to the classic definition of social influence. The newly formed group looks in particular at approaches and methods for exploring social influence in social networks. The group focusses on methods and algorithmic approaches for the detection of influential campaigns (*on the content level*), the modeling of the effect of countermeasures against disinformation and hate, the consideration of opti-

mization problems (*e.g., the maximization of influence*). Besides that, the modeling of dynamics in network structures (*over time*) and the definition of suitable measures for the determination of influence variables are at the center of the joint research efforts. Partner institutions of this network come from all over Europe: Germany, the Netherlands, Poland, and Italy.

During the first half of 2022 members of the CC-SMA were strongly involved in organizing the EU Theme Development Workshop “AI: Mitigating Bias & Disinformation” in collaboration with CLAIRE, AI4Media and other European key players in the context of AI and social media research. The workshop was held virtually in May 2022 and the CC-SMA was involved in organizing and chairing two sessions on Automation in Online Media as well as on Abusive Language Detection and Comment Moderation.

### TEACHING ACTIVITIES

As part of a DAAD-IVAC funded the Universities of Münster, Twente and Leiden held a collaborative virtual Master & PhD-level course on the topic of “AI, Human Rights and Ethics”. The course covered the fields of Computer Science, Information Systems, and Law to provide a comprehensive view on many aspects of AI development and application. Over two terms, more than 60 Students actively participated in this course and discussed diverse topics, which will be published in an edited book soon. Additionally, the CC-SMA was actively involved in the organization of a lecture series on disinformation research related topics (*some topics were social bots, psychological aspects of disinformation, conspiracy narratives, and dis- and misinformation in media*) held during the summer term 2022 at the University of Münster.

### MISDOOM again: first US-hosted edition

Members of the CC SMA supported Boise State University in organizing the fourth edition of the Multidisciplinary International Symposium on Disinformation in Open Online Media (<https://www.boisestate.edu/misdoom-2022/>).



For the first time MISDOOM was organized overseas in the US. The symposium still follows the initial idea of a multidisciplinary joint conference on disinformation research bringing together computer science, social science, political science, journalism, and public services. Again, the conference featured four highly interesting keynotes from different scientific domains and many parallel sessions in a packed two-day program during 11–12 October 2022.

### PUBLICATIONS

Many members of the CC SMA have published multiple papers on disinformation identification, algorithmization as well as on methodological issues:

*Pohl, J.S., Assenmacher, D., Seiler, M.V., Trautmann, H., & Grimme, C. (2022).* Artificial Social Media Campaign Creation for Benchmarking and Challenging Detection Approaches. Workshop on Novel Evaluation Approaches for Text Classification Systems on Social Media (*NEATCLAS*) as part of the AAAI 16<sup>th</sup> International Conference on Web and Social Media, Atlanta, USA.

*Assenmacher, D., & Trautmann, H. (2022).* Textual One-Pass Stream Clustering with Automated Distance Threshold Adaption. ACIIDS Conference, Ho Chi Minh City, Vietnam

*Pohl, J., Seiler, M., Assenmacher, D., & Grimme, C. (2022).* A Twitter Streaming Dataset collected before and after the Onset of the War between Russia and Ukraine in 2022. Social Science Research Network (*SSRN*).

*Grimme, C., Pohl, J., Cresci, S., Lüling, R., & Preuss, M. (2022).* New Automation for Social Bots: From Trivial Behavior to AI-Powered Communication. In Multidisciplinary International Symposium on Disinforma-

tion in Open Online Media (pp. 79–99). Springer, Cham.

*Clever, L., Klapproth, J., & Frischlich, L. (2022).* Automatisierte (Gegen-) Rede? Social Bots als digitales Sprachrohr ihrer Nutzer\* innen. In *Gegenrede digital* (pp. 11–26). Springer VS, Wiesbaden.

*Lena Frischlich, Lara Kuhfeldt, Tim Schatto-Eckrodt & Lena Clever (2022).* Alternative Counter-News Use and Fake News Recall During the COVID-19 Crisis, Digital Journalism

*Weber, D., Falzon, L., Mitchell, L., & Nasim, M. (2022).* Promoting and countering misinformation during Australia’s 2019-2020 bushfires: A case study of polarisation. *Social Network Analysis and Mining* 12(64). Springer Science and Business Media.

### ACTIVITIES

- The CC SMA organized the Workshop on Social Influence Analysis held as part of the newly established SIA Network at University of Twente in February 2022.

- Guest Lecture at University of Twente by Christian Grimme: Disinformation via Social Media: Social Bots, Campaigns, and Computer Science Approaches to foster Resilience.

- The CC SMA was part of the organizing committee of the EU Theme Development Workshop “AI: Mitigating Bias & Disinformation” in May 2022 organized together with CLAIRE, DFKI, TAILOR, VISION, HUMANE AI NET, and the Topical Program on Algorithmization and Social Interaction.

- Members of the CC-SMA actively participated in the “Cyber (In)Securities: Online Disinformation and Cyber Propaganda and its Impacts on International Politics” Workshop, which was organized by the

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ODISCYE project of Research Center Risk, Infrastructure, Security and Conflict held at the Bundeswehr Cyber Hub.

- The CC SMA supported the organization of the MISDOOM 2022 in Boise, ID, USA.

# COLLABO- RATIONS

A network is, according to Merriam-Webster, “[...] a usually informally interconnected group or association of persons (*such as friends or professional colleagues*)”. Let this speak for itself. The ERCIS network was founded to work and research together in the wider field of Information Systems. The collaborations presented in this report provide an insight into what we do – as a network.



Erasmus+ Project – AI-Bility

## ERASMUS+ PROJECT:

### AI-BILITY: CULTIVATING AI AWARENESS IN SCHOOLCHILDREN

An abundance of smart toys, adaptive learning applications, and digital assistants for schoolchildren can be observed on the market. These products are artificial intelligence (AI) based conversational agents that can communicate using natural language. While such products are increasingly adopted, little is known about how schoolchildren harness these AI-based conversational agents for their benefits. The project pursues two main objectives: 1. To explore and understand how schoolchildren interact with different types of AI-based conversational agents and how they perceive these conversational agents compared to their existing social others (such as family, friends, and teachers). 2. To equip schoolchildren as digital natives and their caregivers with hands-on knowledge in dealing with the rapid advancement of smart technologies. By understanding how schoolchildren perceive and interact with conversational agents, parents and teachers will know

how to guide them in developing a more mindful and healthy interaction. Moreover, this project addresses a discussion that is likely to become more glaring in the next years, due to the increasing adoption of AI-based conversational agents for learning and leisure activities. Finally, this project embraces both the bright side and the dark side of technology.

Headed by Leona Chandra Kruse of the University of Liechtenstein, Isabella Seiber, personal member from the Grenoble École de Management, as well as Katrin Bergener and Armin Stein from the University of Münster work on this project.

During the ERCIS Annual Workshop, the AI-Bility researchers met with Alvaro Arenas of the IE Business School, Madrid, to meet with the Digymatex (<https://digymatex.eu/>) EU project and discuss collaborations.

### SHARING EXPERIENCES ACROSS BACHELOR PROGRAMMES IN INFORMATION SYSTEMS

Terje Gjørseter and several faculty members from the University of Agder, department of Information Systems, visited WWU Münster and Paderborn University in May 2022. The main purpose of the trip was to share knowledge and experiences related to different study programs, and in particular the bachelor programmes in information systems. The participants greatly benefited from the meeting, which gave new ideas for how the bachelor programmes could be organized with regard to teaching methods and content.

### COLLABORATION BETWEEN THE UNIVERSITY OF TUSCIA AND THE UNIVERSITY OF MINHO

The collaboration between the University of Tuscia and the University of Minho continues along with the activities of the BePrepared projects. Researchers from both universities participated in the annual meeting in Wiesbaden (July 16–19, 2022) that saw the participation of the whole project consortium of the BePrepared project.

More information: <https://beprepared-project.eu/>, <https://www.voil.eu/>



**RISE\_SMA**  
SOCIAL MEDIA ANALYTICS  
FOR SOCIETY AND CRISIS COMMUNICATION

### 'RISE\_SMA' PROJECT

The 'RISE\_SMA' project (funded by the EU Horizon 2020 research and innovation program), coordinated by Stefan Stieglitz, aims at developing solutions for contemporary challenges for Social Media Analytics in the context of society and crisis communication. The international and interdisciplinary network involves partners from the University of Duisburg-Essen (Stefan Stieglitz), University of Agder (Tim A. Majchrzak), the Queensland University of Technology (Axel Bruns, Jean Burgess), University of Leiden (Michael Emmerich, Suzan Verberne, Frank Takes) and from the municipality of Kristiansand, Norway (Sigurd Paulsen). The COVID-19 pandemic posed a challenge for the project which thrives from sharing knowledge during research stays at the respective locations. At the same time, the pandemic illustrated the relevance of understanding social media communication during crises as many used social media to share and receive information about the disease. With a special focus on investigating COVID-19-related misinformation on social media, an international focus group was initiated by Tim Majchrzak within the RISE\_SMA network. Beginning of 2022 traveling was possible again in the project. Five students from University of Duisburg-Essen visited the Kommune Kristiansand as well as the ERCIS institution University of Agder.



### PUBLICATIONS

Stieglitz, S., Hofeditz, L., Brünker, F., Ehnis, C., Mirbabaie, M. & Ross, B. (2022). Design principles for conversational agents to support Emergency Management Agencies. *International Journal of Information Management (IJIM)*, 63, 102469.

Fromm, J., Eyilmez, K., Baßfeld, M., Majchrzak, T. & Stieglitz, S. (2021). Social Media Data in an Augmented Reality System for Situation Awareness Support in Emergency Control Rooms. *Information Systems Frontiers (ISF)*.

### NETWORK RESEARCH ACTIVITIES OF THE DEPARTMENT OF BUSINESS INFORMATICS OF THE UNIVERSITY OF GDAŃSK

The UoG initiated a partner cooperation with the SAP University Alliance. Furthermore, several virtual research talks were given by Professors from Slovenia and Latvia. Additionally, the department initiated co-operations with the Cisco Networking Academy Program to deliver the latest resources on Networking Issues, including curricula. Finally, the DBI started co-operations with industry, in particular of practical applications of machine learning and big data repositories.

### JOINT RESEARCH ON AUTOMATED ALGORITHM SELECTION AND CONFIGURATION BETWEEN THE UNIVERSITY OF MÜNSTER THE UNIVERSITY OF TWENTE (UT), THE NETHERLANDS

Heike Trautmann was appointed Adjunct Professor for five years within the DMB Group at the University of Twente in March, 2021. In September, Jeroen Rook started his PhD at UT under her supervision focusing on multiobjective aspects of Automated Algorithm Selection and Configuration. Recent publications:

Heins, J., Rook, J., Schäpermeier, L., Kerschke, P., Bossek, J., & Trautmann, H. (2022). BBE: Basin-Based Evaluation of Multimodal Multi-Objective Optimization Problems. *PPSN XVII Conference, Dortmund, Germany*

Rook, J.G., Trautmann, H., Bossek J., & Grimme C. (2022). On the Potential of Automated Algorithm Configuration on Multi-Modal Multi-Objective Optimization Problems. *Companion Proceedings of the Genetic and Evolutionary Computation Conference (GECCO '22)*, pp. 356–359

### JOINT PROJECT BETWEEN UIA AND LUISS

Øystein Sæbø from the University of Agder visited University of LUISS, Rome in June 2022 to continue the collaboration on several research projects focusing on eParticipation and Online Communities, as well as Blockchain technology and data transparency. The collaboration between several researchers at LUISS (and their network) and UiA is a direct result of network activities within the ERCIS network for several years.



**ERASMUS+ PROJECT:  
DEVELOPING PROCESS MINING  
CAPABILITIES AT THE ENTERPRISE  
LEVEL**

Together with the University of Bayreuth, and the Vienna University of Economics and Business, the University of Liechtenstein is working on the Erasmus+ funded project “Developing Process Mining Capabilities at the Enterprise Level”. Digital technologies affect all areas of contemporary work. They support, replace or augment human work, and they require special skills and competencies by those who use them. Process mining is a fast-growing technology concerned with managing and improving business processes. The potentials associated with process mining are vast and the market is estimated to grow tenfold over the next ten years. Yet, there is little knowledge about how to adopt, use and manage this digital technology.

This is important, however, because despite its potentials, it is often reported that process mining leads to misuse or discontinuance of use altogether. Hence, our work intends to support practitioners, and future students, in understanding, estimating, and managing the implications of process mining. We currently conduct a qualitative-inductive interview study to explore how process mining can be leveraged in organizations. To this end, we systematically examine the needs and experiences of practitioners with process mining at different levels, including heads of process mining, process analysts, and data engineers.

**JOINT RESEARCH ON SOCIAL MEDIA  
ANALYTICS OF THE DATA SCIENCE:  
STATISTICS AND OPTIMIZATION GROUP  
(MÜNSTER) WITH LIACS, UNIVERSITY  
OF LEIDEN, NL, THE UNIVERSITY OF  
TWENTE (UT), NL, AND THE WROCLAW  
UNIVERSITY OF SCIENCE AND TECH-  
NOLOGY, PL**

Two research papers emerged from collaboration within the ERCIS competence center ‘Social Media Analytics’, specifically resulting from the Theme Development Workshop AI: Mitigating Bias and Disinformation, jointly organized by CLAIRE, ERCIS and other EU AI initiatives, and the special interest group on ‘Social Influence Analysis’ of the University of Münster Topical Program ‘Algorithmization and Social Interaction’. They have been published at the Multidisciplinary International Symposium on Disinformation in Open Online Media (MISDOOM), October 2022:

**New Automation for Social Bots: From Trivial Behavior to AI-Powered Communication**, Christian Grimme (*University of Münster*); Janina S Pohl (*University of Münster*); Stefano Cresci (*Institute of Informatics and Telematics, IIT-CNR, Pisa*); Ralf Lueling (*Aleph Alpha*); Mike Preuss (*LIACS, Universiteit Leiden*)

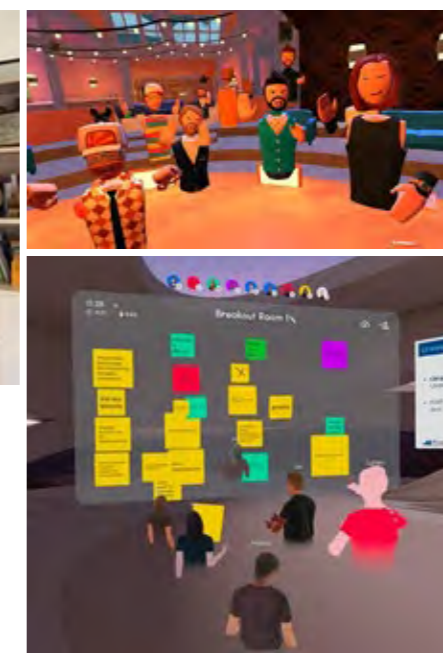
**Social Influence Analysis (SIA) in Online Social Networks**, Agatha Leszkiewicz (*University of Twente*); Doina Bucur (*University of Twente*); Christian Grimme (*University of Münster*); Radoslaw Michalski (*Wroclaw University of Science and Technology*); Lena Clever (*University of Münster*); Janina S Pohl (*University of Münster*); Jeroen G. Rook (*University of Twente*); Jakob Bossek (*RWTH Aachen*); Mike Preuss (*LIACS*); Giovanni Squillero (*Politecnico di Torino*); Stefano Quer (*Politecnico di Torino*); Andrea Calabrese (*Politecnico di Torino*); Giovanni Iacca (*University of Trento*); Hatice Kizgin (*University of Twente*); Heike Trautmann (*University of Münster*)



*Impressions (Erasmus+)*

**ERASMUS+ PROJECT:  
VIRTUAL REALITY IN HIGHER EDUCATION:  
APPLICATION SCENARIOS AND  
RECOMMENDATIONS**

In the recently completed Erasmus+ project, the partners from the University of Liechtenstein (*Jan vom Brocke*), University of Duisburg-Essen (*Stefan Stieglitz*), and University of Agder (*Tim A. Majchrzak*) investigated the potential of virtual reality (VR) in higher education. During the final phase of the project, all three project partners implemented innovative VR applications in courses at their universities. For example, at the University of Duisburg-Essen, the VR app ‘Rec Room’ was first explored for internal research and social meetings within the research group. In teaching, the collaborative VR app ‘Spacial’ was used for a bachelor’s lecture which was designed as a flipped classroom and involved a lot of group work. The students in the VR group perceived more social interaction and achieved higher grades compared to a reference group of students using a video conference tool for the lecture. The partners already published several papers on the project and are continuing to work together.



**PUBLICATIONS**

*Fromm, J., Radiani, J., Wehking, C., Stieglitz, S., Majchrzak, T. A. & Vom Brocke, J. (2021). More than Experience? – On the Unique Opportunities of Virtual Reality to Afford a Holistic Experiential Learning Cycle. The Internet and Higher Education, 50.*

*Radiani, J., Majchrzak, T. A., Fromm, J., Stieglitz, S. & Vom Brocke, J. (2021). Virtual Reality Applications for Higher Education: A Market Analysis. In Proceedings of the 52<sup>nd</sup> Hawaii International Conference on System Sciences (HICSS), Maui, Hawaii.*

*Radiani, J., Majchrzak, T. A., Fromm, J. & Wohlgenannt, I. (2019). A Systematic Review of Immersive Virtual Reality Applications for Higher Education: Design Elements, Lessons Learned, and Research Agenda. Computers & Education, 147.*

*Wohlgenannt, I., Fromm, J., Stieglitz, S., Radiani, J. & Majchrzak, T. A. (2019). Virtual Reality in Higher Education: Preliminary Results from a Design-Science-Research Project. In Proceedings of the 28<sup>th</sup> International Conference on Information Systems Development (ISD), Toulon, France.*

**LIECHTENSTEIN RESEARCH FUND:  
TOWARDS A SCIENCE OF PROCESSES.  
CONCEPTUAL FOUNDATION  
FOR THE INTERDISCIPLINARY STUDY  
OF CONTINUOUS CHANGE**

Since the only constant in our today’s world, is change, the University of Liechtenstein proposed the establishment of process science, a field that studies processes. The partner universities are as follows: RWTH Aachen, Radboud University, Humboldt University, Michigan State University, University of Hamburg, University of Bayreuth, QUT Brisbane, University of St. Gallen. Process science is concerned with understanding and influencing change. It entails discovering and understanding processes as well as designing interventions to shape them into desired directions. Process science is based on four key principles; it (1) puts processes at the center of attention, (2) investigates processes scientifically, (3) embraces perspectives of multiple disciplines, and (4) aims to create impact by actively shaping the unfolding of processes. The ubiquitous availability of digital trace data, combined with advanced data analytics capabilities, offer new and unprecedented opportunities to study processes through multiple data sources, which makes process science very timely.

## ERCIS MASTER THESIS AWARD

2022 was the first time the ERCIS Master Thesis Award has been bestowed. The winner is being chosen from submitted Master Theses nominated by ERCIS Members. Each member institution is eligible to nominate one candidate per year.

The author of the thesis rated best in terms of (1) originality and depth of contribution, (2) methodological soundness, and (3) form and quality of presentation by the ERCIS Master Thesis Award Committee will be invited to the European Conference on Information Systems (ECIS) in the following year. Flight, accommodation, access to the conference, as well as participation in the ERCIS@ECIS network meeting are being covered.

We are happy to give the 1<sup>st</sup> ERCIS Master Thesis Award to Leonor Ribeiro of the Escola de Engenharia da Universidade do Minho, Portugal for the Master Thesis on the “GDPR Toolkit”!

The dissertation can also have impact to the UN Sustainable Development Goals 11 (*Make cities and human settlements inclusive, safe, resilient and sustainable*) and 16 (*Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels*).



### The committee’s laudation:

*“The thesis represents a strong and ample scientific body of work. It is worth emphasizing the breadth of research covered (literature review, research design, analysis of interviews, toolkit validation, among other aspects), indicating a wide coverage and mature understanding of field. Additionally, the reader has access to a wealth of extra 500+ pages with technical details in the appendix.”*

The dissertation describes the development and validation of a tool that freely supplies organizations with the necessary resources for achieving compliance in the process of protecting personal data, by building a greater awareness of the GDPR’s implications and benefits, as well as how implementation does not have to be experienced as a nightmare but, contrarily, as a business opportunity.

The availability of tools that enable enterprises, especially small and medium-sized enterprises (SME), to assure and verify GDPR compliance is of utmost importance as involves considerable resources and commitment. Considering that most European companies are SME, the dissertation can have significant impact in society.

## PROJECT SEMINAR WITH ADVISORY BOARD MEMBER LVM

In the summer semester of 2022, there was a premiere in teaching in the ERCIS network: For the first time, a project seminar took place between the new advisory board member LVM Landwirtschaftlicher Versicherungsverein Münster a.G. and the University of Münster.

A group of seven bachelor students of information systems dealt with the knowledge management system “LVM Portal”, containing more than 14,000 articles for the approximately 5000 employees. The current search revealed various areas of improvement, that were to be investigated during the project seminar: Search hits that did not match the content of the search terms, and missing recommendations for related articles. Methodologically, the students followed the CRISP-DM data mining strategy to process the provided data first exploratively and then in different evaluation steps. As a result, at the end of the semester, the students presented a search algorithm that used TF-IDF values to increase the relevance of search hits. In addition, a recommender system was developed, which recommends suitable documents to users based on the currently opened document. The results were presented in a final presentation at the university as well as internally at LVM during a technology exchange.

## DAAD FUNDED MASTER / PHD LECTURE ON “AI, HUMAN RIGHTS AND ETHICS”, IN COOPERATION WITH THE UNIVERSITY OF TWENTE, AND THE UNIVERSITY OF LEIDEN, THE NETHERLANDS

The course ([https://algorithmization.org/?page\\_id=578](https://algorithmization.org/?page_id=578)) was offered virtually and investigates the role of AI from the perspectives of economy, ethics, computer science and law. Students from various disciplines, and coming from different countries, at the level of MA and PhD were invited to take part in this format.



## ERCIS DOCTORAL CONSORTIUM

In 2022, the ERCIS finally organised a PhD consortium again in Pto. Pollensa, Spain. The rationale of this series is to intensively discuss the PhD endeavour of each participant, provide multi-perspective feedback, network them, and enjoy the time together in a nice environment. The PhD candidates had to submit an eight to ten pages dissertation paper, summarizing motivation, related work, problem statement/research gap, proposed research approach and time frame. Furthermore, each of the students had to conduct a peer review of one dissertation paper. At the venue, the candidates had to present their research for approximately 30 minutes without any means but a whiteboard and pens, leaving at least one additional hour for discussion. Furthermore, the students had to moderate the session of the paper they reviewed.

This gave eight students the opportunity to participate: Enrico Bunde, Ruhr-Universität Bochum, Germany; Chiara Cagnetti, Tuscia University, Italy; Fabio Ribeiro, University of Wroclaw, Poland; Francini Hak, University of Minho, Portugal; María Salas Urbano, University of Sevilla, Spain; Moritz Seiler, University of Münster, Germany; Nina Herrmann, University of Münster, Germany; Rodion Vladimirov, University of Liechtenstein, Liechtenstein.

The faculty board consisted of Katrin Bergener, University of Münster; Alessio Maria Bracini, Università degli Studi della Tuscia; Leona Chandra Kruse, University of Liechtenstein; Isabella Seeber, Grenoble Ecole de Management; Jens Pöppelbuß, Ruhr-Universität Bochum; Armin Stein, University of Münster.

Aside from discussing the research, the participants also used the chance to either learn sailing together, or to advance their nautical knowledge. This resulted in a great team spirit, leveraging the idea of the network to our junior scholars.

## VIRTUAL BPM WINTER SCHOOL 2022

In January 2022, information systems students from different European countries had the opportunity to attend a virtual version of the BPM Winter School. The event was open to students from ERCIS member institutions. Students had the opportunity to attend lectures on advanced and state-of-the-art BPM topics as well as guest lectures (e.g., by Hilti). The lecturers were of high quality: Prof. Dr. Jan vom Brocke gave a course and speech about “Process Science”, Prof. Dr. Daniel Beverungen talked about “Organizational Routines”, Prof. Dr. Adela del Rio-Ortega and Prof. Dr. Manuel Resinas organized a session about “Process Performance”, Prof. Dr. Jan Mendling introduced “Process Complexity” and Dr. Katrin Bergener talked about “Ethics in Business Process Management”.

More information on the BPM Winter School: <https://www.ercis.org/bpmws>

## PHD SEMINAR IN MÜNSTER

The Institute for Information Systems of the University of Liechtenstein co-organized a seminar for PhD students, which took place in Münster. The seminar was led by Prof. Dr. Roland Holten, Goethe University Frankfurt, Prof. Dr. Jan Mendling, Humboldt University Berlin, Prof. Dr. Jan Recker, University of Hamburg, Prof. Dr. Christoph Rosenkranz, University of Cologne, and Prof. Dr. Stefan Seidel, University of Liechtenstein. Nine PhD students from different universities presented their PhD research projects and discussed current topics of Information Systems research.

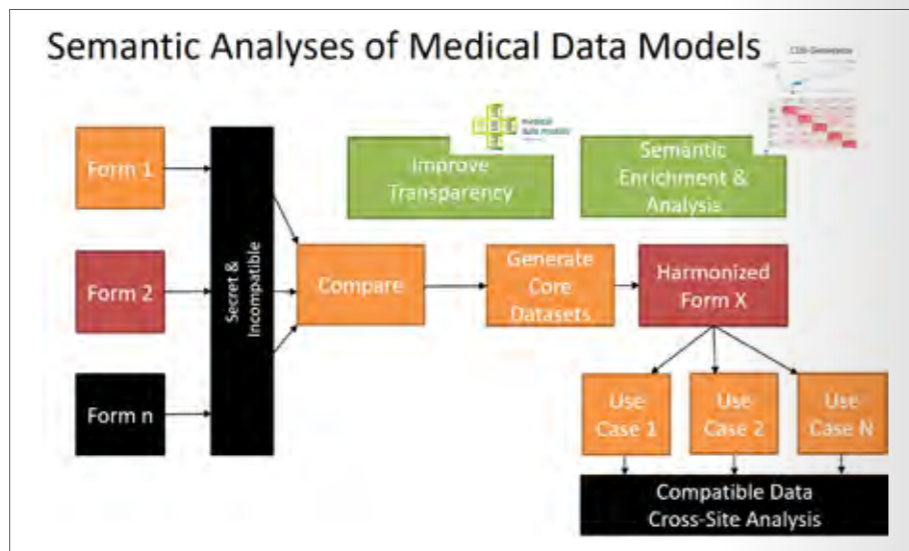
**PROJECT SEMINAR DEVELOPING A VISUAL SEARCH ENGINE FOR SATELLITE IMAGERY**



In the summer semester 2022, nine students from our master's degree program of the Department of Information Systems in Münster collaborated in a project seminar to design and develop a visual search engine for satellite imagery. The student team, supervised by Prof. Gieseke and his team, made use of deep learning techniques to process and analyze 30 terabytes of aerial images. The engine provides a simple and fast visual similarity search that helps users to discover regions of interest in a large-scale map, while enabling results to be sorted and filtered by geographical distance. This project is envisioned to create new opportunities for both researchers and practitioners in global-scale Earth observation tasks.

**MASTER SEMINAR: SEMANTIC ANALYSES OF SEMANTIC ANALYSES OF MEDICAL DATA MODELS – UNDERSTANDING SEMANTIC INTER-OPERABILITY AND GENERATION OF COMMON DATA ELEMENTS IN MEDICINE.**

This eLearning seminar is a joint teaching module by the Institute of Medical Informatics and the Department of Information Systems of University of Münster. It is an online course with intense supervision including lectures, writing and presenting a scientific seminar thesis. It facilitates practical skills for semantic analyses of medical data models and the generation of common data elements in different disease domains. The module will cover the concepts of semantic interoperability, research data standards such as the Operational Data Model by the Clinical Data Interchange Standards Consortium (CDISC



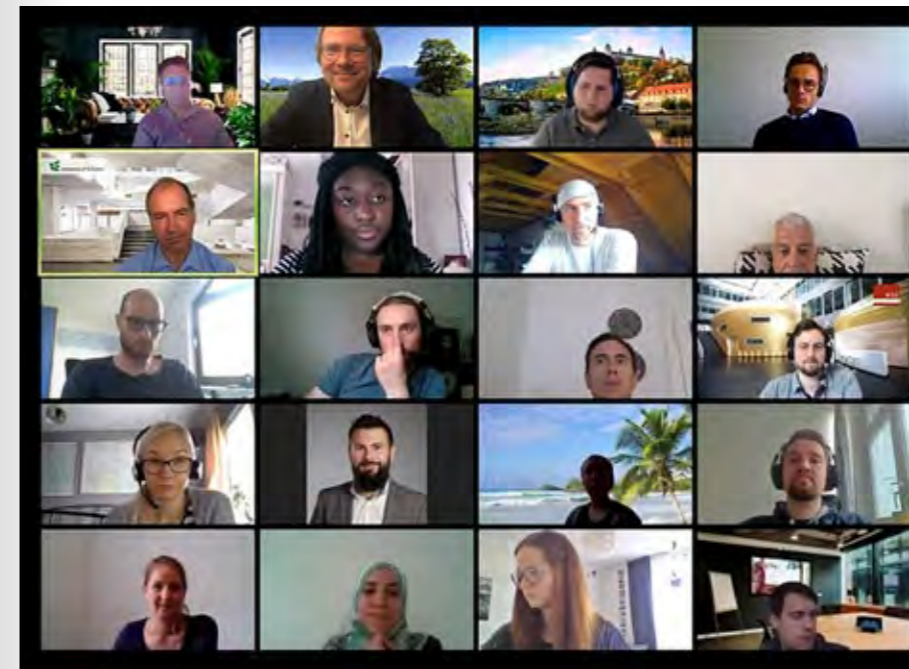
ODM), metadata standards such as the ISO 11179. Based on the FAIR (Findable, Accessible, Interoperable, Reusable) guiding principles for scientific data management, the participants will be familiarized with a

**TEACHING AT THE DEPARTMENT OF BUSINESS INFORMATICS, UNIVERSITY OF GDAŃSK**

Starting from October 2021, a new specialization has been released for Master's Students of Business Informatics: All courses are provided in English. Currently, in 2022 there was second enrollment. Mostly foreign students enrolled to this specialization, i.e., more than 80% of total number of students.

The Department of Business Informatics successfully finalized a grant regarding cooperations between industry and academia in the form of the student traineeships. The IT firms are mostly international corporations.

Professors Marite Kirikova, University of Riga and Joze Zupancic, University of Maribor gave a series of videoconference lectures for students of the new specialization Informatic Applications in Business.



**VIRTUAL PHD SEMINAR ON "DESIGN SCIENCE RESEARCH"**

Since 2017, Prof. Dr. Jan vom Brocke (University of Liechtenstein) and Prof. Dr. Robert Winter (University of St. Gallen) have been offering a joint PhD course on "Design Science" as part of the VHB-ProDok course program. Because of the COVID-19 pandemic, the course syllabus was redesigned so as to be compatible with distance learning in 2020. The course is offered twice in 2022 and has attracted over 200 participants from over 20 countries (many of them from the ERCIS network).

**PHD PROGRAM OF UNIVERSITY OF LIECHTENSTEIN AND HILTI**

The University of Liechtenstein and Hilti have developed a joint PhD program that provides a unique opportunity for students to drive their academic ambitions while setting a cornerstone for a professional career. Students in the program will work on innovative and impactful projects in Hilti, from which they will be able to draw valuable inputs for their research. The program is designed to challenge and support the students to grow their professional talents and to succeed in completing the doctorate requirements. MSc graduates that are fulfilling the general admission criteria for a PhD program at the University of Liechtenstein and that are interested in building a foundation for a career at Hilti. Master's students from ERCIS member institutions are welcome to apply for this program.



**PROJECT SEMINAR WITH ADVISORY BOARD MEMBER CLAAS**

A project seminar of the chair for Digital Innovation and the Public Sector in cooperation with CLAAS gave master students the unique opportunity to dive into the world of augmented reality for agricultural machinery. The students worked together with the CLAAS application development team and built an AR application for the existing CLAAS Connect App. On-site visits at CLAAS in Harsewinkel allowed the students to develop the prototype in a hands-on way. The testing of the developed AR application on real agricultural machines at CLAAS rounded off the project seminar.

**HILTI FELLOWSHIP PROGRAM**

The Hilti Fellowship offers excellent students the opportunity to be part of an international project team at Hilti while they attend lectures and seminars in the Master's program in Information Systems at the University of Liechtenstein. The Hilti Fellowship is primarily aimed at Master's students from fields like information systems, business, and management; however, doctoral students and Bachelor's students who will complete their studies in the near future and plan to pursue a Master's degree in the following semester can also apply. Because of visa regulations in Liechtenstein, the program is open to EU/EEA and Swiss citizens. Therefore, this program is of great interest for students of ERCIS member institutions. Participants work on real projects at Hilti three days a week and attend the Master's program in Information Systems on the other two days.





## BPM CONFERENCE IN MÜNSTER

This year the 20<sup>th</sup> Business Process Management conference was hosted by the ERCIS headquarter and organized by Armin Stein and Katrin Bergener in Münster from 11<sup>th</sup> to 15<sup>th</sup> September. With around 330 participants attending in presence, the conference was back to a number of attendees, which is comparable to pre-Covid BPM conferences.

The conference kicked off on 11<sup>th</sup> September with the Doctoral Consortium and continued on Monday, 12<sup>th</sup> with the workshop day, during which eight workshops were offered. The Monday concluded with a welcome reception at the Schlossgarten Café. The main conference was then held from 13<sup>th</sup>–15<sup>th</sup> September in the castle in Münster and offered three keynote speeches, 5 tutorials, a demos and resources session, for the first time a Journal First track as well as many paper presentations within the three topical tracks.

On Tuesday evening, the attendees were invited to one of the iconic student pubs in Münster, the Cavete, and it was a great sight when entering the pub: It was full of joyful and relaxed BPM participants enjoying food and drinks, networking with colleagues.

The conference party on Wednesday evening took place in “Heaven”, a chilled club in Münster’s harbor section. After dinner, the award ceremony took place before giving place to the DJ, who opened the dance floor, which was really crowded until the end – a fun night with colleagues from the BPM community around the world that was very much needed after the pandemic.



## 41<sup>ST</sup> INTERNATIONAL CONFERENCE ON ORGANIZATIONAL SCIENCE DEVELOPMENT: SOCIETAL CHALLENGES FOR ORGANIZATIONAL OPPORTUNITIES, MARCH 23–25, 2022, PORTOROŽ, SLOVENIA

The International Conference on Organizational Science Development is the conference with the longest tradition at the University of Maribor. Every year in March, it attracts international participants, researchers and students in the broad field of organizational sciences. This year’s International Scientific Conference on the Development of Organizational Science 2022 was held under the overarching theme – Societal Challenges for Organisational Opportunities.

<https://konferenca.fov.um.si/en/home-page/>

## 2<sup>ND</sup> INTERNATIONAL SUMMER SCHOOL “ORGANIZATION, MANAGEMENT, AND SOCIETY” FOV 2022, SEPTEMBER 12–17, 2022, KRANJ, SLOVENIA

2<sup>nd</sup> International Summer School at the Faculty of Organizational Sciences in Kranj offered an opportunity to acquire new knowledge through excellent lectures and with the help of world-class educators from Faculty of Economics and Tourism (*Croatia*), Prague University of Economics and Business (*Czech Republic*), Faculty of Organization and Informatics (*Croatia*), Faculty of Technical Sciences (Serbia), Faculty of Tourism and Hospitality Management (*Croatia*), Kozminski University (*Poland*), Faculty of Economics (*Macedonia*).

<https://summerschool.fov.um.si/>

## EVENTS IN THE ERCIS NETWORK



### WORKSHOP SERIES ON DIGITALIZATION AT THE UNIVERSITY OF LIECHTENSTEIN

This year the workshop series on Digitalization series was physically held on campus at the University of Liechtenstein again for the first time, as events were canceled and postponed during the COVID-19 pandemic. The series is designed for academics, practitioners, and stakeholders from public organizations who support the transformation of their organizations, the country, and beyond. The lecture series includes courses on fundamentals of

digitalization, basic concepts of digital innovation, the explanation and benefits of artificial intelligence, transforming organizations through business process management, and cybersecurity, including aspects of cybercrime. Current plans are to further expand the range of continuing education courses and to develop a range of courses tailored to regional companies, particularly in the area of security. The new offerings are based on the university's upcoming executive education strategy and are planned for spring 2023.

### ORGANIZATION OF THE STUDENT TRACK AT THE 17<sup>TH</sup> INTERNATIONALE TAGUNG WIRTSCHAFTSINFORMATIK

The University of Liechtenstein has organized the Student Track at the 17<sup>th</sup> Internationale Tagung Wirtschaftsinformatik. The goal of the Student Track is to give students – especially from the ERCIS network and beyond – the opportunity to actively participate in this conference and submit research papers. The Student Track provides a platform through which students, researchers and practitioners can get to know each other in professional discourse. The best student paper receives the Best Student Paper Award from the Liechtenstein Chapter of the Association for Information Systems (AIS) and Hilti.

### EDUCATION IN INFORMATION SOCIETY, OCTOBER 14, 2022, LJUBLJANA, SLOVENIA

The VIVID 2022 conference, now in its 25<sup>th</sup> year, is dedicated to exploring new ways of working and living together in the educational process brought about by modern information and communication technology. The conference is organized by the Faculty of Organisational Sciences and the Jožef Stefan Institute. The co-organisers are the Faculty of Computer Science and Informatics and the Slovenian Informatics Society.

<http://vivid.fov.uni-mb.si/>

### 7<sup>TH</sup> IFIP WG5.15 2022 CONFERENCE ON INFORMATION TECHNOLOGY IN DISASTER RISK REDUCTION (ITDRR-2022)

University of Agder hosted the ITDRR conference on 12–14 October 2022. The conference is especially focused on the various IT aspects and challenges of coping with disaster risk reduction. One of the keynotes focused on strategic management of disaster risk mitigation, and the conference sessions focused among others on machine learning and risk assessment for decision making, community and organizational resilience, the measurement and facilitation of situational awareness in different emergency situations including cybersecurity issues, and risk communication. One of the more technical sessions focused on sensors, telecommunication, and supply chains. Earthquake and climate forecasting were also accentuated. The conference received paper submissions from 17 countries.

<https://www.uia.no/arrangementer/the-7th-ifip-wg5.15-conference-on-information-technology-in-disaster-risk-reduction-itdr-2022>

### CAPSI2022 – CONFERENCE OF THE PORTUGUESE ASSOCIATION FOR INFORMATION SYSTEMS

The 22<sup>nd</sup> edition of the Portuguese Association of Information Systems Conference was held online on November 3<sup>rd</sup> and 5<sup>th</sup>, 2022, at the University of Santiago, in Cape Verde, in partnership with the Polytechnic Institute of Santarém, ISCTE – Instituto Universitário de Lisboa and the University of Évora. The conference's main theme is "Information Systems: Innovation and Development in the Lusophone Space". The proceedings are published in the eLibrary of AIS.

<http://caps2022.apsi.pt/index.php/en/>

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### ICIST 2022 ORGANIZED BY KAUNAS UNIVERSITY OF TECHNOLOGY

The 28<sup>th</sup> International Conference on Information and Software Technologies was organised by Kaunas University of Technology October 13–15, 2022, and is one of the longest running IT research conferences in Lithuania. The event accepts only ~30 papers, which means that no two sessions are taking place at the same time and participants can hear all presentations they may be interested in. Thematically, the 2022 iteration stayed on the track set up two years ago, with all of the accepted papers falling under one of the following four research areas:

- Intelligent Systems and Software Engineering Advances
- Intelligent Methods for Data Analysis and Computer Aided Software Engineering
- Smart e-Learning Technologies and Applications
- Language Technologies

On the last day of the event, an extensive closed session on the latest e-learning technologies, its advantages and disadvantages in education also took place. The proceedings of the event were published by Springer as a part of Communications in Computer and Information Science (CCIS) series.

<https://icist.ktu.edu/>



Photo by M. Binkis



## ERCIS@ECIS 2022

After the virtual years of the pandemic, the first ERCIS@ECIS meeting took place again in Timișoara, Romania in June 2022! 26 members from eleven partner institutions joined a nice meet and greet at the Bega river, which was followed by the handing over of the first ERCIS Master Thesis Award! We are looking forward to meeting many fellow members next year again, where our partners from Kristiansand, Norway, will serve as hosts of the European Conference on Information Systems!

## NOKOBIT 2022 – NATIONAL CONFERENCE IN INFORMATION SCIENCE AND INFORMATION SYSTEMS

University of Agder hosted the national conference NOKOBIT 2022 on November 28 to December 1, 2022. The conference focuses on topics related to development, implementation, and use of ICT in organizations, including sustainability and societal issues. The conference attracts researchers and practitioners mainly from Norway, but also from other Scandinavian countries and some international participants are usually present. This year the conference focuses on highly relevant topics including among others application of AI, cloud computing and IS, business process management, data science, IT and sustainability, information infrastructures and platform ecosystems, social IS and collaborative technologies, and information and knowledge governance.

<https://www.uia.no/konferanser-og-seminarer/nikt-2022/nokobit-2022-call-for-papers>

## ROUND TABLE ABOUT “COVID-19 INDUCED ORGANISATIONAL CHANGE”

In the third roundtable about “COVID-19 induced organisational change”, the Competence Center Smarter Work discussed the latest experiences and recommendations regarding hybrid work arrangements. With representatives from four ERCIS advisory board organizations, the discussion yielded interesting insights, among others, about the reorganisation of the offices or hybrid meetings. The office gets redesigned to allow for different forms of collaborative work, yet areas for uninterrupted individual work need to be included. Developing and maintaining a meeting etiquette is even more critical for hybrid meetings than for pure physical/virtual meetings. Overall, the reported experiences are positive, and the participants, in unison, stressed the need to remain flexible and to enhance the current hybrid work arrangements transparently with all involved actors.

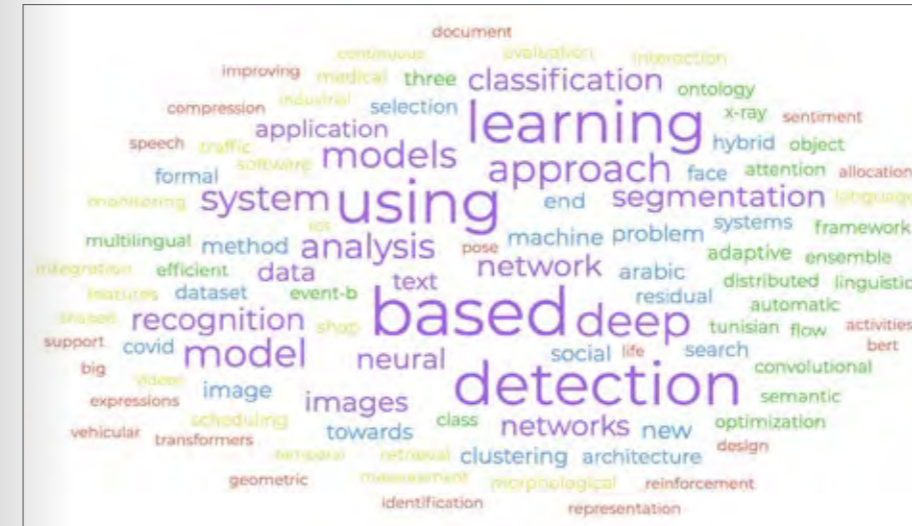
## 35<sup>TH</sup> BLED ECONFERENCE: DIGITAL RESTRUCTURING AND HUMAN (RE) ACTION, JUNE 26–29, 2022, BLED, SLOVENIA

The Bled eConference, organised annually by the Faculty of Organisational Sciences of the University of Maribor, is an international event with the longest tradition in the field of e-business research at the University of Maribor and in Europe, and one of the leading research and professional events in the world. This year, the 35th Bled eConference brought together many researchers, representatives of business, organisations, technology providers and decision makers from different countries around the world under the title “Digital Restructuring and human (re) action”. In addition to the overarching theme and general focus on digitisation and digital transformation, the conference highlighted the following topics: digital health and wellness, digital business models, artificial intelligence and data science, digital ethics, smart and sustainable cities and digital education.

<https://bledconference.org>

## PROJMAN 2022 – INTERNATIONAL CONFERENCE ON PROJECT MANAGEMENT

The conference was held in Lisboa, Portugal, from 9 to 11 of November 2022, co-organized by the University of Minho. During this 3-day conference, under the leitmotif of Project Management, academics, scientists, project managers and solution providers from all over the world will have the opportunity to share experiences, bring new ideas, debate issues, and introduce the latest developments in this largely multidisciplinary field.



## 14<sup>TH</sup> INTERNATIONAL CONFERENCE ON COMPUTATIONAL COLLECTIVE INTELLIGENCE (ICCCI 2022), 28–30 SEPTEMBER 2022, HAMMAMET, TUNISIA

The 14<sup>th</sup> International Conference on Computational Collective Intelligence (ICCCI 2022), was held in Hammamet, Tunisia between 28–30 September 2022. Due to the COVID-19 pandemic, the conference was organized in a hybrid mode which allowed for both on-site and online paper presentations. The conference was hosted by the French SIGAPP Chapter (*ACM Special Interest Group on Applied Computing*), France and jointly organized by Wrocław University of Science and Technology, Poland in cooperation with IEEE SMC Technical Committee on Computational Collective Intelligence, European Research Center for Information Systems (ERCIS), Université de Pau et des Pays de l’Adour (France), Université de Jendouba (Tunisia), and International University-VNU-HCM (Vietnam). The conference is ranked Category B in the 2021 CORE conference rankings.

The ICCCI 2022 conference featured a number of keynote talks and oral presentations, closely aligned to the theme of the conference. The conference attracted a substantial number of researchers and practitioners from all over the world, who submitted their papers for the main track and eleven special sessions.

The main track, covering the methodology and applications of CCI, included: knowledge engineering and Semantic Web, recommender systems, collective decision-making, data mining and machine learning, computer vision techniques, natural language processing, as well as Internet of Things: technologies and applications. The special sessions, covering some specific topics of particular interest, included: cooperative strategies for decision making and optimization, optimization approaches of production systems in Industries 4.0 and 5.0, collective intelligence in medical applications, IoT, deep learning and natural language processing, computational collective intelligence, computational intelligence for multimedia understanding, machine learning for social data analytics, malware analytics in smart environment, big text mining searching and artificial intelligence.

We received over 420 papers submitted by authors coming from 46 countries around the world. Each paper was reviewed by at least three members of the international Program Committee (PC) of either the main track or one of the special sessions. Finally, we selected 66 papers for oral presentation and publication in one volume of the Lecture Notes in Artificial Intelligence series and 58 papers for oral presentation and publication in one volume of the Communications in Computer and Information Science series.

## 20<sup>TH</sup> INTERNATIONAL CONFERENCE ON SERVICE-ORIENTED COMPUTING IN SEVILLA

This year Pablo Fernández and Antonio Ruiz-Cortés, from Universidad de Sevilla, organized the 20<sup>th</sup> edition of the International Conference on Service-Oriented Computing (ICSOC 2022) from November 29<sup>th</sup> to December 2<sup>nd</sup>.

This conference is the premier international forum for academics, industry researchers, developers, and practitioners to report and share ground-breaking work in service-oriented computing. ICSOC fosters cross-community scientific excellence by gathering experts from various disciplines, such as services science, data science, management science, business process management, distributed systems, wireless and mobile computing, cloud and edge computing, cyber-physical systems, Internet-of-Things (IoT), scientific workflows, artificial intelligence, machine learning, and services and software engineering.

Following on the ICSOC tradition, this edition features visionary keynote presentations about Quantum Service-Oriented Computing by Juan M. Murillo and Securing Data Pipelines along the Cloud Continuum by Ernesto Damiani, research and industry presentations, a vision track, workshops, tutorials, demos, and a PhD track.



# OUTLOOK FOR 2023

## JANUARY 2023

**BPM WINTER SCHOOL**, January 9–13, Vaduz, Liechtenstein. <https://www.ercis.org/bpmws>

## MARCH 2023

**START AND KICK-OFF HILTI FELLOWSHIP PROGRAM (Summer term 2023)**. <https://careers.hilti.li>

**41<sup>ST</sup> INTERNATIONAL CONFERENCE ON ORGANIZATIONAL SCIENCE DEVELOPMENT**, Portorož, Slovenia. <https://konferenca.fov.um.si/en/homepage/>

## APRIL 2023

**DEADLINE FOR APPLICATION FOR THE HILTI FELLOWSHIP (Winter term 2023/24)**, April 30<sup>th</sup>

## JUNE 2023

**31<sup>ST</sup> EUROPEAN CONFERENCE ON INFORMATION SYSTEMS (ECIS 2023)**, June 11–16, Kristiansand, Norway. <https://ecis2023.no/>

**36<sup>TH</sup> BLED ECONFERENCE**, June 26–29, Bled, Slovenia. <http://bledconference.org>

## SEPTEMBER 2023

**START AND KICK-OFF HILTI FELLOWSHIP PROGRAM (Winter term 2023/24)**

**14<sup>TH</sup> ERCIS ANNUAL WORKSHOP**, Wrocław, Poland

**WIRTSCHAFTSINFORMATIK CONFERENCE 2023**, Paderborn, Germany, September 18–21. <https://wiz2023.de> (incl. Student Track: <https://wiz2023.de/student-track/>)

## OCTOBER 2023

**EDUCATION IN INFORMATION SOCIETY**, Ljubljana, Slovenia. <http://vivid.fov.uni-mb.si/>

**29<sup>TH</sup> INTERNATIONAL CONFERENCE ON INFORMATION AND SOFTWARE TECHNOLOGIES (ICIST 2023)**, October 12–14, 2023, Kaunas, Lithuania. <https://icist.ktu.edu/>

**21<sup>ST</sup> PORTUGUESE ASSOCIATION FOR INFORMATION SYSTEMS CONFERENCE**

**DEADLINE FOR APPLICATION FOR THE HILTI FELLOWSHIP (Summer term 2024)**, October 30<sup>th</sup>

## NOVEMBER 2023

**PROJMAN 2023 – PROJMAN – INTERNATIONAL CONFERENCE ON PROJECT MANAGEMENT**. <http://projman.scika.org>

**14<sup>TH</sup> ASIAN CONFERENCE ON INTELLIGENT INFORMATION AND DATABASE SYSTEMS (ACIIDS 2022)**, November 28–30, Ho Chi Minh City, Vietnam. <https://aciids.pwr.edu.pl/2022/>

## DEZEMBER 2023

**15<sup>TH</sup> EUROSYMPOSIUM ON DIGITAL TRANSFORMATION**, Gdansk, Poland. <http://www.eurosymposium.eu>

**ICIS 2023 CONFERENCE THEME TRACK: Emerging from the Pandemic and Reshaping Human Endeavors with Digital Technologies** (Jeffrey Parsons, Pallab Sanyal, Jan vom Brocke, Fiona Fui-Hoon Nah)



## ERCIS TEAM

For everything that concerns the ERCIS network simply write us an email. You will for sure get an answer from one of our team members. The team consists of **Dr. Armin Stein**, who is the managing director of the ERCIS network and is being supported by **Dr. Katrin Bergener**, who works part-time for the team and furthermore as Coordinator for the WWU Centre for Europe, and **Julia Seither** as team assistant.

Besides answering emails, the team helps organising events, maintains the website, organises the network communication, and supports project applications.

If you are interested in the network, get in touch with them!

[info@ercis.org](mailto:info@ercis.org)

# THE IS RESEARCH NETWORK



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