Technical University of Munich

ANNUAL REPORT

CHAIR OF INFORMATION INFRASTRUCTURES

2024

Technical University of Munich

ANNUAL REPORT 2024

CHAIR OF INFORMATION INFRASTRUCTURES

Annual Report 2024 | Preface

Dear Friends,

2024 was an exciting and eventful year for the Chair of Information Infrastructures, and this annual report provides a summary of some of its most important highlights. In October, it was time to say goodbye to the Karlsruhe Institute of Technology (KIT). After more than six rewarding years at KIT, I began a new chapter at the Technical University of Munich (TUM), Campus Heilbronn.

We published several research papers that were well received by the academic community. We also presented our work at leading scientific conferences such as the European Conference on Information Systems (ECIS), the International Conference on Information Systems (ICIS), the International Conference on Wirtschaftsinformatik (WI), the ACM International Conference on Future and Sustainable Energy Systems (ACM e-Energy), the ACM CHI Conference on Human Factors in Computing Systems (CHI), the IEEE International Symposium on Biomedical Imaging (ISBI 2024), the MIPRO ICT and Electronics Convention, and the Hawaii International Conference on System Sciences (HICSS). In addition to these conference contributions, we are very proud of numerous journal publications in Information Systems Research, Information & Management, Business & Information Systems Engineering, Briefings in Bioinformatics, ACM Transactions on Computing for Healthcare, IEEE Access, ACM Computing Surveys, and Electronic Markets. A particular highlight this year was receiving two best paper awards: (1) the Junior Researcher Best Paper Award from Wirtschaftsinformatik e.V., and (2) the Best Paper Award from AIS SIGHealth in the junior category.

Since October, I have been serving as Vice President of TUM at the Heilbronn campus, a role that brings new responsibilities as well as exciting opportunities for future development. Additionally, I was honored to be elected to the Scientific Council for Computer Science of the DFG and to the Board of Directors of the German Informatics Society (GI).

Our annual Doctoral Seminar took place in Bad Herrenalb once again. The topic of this year's seminar was "A PhD Toolbox" and we were delighted to welcome Prof. Dr. Kalle Lyytinen, who shared his deep insights and vast experience in the Information Systems field during our three-day retreat.

Annual Report 2024 | Preface

In addition to the substantive discussions, the seminar offered many opportunities for informal exchange and team building.
Throughout 2024, we continued to offer numerous, multi-faceted lectures, seminars, programming courses, and hackathons. We offered the lectures Applied Informatics - Internet Computing, Critical Information Infrastructures, Digital Health, and Trustworthy Emerging Technologies. We were pleased to see strong interest from students in these subjects. In addition, the Blockchain Hackathon, the practical course Sociotechnical Information Systems Development, and the seminars Emerging Trends in Internet Technologies and Emerging Trends in Digital Health were offered. We look forward to supervising many student theses in the coming year and will continue to integrate cutting-edge topics from research and practice into our teaching in 2025.
In terms of research projects, the long-running AUDITOR project concluded successfully with a closing event in Karlsruhe. The DigiAct and GameUp projects started this year with their kick-off events. We eagerly anticipate the results of these and the other research projects in the near future.
Last but most importantly, I was pleased to welcome Lukas Roschel as our new chair assistant and two new PhD students – Kevin Armbruster and Elena Fantino. Welcome again and great to have you on board! I would also like to congratulate Dr. Niclas Kannengießer and Dr. Maximilian Renner, who successfully finished their PhD in 2024. I am genuinely proud of both of you.
You will find much more information in this annual report about our team, research projects, talks, teaching activities, publications, industry-related activities, and community. I hope you will enjoy reading the report and gain some interesting insights into our highlights of 2024.

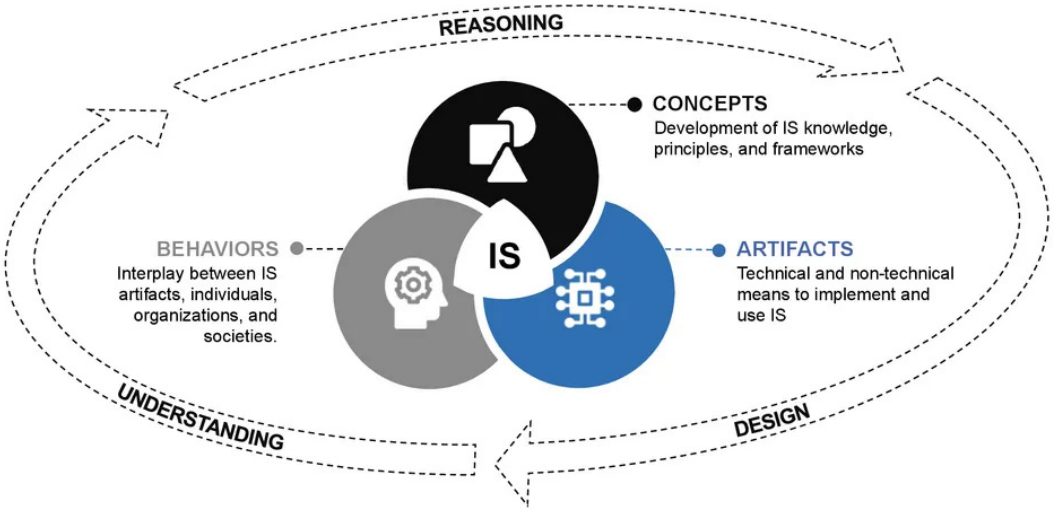
I am looking forward to the year 2025 !

Very Best
Ali Sunyaev

Introduction///

Information infrastructures are sociotechnical systems comprising essential software components and information systems with pivotal impact on individuals, organizations, governments, economies, and society. We work on research challenges concerned with the design, development, and evaluation of reliable and de:centralized information systems. Our research features a strong domain focus, in particular, on internet, mobility, and health care industries as well as on the industry-specific application of secure and trustworthy AI models. The principal goal of our research is theorizing on and designing the applications and methods required for creation and innovation of sociotechnical systems with auspicious value propositions. In our studies, we rigorously employ a variety of interdisciplinary methods and build on theories from information systems and related disciplines. Our work accounts for the multifaceted use contexts of information and communication technologies with research on human behavior affecting critical information infrastructures and vice versa. This enables us to rigorously generate strong theoretical insights while simultaneously producing research outputs of relevance to practical audiences.

Our main research contexts are reliable and de:centralized software and information systems within the scope of critical infrastructures, innovative health IT applications, cloud computing services, blockchain technologies, trustworthy AI, continuous, DLT-based auditing of AI systems, and auditing/certification of IT in general.



WE ARE PART OF///

BILDUNGS CAMPUS
DIETER SCHWARZ STIFTUNG

Technische Universität München
TUM School of Management

CIT
TUM School of Computation, Information and Technology

CAMPUS HEILBRONN

MDSI

KASTEL

HIDSS 4HEALTH
HELMHOLTZ INFORMATION & DATA SCIENCE SCHOOL FOR HEALTH

DFG Deutsche Forschungsgemeinschaft

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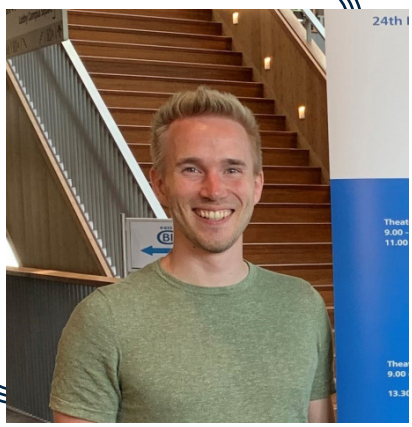

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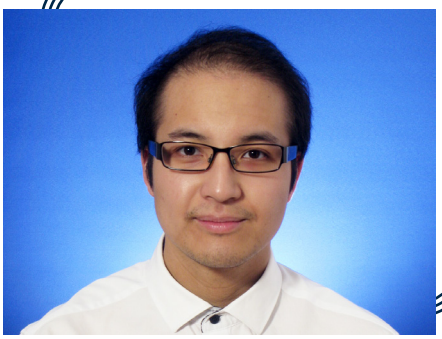

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Research Projects

Accountable Artificial Intelligence-based Systems: A Multi-Perspective Analyses

Abstract

Developments in Artificial Intelligence (AI) offer new innovative ways to contribute to the well-being and progress of individuals and society. However, due to a multitude of incidents with AI (e.g., discrimination through AI predictions), the accountability of AI becomes more and more important. In general, accountability means that actions performed can be clearly assigned to a person.

Applied to AI, accountable AI-based information systems (AAIS) refer to a socio-technical set of relationships consisting of humans interacting with AI technologies to perform certain tasks, where the actions taken in the course of the interaction can be uniquely attributed to a person. AAIS is intended to ensure that someone can be held legally responsible if the AI-based IS fails.

While calls to develop and embed mechanisms to create accountability in AI-based IS are growing, research on AAIS is still in its infancy. This project aims to answer three research questions: (1) "What facets of accountability are relevant to AAIS?", (2) "What impact does accountability have on perceptions during the development, operation, and use of AI?", and (3) "How does accountability affect the behavior of AI users and architects?".

Project Title: Accountable Artificial Intelligence-based Systems: A Multi-Perspective Analyses

Contact Person: Prof. Dr. Ali Sunyaev, Dr. Sebastian Lins

Funded by: Deutsche Forschungsgemeinschaft (DFG)

Project Partner: Prof. Dr. Alexander Benlian, Technische Universität Darmstadt

TECHNISCHE UNIVERSITÄT DARMSTADT

AUDITOR

Abstract

The objective of the research project European Cloud Service Data Protection Certification (AUDITOR) is the conception, exemplary implementation and testing of an enduring EU-wide data protection certification for cloud services.

The certification in accordance with the EU General Data Protection Regulation (GDPR) is in the interests of everyone involved: the cloud customers, who are only permitted to work with cloud providers that can guarantee a sufficient level of data protection, the cloud providers, who can offer just this security with such a certification, the auditing and certification bodies, for whose business area the GDPR stipulates strict laws, and the end-user, potentially affected by the data usage, the protection of whose personal data is in the focus of certifications of cloud services. The highly political project is led by our research group and already enjoys highest attention internationally.

AUDITOR is carried out in cooperation with numerous partners from large, medium-sized and small companies (e.g. IBM, Salesforce, Microsoft, Fujitsu, Deutsche Telekom, and SAP), several major ministries and authorities (e.g. the Deutsche Akkreditierungsstelle), and a large number of German data protection authorities.

Project Title: European Cloud Service Data Protection Certification (AUDITOR)

Contact Person: Dr. Sebastian Lins and Heiner Teigeler

Funded by: Federal Ministry for Economic Affairs and Energy

Project Partner: CLOUD&HEAT Technologies GmbH; datenschutz cert GmbH; DIN-Normenausschuss Informationstechnik und Anwendungen (NIA), DIN e.V.; ecsec GmbH; EuroCloud Deutschland_eco e.V., eco – Verband der Internetwirtschaft; University of Kassel

Website: *https://www.trusted-cloud.de/2025/auditor.html*

Supported by:

Federal Ministry for Economic Affairs and Climate Action

on the basis of a decision by the German Bundestag

BISE Student

Abstract

The BISE Student project develops an innovative open-access platform for publishing excellent student dissertations, like Bachelor, Master, and Diploma theses. Typically, after a thesis has been handed in and graded, it simply disappears into a non-public university archive or desk drawer, never to be seen again. However, many of theses are being carried out with great thoroughness and present results of high practical and scientific value for other students, researchers, and practitioners. Following the open knowledge idea, which is to allow anyone to freely access, use, modify, and share knowledge, BISE Student makes the publication of excellent student theses much easier for students and universities as well as provides an open and highly visible platform revealing the real worth of Bachelor, Master, and Diploma theses.

BISE Student utilizes the innovative potential of distributed ledger technology to achieve the system's three primary design goals: ease of use, openness, and content excellence. The entire submission process is transparently documented and safeguarded by the bloxberg blockchain (https://bloxberg.org).

Project Title: BISE Student – An Open Access Dissertation Library

Contact Person: Prof. Dr. Ali Sunyaev, Dr. Benjamin Sturm

Project Partner: BISE Journal (https://bise-journal.com)

Website: *https://bise-student.io*

BISE Student

BISE

MAX-PLANCK-GESELLSCHAFT

DIGIACT

Abstract

We live in a world of increasingly digitized workforces. Technological developments enable the infusion of digital technologies into a wide range of objects that are present in everyday life and at work. These emerging AI-enabled digital artifacts fundamentally reshape how organizations organize and carry out their work, as they are no longer simple tools used by humans to do tasks, but perform organizational work as autonomous actors in their own right. Such digital actors are central to digital transformation. Regardless of whether actions are carried out by human or digital actors, patterns of action are the building blocks of organizations, constituting various organizational routines. However, we know little about the unfolding interactions between human digital actors in organization routines. As recommendations, guidelines, and actual implementation and use change, the impact of these novel, digital actors on medical and healthcare work practices and organizational routines in healthcare is considerable.

With this research project we aim to address the gaps in literature by employing a mixed-methods research approach that builds on a combination of routines mining and a qualitative approach in a large clinic that currently undergoes significant digital transformation.

Project Title: Digital Transformation in Healthcare: From Digital Tools to Digital Actors (DigiAct)

Contact Person: Prof. Dr. Ali Sunyaev, Dr. Scott Thiebes

Funded by: German Research Foundation (DFG)

Project Partner: University of Cologne, University Hospital Cologne

Website: *https://digitalisierung-der-arbeitswelten.de/*

digital healthwork
DIGITIZATION OF WORK IN HEALTHCARE

UNIVERSITY OF COLOGNE

UNIKLINIK KÖLN

DFG Deutsche Forschungsgemeinschaft
German Research Foundation

DIRECTIONS

Abstract

The research project Data Protection Certification for Educational Information Systems ("DIRECTIONS") aims to design, implement, and test a sustainable data protection certification for educational information systems. Two stages of DIRECTIONS are planned to achieve the project goal: First, a self-declaration of adherence was designed and tested. Second, a data protection certification will be developed and nationally approved. By developing a self-declaration in the first stage, DIRECTIONS provides a short-term means for providers of educational information systems to communicate their data protection practices. This can create transparency and comparability on the market at an early stage and reduce potential uncertainties. However, a self-declaration is insufficient to demonstrate compliance with the GDPR. Therefore, it is planned in the second stage to develop a data protection certification in accordance with Art. 42 of the GDPR and to have it formally approved. DIRECTIONS is supported by over 40 associated partners from the educational sector and funded with more than 6 million euros.

Project Title: DIRECTIONS – Data Protection Certification for Educational Information Systems

Contact Person: Prof. Dr. Ali Sunyaev, Dr. Sebastian Lins

Funded by: German Federal Ministry for Education and Research (BMBF)

Project Partner: Prof. Dr. Gerrit Hornung, University of Kassel; Dr. Sönke Maseberg und Dr. Irene Karper, datenschutz cert GmbH

Website: *https://directions-cert.de*

datenschutz cert

UNIKASSEL VERSITÄT

GAIA-X4ICM

Abstract

Digital solutions play a central role in the Innovation Campus Mobility of the Future (ICM), and Gaia X is seen as a potential enabler for a variety of research activities. The goal of this project is to make Gaia-X usable for production, to realize a concrete instance for this purpose, to enable coupling with production systems, and thus to create the basis for a strongly scaling innovation platform for the ICM, but also beyond that for research and industry. The identification of open research questions, a reflection of the findings in the Gaia-X initiative, and knowledge transfer are the focus. The research group supports the project GAIA-X 4 ICM by identifying requirements to set up an ecosystem compliant with the GAIA-X principles and foundations.

Together with the project partners, the research group will conceptualize and prototypically implement an ecosystem for production systems.

Project Title: GAIA-X4ICM

Contact Person: Dr. Sebastian Lins, Yannick Erb, Heiner Teigeler

Funded by: Ministry of Science, Research and Arts Baden-Württemberg

Project Partner: University of Stuttgart

Website: *https://www.icm-bw.de/forschung/projektuebersicht/detail-seite/sdmanux*

Baden-Württemberg
MINISTRY OF SCIENCE, RESEARCH AND THE ARTS

University of Stuttgart
Germany

GaMeIT

Abstract

Cognitive surgical assistance systems, such as surgical robots require image-based scene understanding to perceive the surgery context, comprehend the surgery procedure, and eventually generate safe trajectories to assist during the surgery. To achieve such scene understanding, recognition and semantic segmentation of different surgery aspects are necessary pre-conditions. Machine Learning (ML) approaches are a promising technology for semantic segmentation of images. To train robots with ML methods, annotated image data (e.g. in the form of videos) is required. Image annotation of surgical images and videos is often manually conducted by healthcare professionals. The process of manual annotation is prone to human errors since it can be tedious, monotonous, and exhausting. As a consequence, poor label quality is a common problem. However, for surgical robots to improve surgical procedures, sufficient data quality of annotated images is a decisive factor.

If ML models for surgical robots are trained based on poorly labeled image data, this may negatively influence patients' health since the robots cannot be utilized to their full potential. In this project, we address the problem of poor label quality of surgical image data by augmenting the annotation process with persuasive technology.

Project Title: Data-driven Gamification to Improve Quality in Medical Image Annotation Tasks (GaMeIT)

Contact Person: Prof. Dr. Ali Sunyaev, Dr. Scott Thiebes, Dr. Manuel Schmidt-Kraepelin, Simon Warsinsky

Funded by: Helmholtz Association, Helmholtz Information and Data Science School for Health

Project Partner: University Hospital Heidelberg

Website: *https://www.hidss4health.de/#projects*

GameUp

Abstract

IT security has become a critical aspect of digital life with the rise of online crime. However, for many end users, protecting personal devices and online accounts can feel like an overwhelming task that is often overlooked or postponed for various reasons. Common vulnerabilities such as weak passwords, misconfigured systems and outdated software highlight the need for improved personal cybersecurity practices. Yet, existing security measures are often complex, inaccessible and lack engaging designs for non-expert users.

To bridge this gap, the GameUp project introduces an interactive chatbot designed to provide real-time alerts and immediate guidance during security incidents. This tool not only offers concise learning nudges and actionable recommendations but also integrates gamification elements to sustain user interest and drive ongoing engagement with security practices.

By estabilishing an engaging and educational process for fostering IT security awareness, GameUp aims to integrate IT security seamlessly into daily digital activities, contributing to a safer and more informed online environment.

Project Title: GameUp - Gamified chatbot for IT security awareness training and real-time support for data protection measures

Contact Person: Prof. Dr. Ali Sunyaev, Dr. Manuel Schmidt-Kraepelin

Funded by: German Federal Ministry of Education and Research (BMBF)

Project Partner: snoopmedia GmbH

Website: *https://www.gameup-projekt.de/*

GameUp
IT-Sicherheit - einfach - zeitnah

SNOOP.

Federal Ministry of Education and Research

ISH

The digital transformation of German small and medium sized craft businesses is creating IT security challenges. The project Intelligent Security Handwerk as part of the BMWi initiative "IT-Sicherheit in der Wirtschaft" will address those challenges by sensitizing SME craft businesses for IT security and technically and organizationally enabling businesses to improve their IT security.
To this end, the cii research group led by Prof. Dr. Ali Sunyaev will develop and test an intelligent IT security assistant for German craft businesses. The assistant will capture the business IT infrastructure and IT security preferences to recommend an individual course of actions. This will enable SME craft businesses to make competent and independent IT security decisions. An interactive application will allow for an easy and intuitive usage which will be tested and evaluated in multiple lab and field studies.

The project consortium consists of the University of Kassel, the Berufsförderungswerk des Handwerk, and the KIT. The project started in August 2021 and will run until January 2025.

Project Title: Intelligent Security Handwerk

Contact Person: Prof. Dr. Ali Sunyaev, Dr. Tobias Dehling, Dr. Benjamin Sturm, Mikael Beyene

Funded by: Federal Ministry for Economic Affairs and Energy

Project Partner: University of Kassel, Berufsförderungswerk des Handwerk (BFH)

Website: *https://intelligent-security-handwerk.de*

INTELLIGENT SECURITY HANDWERK

UNIKASSEL VERSITÄT

BFH Berufsförderungswerk des Handwerks gemeinnützige GmbH

Federal Ministry for Economic Affairs and Energy

SDM4FZI

The challenge in the vehicle and supplier industry today is to produce economically despite highly volatile markets and under dynamic conditions. The decisive competitive factor here is the adaptability of production systems. In order to achieve maximum adaptability, a strict separation must be created between the hardware of the production systems and the controlling software.
The SDM4FZI project therefore deals with the new method: software-defined manufacturing (SDM). Analogous to solutions from information and communication technology, non-predefined functions are also to be realised by automatically generated software. The basic prerequisite is the abstraction of the existing hardware through digital twins with the help of which the software can be automatically derived and distributed.

For this purpose, the existing production OT (Operational Technology) must be rethought in order to make the control and communication infrastructure SDM-capable. SDM creates the basis for innovative applications and business models that use digital twins as their core to optimise adaptable production systems.

Project Title: SDM4FZI - Software-defined Manufacturing for the vehicle and supplier industry

Contact Person: Dr. Sebastian Lins, Heiner Teigeler

Funded by: Federal Ministry for Economic Affairs and Energy

Project Partner: ABB, Audi, Bosch, HOMAG, University of Stuttgart, and many more

Website: *https://www.sdm4fzi.de/*

Software Defined Manufacturing

Supported by:
Federal Ministry for Economic Affairs and Climate Action
on the basis of a decision by the German Bundestag

ABB

HOMAG

University of Stuttgart Germany

BOSCH

Audi

SPECK

Agriculture, and particularly animal husbandry, is currently facing major challenges, such as ensuring food quality and creating sustainable value chains. Regional and global food security, animal welfare, efficient use of raw materials, climate and environmental protection, and their interactions play a prominent role in addressing these challenges.
To address the challenges regarding food quality and sustainable value chains, the digitization of food supply chains seems necessary in order to generate and analyze associated data. Digitization harnesses the potential of novel technologies, such as Artificial Intelligence and Distributed Ledger Technology (DLT), to improve the productivity, quality, and sustainability of food supply chains. For example, DLT has the potential to increase productivity and ensure quality by improving food traceability.

The research project SPECK (Systemic optimization of the meat value chain using the example of pig farming through the development and embedding of digital tools), aims to improve the meat value chain by developing and embedding digital tools (e.g., DLT) and developing a digital application for optimized, animal-specific traceability and for continuous process diagnostics and process control along the value chain.

Project Title: SPECK

Contact Person: Prof. Dr. Ali Sunyaev

Funded by: Federal Office for Agriculture and Food

Project Partner: University of Kassel, Chair of Agricultural and Biosystems Engineering, Karlsruhe Institute of Technology, Institute for Industrial Production

Toward better Smart Contract Development

During the emergence of Distributed Ledger Technology (DLT) over the past decade, various applications on DLT have been proposed, implemented, and even patented. In the course of the development of such applications, new challenges arose from the inapplicability of extant programming paradigms to application development on DLT. Since these new challenges have not been fully identified and only barely solved, various incidents have already shown how devastating the effects of faulty applications on DLT can be (e.g. the loss of 50 million US dollars in The DAO Hack). The research project has not only synthesized existing development challenges related to smart contracts but has also provided solutions and software design patterns that help developers making DLT applications perform, secure, and maintainable.

Results of the research project have been recently published at the prestigious journal IEEE Transaction on Software Engineering.

Project Title: Toward better Smart Contract Development

Contact Person: Prof. Dr. Ali Sunyaev, Dr. Benjamin Sturm, Dr. Niclas Kannengießer, Mikael Beyene

Funded by: EnBW AG

Project Partner: EnBW AG

EnBW

XAIOmics

As it is becoming progressively challenging to wholly analyze the ever-increasing amounts of generated biomedical data (e.g., CT scans, X-ray images, omics data) by means of conventional analysis techniques, researchers and practitioners are turning to artificial intelligence (AI) approaches to analyze their data. Extant AI approaches are often inaccessible and non-transparent to humans, thus limiting us in fully understanding and therefore trusting the produced outputs. Explainable AI (XAI) addresses this opacity issue by producing (more) interpretable AI models whilst maintaining high levels of performance and accuracy. The objective of XAIOmics is to design, develop, and evaluate XAI approaches to biomedical (i.e., omics) data. In particular, we will identify biomedical use cases and current, viable approaches in the domain of XAI and apply and adapt them to the identified use cases. With regards to the highly interdisciplinary field, a central research hurdle will be the development of an understanding for the different kinds of biomedical data and the subsequent feature engineering in the context of the design of the AI algorithms.

In doing so, this project will not only aid researchers and physicians in obtaining a better understanding of the outputs of contemporary AI approaches for biomedical data but also create more transparency.

Project Title: Explainable Artificial Intelligence in Life Science: An Application to Omics Data

Contact Person: Prof. Dr. Ali Sunyaev, Dr. Scott Thiebes, Philipp Toussaint

Funded by: Helmholtz Association, Helmholtz Information and Data Science School for Health

Project Partner: German Cancer Research Center (DKFZ, Deutsches Krebsforschungszentrum)

Website: *https://www.hidss4health.de/*

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Talks & Highlights

Papers Presented at the Hawaii International Conference on System Sciences (HICSS'24)

Manuel Schmidt-Kraepelin and Philipp Toussaint from the cii research group presented two papers at the Hawaii International Conference on System Sciences (HICSS). The conference took place on O'ahu, Hawaii, from January 3-6, 2024.

The conference proceedings are openly accessible at:
https://hdl.handle.net/10125/107396

Prof. Kalle Lyytinen is awarded the International Excellence Fellowship of KIT

The International Excellence Fellowship is a distinguished award of the KIT, which is aimed at world-leading scientists in research fields relevant to the KIT. It is intended to further intensify KIT's international cooperation with top universities and research institutions and to help researchers from KIT and abroad to continue existing scientific partnerships and projects and to initiate new ones. Only a few outstanding researchers are given the honour of being awarded the International Excellence Fellowship of KIT.

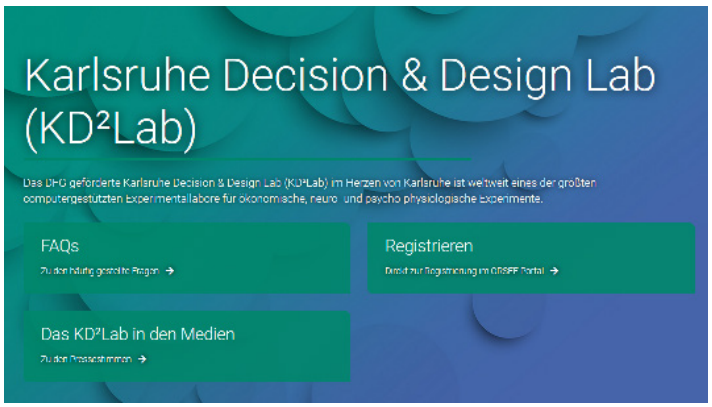
As part of his International Excellence Fellowship, Prof. Lyytinen will spend several months conducting research at KIT. The Institute for Applied Informatics and Formal Description Methods (AIFB) and the research group cii of Prof. Ali Sunyaev are pleased to host Prof. Lyytinen's visit and to extend and intensify the long-standing cooperation with Prof. Lyytinen.

KASTEL Science Slam

Gabriela Ciolacu from the cii research group presented her research during the Science Slam for KASTEL Winter Colloquium.
KASTEL SRL has celebrated the Winter Colloquium on the 22nd of January. The gathering featured active participation from lab members who seized the opportunity to showcase their research. Our CII colleague and PhD student, Gabriela Ciolacu, participated in the competition by presenting her research entitled “It’s not Fair! Why We Fail to Understand Fairness”. Her insights tackled the challenges associated with the fairness design of information systems, shedding light on the complexities of such a topic.

Prof. Dr. Ali Sunyaev is now Member of the KD²Lab

The Karlsruhe Decision & Design Lab (KD²Lab) welcomed Prof. Dr. Ali Sunyaevas a new member.
The KD²Lab (https://www.kd2lab.kit.edu/) in the heart of Karlsruhe is one of the world’s largest computer-based experimental laboratories for economic, neuro- and psycho-physiological experiments. In the KD²Lab experiments can be conducted in a controlled environment, which provides a clear boundaries within participants can make decisions. This helps isolating experimental effects and gaining a better understanding of the decision-making behavior of individuals.



Prof. Dr. Ali Sunyaev was elected to the Member Board of Directors at German Informatics Society (GI)

Prof. Dr. Ali Sunyaev is now part of Member Board of Directors at German Informatics Society (GI). He will represent the interests of information systems and computer scientists in science, business, public administration, society, and politics on behalf of around 20,000 members.
The newly elected Member Board of Directors of the German Informatics Society (GI) met for the first time at the Michaelsberg in Siegburg as part of the board and executive committee meeting. There, the GI Executive Committee unanimously elected Prof. Dr. Nadine Bergner from RWTH Aachen University and Prof. Dr. Ali Sunyaev from the Karlsruhe Institute of Technology (KIT) to the Board. This completes the six-member board.

GESELLSCHAFT
FÜR INFORMATIK

Prof. Dr. Ivo Blohm gave a lecture in the Research Talk Series on Digitalization 2024

On February 6th, 2024, Prof. Dr. Ivo Blohm, Director of the Information Systems Institute, University of St. Gallen (IWI-HSG) introduced the research groups and interested students in the Triangel Studio to his research on “Hybrid Creativity: How Artificial Intelligence Can Defy or Reinforce Human Creative Performance”.

Congratulations to Niclas Kannengießer for his successful doctoral examination

On February 8th, 2024, Niclas Kannengießer successfully defended his Ph.D. thesis! His dissertation is entitled “Purposeful Information System Decentralization based on Distributed Ledger Technology”

During his doctoral studies, Niclas has published several papers in the proceedings of leading IS, computer science, and human-computer interaction journals and conferences.

DFG-Project Kick-off “DigiAct - Digital Transformation in Healthcare: From Digital Tools to Digital Actors”

Together with the University of Cologne and the University Hospital Cologne, the cii research group had their first workshop to discuss ideas and directions of the DFG-funded basic research project “DigiAct - Digital Transformation in Healthcare: From Digital Tools to Digital Actors”.
The consortium seeks to uncover how autonomous, digital actors like AI agents change clinical processes. By using both a process mining approach and a case study approach the project aims to conceptualize digital transformation on a process level.
Further Information: https://digitalisierung-der-arbeitswelten.de/diact

Professor Dr. Ali Sunyaev is now Member of the Scientific Council Computer Science of the DFG

For the next four years, Professor Dr. Ali Sunyaev will be part of the DFG scientific council for computer science for the subject of data management, data-intensive systems, computer science methods in business informatics. He is thus part of the scientific representation of 49 review boards that decide on DFG funding decisions according to the DFG's own scientific standards and in the spirit of excellence in research, innovation, and the search for knowledge.
The 49 DFG scientific councils represent 150,000 researchers in a total of 214 subjects. A total of 649 researchers were appointed to the 49 review boards. The review boards will begin their work at the start of the new term of office in their constituent meetings in April and May 2024. They will replace the previous review boards in evaluating proposals submitted to the DFG for financial support for research projects and monitoring compliance with uniform standards during the review process.

Fachkollegienwahl 2023 DFG

Current Research of the cii Group Presented at the Conference of the DFG Priority Programme 2267 "Digitalization of Working Worlds"

At the Harnack House in Berlin Richard Guse presented the cii research group's current research on digital transformation in healthcare at the conference "Work. Transform? Repeat" of the DFG Priority Program 2267. At the three-day conference on March 11-13, 2024, current research contributions on the topic of "Digitalization of Working Worlds" were presented and discussed by associated DFG project members and other external researchers.
The conference included a total of 40 contributions from researchers as well as five keynotes from renowned researchers from various disciplines: Prof. Dr. Thomas Becker (NTNU Trondheim), Prof. Dr. Monika Dommann (University of Zurich), Prof. Dr. Lauri Wessel (European University Viadrina), Prof. Dr. Robin Williams (University of Edingburgh), Prof. Dr. John Zysman (University of California, Berkeley).

Congratulations to Maximilian Renner for his Successful Doctoral Examination

On March 19th, 2024, Maximilian Renner successfully defended his Ph.D. thesis! His dissertation is entitled “Revealing Trust Transfer Mechanisms in the Context of Artificial Intelligence”.

During his doctoral studies, Maximilian worked on several papers about the understanding of trust in Artificial Intelligence.

Girls’ Day - Future Prospects for Girls: cii Workshop

In contribution to this year’s nationwide “Girls’ Day - Future Prospects for Girls” on the 25th of April 2024, the cii research group conducted the workshop ‘Another cat video?! The science behind recommendations on TikTok & Co.‘ - “ Noch ein Katzenvideo?! Die Wissenschaft hinter Empfehlungen auf TikTok & Co.“ as a part of the overall KIT program.

The workshop provided students with an introduction to our research group and insights into the scientific background of recommendations on online platforms to better understand how personalized experiences, advertisements, and recommendations of videos, clothing, or music work. Finally, we resolved any remaining questions regarding a scientist’s job role, daily work, or our research interests.

Meeting of the AUDITOR project in Karlsruhe

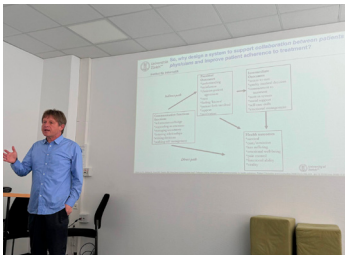
On April 26, 2024, the closing event of the research project “European Cloud Service Data Protection Certification” (AUDITOR) took place in Karlsruhe. The research project was led by the cii research group in the role of consortium leader over the project duration of more than 6.5 years.
During the event, the key results of the project were presented, but the project partners also reported on the continuation of the resulting “GDPR CC” certification beyond the end of the project and the upcoming certifications.

cii Doctoral Seminar 2024 – Bad Herrenalb – with Prof. Dr. Kalle Lyytinen

This year the cii research group again held a doctoral seminar in Bad Herrenalb. For the three-day retreat doctoral students worked together on their current research ideas at the Haus der Kirche Evangelische Akademie Baden, Bad Herrenalb, from May 6th through May 8th. They were joined by Prof. Dr. Kalle Lyytinen who shared his knowledge on various topics throughout the seminar.
The theme for this year’s seminar was “A PhD Toolbox”. For the seminar the research group around Prof. Dr. Ali Sunyaev organized several sessions and workshops on contextualizing research, selecting and reasoning research methods, academic writing and presenting research.

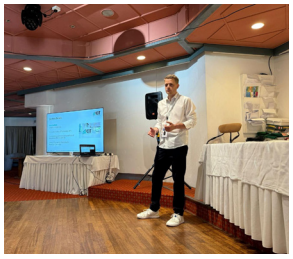
On Generative AI in Healthcare – A Recap of Prof. Dr. Gerhard Schwabe's lecture in the Research Talk Series on Digitalization 2024

On May 14, 2024, Prof. Dr. Gerhard Schwabe, Chair of Information Management at the Institute of Informatics at the University of Zurich since 2002, introduced the research groups and interested students in the KD2Lab to his research on "How can doctors and generative AI together help me lose weight?".

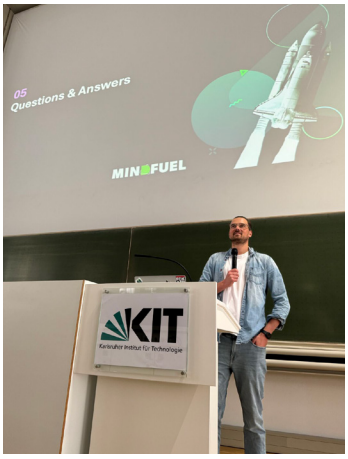

cii at the European Conference on Information Systems (ECIS) 2024

Three members of the cii research group participated in this year's ECIS, held from June 13th to 19th in Paphos, Cyprus.
This year's ECIS took place from June 13th to 19th in Paphos, Cyprus. Before the conference (from June 13th to 16th), Prof. Dr. Ali Sunyaev served as a faculty member at the doctoral consortium, guiding young researchers on their path to success.
The official conference started with a warm welcome reception on June 16th. The day after, Sascha Rank and Long Hoang Nguyen presented their accepted papers. Both paper sessions had a great audience, providing helpful and constructive feedback. The presented papers are available here: https://aisel.aisnet.org/ecis2024/.

Industry Insights from Guest Speakers in this Year's Course "Angewandte Informatik - Internet Computing"

In this year's cii "Angewandte Informatik - Internet Computing" Guest Speaker Series, two guest speakers provided their insights on current industry trends. The different perspectives on latest internet computing topics and issues included: "System Integration and DevOps & Kubernetes" and "Create and Capture Value (from data) with Data & AI Product Management"



cii at the Hi! PARIS Summer School 2024 in Paris

Three members of the cii research group participated in this year's Hi! PARIS Summer School, held from July 8th to 11th at the HEC Paris.
Every year, the Hi! PARIS Center (HEC Paris & Institute Polytechnique de Paris) offers a summer school on AI & Data for Science, Business & Society. This year's edition comprised two distinct tracks on (A) Data Science for Business and Society and (B) Theory and Methods of AI. Lecture foci ranged from the impact of the EU AI Act to agent-based modeling in combination with machine learning. Furthermore, participants could engage with leading scholars and industry professionals through panels, keynotes, and a poster session.

Last Lecture “Angewandte Informatik - Internet Computing” of Prof. Dr. Ali Sunyaev and Industry Insights from BMW

Prof. Dr. Ali Sunyaev gave his last lecture at KIT by concluding this year’s course “Angewandte Informatik - Internet Computing”. He was joined by Dr. Jens Fähling from BMW who provided insights into success factors when introducing test automation in a transformation project. With that he concluded the AIIC guest speaker series that provided different perspectives on latest internet computing topics and issues.

Successful Final Event of the Course “Team Projects in Business & Technology” at the Karlsruhe Institute of Technology

On Wednesday, July 17, the final event of the course “Team Projects Business & Technology” took place in the Tulla building of the Karlsruhe Institute of Technology (KIT). This event is organized by the Institute of Information Systems and Marketing (IISM) and deals with interdisciplinary issues in information systems.
As part of this event, the “Critical Information Infrastructure” (cii) research group at the Institute of Applied Informatics and Formal Description Methods (AIFB) presented an innovative project that was carried out by a group of students in the B.Sc. in Industrial Engineering and Management. The topic of the project was “Development of an AI-based tool for the ontological mapping of security knowledge”. Based on our research project “Intelligent Security Handwerk”, in which an intelligent IT security assistant for craft businesses is to be developed, the aim was to develop a tool that extracts security knowledge from security guidelines and stores it in a structured manner in a security ontology.
The final event was embedded in a partner event at which various industry partners reviewed the students’ work. The group supervised by the cii research group achieved second place, which underlines the high quality and relevance of their work.

cii New Collaboration with Università degli Studi di Milano (UNIMI)

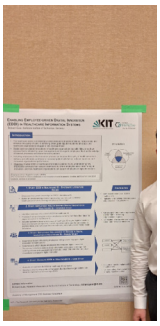
Kathrin Brecker from the cii research group was invited to UNIMI to pursue research on Artificial Intelligence assessment with Professor Claudio A. Ardagna, Professor Marco Anisetti and Dr. Nicola Bena. During her stay she also held a research seminar on AI assessment at the UNIMI computer science department. We are looking forward to the collaboration!

The cii research group presents a Catalog of Criteria for Data Protection-Compliant School Information Systems

Within the DIRECTIONS (Data Protection Certification for Educational Information Systems) project researchers from the cii research group and the University of Kassel presented a catalog of criteria for a data protection certification to establish higher security for information systems in schools.

Article Presented and Doctoral Consortium at the Academy of Management (AOM) Annual Meeting

Richard Guse from the cii research group presented the accepted paper on “The Development of Value Proposition in Healthcare in the Course of Digital Transformation”. The article was co-authored by Scott Thiebes, Philipp Winterhoff, Martín V. Alzate, Jonas Stangier, and Ali Sunyaev. Additionally, he presented his current dissertation research at the doctoral consortium.



New podcast on narratives in gamified information systems with Dr. Manuel Schmidt-Kraepelin

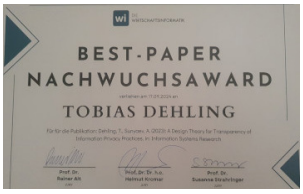
On August 28, 2024, Manuel Schmidt-Kraepelin was a guest on Benjamin Linz and Philip Weber's Spielsinn podcast to talk about his research on narratives in gamified information systems. Spielsinn is a four-weekly podcast dealing with current research on topics such as gamification, game user experience and game design.

Project Kick-Off GameUp

On August 12, 2024, the kick-off meeting for the new research project GameUp took place in Bonn. The research project is funded by the Federal Ministry of Education and Research for three years, from August 2024 to July 2027. The objective of the GameUp project is to develop a gamified, AI-based chatbot that offers rapid assistance in the event of security breaches with a real-time alert system and supports private users in optimizing IT security with small learning nuggets.
Within the research project, the cii research group led by Prof. Dr. Ali Sunyaev, will focus on developing and evaluating a gamification concept to ensure that the GameUp chatbot is used over the long term and that information can be optimally absorbed and understood.
The project consortium is led by the Snoopmedia GmbH.

Best paper award for junior researchers of the Wirtschaftsinformatik e.V.

The article "A design theory for transparency of information privacy practices" by Tobias Dehling and Ali Sunyaev has been awarded awarded the best paper award for junior researchers of the Wirtschaftsinformatik e.V.



New Short Paper presented at Mensch und Computer Conference 2024

Paula Hofmann and Eva Späthe presented our new short paper, “AI-based Tools in Higher Education – A Comparative Analysis of University Guidelines” at a conference series on human-computer interaction in Karlsruhe, Germany. In this study, together with their co-authors Alexa Brand, Sebastian Lins, and Ali Sunyaev, they conducted a comparative analysis of existing guidelines at German universities. They provided an overview of the current regulations on the use of AI-based tools at German universities.

cii Student Papers – 2024 collection published

We are delighted to present this year’s cii student papers collection, where we strive to publish outstanding seminar papers from our courses. During our courses, students work in groups and deal with problems and issues related to sociotechnical challenges in (critical) information infrastructures. The cii Student Papers - 2024 collection is now published. For this year’s collection, the cii research group proudly presents seven outstanding student seminar papers from four of our courses. It is freely available online via KITopen: https://doi.org/10.5445/IR/1000173991

Panel on High-Risk AI at Wirtschaftsinformatik Conference in Würzburg

Ali Sunyaev and Scott Thiebes of the cii research group participated in a panel on high-risk AI at the 19th International Conference on Wirtschaftsinformatik (WI 2024) in Würzburg. The panel brought together experts from academia and industry. It focused on IS’ role in capitalizing on the opportunities while at the same time mitigating the risks of high-risk AI. Other panelists included Alexander Benlian (TU Darmstadt), Jella Pfeiffer (KIT), Ekaterina Jussupow (TU Darmstadt), Alexander Maedche (KIT), Joshua Gawlitza (InformMe), and Rainer Hoffmann (EnBW).

The cii Research Group and Prof. Dr. Ali Sunyaev Bid Farewell

After seven years the cii research group and Prof. Dr. Ali Sunyaev say their good-bye at KIT. They are moving to Technical University of Munich (TUM), Campus Heilbronn, where they will continue their research. For a final farewell ceremony, they were joined by various colleagues and KIT members.
As the research group embarks on a new journey at to TUM (Campus Heilbronn), we want to extend our heartfelt gratitude to KIT and AIFB. The support, collaboration, and opportunities provided here have been instrumental in our growth and success.

We are grateful for the enriching experiences and the strong foundation we have received. While we look forward to new challenges and achievements at TUM (Campus Heilbronn) we will always cherish our time at KIT and AIFB. We also wish the KIT students all the best and hope to see you again soon!

Prof. Ali Sunyaev is a new Vice President of TUM

The Technical University of Munich (TUM) has appointed a new Vice President to manage and further develop the TUM Campus, Heilbronn. Effective 1 October 2024, Prof. Ali Sunyaev has assumed the role of Vice President TUM Campus Heilbronn. He will lead the campus, which Prof. Helmut Krcmar has successfully built up since 2018 as Founding Dean and President's Representative, into the future.

cii at Ludwig-Maximilians University Munich for “Forschungsmethoden der Wirtschaftsinformatik” Course

For the first time, three PhD students of the cii research group were invited to join a course on “Forschungsmethoden der Wirtschaftsinformatik.” The course was hosted by LMU Munich, and (early-stage) PhD students from TUM (including TUM Campus Heilbronn), LMU Munich, and the University of the Bundeswehr Munich took the opportunity to broaden their methodological knowledge.
Lecturers from all three universities and the University of Passau introduced the doctoral students to the research methods they excel in. The course offered a broad overview of the manifold methods used in information systems research, including qualitative methods (e.g., Grounded Theory Methodology), quantitative methods (e.g., Difference-in-Differences Quasi Experiments), and design-oriented methods (e.g., Design Science Research). Therefore, the course is well-suited for early-stage PhD students or those who want to enhance their methods portfolio.
Besides that, the course offered a perfect opportunity for networking among PhD students beyond the topics and participants of the course.

Niclas Kannengießer Gave a Talk on Automated Machine Learning Methods at the University of St. Gallen

Machine learning (ML) has become an integral part of daily life, powering voice assistants, personalized recommendations, and even medical diagnostic systems. However, to make ML models function effectively, they must be carefully fine-tuned. A critical step in this process is optimizing ‘hyperparameters’—settings that significantly impact a model’s performance. These parameters, such as learning rate, dictate how quickly a model learns, affecting, for instance, the robustness of its learned insights. In his research talk, Dr. Niclas Kannengießer from the Karlsruhe Institute of Technology (KIT) explained the importance of choosing the right optimization method and the factors guiding practitioners in this decision.

cii Christmas Celebration 2024

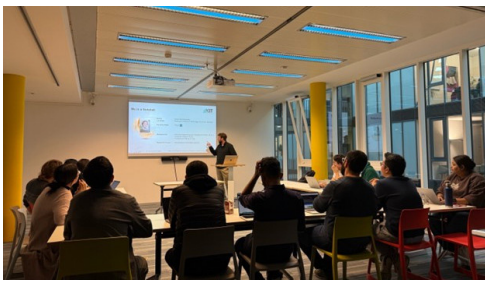
On December 3, 2024, this year's Christmas celebration of the cii research group took place in Weingut Able in Heilbronn. Together with new members of the research group at TUM Campus Heilbronn, the group engaged in a joint activity to decorate small Christmas trees and parted ways into the evening after a long celebration.






Niclas Kannengießer gave a talk at the UZH Blockchain Center

Niclas Kannengießer delivered an insightful presentation on his research into decentralized information systems. He highlighted critical findings on blockchain technology, including trade-offs in blockchain system designs and the "blockchain trilemma" of decentralization, scalability, and security. He also introduced tools for blockchain benchmarking and software patterns to tackle smart contract challenges. Niclas Kannengießer discussed innovative concepts like Automated Market Makers (AMMs) tackling liquidity issues in cryptoeconomic systems and Collaborative Distributed Machine Learning (CDML) fostering data sovereignty in AI. The presentation emphasized bridging technical designs with social needs, showcasing a future where decentralization supports inclusivity and innovation.



4

Teaching & Research

Lectures

Applied Informatics - Internet Computing (Bachelor)

The lecture Applied Informatics – Internet Computing provides insights into fundamental concepts and future technologies of distributed systems and Internet computing. Students should be able to select, design and apply the presented concepts and technologies. The course first introduces basic concepts of distributed systems (e.g., design of architectures for distributed systems, internet architectures, web services, middleware). In the second part of the course, emerging technologies of Internet computing will be examined in depth. These include, among others: cloud computing, fog computing, internet of things, blockchain, artificial intelligence. Practical topics are discussed in tutorials.

Critical Information Infrastructures (Master)

The course critical information infrastructures introduces students to the world of complex sociotechnical systems that permeate societies on a global scale. Students learn to handle the complexities involved in the design, development, operation, and evaluation of critical information infrastructures. In the beginning of the lecture, critical information infrastructures are introduced on a general level. The following sessions focus on an in-depth exploration of selected cases that represent current challenges in research and practice.

Digital Health (Master)

The course Digital Health introduces master students to the subject of digitization in health care. Students learn about the theoretical foundations and practical implications of various topics surrounding the digitization in health care, including health information systems, telematics, big health care data, and patient-centered health care. After an introduction to the challenge of digitization in health care, the following sessions focus on an in-depth exploration of selected cases that represent current challenges in research and practice. Students work (in a group of 3-4) on a selected topic and have to write a course paper. Students can choose a topic from a variety of topics. To answer the research questions, students use literature reviews but also interviews, surveys, programming tasks, and other research methods.

Trustworthy Emerging Technologies (Master)

The novel course Trustworthy Emerging Technologies provides insights into emerging and disruptive technologies and resulting information systems. Students write a scientific paper on topics such as generative AI, metaverse, and fog computing. Throughout the course, students develop a learning portfolio to get immediate feedback on their way to solving a real-world problem. They apply diverse research methods to solve identified problems, including literature reviews, interviews, and surveys. The course is supported by an online learning module teaching the basics on how to write scientific theses.

Practical Courses

Practical Course Blockchain Hackathon (Bachelor/Master)

The practical course “Blockchain Hackathon” aims to teach students the basics of developing sociotechnical information systems in the context of blockchain or distributed ledger technology (DLT) in a practical way. To this end, students are introduced to DLT and the development of DLT applications in a kick-off event. Subsequently, students work in groups to implement a software artifact (e.g., desktop application, mobile app, or web application) that solves a given problem. The practical course is held in the form of a 1-week hackathon. The hackathon also focuses on quality assurance (e.g. by implementing tests) and documentation of the implemented software artifact.

Practical Course Sociotechnical Information Systems Development (Bachelor/Master)

The goal of the practical course is to understand the fundamentals of developing sociotechnical information systems for different application areas. Within the scope of the course, students learn to identify a suitable solution strategy for a given problem, define requirements and implement them in form of a working software product (e.g., web platforms, mobile apps, desktop applications). Students also learn to test the quality of the developed sociotechnical system and document it in accordance with established standards.

Seminars

Seminar Emerging Trends in Internet Technologies (Bachelor/Master)

The seminar aims at providing insights into current topics in the field of Information Systems with a focus on fundamental and innovative Internet technologies. There are short introductions and corresponding seminar paper topics for different topics around the lectures and research topics of Prof. Sunyaev's research group "Critical Information Infrastructures" including distributed ledger technologies (e.g. blockchain), cloud computing, green IT, artificial intelligence, security, and privacy. Students can also propose their own topics within the framework of the given topic areas. The seminar aims to provide insights into current topics in the field of business informatics and to offer students the opportunity to write a scientific paper in a group of students for the first time.

Seminar Emerging Trends in Digital Health (Bachelor/Master)

The seminar aims at providing insights into current topics in the field of Information Systems with a focus on innovative digital healthcare systems. There are short introductions and corresponding seminar paper topics for different topics around the lectures and research topics of Prof. Sunyaev's research group "Critical Information Infrastructures" including genomics, distributed ledger technologies (e.g. blockchain), artificial intelligence, and gamification in healthcare. Students can also propose their own topics within the framework of the given topic areas. The seminar aims to provide insights into current topics in the field of digital health and to offer students the opportunity to write a scientific paper in a group of students for the first time.

Research Seminar: Critical Information Infrastructures (PhD Students)

The CII research seminar, aims to strengthen rigor and relevance of the research conducted in the CII research group. In weekly sessions, PhD students present their ideas for and challenges with their current research to the entire research group to obtain feedback. The CII research seminar fosters the exchange of ideas and knowledge within the research group, enables the effective mastering of arising challenges, and improves the overall quality of the research conducted in the CII research group.

Team Projects

Team Project Economy and Technology (Bachelor)

The team project course “Economics and Technology” is conducted in cooperation with colleagues from the Institute of Information Systems and Marketing (IISM). It aims to prepare students for working in heterogeneous teams. The course implements the concept of research-oriented teaching and fosters students’ problem-solving competences. In teams of 4-5, students work on defined interdisciplinary problems at the intersection of economics and technology. Potential results of the projects include artifacts, such as methods, algorithms, models, software or components. Each team writes a final report and presents their findings to their supervisors and fellow students. Each semester, our research group offers interesting topics in the areas of digital health and information privacy.

5

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