Karlsruhe Institute of Technology

aifb

ANNUAL REPORT 2019

RESEARCH GROUP
CRITICAL INFORMATION INFRASTRUCTURES

CRITICAL
INFORMATION
INFRASTRUCTURES
RESEARCHGROUP

PREFACE

Dear Friends,

2019 had many ups and downs. Looking back, in the annual report, I will as usual focus on the ups to share some of the exciting moments—both stressful and inspiring—my research group and I experienced last year.

For two years, we are now a proud member of the Institute for Applied Informatics and Formal Description Methods (AIFB) at the Karlsruhe Institute of Technology (KIT).

In 2019, we were able to make several major national and international contributions to research, teaching, and innovation at the KIT.

In research, we published several research articles that were very well received by our academic community. We also presented and discussed our research at the leading conferences in our field. Certainly, one of the highlights last year was the participation of the entire research group in the International Conference on Information Systems (ICIS) in Munich. I felt so blessed to have all my fellows with me. It was the time to see some of them have grown and are now established researchers in our field. Scott Thiebes, for example, received the conference's prestigious best reviewer award.

In terms of teaching, our research group has contributed in many ways to the excellent teaching program of the KIT. We restructured and improved the lecture "Applied Computer Science II: Principles of Internet Computing". We offered master lectures (e.g., "Digital Health" and "Critical Information Infrastructures"), seminars, and practical courses to our students. We are very encouraged by the positive feedback we received and look forward to our classes in 2020.

In the area of innovation, I would like to highlight the extension of our AUDITOR research project

and the new COOLedger project that is funded by the Helmholtz Association and the Russian Science Foundation. AUDITOR attracts much international attention through the development of an innovative data protection certification in cooperation with renowned partners from industry, such as SAP, datenschutz cert, Microsoft, Deutsche Telekom, Trusted Cloud, Cloud & Heat, EuroCloud, and DIN. In the second project phase of the project (November 2019 to October 2021), AUDITOR certification is going to become an EU-wide data protection seal for cloud services. The goal of the research project COOLedger is to support the selection and configuration of distributed ledgers through a model that identifies the dependencies between DLT characteristics and presents them in a comprehensible manner. The model will be embedded in a process and implemented as software, which facilitates finding the suitable configuration of distributed ledgers for specific applications. Additionally, it was very nice to get the DFG-funded research project “Unblackboxing IT Certifications” being extended by further two years. I am extremely happy and excited to be able to work with incredibly smart and passionate young people in these research projects.

There are much more information and exciting highlights of equal importance regarding our team, research projects, talks, teaching activities, publications, and memberships that can be found on the following pages of this annual report of the research group critical information infrastructures. I hope you will enjoy reading the report and gain some interesting insights into our activities in 2019.

I am looking forward to the year 2020 !
Very Best,
Ali Sunyaev

TABLE OF CONTENTS

1 Research Group
Critical Information Infrastructures

2 Research Projects

3 Talks

4 Highlights

Teaching

Selected Publications

Committees and Memberships

Imprint

INTRODUCTION

Critical 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, secure, and purposeful software and information systems. Our research features a strong domain focus, in particular, on internet and health care industries. 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.

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RESEARCH PROJECTS

AUDITOR

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 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, Federal Ministry of the Interior, Federal Office for Information Security), and a large number of German data protection authorities.

Gefördert durch:

Bundesministerium für Wirtschaft und Energie

DLR Projektträger

aufgrund eines Beschlusses des Deutschen Bundestages

auditor

Contact Person: 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: auditor-cert.eu

COOLedger

Over the past decade, various application areas have been identified for the use of Distributed Ledger Technology (DLT), which includes concepts such as blockchains. These application areas have specific requirements for DLT characteristics (e.g., fast consistency or high availability). However, trade-offs between these characteristics prevent the development of universally applicable distributed ledgers that can simultaneously address all requirements. Instead, a large number of distributed ledgers exists (e.g., Bitcoin, Ethereum, or IOTA), each optimized to meet requirements of a specific application area. Since it is hardly possible to retroactively change of an underlying DLT design, developers must consider the suitability of DLT designs for their use cases before implementation. In order to support the selection and configuration of a suitable distributed ledger, the COOLedger research project develops a model that identifies the dependencies between DLT characteristics and presents them in an understandable way. The model will be embedded in a process and implemented as software, which facilitates finding the optimal configuration of distributed ledgers for specific applications.

Contact Person: Niclas Kannengießer

Funded By: Helmholtz Association and
the Russian Science Foundation

Project Partner: Higher School of Economics

Website: aifb.kit.edu/web/COOLedger

NATIONAL RESEARCH UNIVERSITY
HIGHER SCHOOL OF ECONOMICS

HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

RSF | Russian Science Foundation

digilog@bw

Digitalisierung im Dialog

Digitalization is changing social coexistence in a variety of ways, some of which are fundamental. The aim of digilog@bw is to analyze the influence of digitalization on people and the resulting social changes in an interdisciplinary way. The digilog@bw project develops scientifically sound decision bases for politics and society in order to enable digitalization to be designed for the benefit of people. This design task requires orientation towards critically reflected values, norms and framework conditions. The collaborative projects “Autonomy”, “Knowledge” and “Participation” will be carried out in an interdisciplinary, cross-location manner and brings together on the question of criteria for a promising and responsible digital society. To this end, the Research Network brings together Baden-Württemberg expertise from academic and non-academic research in the humanities, social sciences, law, economics, media and communication sciences, ethics, computer science, and interdisciplinary technology assessment at the highest scientific level.

EBERHARD KARLS UNIVERSITÄT TÜBINGEN

UNIVERSITY OF MANNHEIM

ZKM Zentrum für Kunst und Medientechnologie Karlsruhe

Contact Person: Benjamin Sturm

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

Project Partner: Eberhard Karls University Tübingen, IZEW, IWM, University Mannheim, ZEW, ZKM

Website: digilog-bw.de

DLT4Life

Modern life sciences with their highly sensitive omics data sets face several challenges with regard to data storage and sharing. On the one hand data must be protected in order to preserve the privacy of those individuals who contributed their data to research.On the other hand, the true value of omics data can only be realized if shared with as many researchers as possible.

In an ideal world, data subjects (i.e., patients) should be able to control access to their data directly. However, granting and revoking access to data is a slow and tedious process within the current life sciences research paradigm, where most data is either stored on central controlled-access data repositories or kept locally within the respective research groups.

Distributed ledger technology (DLT; e.g., blockchain) enables immutable transactions between untrustworthy parties, which are kept in a consistent state through automated, algorithm-based consensus building mechanisms, thus eliminating the need for third-party trust enforcement.

Applications of DLT within the life sciences promise to enable data subjects granting and revoking access rights flexibly, independent of intermediaries, and on an individual basis, giving way for data subjects' direct control over who may access their data for what purposes.

Contact Person: Ali Sunyaev

Funded By: Helmholtz Association

Project Partner: Deutsches Krebsforschungszentrum

Website: hidss4health.de

dkfz. DEUTSCHES KREBSFORSCHUNGSZENTRUM IN DER HELMHOLTZ-GEMEINSCHAFT

HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

dlt4life.

ePill

Medication needs to be taken correctly. However, patients often do not comply with prescribed regimens. This worsens the overall morbidity and mortality rates. Besides the negative impact on patients' state of health, bad medication adherence raises the overall cost of healthcare due to an increased need for medical treatments, e.g. hospitalizations. With ePill we aim to contribute to the efforts focused at improving medication adherence by improving the information provision for medication through mobile and web information technology.

Improved presentation of drug information could improve adherence in various ways. For instance, patients could more easily inform themselves on prescribed pharmaceuticals, enabling them to understand why and how they must take pharmaceuticals. A dynamic web application is well suited to aggregate information on pharmaceuticals based on patients' needs and demands. This way, side effects or adverse drug reactions, which might lead a patient to stop taking a prescribed pharmaceutical, can be avoided without reading a lot of leaflets or consulting a physician.

GELBE LISTE. PHARMINDEX

ROTE LISTE

University of Cologne

ePill

Contact Person: Anton Grube

Website: epill.aifb.kit.edu:8080/#/

LitSonar

A rigorous literature review is essential for any high-quality research endeavour. However, collecting the necessary literature base, i.e. conducting a rigorous literature search, is a highly complex and difficult task, especially for students and novice researchers. The LitSonar project tries to facilitate this process. The project follows a design-oriented research approach that iteratively develops, evaluates, and refines technical solutions for conducting systematic and rigorous literature searches. The main goals of the developed solutions are to make systematic literature searches more comprehensive, transparent, and efficient, which, eventually, improves the quality of the entire literature review. A current prototype system allows a first glance on how such systems might look like. The prototype's user-friendly web interface supports the entire literature search process by providing, for instance, meta-access to multiple literature databases, innovative publication filters, and extensive search reports. The current prototype system can be found here: litsonar.com

Contact Person: Benjamin Sturm

Funded By: University of Cologne, University of Kassel

Project Partner: University and City Library Cologne, Kassel University Library

Website: itsonar.com

PEER—Open Dissertations Library

The PEER project will provide 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 these 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, PEER will make the publication of excellent student theses much easier for students and universities as well as provide an open and highly visible platform revealing the real worth of bachelor, master, and diploma theses.

PEER will utilize the innovative potential of distributed ledger technology to archive the system's three primary design goals: ease-of-use, openness, and content excellence. The entire submission process will be transparently documented and safe-guarded by the bloxberg blockchain (bloxberg.org). In order to create a truly open publication platform, PEER will store the theses and accompanying research data (e.g., interview transcripts, statistical data, program code) using a public decentralized storage solution—the InterPlanetary File System (IPFS).

BISE

MAX-PLANCK-GESELLSCHAFT

bloxberg

Contact Person: Benjamin Sturm

Website: aifb.kit.edu/web/PEER

Security & Complience Automation

The research group CII is working together with SAP SE to take on the challenges of an ever-increasing number of certifications that cloud services have to fulfill. The project “Security & Compliance Automation” supports this process and explores ways to automate compliance management processes and certification procedures, which, in the long run, should help reduce the effort needed to comply with diverse certification requirements. The project can be regarded as a follow-up project of the Next Generation Certification (NGCert) project and applies learnings and insights into practice. Throughout the project, we will analyze and validate the compliance master data management approach, propose suitable data visualizations, and define requirements on a self-audited compliance system. The goal is also to define automated test procedures and audit rules, and accompany a proof of concept for compliance automation

Contact Person: Sebastian Lins,
Malte Greulich

Funded By: SAP SE AG

Project Partner: SAP SE AG

Website: aifb.kit.edu/web/Security_and_Compliance_Automation

Security & Compliance Automation

Social Comparison in mHealth

Mobile Health (mHealth) technology, such as mobile applications and activity trackers, have been identified as promising tools for increasing physical activity. However, a majority of users are not using mHealth frequently and over a sustained period of time. To overcome the problem of decreasing use and engagement in mHealth, research and practice increasingly draws on gamification. We propose that social comparison is a driving mechanism for how gamification elements affect users and technology use outcomes. When data, such as one's position on a leaderboard, number and type of badges, and points for completing activities, are mutually shared with other users, it allows users the opportunity to compare their physical activity behavior with other users' behaviors and evaluate their standing in relation to others. However, it is unclear if including such features in mHealth results in positive or negative user reactions and how this impacts the subsequent behavior. This project aims to understand how and why the design of social comparison features can result in positive and negative reactions and empirically evaluate how this impacts subsequent physical activity behavior.

UNIVERSITY OF MANNHEIM

ForDigital

Contact Person: Manuel Schmidt-Kraepelin

Funded By: Research alliance ForDigital

Project Partner: Prof. Dr. Amin Heinzl, University of Mannheim

Toward better Smart Contract Developement

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). To address existing challenges, the research project aims to provide software design patterns that help developers make DLT applications perform, secure, and maintainable. Such software design patterns should support developers in avoiding predominant programming mistakes and to identify potential vulnerabilities in their code.

Contact Person: Niclas Kannengießer

Funded By: EnBW

Project Partner: EnBW

Website: aifb.kit.edu/web/Toward_better_Development_of_Applications_on_DLT

Trusted Blockchain

Distributed Ledger Technology (DLT) has received growing attention in recent years as an innovative method for storing and updating data within and between organizations. Blockchain technology is one of the most well-known uses of DLT, in which the ledger (i.e., a databases used for recording and tracking transactions) comprises ‘blocks’ of transactions. It is becoming apparent that blockchain holds the potential for major opportunities across several sectors, including finance, education, and healthcare. Nevertheless, issues related to an immaturity of the technology, ensuring security and privacy, and interoperability of emerging platforms will become more pressing, ultimately hampering use of blockchain technology by organizations. Establishing standards and certifying adherence to these standards to address prevalent concerns related to blockchain technologies gains high importance as it helps to ensure security and resilience of the blockchain technology and to facilitate trust. The objective of the research project Trusted Blockchain is to develop a standard for blockchain technology and a corresponding certification approach that verifies adherence to the standard through a third-party-attestation.

Blockchain Center.eu

UNIKASSEL VERSITÄT

Trusted Blockchain

Contact Person: Sebastian Lins,
Niclas Kannengießer

Funded By: Metamorphoses Braun GmbH

Project Partner: University of Kassel

Website: blockchain-center.eu

Unblackboxing IT Certifications

The project ‘Unblackboxing IT Certifications’ focuses on providing essential insights about certification structuring, customers’ and online vendors’ perceptions about certifications, and finally certification design. We aim to identify and measure how different certification configurations influence both customers’ and online vendors’ perceptions and thus IT certifications’ effectiveness. Further on, previous literature has mostly focused either on the customer or the online vendor perspective. As a second objective of the research project, we aim to compare and analyze the perceptions of customers and online vendors to resolve emerging conflicts, and thereby increase certification effectiveness. Finally, various research has argued and shown that customers tend to have a limited understanding of certification assurances or even misunderstand them altogether, thus resulting in calls for innovative and informative certification designs. To address this gap, the research project analyses how to design and display certifications to foster their effectiveness.

DFG Deutsche Forschungsgemeinschaft

Contact Person: Sebastian Lins

Funded By: German Research Foundation (DFG)

Project Partner: Technische Universität Darmstadt

TECHNISCHE UNIVERSITÄT DARMSTADT

Website: aifb.kit.edu/web/Unblackboxing_IT_Certifications

Talks & Highlights

TALKS

Helmholtz Key Technologies: The Democratization of Scientific Data

On January 21, 2019 in a recent article by the Helmholtz Association on key technologies, Professor Sunyaev explains why Blockchain is set to change our society just as much as the Internet has in recent decades, and what this means for science. In particular, the article deals with the prospect of blockchain-based solutions to further democratize access to scientific data and results, support the reproducibility of scientific results more effectively, and enhance transparency in science, for example when it comes to the evaluation of scientific performance.

Prof. Sunyaev Interviewed by Mobile Zeitgeist: How Blockchain-technology can Revolutionise Science

In an interview with the online magazine mobile zeitgeist published, Prof. Ali Sunyaev talked about blockchain and, its role as innovation driver, especially for science.

Mobile zeitgeist is one of the leading online magazines on the subject of mobile business in German-speaking countries.

TALKS

Prof. Sunyaev Gave a Talk at the ITAS Workshop on Artificial Intelligence and Algorithmic Decision-Making

On May 5, 2019, Prof. Dr. Ali Sunyaev gave a talk at the ITAS workshop „Künstliche Intelligenz & algorithmisches Entscheiden. Chancen und Risiken für Mensch und Technik“. The talk is entitled „Der transformative Beitrag der Blockchain-Technologie“.

Prof. Sunyaev Interviewed by it-daily: Trust is Good, Control is Better

On December 3, 2019, in an interview with the online magazine it-daily was published, Prof. Ali Sunyaev talks about Cloud services. It-daily is one of the leading online magazines for b2b communication for large and medium enterprises in German-speaking countries.

Highlights

CII Research Group at the 52nd Hawaii International Conference on System Sciences (HICSS)

On January 8, 2019, the CII research group of Prof. Ali Sunyaev was represented with five papers and one best paper nomination at the 52nd HICSS, which took place at the Grand Wailea, Wailea, HI, USA. HICSS is the longest standing scientific conference in the information systems and technology field. Since 1968, it has attracted high caliber scholars and professionals in academia, industry, and government agencies around the world to present their cutting edge research. During the past five decades, research papers presented at HICSS have promoted innovations and advanced the development in the information systems and technology at the global scale.

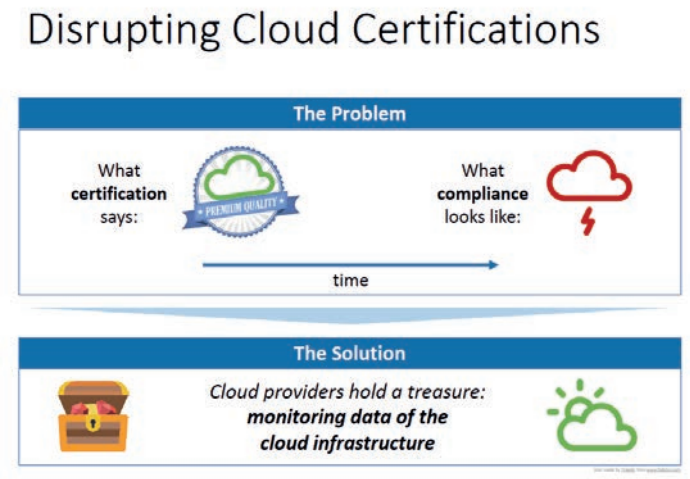
The DFG Funded Project “Unblackboxing IT Certifications” Will be Extended by a Further Two Years

On March 29, 2019, the research project “Unblackboxing IT Certifications: A Decompositional Analysis of IT Certifications in Electronic Markets and their Impact on Customer and Platform Provider Perceptions”, which is funded by the DFG, will be extended by further two years. This research project deals with consumers’ and vendors’ perception of IT certifications in the context of electronic markets.

Highlights

CII Research Group at 27nd European Conference on Information Systems

On June 8, 2019, the CII research group of Prof. Ali Sunyaev presented two papers at the 27th European Conference on Information Systems (ECIS), which took place in Stockholm and Uppsala, Schweden. ECIS is one of the leading international conferences in the information systems field.



KIT Joined the Bloxberg Consortium

On May 23, 2019, on the initiative of research group CII, the KIT has joined the bloxberg consortium led by the Max Planck Digital Library. As a consortium member, the KIT will also provide a node for the bloxberg infrastructure. The bloxberg infrastructure is a secure global blockchain established by a consortium of leading research organizations to provide scientists with decentralized services worldwide. The bloxberg Consortium aims to foster collaboration among the global scientific community, empowering researchers with robust, autonomous services that transcend institutional boundaries.

bloxberg
The Trusted Research Infrastructure

Highlights

Article About the Research Project AUDITOR Published in Handelsblatt

On June 17, 2019, the article “ Vertrauen ist gut, Zertifizierung ist besser” was published in Handelsblatt No. 114. In an interview with journalist Manuel Hecker, consortium leader Prof. Ali Sunyaev from the Karlsruhe Institute of Technology answered questions about the AUDITOR research project.

CII Day Trip 2019

On July 7, 2019, the CII research group took a day trip and attended an archery course in the glistening sun, where concentration and a steady hand were required. Afterwards the day ended with cool drinks and a tasty dinner.

Highlights

CII Research Group at IEEE CBI 2019

On July 15, 2019, three papers of the CII research group have been accepted at the 21st IEEE Conference on Business Informatics, including “Consumer Perceptions of Online Behavioral Advertising”, “Are We Ready to Play in the Cloud? Developing new Quality Certifications to Tackle Challenges of Cloud Gaming Services” and “Wearable Health Devices in the Workplace: The Importance of Habits To Sustain” the Use.

Prof. Sunyaev at the German-Russian Science Forum on Artificial Intelligence in Moscow

On June 27, 2019, Prof. Sunyaev was invited as an expert to the German-Russian Science Forum in Moscow on the state of the art of Artificial Intelligence (AI) research. Among other things, he discussed the question of whether AI will become human in the near future.

Highlights

Internships at Yale University in 2019

In 2019, Prof. Ali Sunyaev from the CII Research Group offered a research internship in cooperation with Prof. Jakub Szefer at the Yale University. Bachelor students wrote their bachelor thesis in the CII research group as a preparation for the internship.

Seminar on Good Research Practices with Abhay Mishra

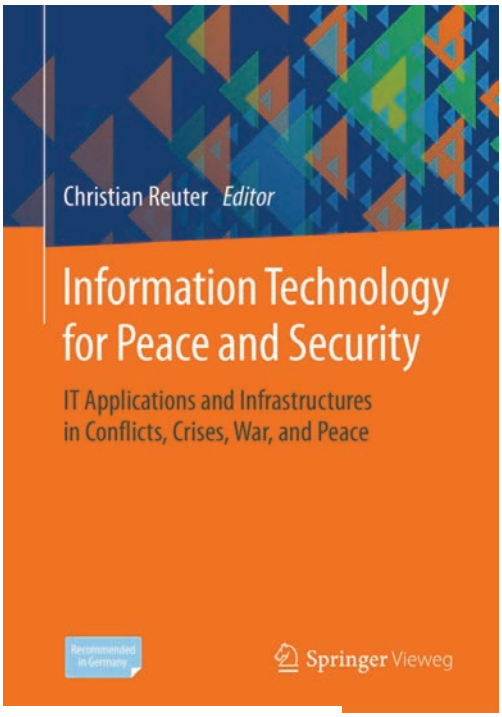
On June 17-21, 2019, Prof. Abhay Mishra from the Iowa State University in Ames, USA visited the CII research group to hold a seminar on good research practices. The focus of the seminar was to discuss current trends in good research practices, one-to-one discussions with PhD students to resolve challenges in and develop ideas for their PhD projects, and to further a joint manuscript project at the intersection of information privacy, user behaviors, and distributed ledger technologies.

Highlights

Special Interest Group ‘Digital Health’ Founded

On March 5, 2019, the interdisciplinary special interest group Digital Health examined current issues relating to the use of IT in healthcare and medicine from a variety of perspectives. The special interest group is to serve as an communication platform for stakeholders in the field of digital health.

Book Chapter on “Security of Critical Information Infrastructures” has been Published



On March 18, 2019, the book chapter entitled “Security of Critical Information Infrastructures” by Tobias Dehling, Sebastian Lins, and Ali Sunyaev has been published by Springer in the book “Information Technology for Peace and Security: IT Applications and Infrastructures in Conflicts, Crises, War, and Peace” edited by Christian Reuter.

AUDITOR at the Days of Digital Technologies 2019 in Berlin

On May 14-15, 2019, the Federal Ministry of Economics and Energy hosted the ‘Tage der digitalen Technologien’ in Berlin. At the event in the ‘Bolle Festsäle’, the AUDITOR consortium informed interested visitors about the current progress.

Highlights

Current CII DLT Research at the 3rd ForDigital Blockchain Workshop

On February 14, 2019, Tobias Dehling presented current DLT research of the CII research group on the “Design and Evaluation of a Configuration Tool for Viable Applications on Distributed Ledgers” at the 3rd ForDigital Blockchain Workshop.

The 35th AIK Symposium „Blockchain - Proof-of-Worth“

On November 12, 2019, the actual potential of DLT were discussed during the 35th symposium of the Association of Applied Informatics Karlsruhe e.V. (AIK) from different perspectives such as computer science, law, and business. As the organizer of the symposium, Prof. Dr. Ali Sunyaev gave his inaugural lecture on the transformative character of the DLT and a multi-perspective consensus that must be reached across various disciplines (e.g., computer science, law, and economics) in order to make the DLT fit for the future.

Highlights

Unblackboxing IT Certifications – Kickoff Meeting at Karlsruhe Institute of Technology

On July 2, 2019, Prof. Dr. Ali Sunyaev (KIT) and Prof. Dr. Alexander Benlian (TU Darmstadt) as well as their doctoral students met at Karlsruhe Institute of Technology in order to discuss their current work within the context of the research project “Unblackboxing IT Certifications”; this research project is funded by the DFG.

CII Christmas Party 2019

On December 11, 2019, the research group CII celebrated the annual Christmas party in Karlsruhe. After a quick stop at one of Karlsruhe’s christmas markets, they visited the Hoepfner Burgstueble, where they could reflecte the year and enjoyed good food and drinks in a rustic atmosphere.

Highlights

CII Research Group @ China

In October 2019, Scott Thiebes travelled to China as a member of the delegation of KIT Vice-President for Innovation and International Affairs, Prof. Dr. Thomas Hirth, to celebrate the 20-year anniversary of the cooperation between the Tongji University in Shanghai and KIT. After the festivities in Shanghai, Scott also participated in the fourth KIT China Innovation Days in Suzhou and Wuxi, where he gave talks on the convergence of Distributed Ledger Technology and Artificial Intelligence in health care.

Best Reviewer Awards

In December 2019, two PhD students at the CII research group, Manuel Schmidt-Kraepelin and Scott Thiebes, have been awarded the best reviewer award of the Pre-ICIS Workshop in Information Security and Privacy 2019. For Manuel, this is the second best reviewer award at WISP in a row. Scott also won the best reviewer award at the 40th International Conference on Information Systems, that took place in Munich.

Highlights

CII Research Group at the 14th International Business Informatics Congress

On February 23-27, 2019, the CII research group of Prof. Ali Sunyaev presented a paper at the 14th International Business Informatics Congress, which took place in Siegen. More than 750 scientists, practitioners and students took part in the largest German-language conference on information systems. The paper “Gamification in Health Behavior Change Support Systems-A Synthesis of Unintended Side Effects” was presented by Manuel Schmidt-Kraepelin.

CII Research Group at the 40th International Conference on Information Systems

On December 15-18, 2019, the whole CII research group of Prof. Sunyaev attended the 40th International Conference on Information Systems (ICIS), which took place in the International Congress Center Munich. The conference brought together information systems researchers from around the world to discuss cutting-edge research. Two research articles of the CII research group were published in the proceedings of this years ICIS.

Highlights

Research Talk Prof. Dr. Ali Sunyaev, KIT, on “Digital Health: Design of User-Centered Mobile Applications for the Healthcare Industry and Blockchain in Genomics”

On June 14, 2019, Prof. Sunyaev gave a research talk on “Digital Health: Design of User-Centered Mobile Applications for the Healthcare Industry and Blockchain in Genomics”. Whereby he talks about the changes of the health care environment. While paternalism was the dominating paradigm for ages, the focus is now shifting to the individual patient and on empowering patients' to take an active role in their own health care. The increasing patient-centeredness reflects also on the health care information systems landscape. We investigate arising challenges through design science research and develop a patient-centered health IT service (ePill—electronic patient information leaflet) targeting the prevalent problem of medication compliance through enhanced information provision.

AUDITOR at the Federal Commissioner for Data Protection and Freedom of Information

On March 28, 2019, an exclusive meeting was held with the Federal Commissioner for Data Protection and Freedom of Information Ulrich Kelber and representatives of the BfDI in Bonn. Among other things, the BfDI assured the AUDITOR project team of its support at international level.

Highlights

AUDITOR at the LDI of NRW

On June 17, 2019, the AUDITOR consortium presented the project to Ms. Block in Düsseldorf as the State Commissioner for Data Protection and Freedom of Information (LDI) Nordrhein-Westfalen. Not only the most important key points of the project were presented, but also the requirements and processes for the submission of a national and then a European seal of quality for data protection were discussed.

International AUDITOR Workshop in Brüssel

On April 11, 2019, an international AUDITOR-Workshop took place in Brussels with the participation of about 30 participants. The workshop was attended by participants from various institutions and countries. Pierre Chastanet (DG Connect, EU Commission) described in a welcome speech the European view on the current situation regarding certifications in the cloud market and clearly described AUDITOR as a groundbreaking project which the EU Commission will continue to pursue with great interest.

Highlights

AUDITOR @ Canada Roadshow

On September 22-27, 2019, a seventeen-member delegation led by the Federal Ministry of Economics and Energy (BMWi) and the Digital Technologies Forum (FDT) visited four exciting cities on Canada's east coast. Relevant actors and institutions in Montreal, Ottawa, Toronto and Waterloo were visited to promote international exchange and the initiation of new German-Canadian research projects in the fields of artificial intelligence (AI) in health care, networked production and AI technologies.

German-Russian Research Exchange in Sochi

On May 13-15, 2019, Prof. Sunyaev participated at the German-Russian exchange day at the conference ‘Science of the Future’ held at the Educational Centre Sirius in Sochi. Twelve representatives of six Russian-German project teams, awarded funding in the first two rounds of the joint RSF-Helmholtz calls for proposals, took part in the discussion on how young scientists can work successfully within the existing mechanisms of support of international research projects. Based on the initial discussions on site, the CII group was able to initiate the COOLedger research project.

Highlights

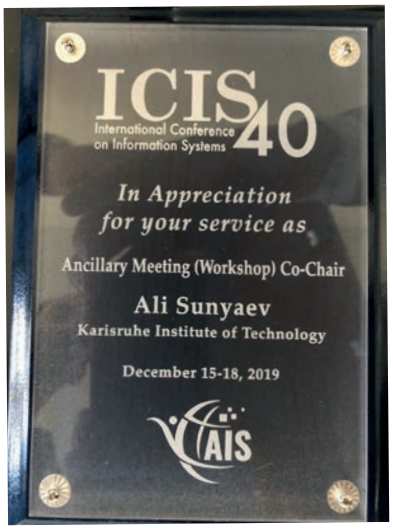
Ambassador of the University (KIT) at the Evaluation for Funding in the Excellence Strategy of the Federal and State Governments in Germany

In 2019, Prof. Sunyaev was present at the inspection of the excellent application of our university, as one of the experts available to the evaluators and representing KIT. In this context, KIT has successfully asserted itself in the "Excellence Universities" funding line in the excellence strategy of the federal and state governments. The concept "The Research University in the Helmholtz Association | Living the Change" is now receiving funding, for which a total of 105 million euros have been applied for over the next seven years. This application focuses on the expansion of top-level research at KIT.

Cheers after the decision: KIT is University of Excellence!
(Photo: Markus Breig, KIT)

Conference Committee of the ICIS 2019— Ancillary Meeting (Workshop) Chair

On December 15-18, 2019, Prof. Sunyaev attended the 40th International Conference on Information Systems (ICIS) and was also chairman of the board of examiners.




Teaching & Research

Teaching

Selected Student Theses

Off-Chain Interoperabilität in der Distributed Ledger Technology
Niklas Hasebrook

Vehicular Fog Computing: Challenges in the Context of V2X Communication for Manufacturers
Raphael Maric

Determinant Factors of the Adoption of AIaaS
Calvin Bayer

Effectiveness of Cloud Certification to prove GDPR compliance
Maroua Ben Ayed

Determining Suitability of Interoperability Concepts for Distributed Ledger Technology for Use Cases
Gauthier Eeckeleers

Improving Recall of Information from Drug Leaflets by Nudging
Fabian Vormittag

Die Bausteine von Gamification: Eine Synthese und Klassifizierung gängiger Spielelemente
Tarik Akgöz

Can Gamification Make Us Healthier? A Research Agenda Concerning the Role of Gamification in Health Behavior Change Theories
Feride Güclü

Teaching
Selected Student Theses

Towards a Benchmarking Process for Distributed Ledger Technology
Florian Gräbe

Gamification and Health Behavior Change Theories
Simon Warsinsky

Gamification of Survey Entrance: Improvement of Response Rates or Gimmickry?
Lara Ambrosius

Blockchain for Open Science: Addressing Existing Problems of the Peer-Review System
Chenyang Dong

A Research Agenda for Interoperability Concepts between Distributed Ledgers
Michelle Mei-Li Pfister

Implementation-based Performance Evaluation of Distributed Ledger Technology for Personal Health Data
Konstantin Knieps

Blockchain-based System Prototype for Emergency Health Information
Mohamed Bassem Abidi

Cancer Genomics Research in the Cloud: Revision of a Taxonomy of Genome Data Sets
Yiwei Zhang

Teaching
Lecture

Applied Informatics II - Internet Computing
The lecture Applied Computer Science II 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

Critical Information Infrastructures
The course critical information infrastructures introduces students to the world of these 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
The lecture ‘Digital Health’ had a twofold purpose: First, to introduce theoretical foundations of various topics in digital health (including eHealth, smart homes in health care, and healthcare service and systems engineering); and second, to introduce current topics in research on digital health (including genomics, gamification, distributed ledger technology, and artificial intelligence) by presenting research papers and research projects the research group is working on. After introductory lectures, students gather in groups to work independently on a current challenge in digital health. The results of their project work are summarized in a term paper and presented at the end of the semester. Students also review projects of other groups to get familiar with the scientific review process.

Teaching
Seminars and Pratical Courses

Selected Issues in Critical Information Infrastructures
Critical digital infrastructures are sociotechnical systems that comprise basic applications and information systems and have a significant impact on individuals, businesses, governments, the economy and society. Critical digital infrastructures require careful design, development and testing to ensure reliability, security and suitability. The seminar selected Issues in Critical Information Infrastructures offers each semester a series of selected topics related to critical digital infrastructures that can be addressed by students individually or in small groups.

Emerging Trends in Critical Information Infrastructures
The block seminar Emerging Trends in Critical Information Infrastructures comprises topics related to the lectures and research topics of Prof. Sunyaev's research group. In the winter semester 2018/2019 40 students out of more than 100 applications could be admitted to the seminar. Seminar theses topics on current issues from a variety of research areas were offered, including internet of things, edge computing, cloud computing, continuous certification, distributed ledger technology, digital health, and gamification. The seminar aims to give insights into current topics in the field of information systems as well as giving students the opportunity to write their first scientific paper in a group of students.

Teaching
Seminars and Pratical Courses

Sociotechnical Information Systems Development
The goal of the practical course is to understand the fundamentals of developing socio-technical 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 socio-technical system and document it in accordance with established standards.

Research Seminar: Critical Information Infrastructures
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.

SELECTED PUBLICATIONS

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Dehling, T.; Lins, S.; Sunyaev, A. (2019)
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Distributed Ledger Technology in Genomics: a call for Europe. European Journal of Human Genetics, 2019. DOI: 10.1038/s41431-019-0512-4.

COMMITTEES AND MEMBERSHIPS

Prof. Ali Sunyaev is assigned to specific committees and is a member of various associations.

- Gesellschaft für Informatik (GI)
- Since 2015, Auditor of Gesellschaft für Informatik (GI)
- Association for Information Systems (AIS)
- Deutsche Gesellschaft für Medizinische Informatik, Biometrie und Epidemiologie e.V. (GMDS)
- Editorial Board Journal of the Association for Informtion Systems (JAIS)
- Editorial Board Communications of the Association for Information Systems (CAIS)
- Editorial Board Electronic Markets (EM)
- Member of the Scientific Advisory Coucil of the Anwenderverein Fujitsu NEXT e.V. („Network of Experts“)
- Verband der Hochschullehrer für Betriebswirtschaft (VHB)
- Founder and Spokesperson of the “Digital Health” section in the German Informatics Society (GI)
- Chairman of the examination board for the course of studies “Information Systems” at the KIT

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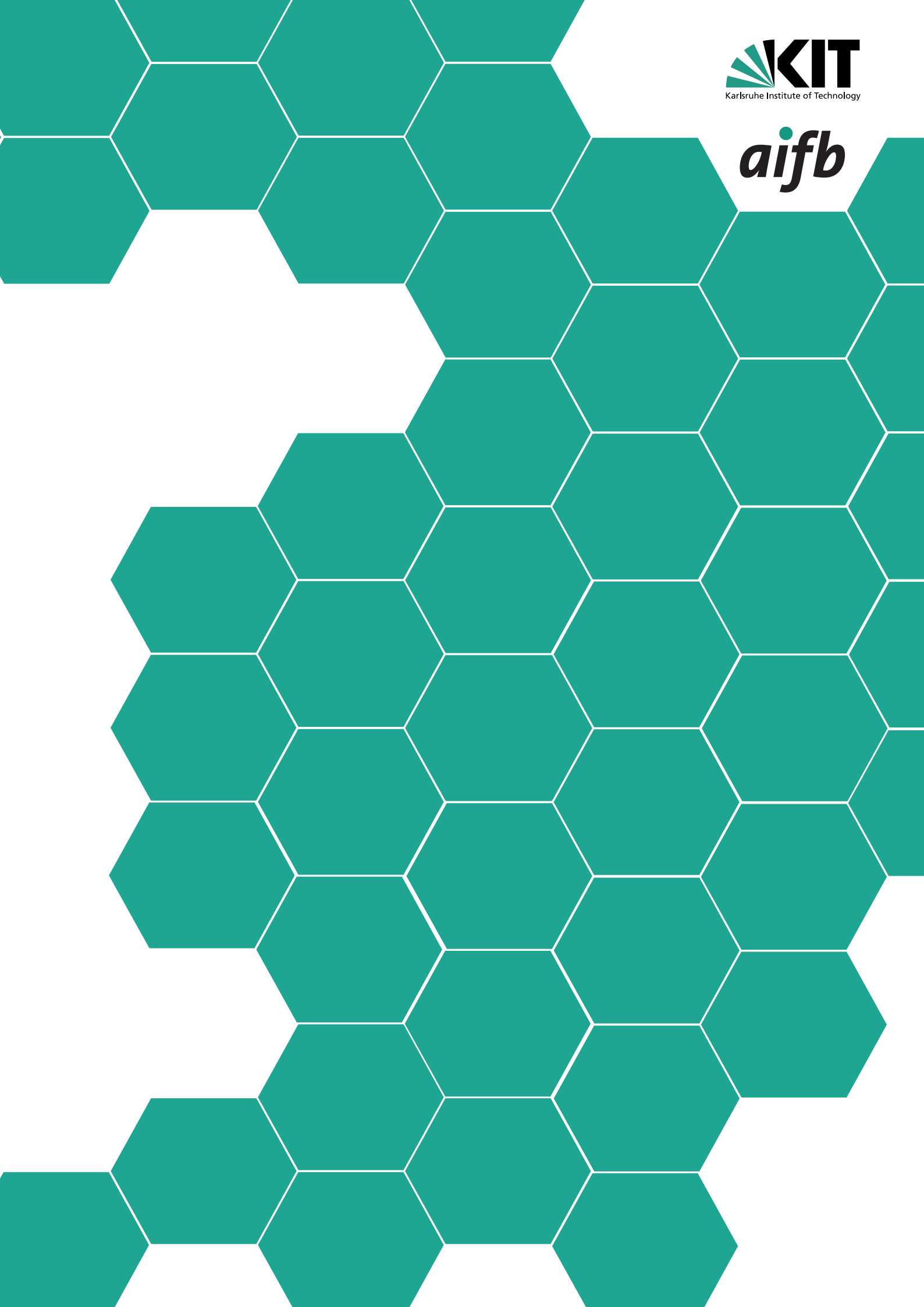
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