

Institute of Computer Science (ICS-HSG)

Annual report 2025

D. Borth, S. Handschuh, A.-L. Horlemann, S. Mayer, K. Mitrokotsa, G. Salvaneschi, J. Schöning, B. Weber

2026-03-31

University of St.Gallen

Institute of Computer Science

Acknowledgements

The directors of the Institute of Computer Science would like to take this opportunity to express their gratitude for the support that we, as individuals and as an institute, continue to receive from a broad range of individuals and offices affiliated with the University of St.Gallen and beyond.

Since 01.01.2025, Markus Bänziger has been advising the Institute. We would like to thank Markus for his valuable support, and we look forward to continuing to work together.

Contents

Acknowledgements . . . .

Introduction 1

Artificial Intelligence & Machine Learning (AIML), Damian Borth . . 3
- Team Members 3
- Research 3
- Projects 5
- Teaching 5
- Outreach 6

Data Science and Natural Language Processing, Siegfried Handschuh 7
- Team Members 7
- Research 8
- Publications 9
- Projects 10
- Teaching 11
- Outreach 11
- Academic Service 12
- Infrastructure 12

Foundations of Computation, Anna-Lena Horlemann 14
- Team 14
- Research 14
- Projects 15
- Teaching 15
- Outreach 16

Interactions Research Team, Simon Mayer 17
- Ongoing PhD Theses 17
- Postdoctoral Researchers 18
- Teaching 19
- Research 19

Cybersecurity, Katerina Mitrokotsa 21
- Team 22
- Research 22
- Projects 24
- Teaching 25
- Outreach & Academic Activities 26

Programming, Guido Salvaneschi **28**
Team Members 28
Projects 28
Teaching 29
Research 30
Outreach and Academic Citizenship 31

Human-Computer Interaction, Johannes Schöning **33**
Team 33
Research 34
Teaching 35
Funding & Outreach 35

Software Systems Programming and Development, Barbara Weber . **37**
Team 37
Teaching 38
Research 38
Outreach and Academic Citizenship 46

References **49**

Introduction

The Institute of Computer Science (ICS-HSG) includes eight research groups: Artificial Intelligence and Machine Learning, led by *Prof. Dr. Damian Borth*; Data Science and Natural Language Processing, headed by *Prof. Dr. Siegfried Handschuh*; Foundations of Computation, under the guidance of *Prof. Dr. Anna-Lena Horlemann*; Interaction- and Communication-based Systems, directed by *Prof. Dr. Simon Mayer*; Cybersecurity, managed by *Prof. Dr. Katerina Mitrokotsa*; Programming, overseen by *Prof. Dr. Guido Salvaneschi*; Human-Computer Interaction, chaired by *Prof. Dr. Johannes Schöning*; and Software Systems Programming and Development, led by *Prof. Dr. Barbara Weber*. Since 2023, professors Borth, Handschuh, Mayer, Mitrokotsa, Schöning, Weber, Horlemann, and Salvaneschi have formed the board of Directors of the ICS-HSG. Since February 2024, Prof. Salvaneschi has been the Managing Director ICS-HSG. The role of the Managing Director is a coordinating one, and it does not involve any authority to issue directives to other members of the board of Directors.

Figure 1 shows the current figures for 2025. Particularly striking is the 45 percent increase in student numbers over the three-year period. Collaboration with other universities has also risen significantly, highlighting how strongly ICS-HSG is networked both nationally and—especially—internationally.

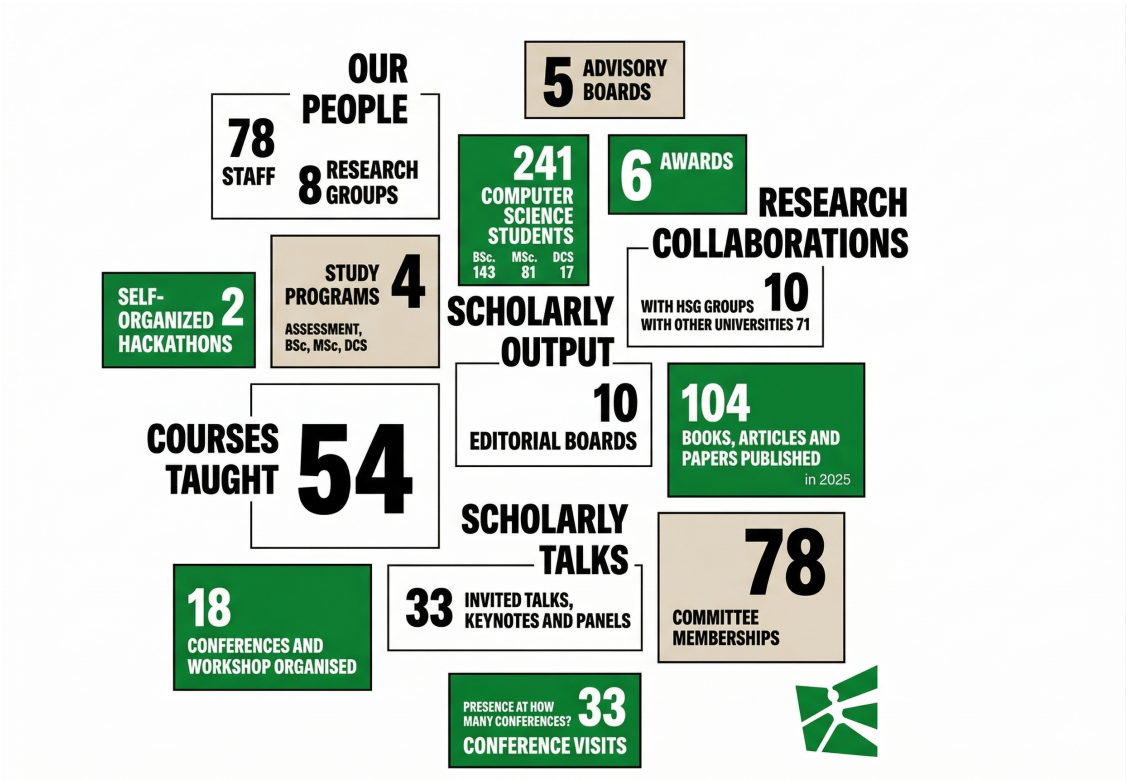

Figure 1: Key Figures of the Institute for Computer Science for the year 2025.

The research of ICS-HSG spans various areas, including deep neural networks, language models, coding theory, cryptography, ubiquitous computing, autonomous systems, cybersecurity, programming languages, human-computer interaction, and software development. ICS-HSG's research is highly interdisciplinary and resulted in numerous publications in prestigious venues. The details of our research achievements are discussed extensively in the rest of this document.

With this annual report, we provide an overview of the activities of the ICS-HSG and its research groups in 2025. Further details and updated news are presented on our institute website, `https://ics.unisg.ch/`

Artificial Intelligence & Machine Learning (AIML), Damian Borth

The **Artificial Intelligence & Machine Learning** lab led by Prof. Damian Borth performs research on deep neural networks to make such models more robust, more performant, and trustworthy when applied to real-world data with a focus on weight space learning and remote sensing.

Highlights of 2025 were (i) Prof. Damian Borth being appointed visiting professor at the European Space Agency (ESA) in Frascati, Italy (ii) the organization of the ICLR Workshop on "Weights as Novel Data Modality", (iii) the start of a project collaboration with the "Bundesagentur für Sprunginnovation Deutschland" (SPRIND), (iv) and the successful graduation of one PhD candidate from the lab.

Team Members

The chair of Artificial Intelligence and Machine Learning has 9 members. In 2025, Dr. Linus Scheibenreif successfully defended his PhD thesis on "**Self-supervised Deep Learning in Earth Observation**" and joined Konrad Schindler's group at ETH Zurich as a postdoc afterwards. After his PhD graduation in 2024, postdoc Konstantin Schürholt left the group to join Francois Chollet's newly founded startup NDEA[1] to work on program synthesis and the ARC Prize. With Damian Falk, Konstantinos Tzevelekakis, and Aron Asefaw three new PhD students joined the group in 2025.

Research

The AIML lab currently focuses on the following research areas (a) **Weight Space Learning**, (b) **Remote Sensing and Earth Observation**, and (c) **Representation Learning of Tabular Data**. In 2025, the lab got **14 publications accepted**. This includes 3 journal publications, 3 conference publications, and 4 workshop publications. Additionally, 4 working papers have been published.

[1] https://ndea.com/

In the research area “Weight Space Learning”, the lab has made a significant breakthrough by learning weight space representations from **open-weights models of arbitrary neural network architectures** from Hugging Face. Additionally, the group has formed a new collaboration with NTU Singapore on weight space learning and large language models with first results being published at ”Neural Information Processing Systems” (NeurIPS) in San Diego. In parallel, a new model zoo on **phase transitions** has been published at the “Journal of Data-centric Machine Learning Research” (DMLR) allowing to study neural network training phenomena such as grokking. Finally, members of the AIML lab have **organized the first workshop on weight space learning** at the “International Conference on Learning Representations” (ICLR) conference in Singapore [2].

In the research area of “Remote Sensing and Earth Observation”, the group established a new collaboration with IBM Switzerland to develop novel methods on **greenhouse gas monitoring** from hyperspectral satellite data. Additionally, the group has developed novel approaches for **weakly supervised semantic segmentation** for earth observation and computer vision applications, which has been published at “International Conference on Computer Vision” (ICCV).

In the research area of “Representation Learning of Tabular Data”, we have published one of the first **diffusion-based denoising autoencoder** for anomaly detection, which has been published at “ACM SIGKDD International Conference on Knowledge Discovery and Data Mining” (KDD) in Toronto. This work has been extended with **privacy-preserving** capabilities to ensure confidentiality in federated learning setups and published at the EurIPS Workshop on Privacy Preserving Learning in Copenhagen.

In summary, members of the AIML lab published 14 papers at venues such as ICLR, NeurIPS, ICCV, KDD, and DMLR. These papers have been written in collaboration with authors of NTU Singapore, LMU Munich, Deutsche Bundesbank, Eidgenössische Finanzkontrolle, and IBM Switzerland. An overview of all published work can be found at the Alexandria platform of the University of St.Gallen [3]. As in the previous year, members of the lab were serving as area chairs, technical program committee, and reviewers of international conferences (NeurIPS, ICLR, ICML, IEEE CVPR, IEEE ECCV, ACM KDD), and governmental funding programs such as the DFG and the ERC.

[2] https://weight-space-learning.github.io/
[3] https://www.alexandria.unisg.ch/entities/person/Damian_Borth

Projects

In 2025, the group is running two SNF projects titled: **"Hyper- Representations: Learning from Populations of Neural Networks"** and **"Self-Supervised Learning for Earth Observation: Leveraging a wealth of multi-modal data"**. These projects are the backbone of the main research areas of the AIML group. Additionally, a new project funded by the "Bundesagentur für Sprunginnovation Deutschland" (SPRIND) titled "**Model Foundry**" has been acquired and started. This project aims to evaluate scaling capabilities of weight space learning on open-weight models training.

Teaching

In 2025, the group was teaching in the spring and fall semester in total 9 courses, did supervise two group projects, and 3 master thesis works and co-supervised 6 bachelor and master thesis works.

For the Master of Science in Computer Science (MCS), the AIML lab taught the **"Machine Learning"** course, which became compulsory in fall 2025 and the elective course **"Deep Learning"**. For the Bachelor of Science in Computer Science (BCS), the AIML lab taught the **"Artificial Intelligence"** course and the elective course **"MLOps"**. Additionally, the AIML group has been active in service teaching at the MGM with the course **"Introduction to Machine Learning and Deep Learning"**. On PhD level, the AIML group was teaching in the PhD program in computer science (DCS) the course **"Advanced Topics in Deep Learning"**. Like in the previous year, in 2025 the "Deep Learning: Fundamentals and Applications" course of the "Global Summer School for Empirical Research Methods (GSERM)" was held in collaboration with Dr. Marco Schreyer.

Lastly, members of the lab were active in multiple executive education programs with invited sessions, full days, or full-week electives. In particular, the elective course "Coding and AI", which is held in collaboration with Prof. Barbara Weber was executed in 2025 in the EMBA / IEMBA program of the University of St.Gallen. Finally, Prof. Damian Borth in collaboration with Prof. Torbjørn Netland from ETH Zurich held their course at the embaX joint executive education program between the University of St.Gallen and ETH Zurich.

Outreach

The scientific work and expertise of the lab was highlighted and outlined in multiple events and articles in public media. One of the highlights of 2025 was the keynote talk at the **"United Nations Human Rights Office"** in Geneva and the keynote talk at the Annual Symposium of the **"Department of Mathematical Modeling and Machine Learning"** at the University of Zurich.

Additionally, multiple invited lectures or seminars at universities such as EPFL Sion, NTNU Trondheim, and multiple other invited talks at Internet Archive, Startfeld St.Gallen, PH St.Gallen, IHK St.Gallen, St.Gallen Symposium, HSG Alumni Germany Conference, and HSG Highlights. In total, the AIML lab was able to communicate its research in **11 invited keynotes, lectures, and seminars**.

In 2025, Prof. Damian Borth hold positions at the Ringier AI Advisory Board together with Ringier Group CEO Marc Walder, Anna Mossberg, and Léo Steinacker [4] Similarly, Prof. Damian Borth held elected positions at the board of Trustees at the Int. Computer Science Institute in Berkeley, the Scientific Advisory Board of the Roman Herzog Institute, and the Scientific Advisory Board of the DAAD IFI Program.

[4] https://www.ringier.com/ringier-nominates-ai-advisory-board/

Data Science and Natural Language Processing, Siegfried Handschuh

The **Data Science and Natural Language Processing (DS-NLP)** lab, led by Prof. Dr. Siegfried Handschuh, continued to advance its research agenda in 2025 with a strong focus on **Foundational NLP Models**, **Argumentative AI and Multi-Perspective Reasoning**, and **Financial NLP**. A highlight of the year was the **Best Paper Award at KDIR 2025** for work on adaptive optimizer-switching in deep learning. The lab further published in the *California Management Review*, expanded its team, delivered strong teaching across bachelor, master, and executive education programs, and contributed to university governance and public outreach on AI topics.

Team Members

The DS-NLP lab comprised the following members in 2025:

- **Chair:** Prof. Dr. Siegfried Handschuh
- **Research Staff:** Dr. Tomas Hrycej, Götz-Henrik Wiegand, Michael Gaus, Thomas Huber
- **Office Manager:** Anja Boxleitner
- **Intern:** Anfissa Wehrle
- **External PhD Student:** Jan Spörer
- **Student Assistants:** Massimo Pavone, Lorena Raichle

Three PhD students are actively pursuing their dissertations: Götz-Henrik Wiegand (Deep Learning Optimization, started January 2025), Thomas Huber (Controlled Text Generation for Alignment with Human Values, since 2024), and Jan Spörer (Financial NLP and Equity Research Automation, since 2022). Research on **Foundational NLP Models**, including efficient training, architecture optimization, and the theoretical foundations of deep learning , was pursued in close collaboration with Dr. Bernhard Bermeitinger (Senior Lecturer, Institut für Computer Science in Vorarlberg, ICV-HSG), who is a key research partner and co-author on multiple publications. Research on **Argumentative AI** was conducted in collaboration with Assistant Professor Christina Niklaus, who leads complementary work in the area of text simplification and argumentation mining.

Key Collaboration Partners. The DS-NLP lab maintains close interdisciplinary collaborations within HSG:

- **Prof. Christoph Lechner** (Full Professor of Strategic Management, Director IFB-HSG): joint research on GenAI capabilities in strategic management, resulting in a publication in the *California Management Review* (2025).
- **Prof. Tomi Laamanen** (Full Professor of Strategic Management, Director SIM-HSG): SNF-funded project "Microstructural Impacts of AI on Strategy Processes" (2025–2029), investigating how AI tools influence strategic decision-making at the micro level.
- **Prof. Sabine Seufert** (Full Professor of Business Education, IBB-HSG): long-standing collaboration on AI in education, including the Innosuisse project "Integrating AI Chatbots into Social Learning" (2024–2026, with Brain AG) and prior joint projects on educational chatbots and AI-enabled learning.

Research

The research agenda of the DS-NLP lab in 2025 spanned several interconnected areas:

Foundational NLP Models: Efficient Training and Architecture Optimization. The lab continued its systematic investigation of Transformer architectures and their optimization. Key research questions addressed the integration of attention mechanisms into state space models, optimal depth of residual networks, and subset pretraining strategies for more efficient neural network training. A particular highlight was the development of a dual-algorithm training approach combining Adam with Conjugate Gradient methods, achieving up to 3x faster convergence. This work received the **Best Paper Award at KDIR 2025**. These efforts resulted in several publications at venues including KDIR 2025 and the IEEE Swiss Conference on Data Science (SDS 2025).

Argumentative AI and Multi-Perspective Reasoning. A research theme in collaboration with Christina Niklaus was the development of AI systems capable of generating, evaluating, and improving argumentative discourse from multiple perspectives. This included work on argument quality assessment, feedback and improvement mechanisms, and the simulation of rational pluralism through multi-agent debate architectures. Ongoing paper revision cycles, evaluations, and poster preparations contributed to a productive publication pipeline in this

area. Lorena Raichle advanced research on latent steering of language models, preparing submissions for COLM and ICLR workshops.

Financial NLP. The lab established a new research direction in Financial NLP. A major output was the **Financial Touchstone Benchmark**, comprising 2,878 Q&A pairs derived from 480 international annual reports. This work, presented at the ICAIF'25 FinREM Workshop, demonstrated that current frontier models such as Gemini 2.5 Pro achieve 91.6% accuracy on financial comprehension tasks, surpassing human performance at 82.8%. Additionally, an interdisciplinary collaboration with Prof. Christoph Lechner (Full Professor of Strategic Management, Director IFB-HSG) resulted in a publication in the *California Management Review*, systematically evaluating which strategic management tasks LLMs can accomplish and where fundamental limitations remain.

RAG, Knowledge Graphs, and Applied NLP. The lab explored GraphRAG approaches, including the successful indexing of a finance dataset and the development of evaluation concepts for retrieval-augmented systems. Additionally, collaborative work on evaluating Swiss LLMs (Apertus model family) was carried out with the Swiss AI Initiative.

Deep Sleep. A new interdisciplinary research direction was established in the area of sleep tracking and machine learning, combining wearable sensor data analysis with neuroscience perspectives.

Publications

In 2025, the lab published and presented the following works:

- T. Hrycej, B. Bermeitinger, M. Pavone, G.-H. Wiegand, S. Handschuh: **Adaptive Optimizer-Switching for Deep Learning**. In: *Proceedings of KDIR 2025*. **Best Paper Award** [HBP+25].
- J. Spörer, M. Gaus, S. Handschuh: **Overcoming the Bottleneck: GraphRAG for Reliable Financial Annual Report Retrieval and Comprehension**. In: *ICAIF'25 FinREM Workshop*, 2025 [SGH25].
- T. Hrycej, B. Bermeitinger, S. Handschuh: **Integrating the Attention Mechanism Into State Space Models**. In: *Proceedings of the IEEE Swiss Conference on Data Science (SDS 2025)*, June 2025 [HBH25].

- B. Bermeitinger, T. Hrycej, S. Handschuh: **Is There an Optimal Depth of Residual Networks?** May 2025 [BHH25].
- B. Bermeitinger, T. Hrycej, J. Spörer, S. Handschuh: **Subset Pretraining for Enhancing Neural Network Training Efficiency**. October 2025 [BHSH25].
- C. Lechner, N. Lang, O. Bouffault, J. Cooper, S. Handschuh: **Can GenAI do your next strategy task? Not yet.** In: *California Management Review*, 2025. Interdisciplinary collaboration with Prof. Christoph Lechner (IFB-HSG) and BCG [LLB+25].

Members of the lab also served as reviewers for international conferences and journals, including AAAI, as well as for funding agencies (SNF, DFG, FWF, ISF, European Commission). An overview of all publications is available on the Alexandria platform[5].

Projects

Research Projects. The lab was involved in several research projects in 2025:

- *Conversational AI: Dialogue-based Adaptive Argumentative Writing Support* (SNF, 2022–2026)
- *Synthesis of State Space Models and Attention Mechanism* (HSG Stepping-Stone Grant, 2025)
- *Microstructural Impacts of AI on Strategy Processes* (SNF, 2025–2029, with Prof. Tomi Laamanen, Full Professor of Strategic Management, Director SIM-HSG)
- *Integrating AI Chatbots into Social Learning* (Innosuisse, 2024–2026, with Prof. Sabine Seufert, IBB-HSG, and Brain AG)

BP/IMP 2025 (Bachelor Projects / Integrated Master Projects). In 2025, the DS-NLP lab supervised **3 student projects** within the SCS Bachelor Project (BP) and Integrated Master Project (IMP) programs. Two bachelor projects were supervised by Christina Niklaus. The projects were presented at the SCS Student Conference in December 2025:

[5] https://www.alexandria.unisg.ch/entities/person/Siegfried_Handschuh/publications

- L. Raichle, R. Städeli: *Efficient Transformer Training: Optimizing Miniaturized Models through Subset Pretraining and Model Soup Aggregation* (IMP, supervised by Wiegand and S. Handschuh)
- B. Stieger, M. Terberger: *TruthSplit: A Tool to Visualize When and Why People Disagree* (BP, supervised by C. Niklaus)
- A. Zaradez, L. Six: *TruthSplit: A Tool to Visualize When and Why People Disagree* (BP, supervised by C. Niklaus)

Teaching

In the spring semester 2025, the lab taught **Natural Language Processing with Large Language Models (NLP with LLMs)** in the Master of Science in Computer Science (MCS) program. In the fall semester 2025, the lab taught **Statistik für Data Science** at the bachelor level, receiving excellent student evaluations (instructor engagement rating of 1.4). In addition, the lab contributed to the **Executive Education** program "AI and Data for Insurance Executives" (Swiss Re Institute / HSG). In 2025, the lab supervised bachelor and master theses. Completed theses include work on LLM-based AI coaching, the influence of recommender systems on the Swiss information environment, and local RAG evaluation. Further ongoing theses address LLM argument quality, annotator disagreement, and controllable text simplification.

Outreach

The DS-NLP lab was active in public outreach and science communication throughout 2025. Selected invited talks and keynotes include:

- **IHK Innovationsforum Ost** (February 2025): Keynote "KI: Beyond the Hype. GenAI als Co-Pilot für Führungskräfte"
- **HSG Senatsklausur** (September 2025): Tutorial "Wie funktionieren LLM und ChatGPT"
- **WEITBLICK regional, Wil** (September 2025): Keynote "KI zwischen Forschung und Praxis: Data Science und NLP"
- **HSG Alumni Club Presidents' Meeting** (October 2025): Workshop "Reflektierter Umgang mit KI"

The lab participated in the **Swiss Conference on Data Science (SDS 2025)** with a poster presentation. Prof. Handschuh serves on the **Scientific Steering Committee of the IEEE SDS conference** (2025–2026). Research results were featured in **HSG News** articles on the Best Paper Award at KDIR 2025 and the Financial Touchstone Benchmark. Prof. Handschuh was interviewed by the **NZZ** (September 2025) on AI market developments. The lab continued to develop its public presence through its research blog[6] and website.

Academic Service

Prof. Handschuh held the following roles in 2025:

- Member of the **HSG Research Commission** (2020–2025), reviewing research proposals across all Schools
- Member of **hiring committees** for professorships at HSG (Associate Professor Computer Vision, SCS-HSG) and external evaluator (WU Vienna, 2025)
- **Scientific Advisory Board**, German Economic Council (CDU Wirtschaftsrat, since 2020)
- **Scientific Advisory Board**, Thurgauer Institut für Digitale Transformation (TIDIT, since 2023)
- Pro-bono advisor to the **EnableMe Foundation** on AI technologies for people with disabilities (since 2024)
- Mentor to Assistant Professor Christina Niklaus (SCS-HSG)

Infrastructure

Modern NLP and deep learning research is fundamentally dependent on access to high-performance GPU infrastructure. In 2025, the lab invested significant effort in managing and optimizing its limited computational resources, including the development of governance policies to ensure transparent and fair allocation across research projects. Despite these efforts, **GPU capacity remains a critical bottleneck**: training runs for state space models and efficient architecture experiments regularly require multi-day allocations on high-end hardware, and the growing number of PhD students and research projects places increasing

[6] `https://blog.nlp-lab.ai`

demand on a resource pool that has not kept pace. Several promising experiments had to be scaled back or delayed due to insufficient compute availability. Expanding GPU infrastructure remains a top priority for the lab going forward. On the software and tooling side, the lab advanced its **website and blog deployment pipelines**, explored AI coding tools (e.g., Cursor, Claude Code), and maintained its repository infrastructure across GitLab and GitHub.

Foundations of Computation, Anna-Lena Horlemann

The group for **Foundations of Computation** is engaged in research and teaching in the areas of theoretical computer science, coding theory, cryptography and algorithmic mathematics. With our research results we aim to improve digital communication technologies in their reliability, efficiency and security.

Team

Our former PhD student Nadja Willenborg successfully defended her thesis in spring and officially graduated with a **PhD degree** in September. With her graduation she also left the group and hence the ICS. Around the same time our Postdoctoral researcher Dr. Hassan Ou-azzou's left our group to take on a research position in his home country, Morocco, and our Postdoc Dr. Carlos Vela Cabello left to take on a professorship in his home country, Spain. The other team members, i.e., the head of the chair as well as the doctoral researchers Marc Newman and Adrien Pasquereau remained unchanged.

Research

Overall, we continued all ongoing **research projects** on various topics in **coding theory and post-quantum cryptography**. The chair spent the spring semester at the University of Queensland in Brisbane, Australia, and initiated a research project on perfect graph matchings and array codes with the local expert in combinatorics, Prof. Barbara Maenhaut.

Two of the assistants, Marc Newman and Dr. Carlos Vela Cabello, independently visited the head of the group during her sabbatical in Brisbane. During their stays they continued working on and finishing their projects on lattices and Lee metric codes, as well as locally recoverable codes and neighbors of linearly complementary dual codes. They both presented some of these results in public academic events at the University of Queensland in Brisbane.

Furthermore, the two **articles**

- *A new path to code-based signatures via identification schemes with restricted errors*, Marco Baldi, Massimo Battaglioni, Franco Chiaraluce, Anna-Lena

Horlemann-Trautmann, Edoardo Persichetti, Paolo Santini, Violetta Weger, (Advances in Mathematics of Communications)
- *Dihedral quantum codes*, Nadja Willenborg, Martino Borello, Anna-Lena Horlemann, Habibul Islam (Journal of Algebra and Its Applications)
were published, and we submitted four more papers to various high-standard journals in the field.

Projects

We completed the externally funded **research projects** on *Gray maps in code-based cryptography* (Grundlagenforschungsfond (GFF) project) and *Neighbors of linear complementary dual (LCD) codes* (Leading House Latin America – Research Partnership Grant). Furthermore, we initiated the execution of the **SNF-FWO-Weave project** on *Finite geometry applications to coding theory and cryptography*.

Teaching

During the spring semester 2025 the head of the chair was on sabbatical leave in Australia. Nonetheless, the group taught several **courses in various degree programs** of the University of St.Gallen. These include *Fundamentals of Computer Science* and *Discrete Mathematics* (with main lecturer Dr. Dominik Kachel) in the Bachelor of Computer Science, as well as *Mathematical Tools for Data Science* as electives for other schools at Bachelor level, and *Introduction to Cryptography and Cybersecurity* as an elective for other schools at Master level. Furthermore, we offered a Master of Computer Science elective course on *Information Theory and Channel Coding* and a PhD seminar on *Error Correcting Codes and Their Application* in the fall semester.

Additionally, the group supervised one **Bachelor's** and one **Master's thesis** at the School of Computer Science.

Lastly, the chair taught courses on blockchain technology in the two HSG **executive education** programs *Innovation in Finance* and *Blockchain Finance*.

Outreach

The head of the group, Prof. Anna-Lena Horlemann, gave a **public lecture** titled *Quantum Computing und Cybersecurity – Sicher oder gefährdet?* and was **invited speaker** and panel discussion member to the Alps Forum focused on *Quantum Security – Safeguarding the Digital Transformation* by the Law and Economics Foundation St.Gallen. She furthermore wrote the **article** *Quantencomputing fordert Cybersicherheit heraus* for the HSG ALMA magazine.

Interactions Research Team, Simon Mayer

The Interactions Research Team[7] investigates technology-mediated interactions in complex socio-technical systems. Within this broad field, we are interested in a great many aspects of the interaction of (computer) systems with other systems as well as with people, and specifically in pervasive computing environments.

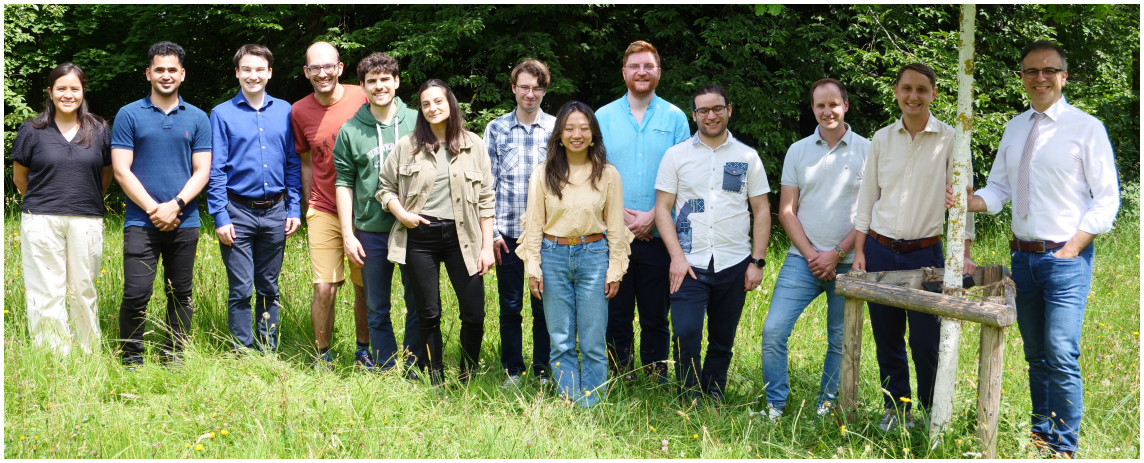

Figure 2: Most members of the Interactions Research Team in 2024.

Ongoing PhD Theses

In our group, the PhD work of Danai Vachtsevanou—who finished her PhD in the year 2025—is on the bridging of affordance-driven and hypermedia-driven interaction in the design of adaptive interfaces for human and artificial agents in Web-based Multi-Agent Systems while Jérémy Lemée studies how heterogeneous agents can combine their own specialized knowledge and cognitive abilities in order to improve collaboration efficiency. Based on a fascination for bio-inspired technology in general and its application to software specifically, Alessandro Giugno is working on socio-technical systems as well, and currently applies this to the design and creation of information management systems for circular economy and sustainability. And Ganesh Ramanathan—who also finished his PhD in the year 2025—is striving to achieve autonomy in industrial control systems by making system and domain knowledge accessible to the automation agents, with a specific focus on autonomous buildings.

More autonomous systems might behave in a way that is not so intelligible for their human users, and hard to interpret for other machines—hence, Sanjiv Jha—

[7] https://interactions.ics.unisg.ch

another member of our team who finished his PhD in the year 2025—works towards explaining contextual influences on the behavior of cyber-physical systems using multimodal scene understanding. Turning more towards people, Damian Hostettler investigates how the behavior of an industrial robot can be adapted to the implicit and explicit responses of humans to promote satisfactory human-robot interactions; Damian also finished his PhD in the year 2025, and was awarded the University of St.Gallen's Amicitia Award for the university's Best PhD Thesis in Business Administration in the year 2025. Such personalization also features heavily in Jannis Strecker's research—Jannis studies how ubiquitous personalization systems can make our interactions with our environment more efficient, safer and more inclusive, and how they can be built in a responsible and societally beneficial way. Luka Bekavac' focuses on understanding and addressing the systemic risks posed by Very Large Online Platforms, combining methods from technology law, computer science, and social sciences to study how platforms' personalized recommender systems influence us, while developing tools to enhance transparency and accountability in their operation. Benefiting individuals and society is also core to Jing Wu: Her research work is about analytics-based behavior interventions to promote human health, specifically in the fields of nutrition and ambient lighting; and for her work on human nutrition she received the 2025 Research Award of the Swiss Society for the Advancement of Nutrition Research (SFEFS).

To support bringing our research to practice, Lukas Eichelberger is our team's Research Entrepreneur—he is interested in exploring the commercial potential of newly emerging technologies and is particularly engaged in the fields of robotics (e.g., for Understanding Robots) and applications in the field of healthcare. And Jan Albert is a software developer who maintains our lab's infrastructure and supports other team members in their research work wherever possible.

Postdoctoral Researchers

Kimberly Garcia designs and studies systems that we refer to as Digital Companions; these are created to assist and protect their users while being aware of their privacy, and Kim uses a combination of machine-learning systems and symbolic approaches such as Knowledge Graphs in neuro-symbolic ensembles to achieve this. And Kenan Bektas brings in the human eye—quite literally, as since his PhD and during his postdoctoral studies he has been using eye tracking as an interaction mechanism and to study the workload of operators in human-robot interactions. All our work interacts with society and societal processes,

and hence regulation is a cross-cutting aspect—Clement Guitton brings in this dimension: He investigates the extent to which regulations (standards, laws, etc.) can and should be turned into an automatically processable format, for instance to automate compliance or facilitate their comprehension via querying possibilities.

Finally, our group is comprised of Andrei Ciortea and Simon Mayer. Andrei is Assistant Professor for Web-based Systems and his research focuses on designing a new class of Web-based multi-agent systems (MAS) that inherit the architectural properties of the Web, preserve the properties of MAS, and are human-centric. And Simon is fascinated by the integration of concepts and approaches from across the fields of pervasive computing, hypermedia, Human-Computer interaction, and embedded systems to realize ideal interfaces between ubiquitous machines and animals.

Teaching

Our group offers a series of challenging but rewarding courses on the topics of Ubiquitous Computing and Web-based Autonomous Systems as well as introductory courses to Computer Systems, Computer Networks, Distributed Systems, and Computer Science. In addition to the supervision of many Bachelor and Master theses, in the year 2024 our group's teaching comprised 10 courses that were attended by more than 1300 students in total. Overall, we are active in seven different degree programs at the University of St.Gallen and several of our courses are open to all students of the university. Abroad and at HSG, we again received very good student evaluations across all our courses, where specifically our BCS and MCS courses stood out with excellent evaluations.

Research

Our team engages in two overlapping research fields. On the one hand side, we are investigating *Systems and People in Ubiquitous Computing Environments*. During the year 2024, we further deepened our expertise and increased our research output across the topics of novel user interfaces for pervasive computers, reasoning and explainability of (and in) ubiquitous computing environments, and on user trust in pervasive computing systems (especially robotics). We continued our collaboration with Inselspital Bern on fully automatic nutrition

support systems, and deepened our collaboration on automatically processable regulation with Prof. Dr. Aurelia Tamò-Larrieux at Maastricht University. Our second major area of interest are *World-Wide Autonomous Systems*. In this field, we are investigating interactions of autonomous agents with each other, with their environment, and with people, where we continued our exploration of the application of concepts from ecological psychology to the interaction of *artificial* agents. Bridging with ubiquitous computing, we furthermore continued our investigation of the deployment of autonomous agents in embedded and low-power systems, and we remain active in the field of interoperable Web of Things systems. Across these research fields and in the context of several funded research projects, our group has in the year 2025 made contributions to publishing 41 research articles at international journals, conferences, and workshops.

Cybersecurity, Katerina Mitrokotsa

The **Chair of Cybersecurity**, headed by Prof. Katerina Mitrokotsa at the Institute of Computer Science, University of St. Gallen,[8] focuses on advancing Information Security and Applied Cryptography, with the broader objective of safeguarding digital communications and providing strong privacy guarantees. Our research spans several key areas, including privacy preservation, secure and privacy-preserving digital identity, secure multi-party computation, as well as secure and reliable authentication protocols.

The Cybersecurity Group has made significant contributions to the field through high-quality research, teaching, and outreach. The team actively collaborates with leading international cybersecurity and cryptography laboratories, including TU Darmstadt and KIT in Germany, EURECOM in France, Aarhus University in Denmark, IBM Research Zurich, and IIT Delhi in India.



Figure 3: The Cybersecurity Research Team in 2025.

These collaborations enrich our scientific output and broaden the reach and impact of our work. Among the year's highlights, two doctoral researchers from our group, Nan Cheng and Johannes Ottenhues, successfully defended their **PhD theses**, marking an important milestone for the team. In addition, we launched a **Cyber Defence Campus (CYD)**, supported research project focusing on *Privacy-Preserving Primitives for Proximity Tracking and Collision Avoidance*, further expanding our engagement with national cybersecurity priorities.

[8] https://cybersecurity.unisg.ch

Team

In 2025, the Cybersecurity Group at the University of St. Gallen consisted of ten members, including Prof. Katerina Mitrokotsa. The team was composed of one postdoctoral researcher Dr. Subhranil Dutta and seven doctoral researchers, Nan Cheng, Ioannis (Jannis) Katis, Florias Papadopoulos, Johannes Ottenhues, Jenit Tomy, Wilson Tsuata, and Liujun (Alice) Yu. It is worth highlighting that Wilson Tsuata received the prestigious **ESKAS (Swiss Government Excellence Scholarship)** for his doctoral studies in 2025, while Florias Papadopoulos was awarded the highly competitive **Cyber Defence Campus (CYD) Doctoral Fellowship**.

In 2025, two doctoral students of the Cybersecurity Group successfully defended their PhD theses with honors. More precisely, in March 2025, our doctoral researcher *Johannes Ottenhues* defended his PhD thesis on the topic **Cryptographic Protocols for Biometric Authentication**. His examination committee consisted of Prof. Anja Lehmann (Hasso Plattner Institute, Germany), Prof. Melek Önen (EURECOM, France), Prof. Jiayu Xu (Oregon State University, USA), and Prof. Mitrokotsa. Johannes Ottenhues is currently a postdoctoral researcher at Karlsruher Institut für Technologie (KIT), in Germany.

In June 2025, our doctoral researcher *Nan Cheng* submitted his doctoral dissertation on the topic **Concretely Efficient MPC Protocols for Real-world Applications**, and in September 2025, he successfully defended his PhD thesis. His examination committee consisted of Prof. Peter Scholl (Aarhus University, Denmark), Prof. Melek Önen (EURECOM, France), Dr. Chen-Da Liu-Zhang (HSLU), and Prof. Mitrokotsa. Nan Cheng is currently a postdoctoral researcher in our Cybersecurity Group.

Research

The research of the Chair of Cybersecurity focuses on core areas of information security and applied cryptography, with a particular emphasis on developing efficient and robust cryptographic protocols and primitives suitable for real-world deployment. Our work mainly concentrates on secure outsourcing of computations to untrusted cloud environments, fine-grained access-control mechanisms, and reliable as well as privacy-preserving authentication protocols.

During 2025, our group published *several research papers and book chapters* in well-known venues in cybersecurity and cryptography, including **PKC 2025** (International Conference on Practice and Theory of Public-Key Cryptography) and **ESORICS 2025** (European Symposium on Research in Computer Security). In addition, several works submitted in 2025 were recently accepted at prominent conferences such as the **ACM Asia Conference on Computer and Communications Security (AsiaCCS) 2026** and **PKC 2026**. Furthermore, a paper submitted to the *Journal of Design, Codes and Cryptography* (Springer) was accepted with minor revisions, and a book chapter will appear in an upcoming Springer volume for the book *Privacy and Security Matters in Biometric Technologies*. These research contributions primarily propose *new cryptographic protocols and primitives* that enable *secure and efficient computations* involving multiple parties, where **sensitive data must remain private**.

Our work spans a broad range of applications, including **secure and privacy-preserving machine-learning inference** and **reliable and privacy-preserving digital identity**, as well as *secure and private statistical aggregation with fine-grained access control*, *privacy-preserving biometric authentication*, and *distributed cryptographic constructions* such as distributed oblivious pseudorandom functions (OPRFs) and multi-client functional encryption. More precisely, we focus on the design of *provably secure cryptographic protocols and primitives* that address two central challenges.

First, we aim to develop **reliable and privacy-preserving authentication and digital-identity mechanisms**, including those used in access-control systems, electronic identity infrastructures, or electronic payment environments. These mechanisms often rely on *sensitive biometric templates* (e.g., fingerprints or voice recordings) or *traditional passwords*, and require strong guarantees for the protection of users' identity attributes.

Second, we design **privacy-preserving computation techniques** that ensure data generated by individuals remains confidential while still enabling meaningful computations on it. Typical examples include *privacy-preserving machine learning* and *aggregation of statistics* for health diagnostics or financial analysis, all performed *without revealing any sensitive underlying data*.

At a more technical level, we develop cryptographic protocols supporting **robust user authentication and digital identity**, together with *secure and private cloud-assisted computation* and *privacy-preserving machine-learning workflows*. In this context, we design methods that allow users or organisations to

verify, *control*, and *validate* computations performed by untrusted cloud servers, while ensuring that no sensitive information is leaked in the process.

Projects

During 2025, we were involved in five major funded research projects. These included the GFF Stepping Stone grant *"Privacy-Preserving & Distributed Authentication"*; the GFF Mobi.Doc project *"Threshold Adaptor Signatures and the Applications to Blockchain Technologies"*, awarded to the doctoral researcher Jenit Tomy; the CYD doctoral fellowship project *"Privacy-Preserving Primitives for Proximity Tracking and Collision Avoidance"*, awarded to Florias Papadopoulos; the ESKAS (Swiss Government Excellence Scholarship) postdoctoral fellowship project *"Reinforcing Privacy in Cloud Computing via Unbounded Attribute-Based Quadratic Functional Encryption & Its Applications"*, awarded to Dr. Subhranil Dutta; and the ESKAS doctoral fellowship awarded to Wilson Tsuata for the project *"Functional Encryption for Privacy-Preserving Data Analysis & Machine Learning"*.

These projects reflect our group's strong engagement in advancing privacy-enhancing technologies, applied cryptography, and broader national cybersecurity priorities.

- The GFF Stepping Stone project *"Privacy-Preserving & Distributed Authentication"* introduced a decentralized and privacy-preserving approach to token-based authentication that removes the reliance on centralized identity providers. It develops cryptographic primitives enabling secure, unlinkable, and quantum-resistant authentication in real-world distributed systems.

- The CYD project *"Privacy-Preserving Primitives for Proximity Tracking and Collision Avoidance"* designs a framework that allows drones to detect nearby objects or other drones without disclosing sensitive location or identity information. By integrating secure proximity testing with privacy-aware collision-avoidance techniques, the project enhances autonomous-flight safety while preventing tracking or profiling, and its results naturally extend to proximity-based systems increasingly used in social applications such as ridesharing (e.g., Uber, Lyft, Taxify, Bolt), dating platforms, and location-based networking.

- The ESKAS postdoctoral project *"Reinforcing Privacy in Cloud Computing via Unbounded Attribute-Based Quadratic Functional Encryption & Its Applications"* advances Functional Encryption by developing efficient quadratic schemes that allow authorized computations on encrypted data without revealing the underlying plaintext. Complementarily, the project *"Functional Encryption for Privacy-Preserving Data Analysis & Machine Learning"* focuses on robustness, efficiency, and applicability for secure data processing and machine-learning workflows in cloud environments, with direct relevance to privacy-preserving data analysis in sensitive domains such as healthcare and finance.

- The Mobi.Doc project *"Threshold Adaptor Signatures and Their Applications to Blockchain Technologies"* investigates adaptor-signature schemes with strong relevance to decentralized finance and digital-transaction security. It develops threshold adaptor signatures that enable secure conditional actions in applications such as blockchain payments, coin-mixing protocols without relying on a trusted intermediary.

Teaching

Our Chair offers multiple courses in the area of Cybersecurity and Applied Cryptography. During 2025, the Chair of Cybersecurity offered a total of **eight courses**: four at the *Master* level, two at the *Bachelor* level, and two *PhD* level courses. The Master-level courses were taught in the Master in Computer Science programme at the University of St. Gallen, as well as within the Contextual Studies programme. The Bachelor-level courses were taught in the Bachelor of Computer Science. More precisely, the mandatory course *Advanced Cybersecurity* was offered for the fifth time to students in the Master in Computer Science programme. In addition, the Chair offered the elective Master course *Secure and Private Computing*. The group also supervised two students completing their *Integrative Master Project* in the area of Cybersecurity and Applied Cryptography. At the Bachelor level, the mandatory course *Cybersecurity* was taught to Bachelor in Computer Science students, together with the elective course *Security Protocols and Applications*. Furthermore, the group offered one Contextual Studies course, *Data Security and Privacy*. During 2025, two PhD-level courses were offered to further strengthen the expertise of doctoral students in the area of Security & Privacy at the Doctoral School of Computer Science. Based on student feedback and course evaluations, our courses were well received and highly appreciated. Furthermore, the Cybersecurity Group has supervised a *Bachelor*'s

and a *Master*'s thesis for the School of Computer Science, both of which are about to be completed.

Outreach & Academic Activities

During 2025, Prof. Mitrokotsa delivered a *keynote talk* and participated in a *panel discussion* on *cybersecurity* and *AI-driven threat intelligence* at the **Global Cyber Conference 2025** in Zurich. She also gave *invited research talks* at **KTH** (Sweden) and **TU Graz** (Austria). Furthermore, Prof. Mitrokotsa delivered an invited talk on cryptography and privacy preservation at the **E-Collecting Hackathon**, organised by the Swiss Federal Chancellery [9]. Prof. Mitrokotsa was also approached by public media to comment on current cybersecurity threats, and her expert opinions were featured in prominent outlets such as **Live Science**, **Inkl**, and **Network Today**.

Members of our group have attended multiple conferences and workshops related to cryptography and cybersecurity and disseminated our research results i.e., including PKC 2025, ESORICS 2025, Eurocrypt 2025, CYD Alp Retreat 2025, Real World Crypto 2025.

In addition, Prof. Mitrokotsa served as an **Associate Chair** for **Cybersecurity & Applied Cryptography** at the flagship cybersecurity conference **IEEE S&P 2026**. She also served as a programme committee member for several top-tier conferences in cybersecurity and applied cryptography, including: *ACM Asia Conference on Computer and Communications Security* (AsiaCCS 2025), *Privacy Enhancing Technologies Symposium* (PETS 2025), *Applied Cryptography and Network Security Conference* (ACNS 2025), *Cryptology and Network Security Conference* (CANS 2025), *Conference on Decision and Game Theory for Security* (GameSec 2025).

During 2025, Prof. Mitrokotsa served as an evaluation committee member for three PhD theses in the areas of privacy preservation and applied cryptography: one at **KTH (Sweden)**, one at **Inria Lille (France)**, and one at **TU Graz (Austria)**. Furthermore, Prof. Mitrokotsa gave a **public lecture** in Spring 2025 titled *Secure & Private Computing*, which was very well received and highly appreciated.

Since November 2022, Prof. Katerina Mitrokotsa has been a member of the

[9] https://www.bk.admin.ch/bk/de/home/politische-rechte/e-collecting.html

Sounding Board Researchers of the **Swiss National Open Research Data Strategy**[10]. The main role of the Sounding Board Researchers is to advise both the Swiss National Open Research Data Strategy Council and the Open Research Data Coordination Group by responding to their questions and issuing recommendations that support the participation of research communities in the continued development of the Swiss Open Research Data landscape. Prof. Mitrokotsa continued her contributions to this body throughout 2025 and also served on the evaluation committee of the **Open Research Data Award 2025**.

In addition, the *Chair of Cybersecurity* continued its collaboration with the **Cyber Defence (CYD) Campus** of Switzerland and participated in the *Cyber Alp Retreat 2025* in Davos, where CYD Fellow Florias Papadopoulos, a member of the Cybersecurity group, delivered an invited talk. The Chair also hosted several visitors and leading researchers in Cybersecurity and Cryptography, many of whom presented their work at the **CSI Seminar** organised by the School of Computer Science at the University of St. Gallen. Our visitors included **Prof. Anja Lehmann** (Hasso Plattner Institute, Potsdam, Germany), **Dr. Nguyen Hai Hoang** (ETH Zurich), **Prof. Shweta Shinde** (ETH Zurich), **Dr. Chen-Da Liu-Zhang** (HSLU), **Dr. Jonathan Bootle** (IBM Research Zurich), **Dr. Martin Burkhart** (Armasuisse), and **Dr. Tapas Pal** (KIT, Germany).

Finally, in 2025, Prof. Mitrokotsa continued serving on the following committees:

- **Information Security Board**, University of St. Gallen,
- **Ethics Committee**, University of St. Gallen,
- **Research Committee** of the University of St. Gallen (as a substitute member),
- **Review Committee of the School of Computer Science** for the evaluation of faculty members,
- **Equality, Diversity and Inclusion Committee** of the University of St. Gallen, which aims to promote and ensure equal opportunities, diversity, and inclusion within the university.

[10] https://akademien-schweiz.ch/en/themen/scientific-culture/open-science/

Programming, Guido Salvaneschi

The Programming Group at the Institute of Computer Science conducts research on advanced programming techniques aimed at improving the efficiency, maintainability, and security of software systems.

Team Members

The Programming Group at the University of St. Gallen comprises four Ph.D. students. Research scientist Christoph Bühler has been working with the group during 2025 and will also join the Ph.D. program from 2026. Three postdoctoral researchers are also part of the team. Dr. Pascal Weisenburger has been with the group since 2021, Dr. Matteo Biagiola has joined the group in February 2025, and Dr. Luca Di Grazia has joined the group in August 2025 with a Great Minds Postdoctoral Fellowship from the University of St. Gallen. The group is also supported by several student programmers who contribute to ongoing research efforts.

The group's research focuses on two main areas. The first is programming language design and software verification, which are essential for improving the reliability of (distributed) software applications. The second area involves languages and systems for infrastructure as code, contributing to the safety and reliability of Cloud computing systems.

Projects

The group is active on several research projects in 2025, reflecting the international recognition of its scientific contributions.

- **SNSF** *Consistency Programming for Local First Software* (4 years). The project develops a programming framework for distributed software that is resilient to intermittent connectivity while providing correct functionality when clients operate offline and reconnect later.

- **EU-HORIZON** *CAPE: European Open Compute Architecture for Powerful Edge* (3 years). CAPE aims to strengthen European digital sovereignty by shap-

ing the next generation of edge-to-cloud computing systems. The project seeks to position Europe as a leader in green cloud computing infrastructure by reducing waste heat, increasing the reuse of heat and cooling capacity, and integrating renewable energy sources.

- **Cyber Defence Campus (CYD)** *Software Security of Cloud Infrastructure Configurations via Automated Verification* (1 year, follow-up of a previous project). This project contributes to the broader vision of protecting infrastructures from attacks that exploit security vulnerabilities. The ultimate goal is to develop methods that apply software quality techniques (e.g., testing and verification) to Infrastructure as Code specifications, ensuring security by design. The project aims to verify infrastructure code before deployment, providing cloud administrators with early insights into issues such as network reachability and access control without requiring cloud interaction. The project was concluded in December 2025. A follow-up has already been approved for 2026.

- **SNSF** *Multitier Programming Above the Clouds* (4 years). The project started in 2021 and concluded in October 2025. The project has led to numerous top-tier publications and the graduation of Dr. Daniel Sokolowski, currently employed at Amazon Research.

Teaching

The group offers several courses in the areas of programming languages and software systems. In 2025, it delivered a total of five courses across various programs at the University of St. Gallen.

In the first semester of the Bachelor's program in Computer Science, the group teaches the course *Introduction to Programming*, where students learn the foundations of programming using Python. In the second semester, the group teaches *Programming Methodology*, which focuses on object-oriented programming in Java.

In Fall 2024, the group offered the course *Introduction to Software Engineering* in the MBI program, an introductory course covering Java programming and basic application engineering. The group also taught a course on *Advanced Programming* in the Master's program in Computer Science, providing an overview of advanced programming abstractions for software developers.

Since Fall 2024, the group has had a new course titled *Coding with AI*, focusing on novel programming techniques enabled by large language models. The course was repeated in Fall 2025. It was again very well-received and gave students the opportunity to explore cutting-edge methods for software development supported by AI tools. Like the previous edition, it included guest lectures from industry professionals and visiting professors, such as: Dr. Beat Buesser (IBM Zurich) (*Software Security with AI*).

Finally, Prof. Salvaneschi contributed to the Executive Education program *Cybersecurity for Managers*, offered by the Executive School of Management, Technology and Law (ES-HSG) at the University of St. Gallen. He delivered lectures on the topic *Software Development and Security by Design*.

Research

The group's main research area is programming language techniques and their implications for the development of software systems. More specifically, the group focuses on two interconnected research lines.

The first research area addresses language design and program verification for distributed systems. In this domain, the group develops programming languages that support the creation of distributed software that is more efficient, secure, and maintainable. Additionally, the group is active in the development of automated verification techniques tailored to the specific challenges of distributed systems.

The second research area focuses on a class of software applications known as Infrastructure as Code (IaC). These applications are responsible for securely configuring infrastructural elements such as networks, cloud resources, or other software systems, rather than providing services directly. Given their foundational role, the correctness of these applications is critical. A defect in the configuration process can compromise entire system landscapes. The group is currently investigating techniques for testing and verifying infrastructure as code.

These research efforts resulted in five publications in 2025. Papers from the group appeared, among others, in POPL (Principles of Programming Languages, ACM), a top venue in programming languages, and TSE (Transactions on Software Engineering, IEEE), a top venue in Software Engineering. These publications con-

firm the group's track record of publishing in top international computer science venues.

Outreach and Academic Citizenship

The group is highly visible in the scientific community.

Prof. Salvaneschi is also a member of AITO (Association Internationale pour les Technologies Objets), the organization that oversees the ECOOP conference series. Furthermore, he serves as Chair of the AOSA Steering Committee. AOSA is a non-profit organization whose mission is to sponsor the Programming conference and publish the Programming Journal.

In addition, Prof. Salvaneschi has been involved in several program committees in 2025, including:

- ASE 2025 – IEEE/ACM International Conference on Automated Software Engineering.
- ISSTA 2025 – ACM SIGSOFT International Symposium on Software Testing and Analysis
- ICSME 2025 – IEEE International Conference on Software Maintenance and Evolution
- ICSE 2025 – International Conference on Software Engineering (NIER Track)
- DEBS 2025 – ACM International Conference on Distributed and Event-based Systems

Prof. Salvaneschi has also served as an external reviewer for the DFG (German Research Ministry) review panel on the Priority Program "Resilience in Connected Worlds - Mastering Failures, Overload, Attacks, and the Unexpected".

Since February 2021, Prof. Salvaneschi has been a member of the Advisory Board of the Department of Computer Science at OST University of Applied Sciences, Switzerland. As of June 2024, he also serves on the Scientific Committee of DIGITAL SME (Brussels). The European DIGITAL SME Alliance is the largest network

of ICT small and medium-sized enterprises in Europe, representing over 45,000 companies.

In 2025, the group hosted several renowned researchers, including:

- Prof. Andrea Stocco (TUM)
- Prof. Davide Ancona (University of Genova)
- Prof. Vincent Lenders (University of Luxembourg)
- Dr. Oliver Bračevac (EPFL)
- Prof. Alberto Bacchelli (UZH)

Human-Computer Interaction, Johannes Schöning

The Human Computer Interaction (HCI) group at the Institute of Computer Science in St. Gallen contributes to research, teaching, and outreach in this field. The group focuses on the design and study of novel user interfaces that support individuals and communities. Its work has been published in recognised academic venues, and several projects have received external funding. Interdisciplinary collaboration is a core aspect of the group's approach and has led to sustained cooperation with leading HCI laboratories in Europe and with research groups within HSG. Research results and related activities have also received public attention, featured in media outlets such as *Der Spiegel*, *Neue Zürcher Zeitung*, and *Die Zeit*, as well as in radio broadcasts and other outlets.

The group is led by Johannes Schöning. It was established at HSG in September 2021 and formally integrated into the Institute of Computer Science in February 2022. As outlined in the two previous reports, the group has continued to make substantive contributions to HCI research in Switzerland and has published a series of peer-reviewed articles. In recognition of his sustained and impactful contributions to the field, Johannes Schöning was appointed an ACM Distinguished Member in 2025 by the Association for Computing Machinery (ACM). This distinction is awarded to a select group of researchers worldwide for outstanding scientific achievement, leadership, and service, and is held by only a small number of computer scientists in Switzerland.

Team

The team, which focuses on developing user interfaces that support individuals and communities with the information needed to make informed, data-driven decisions, comprises six PhD candidates and two PostDocs based at HSG in St. Gallen. Additionally, one PhD candidate continues their research at the University of Bremen. One member, Eve Schade, successfully graduated with their PhD in November 2025.

Leon Reicherts, a Postdoctoral Researcher at Microsoft Research Cambridge, and Katerina Koleva, who completed her PhD at KTH Stockholm, joined the team in October and November 2025, respectively, as a Postdoctoral Researcher and a PhD student.

Research

As in the previous years, the 2025 research efforts of the HCI group at the University of St. Gallen closely align with our mission to empower individuals and communities by co-creating data-driven interfaces that support meaningful decision-making. We aim to develop an understanding of user requirements across a broad range of conditions, from everyday settings to extreme environments, and to benefit from interdisciplinary collaboration across AI, computer graphics, and cognitive psychology. This year's research advances our mission to design interfaces that facilitate more informed, empowered interactions with technology by applying rigorous, user-centred methodologies and leveraging mixed methods. This short summary addresses current topics in HCI through a range of empirical and conceptual methodologies. Our papers [SSNS25, PCSM25, SS25, TSZ+25, MS25] addresses current topics in HCI.

Across the 2025 publications, our research focuses on how interactive technologies become embedded in everyday life, with particular attention to socio-emotional interaction, embodied use, accessibility, and civic participation. A shared concern across all papers is the discrepancy between technological promise and lived experience, especially during early adoption phases or in real-world settings beyond controlled environments.

Several contributions examine technologies that intervene directly in personal and social practices. Tschopp et al. [TSZ+25] investigate early interactions with a socio-emotional companion bot and analyse why motivated users fail to establish emotional connections during the initial adaptation period. Their findings foreground structural and interactional asymmetries, such as mismatched role expectations and unreliable memory, that hinder relationship formation.

Sun et al. [SS25] extend the focus on personal technologies to mobile mixed reality, using an autoethnographic approach to study how continuous MR use affects everyday activities, social encounters, and ethical reflection across contexts such as travelling, eating, and exercising.

Everyday support and autonomy form another thematic strand. Mathis et al. [MS25] address limitations of existing assistive technologies for blind and low vision people by examining daily experiences and translating them into the design of an AI-powered wearable. Their work emphasises mobility, goal-oriented interaction, and adaptability across scenarios, highlighting how assistive systems must align with the fluid nature of everyday life.

A further theme concerns agency and participation in shared urban environments. Preussner et al. [PCSM25] study the use of generative AI to support citizen participation in urban development, demonstrating how visual co-creation can empower expression in early planning stages while also revealing risks of exclusion, particularly for senior citizens.

Schade et al. [SSNS25] approach agency from a navigation perspective, analysing how efficiency-focused routing constrains exploration and spatial learning, and showing how alternative routing strategies can diversify urban experience.

Methodologically, the papers share a strong commitment to qualitative, participatory, and in-the-wild approaches. They combine longitudinal studies, autoethnography, experience-driven design, technology probes, and long-term field observation to capture how people interact with technology in real life. This approach allows the research to uncover subtle, context-dependent behaviours, needs, and challenges that are often invisible in short-term or laboratory-based studies, providing rich insights to inform more human-centred and adaptive system design.

Teaching

The HCI group has contributed to the curriculum at both bachelor's and master's levels, teaching mandatory courses that equip students with essential skills. They have also facilitated master's projects and supervised many bachelor's and master's theses in computer science and interdisciplinary programs such as the Master of Business Informatics (MBI).

Funding & Outreach

In 2025, we acquired a new inter- and transdisciplinary research project that brings together the Institute for Business Ethics, St. Gallen (IWE-HSG), the Think-and-Do Tank Pro Futuris, the Centre for Democracy Aarau (ZDA), and the magazine Beobachter. The project is funded by the Hasler Foundation and the Mercator Foundation and is conducted in close collaboration with Prof. Thomas Beschorner (HSG). Our project aims to develop and evaluate an AI-based dialogue interface designed to improve the quality of deliberative exchanges. By

combining insights from philosophical ethics and deliberative democratic theory with large language models (LLMs), the application provides participants with feedback on substantive commonalities and on the form and quality of discourse, thereby fostering learning processes for reasoned dialogue.

Beyond that, as described earlier, our research got attention within both academic and media circles. For example our research was prominently featured in an interview with Spiegel Online [11], as well as in the Neue Zürcher Zeitung (NZZ) [12], along with several other media outlets [13].

[11] https://www.spiegel.de/auto/google-maps-wann-autofahrer-besser-auf-ihr-bauchgefuehl-als-das-nav
[12] https://www.nzz.ch/wirtschaft/alexa-auf-steroiden-altmans-ki-geraet-droht-zu-scheitern-das-sind
1905729
[13] https://www.radioeins.de/programm/sendungen/die_sonntagsfahrer/_/
stauvorhersagen-bei-google---co-.html

Software Systems Programming and Development, Barbara Weber

The chair deals with the development of adaptive software systems. This includes the integration of process-oriented information systems with the Internet of Things as well as the development of neuro-adaptive software systems. Furthermore, the chair conducts research on human and cognitive aspects of software and process engineering. Moreover, *Process Mining* is an overarching research area at the chair.

Team

The “Software Systems Programming and Development” chair began operations in February 2019 and has since grown into a strong research team. Dr. Marco Franceschetti continues his research at the interface between Internet of Things (IoT) and Business Process Management (BPM) as part of the SNSF-funded research project *ProAmbitIon*. Dr. Amine Abbad-Andaloussi strengthens the team’s expertise in human and cognitive aspects of software engineering. Dr. Hagen Völzer is Senior Project Manager since 2022, focusing on Process- and Business Rule Mining. Prof. Dr. Ronny Seiger, as an Assistant Professor, conducts research at the intersection of IoT, BPM, and Software Engineering. In 2025, Ronny Seiger successfully passed the mandatory mid-term evaluation of his assistant professorship, which allows him to continue researching and teaching in this position. Furthermore, Ronny Seiger received an offer for an associate professorship of Software Architecture at RWTH Aachen University, which he accepted per April 2026. The team also includes two PhD students: Thierry Sorg, who has been researching neuro-adaptive software systems, and Lisa Zimmermann who has been advancing research in process mining. Raffael Rot joined the team as research assistant in 2025 in a supporting role for tool development in the context of a new SNSF-funded project on software architectures. This work is complemented by the joining of Dr. Olaf Zimmermann who works on architectural decisions and software architectures as a senior researcher.

Teaching

Our teaching activities included the development and teaching of a mandatory course ("*Advanced Software and System Engineering*") in the Master of Computer Science (since 2021 together with the chair of Interaction- and Communication-based Systems), the two elective courses "Event-driven and Process-oriented Architectures" and "Software Assessment: From Planning to Experimentation". Moreover, we are responsible for the mandatory course "Entwurf von Softwaresystemen" (Design of Software Systems) taught to 3rd semester Bachelor of Computer Science students and the mandatory course "Software Engineering" taught to the 4th semester Bachelor of Computer Science students. We also teach the elective courses "Process Mining – Data Driven Improvement of Business Processes" and "MLOps" in the Computer Science Bachelor program.

In addition, our teaching portfolio includes a course in the Master of Business Innovation ("*Business Process Mining and Engineering*") in the Spring 2025 semester and a course in the Entrepreneurial Informatics profile area of the Bachelor of Business Administration ("*Introduction to Business Process Automation and Process Mining*") in the Fall 2025 semester.

Furthermore, the chair is continuously involved in the supervision of Bachelor and Master theses inside and outside of the School of Computer Science, as well as in the supervision of Bachelor Projects and Integrative Master Projects at the SCS.

Since 2021, Barbara Weber has also taught the elective *Coding for Executives* in the EMBA and IEMBA programs, jointly offered with the Chair of Artificial Intelligence and Machine Learning as part of the university's Executive Education portfolio. The course has gained increasing popularity over the past two years.

Research

Our research is currently focused on the development and evaluation of software artifacts. The research covers topics in process mining, Internet of Things, software architectures, as well as process model and source code analysis to develop event-driven software systems that adapt to the user's behavior and context. Our research is supported by the Swiss National Science Foundation

(SNSF) with three projects: *ProMiSE*[14] and *ProAmbitIon*[15] led by Prof. Barbara Weber; and *TaSSAreCt*[16] led by Prof. Ronny Seiger.

Process Science as a Conceptual Foundation. Our research contributes to Process Science, an interdisciplinary field that studies socio-technical processes—coherent sequences of actions and events involving both humans and digital technologies. In our paper, we discuss the increasing availability of digital trace data and advancements in process analytics as new opportunities to understand, optimize, and intervene in these processes [BAB+24]. This perspective underpins our research across Process Mining, BPM & IoT, and Human and Cognitive Aspects in Software and Process Engineering, highlighting how digital trace data can be leveraged for both automated and human-in-the-loop processes.

Process Mining. In 2025, we successfully completed the SNSF-funded ProMiSE project, which had been running since 2020 and focused on understanding and supporting analysts in exploratory process mining tasks [ZZVW23]. The project investigated how analysts formulate and refine analysis questions, explore event log data, and derive insights during exploratory analysis. Several publications resulting from the project addressed different aspects of this analytical process and contributed to better understanding and supporting process analysts.

In 2025 we contributed three additional papers to the project. First, in a contribution published in the Computer Graphics Forum and presented at the EuroVis conference, we introduced a methodological workflow for pre-processing and analyzing observational data to evaluate the use of visualizations in visual analytics settings [ZZVW25]. Based on this workflow, the study also provides empirical insights into how analysts use different visualizations during their analytical process, including when they employ them and how effectively they support the derivation of observations. Second, we developed a taxonomy of typical analysis questions raised at the beginning of process mining projects,which got published in the Business and Information Systems Journal [ZZG+25]. The taxonomy structures common analytical goals and supports analysts in formulating relevant and actionable questions that guide the subsequent analysis process. Third, building on a collaboration initiated at a Dagstuhl seminar in 2023 with researchers from the University of Haifa (Israel), Linköping University (Sweden),

[14] https://data.snf.ch/grants/grant/197032
[15] https://data.snf.ch/grants/grant/208497
[16] https://data.snf.ch/grants/grant/10002384

and the University of Queensland (Australia), as well as a practitioner from Celonis Labs GmbH, we proposed a structured bridge between requirements from process mining and concepts from visual analytics [ZVS+25]. This work aims to help visualization experts better understand process mining requirements and suggest suitable visualization designs, addressing the current situation in which visualization design in process mining tools is often driven primarily by technical considerations rather than established visualization design practices.

Beyond ProMiSE, we continued our research on visual analytics approaches for exploring process data. Process exploration is a critical task in process mining, enabling analysts to uncover insights and generate hypotheses about process behavior from event log data. Traditional approaches often rely on static, single-facet visualizations, such as Directly-Follows Graphs, which limit flexibility and obscure multi-perspective dependencies. To address these limitations, we developed a visual analytics approach based on coordinated projections that supports multi-faceted process exploration [vdEAK+25]. Using dimensionality reduction techniques such as UMAP and t-SNE together with topic modeling, the approach generates coordinated views linking different facets of process data. Interaction techniques such as zooming and panning, brushing and linking, and visual attribute encodings allow analysts to explore relationships across perspectives. We demonstrate the approach using the road traffic fines event log.

Another line of work focused on improving the understanding of roles and competencies in process mining initiatives [SLWR25]. Despite the growing adoption of process mining in organizations, the competency requirements for successful implementation remain insufficiently understood. In collaboration with the University of Ghent, the Fraunhofer FIT, and the University of Bayreuth, we analyzed job vacancy data to derive a typology of roles in process mining together with an associated competency framework. Using topic modeling, clustering, and consensus-based validation, the study identifies characteristic role profiles and required competencies. The resulting framework provides both theoretical insights and practical guidance for organizations adopting process mining.

Together with our collaborators from Karlsruhe Institute of Technology and Technical University of Denmark we contributed to advancing methods for analyzing structural characteristics of process traces [SAB+26]. Event logs often exhibit substantial structural variability, which makes it difficult to compare traces and identify patterns. To address this challenge, we developed an approach for extracting structural characteristics from traces that supports the systematic analysis and comparison of process behavior. This work contributes to improving

the analysis of structural process variability and supports more robust process mining analyses.

Additionally, we contributed to the emerging discussion on autonomous and AI-driven business processes initiated at a Dagstuhl seminar which was held in 2025[17]. Autonomous business processes (ABPs), i.e., workflows that can execute and adapt autonomously based on AI and machine learning techniques, promise significant benefits such as improved operational efficiency and reduced manual effort. However, such systems also raise concerns related to trust, accountability, debugging, and regulatory compliance. In collaboration with researchers from the German Research Center for Artificial Intelligence (DFKI), IBM Research Israel, the University of Duisburg–Essen, and the Technical University of Munich, we proposed the concept of eXplainable Autonomous Business Processes (XABPs) [FFL+25]. The work outlines a systematic perspective on how explainability mechanisms can be integrated into ABPs, characterizes different forms of explanations, and identifies key research challenges for the BPM community in developing trustworthy autonomous process systems.

Business Process Management and Internet of Things. In 2025, we continued our research on integrating Business Process Management (BPM) with the Internet of Things (IoT) as part of the ongoing SNSF-funded ProAmbitIon project (since 2022). The project's goal is to enhance monitoring and validation of business process executions using IoT technologies.

In [FSGBW25], we summarized the achievements and tangible outputs of the project over its funding period. These include the definition of scenarios from two application domains—manufacturing and healthcare—and the implementation of the corresponding IoT setups in our laboratory. In addition, the project improved IoT-based detection of process activities, identified open research challenges in a recent book chapter [MSB+26], and introduced novel methods, metamodels, frameworks, and software prototypes. Our research also deepened the understanding of ambiguity in BPM through both conceptual and empirical work and improved the efficiency of conformance checking for IoT-based event logs. Overall, these contributions provide a solid foundation for IoT-based monitoring and validation of business process executions and support the development of IoT-enhanced digital twins of business processes [FCDD+25].

Our work on IoT-based activity detection builds on the concept of an *activity sig-*

[17] https://www.dagstuhl.de/25192

nature—an exemplary pattern of IoT data characterizing a process activity. Earlier approaches required domain experts with technical knowledge to manually define activity signatures. To address this limitation, in [GBGS+25] we proposed a semi-supervised method that automatically identifies activity signatures in sensor data. This approach bridges the gap between domain expertise and technical knowledge, thereby lowering the entry barrier for adopting IoT-based activity detection. Further results include a framework for online detection of process activity executions from IoT sensors using generated event processing services [SKF26], an approach for case-based activity detection from segmented IoT data [SSB25], and a domain-specific language and architecture for detecting process activities from sensor streams in IoT [SLKK26]. In addition, we proposed a novel approach for modeling business processes in IoT and cyber-physical systems (CPS) based on roles [SSFS25].

To bridge object-centric representation of event logs and ambiguity-awareness, in [FBSW25] we extended the formalism of Event Knowledge Graphs with ambiguity. This extension enables an explicit object-centric representation of ambiguous events and event-object correlations, phenomena that frequently occur in IoT-based process monitoring but are rarely addressed explicitly. The work provides a foundation for developing (semi-)automated ambiguity resolution techniques and novel forms of ambiguity-aware process analytics, which remain open challenges in the BPM-IoT landscape.

Our collaboration with the Internet of Processes and Things working group continued in 2025 and resulted in the development of a common core metamodel for representing IoT-enhanced event logs. The metamodel was developed based on a set of common requirements following the Object-Centric Event Log (OCEL) metamodel. It is expected to facilitate data sharing and collaboration within the BPM community. To ensure early visibility, the metamodel is currently available in a non-peer-reviewed article [BIM+25]. We also contributed to the development of BROOM, a web-based tool that allows transforming between various log formats using the common core metamodel as a bridging artifact [IBG+25]. The tool addresses interoperability challenges arising from the multitude of log formats and representations in the current BPM-IoT landscape and is expected to have significant impact within the community. These efforts further strengthen our role as active contributors to research at the intersection of BPM and IoT. In addition, we continue to support the community by publishing new datasets publicly[18].

[18] https://zenodo.org/communities/iopt

In complementary work, we investigated ambiguity in textual business process descriptions and the extent to which it can be detected automatically [LFL+25]. Process descriptions, typically expressed in natural language, often contain statements that allow multiple interpretations, which can negatively affect model quality, understanding, and execution. Our analysis of a large dataset of process descriptions from both academic and industrial contexts revealed that ambiguity is widespread, with the vast majority of descriptions exhibiting at least one form of ambiguity. Beyond establishing this empirical evidence, we explored computational approaches to support ambiguity detection during the design phase. Our findings showed that conventional classification methods have limited effectiveness, whereas approaches based on pre-trained and fine-tuned large language models substantially improve detection performance. This work highlights the pervasiveness of ambiguity in early process specifications and demonstrates the potential of AI-based techniques to support practitioners in identifying and addressing ambiguities, thereby contributing to the development of clearer and more reliable process definitions.

Software Architectures for Cyber-physical Software Systems. In May 2025, we started a new SNSF-funded research project on sustainable software architectures for cyber-physical systems of systems (TaSSAreCt), together with a collaborator from the ZHAW School of Engineering. One of the main objectives of this project is to investigate modern software architectures for complex cyber-physical software systems, including emerging requirements and architectural decision forces such as sustainability. The project aims to support software and system architects in decision-making and system development.

The goal is to develop a model-driven methodology and toolchain that integrates system modeling (e.g., using SysML) with automated decision support. The approach considers non-functional requirements and architectural best practices derived from both scientific literature and industry experience. Based on these system models, software components and architecture configurations are generated semi-automatically and deployed flexibly at runtime along the cloud–edge continuum.

First insights were already achieved and published in collaborations with the University of Jyväskylä, discussing the use of energy-efficient LLMs in edge computing architectures [KSP+25]; with the Universitat Politècnica de València, discussing sustainability of IoT-enhanced business processes [BSA+25]; and in the form of an architecture for flexible and adaptive human-robot collaborations

via event-driven microservices [Sei25].

Human and Cognitive Aspects in Software and Process Engineering. This research line investigates the cognitive and behavioral processes underlying human interaction with software design artifacts (ranging from process models to source code) across a variety of tasks. We adopt a multi-granular approach that combines high-level assessments of cognitive load at the task level with detailed analyses of users' visual attention patterns and how these patterns shift throughout task execution.

Over the past year, our research on human and cognitive aspects in software and process engineering has advanced along several directions. This includes conceptual work [SAAL+26], defining a framework for studying developers' interactions with software artifacts at a fine-grained level, as well as empirical studies investigating process model complexity [SAAKW25, SAAKW26], ambiguity [AAFL+25], and semantic transparency [AATWL25] in different settings.

On the conceptual side, we introduced a framework that systematically models the relationship between developers' biosignals and software artifacts [SAAL+26]. The framework enables the integration of data from multiple modalities, including eye-tracking and galvanic skin response, and links these signals to artifact properties through a structured analytical approach. Complementing the framework, we developed a prototype visualization tool that leverages a city metaphor to represent the characteristics of software artifacts together with projections of developers' biomeasures. This enables researchers and practitioners to study how developers interact with software artifacts at scale, explore the underlying cognitive and behavioral processes at a fine-grained level, and derive actionable insights regarding artifact quality and understandability.

On the empirical side, we conducted a study exploring how established complexity metrics relate to users' cognitive load and reflect their behavior and comprehension of process models [SAAKW25]. Our investigation covered both essential and accidental complexity metrics, capturing, respectively, the complexity inherent in software artifact specifications and the complexity emerging from their implementation. The findings confirm that a comprehensive metric suite covering both dimensions aligns well with users' cognitive load, reflects their understandability, and corresponds to distinct visual behavior patterns. Building upon these results, we conducted an extended study examining how the comprehension of process models with different levels of complexity unfolds

across time and space [SAAKW26]. The findings revealed distinct comprehension phases and provided new insights into how both task-relevant and non-task-relevant parts of process models influence cognitive load. Together, these studies [SAAKW25, SAAKW26] provide a strong empirical basis for measurement practices in BPM by grounding complexity metrics in cognitive load measurements and revealing new insights into process model comprehension.

With regard to the cognitive effects of ambiguity, we conducted an in-depth analysis [AAFL+25] examining how different types of ambiguity—syntactic, semantic, lexical, and layout-related—affect readers' cognitive load, comprehension accuracy, and visual associations during process model comprehension. In addition, we identified strategies that readers adopt when attempting to resolve ambiguities using insights derived from eye-tracking and retrospective think-aloud protocols. The results confirm the detrimental impact of ambiguity across the measured dimensions and reveal that participants exhibit specific resolution behaviors reflected in distinct attention and cognitive integration patterns. These findings reinforce the need for advanced mechanisms capable of detecting and mitigating ambiguity in process models.

We also investigated how expert users make sense of integrated process models that combine business process logic with business rules [CWS+25]. While such integrated modeling approaches aim to overcome the limitations of documenting processes and rules separately, little is known about how users interpret them in practice. In this study, we analyze how expert process workers engage in sensemaking when interacting with integrated models by combining verbal protocol analysis with eye-tracking metrics. This allows us to capture behavioral patterns associated with key sensemaking phases, such as information foraging and information processing. The results provide insights into how users navigate and integrate multiple sources of process knowledge and highlight the importance of personalized support mechanisms for improving the effectiveness of process knowledge work.

With respect to semantic transparency, we turned our attention to declarative process models, which offer flexibility in representing complex processes but can be difficult to understand due to their implicit representation of control flow [AATWL25]. In this work, we introduced an empirical research model to examine how varying degrees of semantic transparency, represented through different visual notations, influence users' cognitive load, visual behavior, and their ability to understand declarative process models. This work provides a foundation and a blueprint for an upcoming experiment whose results are ex-

pected to deepen the understanding of semantic transparency and inform the design of more comprehensible declarative process models.

Beyond process modeling, we also investigated the effect of visual interface themes on cognitive load and task performance when interacting with dashboards [ESBAA25]. Based on an eye-tracking experiment and the analysis of a large set of psycho-physiological measures, our results revealed under which task conditions dark and light themes affect users' cognitive load and task performance differently. These findings contribute to understanding how visual themes influence cognitive processes in data-driven interfaces and may inform the design of process mining tools that rely on similar dashboard-based visualizations.

Outreach and Academic Citizenship

The Chair has not only played a key role in the development of HSG, with Barbara Weber serving as Vice-President for Education and Teaching, but has also continued to enhance its visibility in 2025, contributing significantly to St. Gallen's growing international reputation as a hub for computer science.

Since 2022, Barbara Weber has been serving on the SNSF evaluation panel for Postdoc.Mobility Mathematics and Engineering (STEM-T). It is highly gratifying that HSG's Computer Science is represented at the national level through her role.

Barbara Weber is now part of the Editorial Board of the journal "Software and Systems Modeling"[19]. Further, she is Department Editor of the journal "Business & Information Systems Engineering (BISE)" for the "Business Process Management" department[20], a member of the Editorial Board of the journal "Computers in Industry"[21], part of the Editorial Advisory Board of the journal "Information Systems", and Associate Editor of the journal "Computing". Moreover, since 2023 she is a member of the editorial board of "Process Science".

Barbara Weber and Hagen Völzer are Senior Program Committee Members of the International Conference of Business Process Management (BPM). Barbara Weber is also part of the International Conference on Advanced Information Sys-

[19] https://www.springer.com/journal/10270/editors
[20] https://www.bise-journal.com/?page_id=20
[21] https://www.journals.elsevier.com/computers-in-industry/editorial-board

tems Engineering (CAiSE) Program Board, Senior PC Member of the International Conference on Process Mining (ICPM) and the International Conference on Conceptual Modeling (ER), and Steering Committee member of BPM. Amine Abbad-Andaloussi was co-organizer of the 2nd Workshop on Empirical Research in Process Mining.

In 2025, we hosted several visiting researchers with whom we collaborated on topics of mutual interest. These included Professor Luciano Garcia-Bañuelos, Mauricio Jacobo González González, and Professor César Torres-Huitzil from Tecnológico de Monterrey (Mexico), as well as Anas Doubabi and Professor Ahmed Aamouche from Al Cadi Ayyad University (Morocco). In addition, we welcomed Andrea Maldonado from Ludwig Maximilian University of Munich and Professors Manuel Resinas and Adela del Río from the University of Seville. In June 2025, Prof. Ronny Seiger was hosted by the Faculty of Information Technology (Profs. Niko Mäkitalo and Tommi Mikkonen) at the University of Jyväskylä (JYU) as a visiting fellow.



University of St. Gallen
Institute of Computer Science (ICS-HSG)
Rosenbergstrasse 30
9000 St.Gallen
https://ics.unisg.ch

Institute Members

- Prof. Dr. Damian Borth (Director)
- Prof. Dr. Siegfried Handschuh (Director)
- Prof. Dr. Anna-Lena Horlemann (Director)
- Prof. Dr. Simon Mayer (Director)
- Prof. Dr. Katerina Mitrokotsa (Director)
- Prof. Dr. Guido Salvaneschi (Director)
- Prof. Dr. Johannes Schöning (Director)
- Prof. Dr. Barbara Weber (Director)

References

[AABS+23] Amine Abbad-Andaloussi, Andrea Burattin, Tijs Slaats, Ekkart Kindler, and Barbara Weber. Complexity in declarative process models: Metrics and multi-modal assessment of cognitive load. *Expert Systems with Applications*, 233:120924, 2023.

[AAFL+25] Amine Abbad-Andaloussi, Marco Franceschetti, Hugo A López, Clemens Schreiber, and Barbara Weber. When a model gives you mixed signals: cognitive effects and visual behavior. *Process Science*, 2(1):19, 2025.

[AALW23] Amine Abbad-Andaloussi, Daniel Lübke, and Barbara Weber. Conducting eye-tracking studies on large and interactive process models using eyemind. *SoftwareX*, 24:101564, 2023.

[AASW24a] Amine Abbad-Andaloussi, Clemens Schreiber, and Barbara Weber. On the task-specific effects of fragmentation in modular process models. In *International Conference on Conceptual Modeling*, pages 18–37. Springer, 2024.

[AASW24b] Amine Abbad-Andaloussi, Clemens Schreiber, and Barbara Weber. Using eye-tracking to detect search and inference during process model comprehension. In *International Conference on Cooperative Information Systems*, pages 21–38. Springer, 2024.

[AATWL25] Amine Abbad-Andaloussi, Dung My Thi Trinh, Barbara Weber, and Hugo A López. On the relationship between semantic transparency and cognitive load: Does context matter in process models? In *NeuroIS Retreat*, pages 193–203. Springer, 2025.

[AMS+24] Manoli Albert, Antoni Mestre, Ronny Seiger, Victoria Torres, and Pedro Valderas. Sustainability in and through iot-enhanced business processes. In *Proceedings of the Best Dissertation Award, Doctoral Consortium, and Demonstration and Resources Forum at BPM 2024*, 2024.

[BAB+24] Jan vom Brocke, Wil Aalst, Nicholas Berente, Boudewijn Dongen, Thomas Grisold, Waldemar Kremser, Jan Mendling, Brian Pentland, Maximilian Roeglinger, Michael Rosemann, and Barbara Weber. Pro-

cess science: the interdisciplinary study of socio-technical change. *Process Science*, 2, 07 2024.

[BDCR+23] Iris Beerepoot, Claudio Di Ciccio, Hajo A Reijers, Stefanie Rinderle-Ma, Wasana Bandara, Andrea Burattin, Diego Calvanese, Tianwa Chen, Izack Cohen, Benoît Depaire, et al. The biggest business process management problems to solve before we die. *Computers in Industry*, 146:103837, 2023.

[BHH25] Bernhard Bermeitinger, Tomas Hrycej, and Siegfried Handschuh. Is there an optimal depth of residual networks? May 2025.

[BHSH25] Bernhard Bermeitinger, Tomas Hrycej, Jan Spörer, and Siegfried Handschuh. Subset pretraining for enhancing neural network training efficiency. October 2025.

[BIM+25] Yannis Bertrand, Christian Imenkamp, Lukas Malburg, Matthias Ehrendorfer, Marco Franceschetti, Joscha Grüger, Francesco Leotta, Jürgen Mangler, Ronny Seiger, Agnes Koschmider, et al. An object-centric core metamodel for iot-enhanced event logs. *arXiv preprint arXiv:2506.21300*, 2025.

[BKD+24] Andrea Burattin, Ekkart Kindler, Nicholas Dyhre, Sebastian Vestrup, Francesca Zerbato, and Barbara Weber. Process mining pipelines with controlled sharing of data and algorithms. In *International Conference on Business Process Management*, pages 357–369. Springer, 2024.

[BSA+25] Victoria Torres Bosch, Ronny Seiger, Manuela Albert Albiol, Antoni Mestre Gascon, and Pedro Jose Valderas Aranda. A conceptual model and methodology for sustainability-aware, iot-enhanced business processes. *arXiv preprint arXiv:2508.05301*, 2025.

[BVJ+24] Irene Barba, Carmelo Del Valle, Andrés Jiménez-Ramírez, Barbara Weber, and Manfred Reichert. Discovering two-level business process models from user interface event logs. In Giancarlo Guizzardi, Flávia Maria Santoro, Haralambos Mouratidis, and Pnina Soffer, editors, *Advanced Information Systems Engineering - 36th International Conference, CAiSE 2024, Limassol, Cyprus, June 3-7, 2024, Proceedings*,

volume 14663 of *Lecture Notes in Computer Science*, pages 456–472. Springer, 2024.

[CGM+24] Nan Cheng, Naman Gupta, Aikaterini Mitrokotsa, Hiraku Morita, and Kazunari Tozawa. Constant-round private decision tree evaluation for secret shared data. *Proc. Priv. Enhancing Technol.*, 2024(1):397–412, 2024.

[CMZH24] Nan Cheng, Aikaterini Mitrokotsa, Feng Zhang, and Frank Hartmann. Efficient two-party secure aggregation via incremental distributed point function. In *9th IEEE European Symposium on Security and Privacy, EuroS&P 2024, Vienna, Austria, July 8-12, 2024*, pages 810–827. IEEE, 2024.

[CÖM+24] Nan Cheng, Melek Önen, Aikaterini Mitrokotsa, Oubaïda Chouchane, Massimiliano Todisco, and Alberto Ibarrondo. Nomadic: Normalising maliciously-secure distance with cosine similarity for two-party biometric authentication. In Jianying Zhou, Tony Q. S. Quek, Debin Gao, and Alvaro A. Cárdenas, editors, *Proceedings of the 19th ACM Asia Conference on Computer and Communications Security, ASIA CCS 2024, Singapore, July 1-5, 2024*. ACM, 2024.

[CWS+25] Tianwa Chen, Barbara Weber, Graeme G. Shanks, Gianluca Demartini, Marta Indulska, and Shazia Sadiq. How do experts make sense of integrated process models? In John Krogstie, Stefanie Rinderle-Ma, Gerti Kappel, and Henderik A. Proper, editors, *Advanced Information Systems Engineering - 37th International Conference, CAiSE 2025, Vienna, Austria, June 16-20, 2025, Proceedings, Part II*, volume 15702 of *Lecture Notes in Computer Science*, pages 3–19. Springer, 2025.

[DCWS22] Daniel Diethei, Ashley Colley, Julian Wienert, and Johannes Schöning. Different length, different needs: Qualitative analysis of threads in online health communities. In *2022 IEEE 10th International Conference on Healthcare Informatics (ICHI)*, pages 348–356. IEEE, 2022.

[DDH+24] Uddipana Dowerah, Subhranil Dutta, Frank Hartmann, Aikaterini Mitrokotsa, Sayantan Mukherjee, and Tapas Pal. Sacfe: Secure access control in functional encryption with unbounded data. In *9th IEEE European Symposium on Security and Privacy, EuroS&P 2024, Vienna, Austria, July 8-12, 2024*, pages 860–882. IEEE, 2024.

[DM24] Uddipana Dowerah and Aikaterini Mitrokotsa. Decentralized private stream aggregation from lattices. In Christina Pöpper and Lejla Batina, editors, *Applied Cryptography and Network Security - 22nd International Conference, ACNS 2024, Abu Dhabi, United Arab Emirates, March 5-8, 2024, Proceedings, Part II*, volume 14584 of *Lecture Notes in Computer Science*, pages 189–214. Springer, 2024.

[ESBAA25] Tobias Julien Ettling, Dominik Steinmann, Kenan Bektaş, and Amine Abbad-Andaloussi. An eye tracking study on the effects of dark and light themes on user performance and workload. In *Proceedings of the 2025 Symposium on Eye Tracking Research and Applications*, pages 1–9, 2025.

[FAAS+24] Marco Franceschetti, Amine Abbad-Andaloussi, Clemens Schreiber, Hugo A López, and Barbara Weber. Exploring the cognitive effects of ambiguity in process models. In *International Conference on Business Process Management*, pages 493–510. Springer, 2024.

[FBSW24] Marco Franceschetti, Dominik Manuel Buchegger, Ronny Seiger, and Barbara Weber. Event knowledge graphs with ambiguity, Oct 2024.

[FBSW25] Marco Franceschetti, Dominik Manuel Buchegger, Ronny Seiger, and Barbara Weber. Toward iot-based process analytics: Extending event knowledge graphs with ambiguity. In *International Conference on Business Process Modeling, Development and Support*, pages 176–192. Springer, 2025.

[FCDD+24] Fabrizio Fornari, Ivan Compagnucci, Massimo Callisto De Donato, Yannis Bertrand, Harry H Beyel, Emilio Carrión, Marco Franceschetti, Wolfgang Groher, Joscha Grüger, Emre Kilic, et al. Digital twins of business processes: A research manifesto. *Internet of Things*, page 101477, 2024.

[FCDD+25] Fabrizio Fornari, Ivan Compagnucci, Massimo Callisto De Donato, Yannis Bertrand, Harry H Beyel, Emilio Carrión, Marco Franceschetti, Wolfgang Groher, Joscha Grüger, Emre Kilic, et al. Digital twins of business processes: A research manifesto. *Internet of Things*, 30:101477, 2025.

[FFL+25] Peter Fettke, Fabiana Fournier, Lior Limonad, Andreas Metzger, Ste-

fanie Rinderle-Ma, and Barbara Weber. Xabps: Towards explainable autonomous business processes. In Fabiana Fournier, Lior Limonad, Giuseppe De Giacomo, Andrea Marrella, Antonella Guzzo, and Antonio Ielo, editors, *Proceedings of the 4th International Workshop on Process Management in the AI Era (PMAI 2025) co-located with the 28th European Conference on Artificial Intelligence (ECAI 2025), Bologna, Italy, October 25, 2025*, volume 4087 of *CEUR Workshop Proceedings*. CEUR-WS.org, 2025.

[FSG+23] Marco Franceschetti, Ronny Seiger, Mauricio Jacobo González González, Enrique Garcia-Ceja, Luis Armando Rodríguez Flores, Luciano García-Bañuelos, and Barbara Weber. Proambition: Online process conformance checking with ambiguities driven by the internet of things. 2023.

[FSGBW25] Marco Franceschetti, Ronny Seiger, Luciano García-Bañuelos, and Barbara Weber. Proambition, reloaded: A two-year retrospection. *Research Projects Exhibition@ CAiSE 2025*, 2025.

[FSL+23] Marco Franceschetti, Ronny Seiger, Hugo A López, Andrea Burattin, Luciano García-Bañuelos, and Barbara Weber. A characterisation of ambiguity in bpm. In *International Conference on Conceptual Modeling*, pages 277–295. Springer, 2023.

[FSW23] Marco Franceschetti, Ronny Seiger, and Barbara Weber. An event-centric metamodel for iot-driven process monitoring and conformance checking. In *International Conference on Business Process Management*, pages 131–143. Springer, 2023.

[FSW24] Kathrin Figl, Pnina Soffer, and Barbara Weber. Guiding attention in flow-based conceptual models through consistent flow and pattern visibility. *Decision Support Systems*, 185:114292, 2024.

[GBGS+25] Luciano García-Bañuelos, Mauricio Jacobo González González, Ronny Seiger, Marco Franceschetti, and Alejandra Guadalupe Silva Trujillo. A semi-automated approach to detecting process-level activities from sensor data. *Procedia Computer Science*, 257:856–863, 2025.

[GKSR23] Florian Gallik, Yusuf Kirikkayis, Ronny Seiger, and Manfred Reichert.

An object-centric approach to handling concurrency in iot-aware processes. In *International Conference on Business Process Management*, pages 105–117. Springer, 2023.

[HBH25] Tomas Hrycej, Bernhard Bermeitinger, and Siegfried Handschuh. Integrating the attention mechanism into state space models. In *Proceedings of the IEEE Swiss Conference on Data Science (SDS 2025)*, June 2025.

[HBP+25] Tomas Hrycej, Bernhard Bermeitinger, Massimo Pavone, Götz-Henrik Wiegand, and Siegfried Handschuh. Adaptive optimizer-switching for deep learning. In *Proceedings of the 17th International Conference on Knowledge Discovery and Information Retrieval (KDIR 2025)*, 2025. Best Paper Award.

[HNA+11] K. Holmqvist, M. Nyström, R. Andersson, R. Dewhurst, H. Jarodzka, and J. van de Weijer. *Eye Tracking: A comprehensive guide to methods and measures*. OUP Oxford, 2011.

[IBG+25] Christian Imenkamp, Yannis Bertrand, Joscha Grüger, Lukas Malburg, Marco Franceschetti, Matthias Ehrendorfer, and Agnes Koschmider. Broom: Toolbox for iot-enhanced process mining. *Proceedings of the Best BPM Dissertation Award, Doctoral Consortium, and Demonstrations Resources Forum co-located with 23nd International Conference on Business Process Management (BPM 2025), Seville, Spain, August 31st to 5th September, 2025*, 2025.

[JDS+21] Christopher Martin Jones, Daniel Diethei, Johannes Schöning, Rehana Shrestha, Tina Jahnel, and Benjamin Schüz. Social reference cues can reduce misinformation sharing behaviour on social media. 2021.

[KAB+22] Neha Kumar, Julie Adams, Bill Buxton, Linda Candy, Pablo Cesar, Leigh Clark, Benjamin Cowan, Anind Dey, Phoebe Toups Dugas, Ernest Edmonds, Johannes Schöning, et al. From 1983 to 2022: A chronology of sigchi conferences. 2022.

[KGSR23] Yusuf Kirikkayis, Florian Gallik, Ronny Seiger, and Manfred Reichert. Integrating iot-driven events into business processes. In *Interna-*

tional Conference on Advanced Information Systems Engineering, pages 86–94. Springer, 2023.

[KS23] Annika Kaltenhauser and Johannes Schöning. Reawakening the ghosts from the past? accessibility lessons learned from second life. In *Workshop: Towards an Inclusive and Accessible Metaverse*, 2023.

[KSFW24] Aaron Friedrich Kurz, Ronny Seiger, Marco Franceschetti, and Barbara Weber. Activity and sequence detection evaluation metrics: A comprehensive tool for event log comparison. 2024.

[KSP+25] Dinesh Kumar Karthikeyan, Roopesh Kumar Shanmugasundaram, Anna-Sofia Paavonen, Tommi Mikkonen, Niko Mäkitalo, and Ronny Seiger. Distributed computing with language models at the edge: A framework and prototype. In *Proceedings of the 15th International Conference on the Internet of Things*, pages 77–85, 2025.

[KSS24] Annika Kaltenhauser, Evropi Stefanidi, and Johannes Schöning. Playing with perspectives and unveiling the autoethnographic kaleidoscope in hci – a literature review of autoethnographies. In *Proceedings of the CHI Conference on Human Factors in Computing Systems*, CHI '24, page 1–20. ACM, May 2024.

[LFL+25] Hugo A López, BingKun Feng, Jonas Lindner, Marco Franceschetti, and Amine Abbad-Andaloussi. Ambiguity detection in business process descriptions: An evidence and an automated approach. In *International Conference on Business Process Management*, pages 379–396. Springer, 2025.

[LLB+25] Christoph Lechner, Nikolaus Lang, Olivier Bouffault, Joshua Cooper, and Siegfried Handschuh. Can GenAI do your next strategy task? Not yet. *California Management Review*, 2025.

[LWBP24] Kalle Lyytinen, Barbara Weber, Markus Becker, and Brian Pentland. Digital twins of organization: implications for organization design. *Journal of Organization Design*, 13:77–93, 2024.

[MCSW24] Silvia Miksch, Claudio Di Ciccio, Pnina Soffer, and Barbara Weber. Visual analytics meets process mining: Challenges and opportunities. *IEEE Computer Graphics and Applications*, 44(6):132–141, 2024.

[MMS+24] Aikaterini Mitrokotsa, Sayantan Mukherjee, Mahdi Sedaghat, Daniel Slamanig, and Jenit Tomy. Threshold structure-preserving signatures: Strong and adaptive security under standard assumptions. In Qiang Tang and Vanessa Teague, editors, *Public-Key Cryptography - PKC 2024 - 27th IACR International Conference on Practice and Theory of Public-Key Cryptography, Sydney, NSW, Australia, April 15-17, 2024, Proceedings, Part I*, volume 14601 of *Lecture Notes in Computer Science*, pages 163–195. Springer, 2024.

[MS25] Florian Mathis and Johannes Schöning. Lifeinsight: Design and evaluation of an ai-powered assistive wearable for blind and low vision people across multiple everyday life scenarios. In *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems*, CHI '25, New York, NY, USA, 2025. Association for Computing Machinery.

[MSB+24] Jürgen Mangler, Ronny Seiger, Janik-Vasily Benzin, Joscha Grüger, Yusuf Kirikkayis, Florian Gallik, Lukas Malburg, Matthias Ehrendorfer, Yannis Bertrand, Marco Franceschetti, et al. From internet of things data to business processes: Challenges and a framework. *arXiv preprint arXiv:2405.08528*, 2024.

[MSB+26] Jürgen Mangler, Ronny Seiger, Janik-Vasily Benzin, Joscha Grüger, Yusuf Kirikkayis, Florian Gallik, Lukas Malburg, Matthias Ehrendorfer, Yannis Bertrand, Marco Franceschetti, et al. From internet of things data to business processes: Challenges and a framework. In *Internet of Things Meets Business Process Management: A Synergistic Integration*, pages 25–61. Springer, 2026.

[PCSM25] Adrian Preussner, Anna Crescenza, Johannes Schöning, and Florian Mathis. Urbai: Exploring the possibilities of generative ai image processing to promote citizen participation. In *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems*, CHI '25, New York, NY, USA, 2025. Association for Computing Machinery.

[PS23] Adrian Preussner and Johannes Schöning. Examining the role of" green apps" in fostering community engagement for sustainable hci. 2023.

[PvBR+24] Rüdiger Pryss, Jan vom Brocke, Manfred Reichert, Enrico Rukzio, Win-

fried Schlee, and Barbara Weber. Editorial: Application of neuroscience in information systems and software engineering. *Frontiers in Neuroscience*, 18, 2024.

[SAA24] Clemens Schreiber and Amine Abbad-Andaloussi. Structural process variety and standardization. In *2024 6th International Conference on Process Mining (ICPM)*, pages 153–160. IEEE, 2024.

[SAAB+25] Clemens Schreiber, Amine Abbad-Andaloussi, Andrea Burattin, Andreas Oberweis, and Barbara Weber. Graph-based similarity measures for the structural comparison of process traces. *Information Systems*, page 102671, 2025.

[SAAKW25] Thierry Sorg, Amine Abbad-Andaloussi, Ekkart Kindler, and Barbara Weber. Process model complexity metrics, cognitive load and visual behavior: A multi-granular eye-tracking analysis. In *International Conference on Business Process Modeling, Development and Support*, pages 87–103. Springer, 2025.

[SAAKW26] Thierry Sorg, Amine Abbad-Andaloussi, Ekkart Kindler, and Barbara Weber. Beyond process model complexity: a multi-granular investigation across time and space based on eye-tracking. *Process Science*, 3(1):2, 2026.

[SAAL+26] Thierry Sorg, Amine Abbad-Andaloussi, Jonas Laenzlinger, Ekkart Kindler, and Barbara Weber. A conceptual framework and city metaphor for investigating the interaction of developers with software artifacts. *International Journal on Software and Systems Modeling (SoSyM) (In press)*, 2026.

[SAAW23] Clemens Schreiber, Amine Abbad-Andaloussi, and Barbara Weber. On the cognitive effects of abstraction and fragmentation in modularized process models. In *International Conference on Business Process Management*, pages 359–376. Springer, 2023.

[SAAW24] Clemens Schreiber, Amine Abbad-Andaloussi, and Barbara Weber. On the cognitive and behavioral effects of abstraction and fragmentation in modularized process models. *Information Systems*, 125:102424, 2024.

[SAB+26] Clemens Schreiber, Amine Abbad-Andaloussi, Andrea Burattin, Andreas Oberweis, and Barbara Weber. Graph-based similarity measures for the structural comparison of process traces. *Inf. Syst.*, 138:102671, 2026.

[SBKS22] Carolin Stellmacher, Michael Bonfert, Ernst Kruijff, and Johannes Schöning. Triggermuscle: Exploring weight perception for virtual reality through adaptive trigger resistance in a haptic vr controller. *Frontiers in Virtual Reality*, 2:173, 2022.

[Sch22] Johannes Schöning. The german research community: within acm sigchi 2010–2020. *Interactions*, 29(1):90–94, 2022.

[SDB+23] Evropi Stefanidi, Julia Dominiak, Marit Bentvelzen, Paweł W Woźniak, Johannes Schöning, Yvonne Rogers, and Jasmin Niess. Magibricks: Fostering intergenerational connectedness in distributed play with smart toy bricks. In *Proceedings of the 22nd Annual ACM Interaction Design and Children Conference*, pages 239–252, 2023.

[Sei24] Ronny Seiger. Teaching computer science fundamentals to business students: A sotl experience report on how to increase student engagement via practical programming tasks and ai. In *Gemeinschaften in Neuen Medien (GeNeMe)*, 2024.

[Sei25] Ronny Seiger. Towards flexible and adaptive human-robot collaborations via event-driven microservices. In *2025 IEEE 30th International Conference on Emerging Technologies and Factory Automation (ETFA)*, pages 1–4. IEEE, 2025.

[SFAA24] Ronny Seiger, Marco Franceschetti, and Amine Abbad-Andaloussi. A process to non-invasively augment legacy iot systems using business processes and microservices. In *International Conference on the Internet of Things*, 2024.

[SFW23a] Ronny Seiger, Marco Franceschetti, and Barbara Weber. Data-driven generation of services for iot-based online activity detection. In *International Conference on Service-Oriented Computing*, pages 186–194. Springer, 2023.

[SFW23b] Ronny Seiger, Marco Franceschetti, and Barbara Weber. An inter-

active method for detection of process activity executions from iot data. *Future Internet*, 15(2):77, 2023.

[SGH25] Jan Spörer, Michael Gaus, and Siegfried Handschuh. Overcoming the bottleneck: GraphRAG for reliable financial annual report retrieval and comprehension. In *ICAIF'25 FinREM Workshop*, 2025.

[SKF26] Ronny Seiger, Aaron F Kurz, and Marco Franceschetti. Online detection of process activity executions from iot sensors using generated event processing services. *Future Generation Computer Systems*, 174:107987, 2026.

[SKS22] Gian-Luca Savino, Ankit Kariryaa, and Johannes Schöning. Free as a bird, but at what cost? the impact of street networks on the user experience of as-the-crow-flies navigation for cyclists. *Proceedings of the ACM on Human-Computer Interaction*, 6(MHCI):1–24, 2022.

[SLKK26] Ronny Seiger, Daniel Locher, Marco Kaufmann, and Aaron F Kurz. A domain-specific language and architecture for detecting process activities from sensor streams in iot. *Internet of Things*, page 101870, 2026.

[SLWR25] Simin Maleki Shamasbi, Amy Van Looy, Barbara Weber, and Maximilian Röglinger. A typological theory of roles in process mining: conceptualising competencies through text mining of job vacancy data. *Enterp. Inf. Syst.*, 19(11), 2025.

[SM24] Ronny Seiger and Lukas Malburg. Revision of a smart factory software architecture from monolith to microservices. In *International Conference on Enterprise Design, Operations, and Computing*, pages 203–220. Springer, 2024.

[SMW+24] Carolin Stellmacher, Florian Mathis, Yannick Weiss, Meagan B. Loerakker, Nadine Wagener, and Johannes Schöning. Exploring mobile devices as haptic interfaces for mixed reality. In *Proceedings of the CHI Conference on Human Factors in Computing Systems*, CHI '24, page 1–17. ACM, May 2024.

[SNS+24] Yu Sun, Luca Nivini, Gian-Luca Savino, Florian Mathis, and Johannes Schöning. Designing grocery shopping experiences for virtual real-

ity. In *Proceedings of the 2024 International Conference on Advanced Visual Interfaces*, volume 1 of *AVI 2024*, page 1–5. ACM, June 2024.

[SPK+24] Carolin Stellmacher, Feri Irsanto Pujianto, Tanja Kojic, Jan-Niklas Voigt-Antons, and Johannes Schöning. Experiencing dynamic weight changes in virtual reality through pseudo-haptics and vibrotactile feedback. In *Proceedings of the CHI Conference on Human Factors in Computing Systems*, CHI '24, page 1–13. ACM, May 2024.

[SRP+24] Ava Elizabeth Scott, Leon Reicherts, Aditya Kumar Purohit, Elahi Hossain, Evropi Stefanidi, Nadine Wagener, Johannes Schöning, Yvonne Rogers, and Adrian Holzer. Diy digital interventions: Behaviour change with trigger-action programming. *Proceedings of the ACM on Human-Computer Interaction*, 8(MHCI):1–28, September 2024.

[SRS24] Ava Elizabeth Scott, Leon Reicherts, and Evropi Stefanidi. Doing chi together: The benefits of a writing retreat for early-career hci researchers. *Interactions*, 31(3):8–9, May 2024.

[SS25] Yu Sun and Johannes Schöning. Experiencing the world through imperfect lenses: An autoethnography of living in mixed reality. In *Proceedings of the 2025 ACM Designing Interactive Systems Conference*, DIS '25, page 1628–1643, New York, NY, USA, 2025. Association for Computing Machinery.

[SSB25] Ronny Seiger, Alexander Schultheis, and Ralph Bergmann. Case-based activity detection from segmented internet of things data. In *International Conference on Case-Based Reasoning*, pages 438–453. Springer, 2025.

[SSF+22] Evropi Stefanidi, Johannes Schöning, Sebastian S Feger, Paul Marshall, Yvonne Rogers, and Jasmin Niess. Designing for care ecosystems: a literature review of technologies for children with adhd. In *Interaction Design and Children*, pages 13–25, 2022.

[SSFS24] Tarek Skouti, Ronny Seiger, Frank J Furrer, and Susanne Strahringer. Rbpmn: the value of roles for business process modeling. *Software and Systems Modeling*, pages 1–32, 2024.

[SSFS25] Tarek Skouti, Ronny Sieger, Frank J Furrer, and Susanne Strahringer.

Role-based modeling of business processes with rbpmn. In *Software Engineering 2025*, pages 10–18420. Gesellschaft für Informatik, Bonn, 2025.

[SSGS24] Eve Schade, Gian-Luca Savino, Yasemin Gunal, and Johannes Schöning. Traffic jam by gps: A systematic analysis of the negative social externalities of large-scale navigation technologies. *PLOS ONE*, 19(8):e0308260, August 2024.

[SSH+23] Elizaveta Sorokina, Pnina Soffer, Irit Hadar, Uri Leron, Francesca Zerbato, and Barbara Weber. Pem4ppm: A cognitive perspective on the process of process mining. In *International Conference on Business Process Management*, pages 465–481. Springer, 2023.

[SSK+23] Yu Sun, Carolin Stellmacher, Annika Kaltenhauser, Nadine Wagener, Daniel Neumann, and Johannes Schöning. Alt text and alt sense in vr: Engaging screen reader users within the metaverse through multisenses. 2023.

[SSNS23] Eve Schade, Gian-Luca Savino, Jasmin Niess, and Johannes Schöning. Mapuncover: Fostering spatial exploration through gamification in mobile map apps. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, pages 1–13, 2023.

[SSNS25] Eve Schade, Gian-Luca Savino, Jasmin Niess, and Johannes Schöning. Describing explored places through openstreetmap data. In *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems*, CHI '25, New York, NY, USA, 2025. Association for Computing Machinery.

[SSRN23] Evropi Stefanidi, Johannes Schöning, Yvonne Rogers, and Jasmin Niess. Children with adhd and their care ecosystem: Designing beyond symptoms. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, pages 1–17, 2023.

[STSS22] Carolin Stellmacher, Jette Ternieten, Daria Soroko, and Johannes Schöning. Escaping the privacy paradox: Evaluating the learning effects of privacy policies with serious games. *Proceedings of the ACM on Human-Computer Interaction*, 6(CHI PLAY):1–20, 2022.

[SWA+24] Evropi Stefanidi, Nadine Wagener, Dustin Augsten, Andy Augsten, Leon Reicherts, Paweł W. Woźniak, Johannes Schöning, Yvonne Rogers, and Jasmin Niess. Teenworlds: Supporting emotional expression for teenagers with their parents and peers through a collaborative vr experience. In *30th ACM Symposium on Virtual Reality Software and Technology*, volume 27 of *VRST '24*, page 1–14. ACM, October 2024.

[SWS24] Gian-Luca Savino, Jana Wahls, and Johannes Schöning. Mobile map applications for foldable devices. In *Proceedings of the 2024 International Conference on Advanced Visual Interfaces*, AVI 2024, page 1–5. ACM, June 2024.

[SZN+23] Carolin Stellmacher, André Zenner, Oscar Javier Ariza Nunez, Ernst Kruijff, and Johannes Schöning. Continuous vr weight illusion by combining adaptive trigger resistance and control-display ratio manipulation. In *2023 IEEE Conference Virtual Reality and 3D User Interfaces (VR)*, pages 243–253. IEEE, 2023.

[SZvZvdA24] Daniel Schuster, Francesca Zerbato, Sebastiaan J van Zelst, and Wil MP van der Aalst. Defining and visualizing process execution variants from partially ordered event data. *Information Sciences*, 657:119958, 2024.

[TAAL23] Dung My Thi Trinh, Amine Abbad-Andaloussi, and Hugo A López. On the semantic transparency of declarative process models: The case of constraints. In *International Conference on Cooperative Information Systems*, pages 217–236. Springer, 2023.

[TAATLA23] Lucien Kiven Tamo, Amine Abbad-Andaloussi, Dung My Thi Trinh, and Hugo-Andrés López-Acosta. An open-source modeling editor for declarative process models. In *International Conference on Cooperative Information Systems 2023*, 2023.

[TSZ+25] Marisa Tschopp, Nadine Schlicker, Nima Zargham, Johannes Schöning, et al. Barriers shaping synthetic relationships with companion bots: A three week initial adaptation study. 2025.

[VCP+23] Johannes Villmow, Viola Campos, Jean Petry, Amine Abbad-Andaloussi, Adrian Ulges, and Barbara Weber. How well can masked

language models spot identifiers that violate naming guidelines? In *2023 IEEE 23rd International Working Conference on Source Code Analysis and Manipulation (SCAM)*, pages 131–142. IEEE, 2023.

[vdEAK+25] Stef van den Elzen, Gennady Andrienko, Andreas Kerren, Manuel Resinas, Barbara Weber, and Peilin Yu. Coordinated projections: A new approach to multi-faceted process exploration. In *Proceedings of the International Conference on Process Mining Workshops (ICPM Workshops)*, Lecture Notes in Business Information Processing. Springer, 2025. To appear / preprint available.

[VHKO24] Hagen Völzer, Daniel Horn, Yusik Kim, and Greger Ottosson. A benchmark for rule induction in automated business decisions. In Sabrina Kirrane, Mantas Simkus, Ahmet Soylu, and Dumitru Roman, editors, *Rules and Reasoning - 8th International Joint Conference, RuleML+RR 2024, Bucharest, Romania, September 16-18, 2024, Proceedings*, volume 15183 of *Lecture Notes in Computer Science*, pages 159–175. Springer, 2024.

[VZSW23] Hagen Völzer, Francesca Zerbato, Timothy Sulzer, and Barbara Weber. A fresh approach to analyze process outcomes. In *2023 5th International Conference on Process Mining (ICPM)*, pages 97–104. IEEE, 2023.

[WAAF+24] Barbara Weber, Amine Abbad-Andaloussi, Marco Franceschetti, Ronny Seiger, Hagen Völzer, and Francesca Zerbato. Leveraging digital trace data to investigate and support human-centered work processes. In Hermann Kaindl, Mike Mannion, and Leszek A. Maciaszek, editors, *Evaluation of Novel Approaches to Software Engineering*, pages 1–23, Cham, 2024. Springer Nature Switzerland.

[WAS+22] Nadine Wagener, Alex Ackermann, Gian-Luca Savino, Bastian Dänekas, Jasmin Niess, and Johannes Schöning. Influence of passive haptic and auditory feedback on presence and mindfulness in virtual reality environments. In *Proceedings of the 2022 International Conference on Multimodal Interaction*, pages 558–569, 2022.

[WKR+24] Nadine Wagener, Arne Kiesewetter, Leon Reicherts, Paweł W. Woźniak, Johannes Schöning, Yvonne Rogers, and Jasmin Niess. Moodshaper: A virtual reality experience to support managing negative

emotions. In *Designing Interactive Systems Conference*, volume 24 of *DIS '24*, page 2286–2304. ACM, July 2024.

[WNRS22] Nadine Wagener, Jasmin Niess, Yvonne Rogers, and Johannes Schöning. Mood worlds: A virtual environment for autonomous emotional expression. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*, pages 1–16, 2022.

[WSRN23] Nadine Wagener, Johannes Schoning, Yvonne Rogers, and Jasmin Niess. Letting it go: Four design concepts to support emotion regulation in virtual reality. In *2023 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*, pages 763–764. IEEE, 2023.

[ZBV+23] Francesca Zerbato, Andrea Burattin, Hagen Völzer, Paul Nelson Becker, Elia Boscaini, and Barbara Weber. Supporting provenance and data awareness in exploratory process mining. In *International Conference on Advanced Information Systems Engineering*, pages 454–470. Springer, 2023.

[ZFW24] Francesca Zerbato, Marco Franceschetti, and Barbara Weber. A framework to support the validation of process mining inquiries. In *International Conference on Business Process Management*, pages 249–266. Springer, 2024.

[Zim24a] Lisa Zimmermann. The process mining question forge. In *Proceedings of the Best Dissertation Award, Doctoral Consortium, and Demonstration and Resources Forum at BPM 2024*, 2024.

[Zim24b] Lisa Zimmermann. Understanding and supporting process mining analyses at the individual level. In *Proceedings of the Best Dissertation Award, Doctoral Consortium, and Demonstration and Resources Forum at BPM 2024*, 2024.

[ZKCS23] Conrad Zeidler, Lennart Kuhr, Jordan Callaham, and Johannes Schöning. Mobile plant health visualizer based on si-ndvi imaging and augmented reality visualization for space greenhouses. 2023.

[ZKW+23] Conrad Zeidler, Matthias Klug, Gerrit Woeckner, Urte Clausen, and Johannes Schöning. Archie 2: An augmented reality interface with

plant detection for future planetary surface greenhouses. In *2023 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, pages 601–610. IEEE, 2023.

[ZRB+22] Nima Zargham, Leon Reicherts, Michael Bonfert, Sarah Theres Völkel, Johannes Schöning, Rainer Malaka, and Yvonne Rogers. Understanding circumstances for desirable proactive behaviour of voice assistants: The proactivity dilemma. In *Proceedings of the 4th Conference on Conversational User Interfaces*, pages 1–14, 2022.

[ZVS+25] Lisa Zimmermann, Katerina Vrotsou, Pnina Soffer, Philipp Koytek, Barbara Weber, and Shazia Sadiq. Milana: Bridging process mining and visual analytics through task classification. 2025.

[ZZG+25] Lisa Zimmermann, Francesca Zerbato, Victoria Gentile, Manuel Resinas, and Barbara Weber. What questions can i ask? a taxonomy and question catalog for process mining analysis questions: L. zimmermann et al. *Business & Information Systems Engineering*, pages 1–26, 2025.

[ZZVW23] Francesca Zerbato, Lisa Zimmermann, Hagen Völzer, and Barbara Weber. Promise: Process mining support for end-users. In *CAiSE Research Projects Exhibition*, pages 60–67, 2023.

[ZZVW25] Lisa Zimmermann, Francesca Zerbato, Katerina Vrotsou, and Barbara Weber. A process-oriented approach to analyze analysts' use of visualizations: Revealing insights into the what, when, and how. In *Computer Graphics Forum*, page e70104. Wiley Online Library, 2025.

[ZZW+23a] Hui Zhou, Francesca Zerbato, Barbara Weber, Marta Indulska, and Shazia Sadiq. Do process analysts care about the metadata of event logs? In *ACIS 2023 Proceedings*, 2023.

[ZZW23b] Lisa Zimmermann, Francesca Zerbato, and Barbara Weber. What makes life for process mining analysts difficult? a reflection of challenges. *Software and Systems Modeling*, pages 1–29, 2023.

[ZZW24] Lisa Zimmermann, Francesca Zerbato, and Barbara Weber. What makes life for process mining analysts difficult? a reflection of challenges. *Software and Systems Modeling*, 23(6):1345–1373, 2024.