CRITICAL
INFORMATION
INFRASTRUCTURES
RESEARCH GROUP

2018 ANNUAL REPORT

CRITICAL INFORMATION INFRASTRUCTURES
RESEARCH GROUP

KIT
Karlsruhe Institute of Technology

aifb

PREFACE

Dear Friends,

I would like to take this opportunity to thank you all for an extensive and great year 2018 !

Last year started with the move of our entire team from our two previous locations at the University of Kassel and the University of Cologne to the Karlsruhe Institute of Technology. For exactly one year, my team and I are now a happy and proud member of the Institute for Applied Informatics and Formal Description Methods (AIFB) .

According to the three pillars of competence at KIT — research, teaching, and innovation — we did our best to make major national and international contributions to all three of them. In research, we published several research articles that were very well received by our academic community. The DFG-funded research project "Unblackboxing IT Certifications" has driven the fundamental scientific research in the field of IT certifications so far ahead that we were asked to have a follow-up industry-funded research project on this topic with the SAP AG. We are very proud that Dr. Tobias Dehling received two prestigious awards for his PhD thesis in 2018. In the field of teaching, our research group has been closely involved in several KIT teaching activities from the very beginning. We took on and improved the lecture "Applied Computer Science II: Principles of Internet Computing". We offered new lectures (e.g., "Digital Health" or "Critical Information Infrastructures"), new seminars, and new practical courses to our students. We are very encouraged by the positive

feedback we received and look forward to our classes in 2019. In the area of innovation, I would like to highlight the AUDITOR research project and the talk about the transformative value of blockchain for science at the Helmholtz Horizons 2018 event. AUDITOR attracts a lot of international attention through the development of an innovative data protection certification in cooperation with renowned partners especially from industry, such as SAP, datenschutz cert, Microsoft, Deutsche Telekom, Trusted Cloud, Cloud & Heat, EuroCloud, and DIN. The Helmholtz Horizons 2018 talk about the transformative value of blockchain for science was very well received and raised an online follow-up discussion on 'democratization of scientific data'.

All other equally important information about our team, research projects, talks, highlights, teaching activities, publications, and memberships can be found on the following pages of this annual report of the research group critical information infrastructures. I hope you enjoy reading and gain some interesting insights into our activities in 2018.

I am looking forward to the year 2019 !

Very Best
Ali Sunyaev

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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

European Cloud Service Data Protection Certification (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 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, Federal Ministry of the Interior, Federal Office for Information Security), and a large number of German data protection authorities. In close co-ordination with the project partners, an initial criteria catalogue for certification was drafted and presented 2018 at the Federal Ministry for Economic Affairs and Energy in Berlin.

CONTACT
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Heiner Teigeler

Funded by
Federal Ministry for Economic
Affairs and Energy

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

www.auditor-cert.eu

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.

CONTACT
Anton Grube

http://epill.aifb.kit.edu:8080/

Distributed Ledger Technology for Life Sciences

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 is only to 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. Adding to this, centralized data repositories create single points of failure in terms of data availability and integrity. 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. The objective of this research project is to develop a secure and privacy-preserving, DLT-based data sharing infrastructure for life sciences. The project will begin in 2019 and is set to run for three years.

CONTACT
Scott Thiebes

HiDSS 4HEALTH

http://www.hidss4health.de/

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 Lit-Sonar 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: http://litsonar.com

LitSonar

CONTACT
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Project Partners
University and City Library Cologne
University Library Kassel
German National Library of Economics (ZBW)
KIT Library

http://litsonar.com

MILES

The "Multi-Disciplinary Identification of Lineage-Specific Signaling Dependencies in Cancer" (MILES) junior group leader alliance is a consortium funded by the German Federal Ministry of Education and Research (BMBF) within the e:Med call that promotes systems-oriented research into diseases and preventive measures by linking life sciences with information sciences. The major goal of the junior group leader alliance is to identify unique signaling networks within individual tumor lineages that mediate tumor growth. Within MILES, the Critical Information Infrastructures Research Group of Prof. Dr. Ali Sunyaev is responsible for developing concepts to ensure privacy and integrity of sensitive medical information, which cannot be anonymized (e.g., genomic data), in cloud computing environments. In particular, the research team of Prof. Dr. Sunyaev addresses the following research questions: (1) How can we integrate genomic data to understand lineage-specific signaling dependencies of transcription regulators? (2) How can we enable efficient and secure large-scale data handling to study these datasets in a multi-disciplinary environment? (3) How can we dissect lineage-specific signaling dependencies of transcriptional regulators on a molecular level?

Next Generation Certification (NGCert)

Current cloud service certifications attempt to assure a high level of security, availability and legal compliance, for a validity period of one to three years. However, cloud services are part of an ever-changing environment, resulting from fast technology life cycles and inherent cloud computing characteristics. Hence, such long validity periods may put in doubt the reliability of issued certificates. Conditions and requirements of such certifications may no longer be met throughout these periods, for instance, due to configuration changes or major security incidents. To increase trustworthiness of issued certifications and to assure continuously reliable and secure cloud services, the German Federal Ministry of Education and Research funded the project "Next Generation Certification" (NGCert). The research project NGCert focuses on research and development of dynamic certifications for cloud services, which enable certification authorities to continuously and (semi-) automatically audit and monitor crucial parameters of cloud services. In this context, the research group Critical Information Infrastructures develops metrics, methods, and design guidelines for continuous monitoring and (semi-) automatic certification of cloud services.

Payment with Data

In the age of information, online activities leave trails of personal data that expose our interests, traits, beliefs, and intentions. This data is frequently gathered by commercial entities. Although many consumers are aware of this problem, they often do not know what personal data is gathered, who has access to their data, how their data is used, and for what prices their data is sold. Personal data can, for example, be used for predicting purchasing behavior to reduce supply chain overhead or to influence consumers' purchasing behavior through behavioral targeting. Organizations purchase sets of personal data from data aggregators and merchants to subsequently use them for their own purposes. In short, personal data has become a commodity. The goal of the research project is to examine the economic value of consumer data and to investigate how organizations use this data for economic value creation. On the one hand, this will help make the public familiar with prevalent personal data markets by making consumers aware of data use and trading processes normally not visible to them. On the other hand, the study results will serve as empirical foundation to contribute to public debate on strengthening consumer rights in our digital world.

CONTACT
Ali Sunyaev
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Manuel Schmidt-Kraepelin

Security & Compliance 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 fulfil. 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 follow-up 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.

Security & Compliance Automation

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Funded by
SAP SE

Project Partner
SAP SE

Trusted Blockchain

Distributed Ledger Technology (DLT) has received growing attention in recent years as an innovative method of 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 computer file 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 health. 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.

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Funded by
Metamorphoses Braun GmbH

Project Partner
University of Kassel

Trusted
Blockchain

https://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.

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Funded by
German Research Foundation (DFG)

Project Partner
Technische Universität Darmstadt

http://www.aifb.kit.edu/web/Unblackboxing_IT_Certifications/en

TALKS

Prof. Dr. Sunyaev Gave a Talk During the KIT Graduation Ceremony

On 06/16/2018 the graduation ceremony of the professional association of economis at the KIT took place at Audimax. Numerous graduates came with their families to celebrate their successful university degree. On this occasion, Prof. Dr. Ali Sunyaev was invited for a presentation of blockchain. During the presentation, Prof. Dr. Ali Sunyaev described the disruptive potential of blockchain, explained technical blockchain basics and possible use cases for blockchain in the business landscape.

Talk at the Applied Informatics Colloquium on October 17, 2018

On 10/17/2018 Prof. Dr. Ali Sunyaev was invited to give a talk entitled „Sorgenfrei in die Zukunft dank Trusted Blockchain at the Applied Informatics Colloquium (AIK). The colloquium was hosted by the Institute of Applied Informatics and Formal Description Methods (AIFB) and the Verein Angewandte Informatik Karlsruhe (AIK) e.V.

Roundtable of the FZI Friends' Association on the Topic of Blockchain

On 10/11/2018 the FZI House of Living Labs hosted the FZI Friends' Association Roundtable on the topic of blockchain. As speaker of the evening, Professor Sunyaev gave a talk "What is DLT? What is Blockchain? Why does it affect my enterprise?".

Prof. Sunyaev Gave a Talk at the
EnSoC Network Seminar „Blockchain und Energiewirtschaft"

On 10/15/2018 Prof. Dr. Ali Sunyaev gave a talk at the EnSoC network seminar „Blockchain und Energiewirtschaft".

Blockchain is a subject of discussion across industry boundaries and is also a controversial topic in science. To bring some light into the darkness, the Energy Solution Center (EnSoC) has set up this network seminar and invited Prof. Dr. Weinhardt and Prof. Dr. Sunyaev as two acknowledged experts in the field of distributed ledger technologies.

The Digital (R)Evolution in Science: Talk at the Helmholtz Horizons Symposium 2018 in Berlin

On 11/06/2018 Prof. Dr. Ali Sunyaev gave a talk at this year's Helmholtz Horizons Symposium on the topic of Distributed Ledger Technology (DLT) and its transformative value for science.

The Helmholtz Horizons Symposium, hosted by the President of the Association, Professor Dr. Otmar D. Wiestler, highlights scientific breakthroughs of Helmholtz Association's established researchers. Beyond that it showcases the Association's talented early career researchers, from doctoral candidates to junior research group leaders. Helmholtz Horizons 2018 was held in Berlin on 6 November 2018 with this year's main topic "The Digital (R)Evolution in Science".

Talk at the Blockchain for Science Con 2018 in Berlin

On 11/05/2018 Prof. Dr. Ali Sunyaev gave a talk at this year's Blockchain for Science Con 2018 on Distributed Ledger Technology (DLT) and its fields of application.

During the talk he presented fundamental characteristics and functionality of DLT using the concept of blockchain as an example. He llustrated the concept of blockchain by providing an overview on the principles of the popular cryptocurrency Bitcoin. Prof. Dr. Sunyaev also explained the role of decentralization in current evolvements and opportunities of DLT in Open Science applications.

Talk at the 7th Ressourceneffizienz- und Kreislaufwirtschaftskongress in Karlsruhe

Prof. Dr. Ali Sunyaev gave a talk on the topic of Blockchain and Distributed Ledger Technologies (DLT) on 10/18/2018 at this year's congress on Ressourceneffizienz- und Kreislaufwirtschaft Baden-Württemberg.

The congress on Ressourceneffizienz- und Kreislaufwirtschaft is organized on behalf of the State Ministry, the Environment Ministry and the Baden-Württemberg Ministry of Economic Affairs. The congress brings together decision-makers and experts from major industrial enterprises, SMEs, research and politics in order to combine environmental policy goals and economic interests.

HIGHLIGHTS
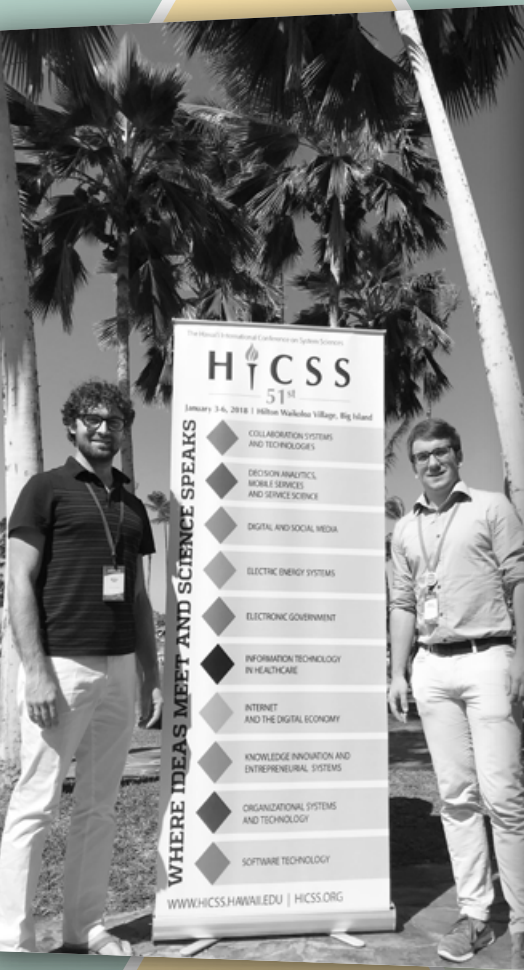
Research Group Critical Information Infrastructures at the 51st Hawaii International Conference on System Sciences (HICSS)

This year the cii lab of Prof. Ali Sunyaev was proudly represented at the 51st HICSS, which took place at the Hilton Waikoloa Village, Hawaii from 01/03/2018 to 01/06/2018. HICSS is one of the most prestigious conferences in information systems as well as the longest-standing active scientific conference in information technology management. At HICSS 2018 Anton Grube and Manuel Schmidt-Kraepelin presented several published papers. Manuel Schmidt-Kraepelin participated in the second HICSS doctoral consortium where he presented his work on Player Types in the Context of mHealth Applications.

Prof. Ali Sunyaev Serves as a Mentor for the Junior Faculty Consortium at ECIS 2018

Prof. Ali Sunyaev served as a mentor for the Junior Faculty Consortium at the 25th European Conference on Information Systems in Portsmouth, UK (06/23/2018 - 06/28/2018).

The Junior Faculty Consortium consists of panels, discussions, and interactive sessions built around issues related to becoming a successful member of the professoriate and to advance your career. A select group of highly successful IS faculty from universities around the world led each session. Each participant had the opportunity to interact with a wide variety of both new and senior faculty and to share their experiences, thoughts, and concerns about developing a career in the academy.

Research Group cii at the 2018 Multikonferenz Wirtschaftsinformatik (MKWI) in Lüneburg, Germany

The research group Critical Information Infrastructures (cii) participated at the 2018 Multikonferenz Wirtschaftsinformatik (MKWI) 2018 in Lüneburg, Germany from March 6–9. Theresa Kromat presented the conference paper Gestaltungsraum für proaktive Smart Homes zur Gesundheitsförderung by Theresa Kromat, Tobias Dehling, Reinhold Haux, Christoph Peters, Bernhard Sick, Sven Tomforde, Klaus-Hendrik Wolf und Ali Sunyaev.

In this conference paper, we identify, describe, and analyze building blocks of proactive smart homes, based on the nine elements of the work system framework. Furthermore, we derive seven design questions to support the design of future proactive smart homes.

Prof. Dr. Ali Sunyaev
Served as an Auditor for the German Informatics Society

As in the previous four years, Prof. Dr. Ali Sunyaev again took up the honourable role of serving as an auditor for the Gesellschaft für Informatik e. V. (German Informatics Society).

The Gesellschaft für Informatik e. V. is the biggest organized representation of its kind in the German-speaking region and represents the interests of computer science educators, researchers, and professionals as well as corporate members since 1969.

Prof. Dr. Ali Sunyaev in Interview with clicKIT

In a recent interview with clicKIT, the online magazine for KIT students, Professor Sunyaev talked about current research topics of the cii lab and answered six questions on his childhood, student days, and spare time.

HIGHLIGHTS

Radio Interview with Prof. Dr. Ali Sunyaev Referring the Research Project AUDITOR

Campusreport from 06/05/2018 - TÜV badge for cloud services – AUDITOR will certify the security of cloud services.

The radio interview „TÜV badge for cloud services" with Prof. Dr. Ali Sunyaev was on air at Campus-radio Karlsruhe on 5th June 2018.

AUDITOR - Project Presentation and Press Conference on 6 June 2018 in Berlin

On 06/06/2018 the AUDITOR catalogue of criteria for data protection certification of cloud services was presented at the Federal Ministry of Economics and Energy (BMWi).

AUDITOR kick-off

The first official kick-off event was held on 03/23/2018 at the KIT Campus in Karlsruhe with large partici-pation of all project partners, the DLR project ma-nagement organisation (represented by Dr. Regine Gernert) and the Federal Ministry of Economics and Energy (represented by Dr. Alexander Tettenborn).

HIGHLIGHTS

AUDITOR @ CEBIT 2018

The research project AUDITOR had its own booth at this year's CEBIT

Kick-Off Workshop for Research Project Trusted Blockchain

To present the research project Trusted Blockchain, which just started in April 2018, the Critical Information Infrastructures (cii) lab, directed by Prof. Dr. Ali Sunyaev, organized an initial workshop at the University of Kassel on the 05/23/2018 in cooperation with the DLT (Distributed Ledger Technology) - Forschungsgruppe Kassel, directed by Prof. Dr. Dr. Walter Blocher. Trusted Blockchain is one of three research projects associated to the DLT-Forschungsgruppe Kassel, which are funded for the upcoming three years by Metamorphoses Braun GmbH. Trusted Blockchain aims at identifying possibilities and methods to make DLTs' functionality and correctness traceable and verifiable.

Dissertation of Dr. Tobias Dehling

The dissertation of Tobias Dehling was published in February 2018 at the University of Kassel. Tobias Dehling received his PhD on 12/19/2018 with highest honours for his dissertation on 'Communication of Information Privacy Practices in Consumer Information System' from the University of Kassel

Disputation of Fangjian Gao

Fanjian Gao received his PhD on 11/23/2018 for his dissertation on 'The Meaningful Use of Cloud Computing in Healthcare' from the University of Cologne.

HIGHLIGHTS

Dissertation in cii group was awarded the Wissenschaftspreis of the Faculty of Economics and Management of the University of Kassel

The dissertation of Tobias Dehling on 'Communication of Information Privacy Practices in Consumer Information System' was awarded with the Wissenschaftspreis 2017/2018 of the Faculty of Economics and Management of the University of Kassel. Tobias Dehling received his PhD from the University of Kassel on 12/19/2017 with highest honour. Every year the Wissenschaftspreis is awarded for a most excellent dissertation. The Wissenschaftspreis was presented to Tobias Dehling on 06/06/2018 at the annual graduation ceremony of the Faculty of Economics and Management at the Kongress Palais Kassel.

Unblackboxing IT Certifications – Project Meeting at TU Darmstadt

Prof. Dr. Ali Sunyaev (KIT) and Prof. Dr. Alexander Benlian (TU Darmstadt) as well as their doctoral students met at TU Darmstadt, in order to discuss their current work within the context of the project "Unblackboxing IT Certifications"; this researc project is founded by the DFG.

AUDITOR @ TECHWEEK 2018

The research project AUDITOR had its own booth at this year's TECHWEEK in Frankfurt.

HIGHLIGHTS

Workshop on Blockchain for Open Knowledge on 10/09/2018

On 10/09/2018 the cii research group held a workshop on the topic of Blockchain for Open Knowledge.

The main objective of the workshop was to initiate an open and interdisciplinary dialogue that addresses the following question: How can blockchains contribute to tackling the current and future challenges in research, teaching, industry, and society in regard to the open use and distribution of knowledge?

Prof. Dr. Ali Sunyaev was a Jury Member for this Year's eco://award in the Cloud category.

At the eco://congress, leading thinkers from industry, politics, science and society exchanged ideas on topics such as cloud computing, the Internet of Things, blockchain and artificial intelligence - at a high professional level and with a responsible eye for the big picture.

On11/28/2018 pioneering companies were awarded the eco://award for the 17th time.

Dissertation in cii Research Group was Awarded the Wissenschaftspreis of the German Association for Data Protection and Data Security (GDD)

The dissertation of Tobias Dehling on 'Communication of Information Privacy Practices in Consumer Information System', which was supervised by Prof. Dr. Ali Sunyaev, was awarded with the Wissenschaftspreis 2018 of the German Association for Data Protection and Data Security (GDD). Every year the Wissenschaftspreis is awarded for most excellent scientific work in the domains of data protection and data security. The Wissenschaftspreis was presented to Tobias Dehling on 11/15/2018 at the 42nd Datenschutzfachtung (DAFTA) at the Maternushaus in Cologne.

HIGHLIGHTS

26th European Conference on Information Systems (ECIS)

This year the ECIS took place at University of Portsmouth from 06/23/2018 to 06/28/2018. The cii lab was represented by Manuel Schmidt-Kraepelin. He presented the work of our research group. ECIS is one of the most prestigious conferences in information systems and a meeting platform for European and international researchers in this field. The conference was held under the theme "Beyond Digitization – Facets of Socio-Technical Change".

cii Christmas Party 2018

On 12/04/2018 the research group cii celebrated the annual Christmas party in Karlsruhe in the restaurant My Heart Beats Vegan. Afterwards the team visits the Christmas market in Karlsruhe.

AUDITOR Project Meeting in Frankfurt

On 11/06/2018 the project meeting of the AUDITOR consortium took place in Frankfurt at the partner company Cloud&Heat.

HIGHLIGHTS

International Conference on Information Systems (ICIS) 2018

The annual ICIS conference was held in San Francisco from 12/13/2018 to 12/16/2018. The conference brings together information systems researchers from around the world to discuss cutting edge research. Besides the conference Prof. Dr. Ali Sunyaev visited alumni and scientific contacts in well-known companies and scientific institutions in San Francisco. Highlights were visits to Prof. Dr. Larry Leifer (Stanford University), SAP, Uber, Apple and Google.

cii Day Trip 2018

On 09/28/2018 the research group cii held the first day trip in Karlsruhe in the climbing park. Afterwards the team visits the Hoepfner beer garden.

Selected Student Theses

Cloud Computing in Genomics: A Taxonomy of Platforms
Yicheng Feng

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

A Qualitative Analysis of GDPR-related Issues and Compliance Practices in German Public Offices
Stefan Mill

Blockchain-based system prototype for emergency health information
Mohamed Bassem Abibi

Design and Prototypical Evaluation of a Blockchain-Based System for Electronic Medical Records
Patrick Frey

Identifikation und Analyse von Komfortpotenzialen eines Smart Homes im Jahre 2025
Erik Kaloi

Use of Privacy Enhancing Technologies -A Qualitative Study
Philipp Danylak

User Perceptions of Information Security and Information Privacy
Naima Mahmood

Discussing the Effectiveness of Means to Reduce Customers' Uncertainty when Selecting Digital Services
Mohsen Rezabakhsh Moghaddam

Opportunities and Challenges for Leveraging Blockchain in the field of Open Science
Zhouyue Chen

Risiken von Gamification im Gesundheitswesen: Ein systematisches Literaturreview
Yasemin Eroglu

The Road to Hell Is Paved with Good Intentions: Negative Side Effects of Gamification in Health and Wellbeing - A Delphi Study
Chenli Liang

Gamification and Health Behavior Change Theories
Simon Warsinsky

Gamified On-Demand Surveys: Sharpen Participant Attention to Improve Survey Result Quality
Maren Rabens

Gamification in Onlineumfragen: Eine theoretische Untersuchung am Beispiel von On – Demand Umfragen
Anatolij Lobanov

Angewandte Informatik II - Principles of 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 in healthcare, cloud computing, mobile health, and information privacy) by presenting research papers and research projects the research group is working on. This lecture was completed through a practice-oriented lecture on preventive healthcare technologies held by Sebastian Dünnebeil, founder and managing director of Bodylabs.

Seminars and Practical Courses

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 20 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.

**Selected Issues in Critical Information Infrastructures**

Critical digital infrastructures are socio-technical 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.

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.

SELECTED PUBLICATIONS

Krcmar, H., Eckert, C., Roßnagel, A., Sunyaev, A., & Wiesche, M. (2018). *Management sicherer Cloud-Services: Entwicklung und Evaluation dynamischer Zertifikate* (1. Aufl.). Wiesbaden: Springer Fachmedien Wiesbaden, DOI: 10.1007/978-3-658-19579-3.
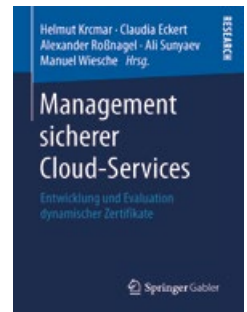
Lansing, J., Benlian, A., & Sunyaev, A. (2018). Unblackboxing Decision Makers' Interpretations of IS Certifications in the Context of Cloud Service Certifications. *Journal of the Association for Information Systems (JAIS)*, DOI: 10.17705/1jais.00520.

Lins, S., Schneider, S., & Sunyaev, A. (2018). Trust is Good, Control is Better: Creating Secure Clouds by Continuous Auditing. *IEEE Transactions on Cloud Computing (IEEE TCC)*, DOI: 10.1109/tcc.2016.2522411.

Schneider, S., Wollersheim, J., Krcmar, H., & Sunyaev, A. (2018). How Do Requirements Evolve Over Time? A Case Study Investigating the Role of Context and Experiences in the Evolution of Enterprise Software Requirements. *Journal of Information Technology (JIT),* DOI: 10.1057/s41265-016-0001-y.

Benlian, A. , Kettinger, W. J., Sunyaev, A., & Winkler, T. J. (2018). Special Section: The Transformative Value of Cloud Computing: A Decoupling, Platformization, and Recombination Theoretical Framework. *Journal of Management Information Systems (JMIS),* DOI: 10.1080/07421222.2018.1481634.

Gao, F., Thiebes, S., & Sunyaev, A. (2018). Rethinking the Meaning of Cloud Computing for Health Care: A Taxonomic Perspective and Future Research Directions. *Journal of Medical Internet Research (JMIR),* DOI: 10.2196/10041.

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Grube, A., Dehling, T., Klein, K., & Sunyaev, A. (2018). Promoting Use of Patient-Centered Health IT: Assessment and Ranking of Incentive Mechanisms. In *Proceedings of the 51th Hawaii International Conference on System Sciences.* Waikoloa, Big Island, Hawaii: IEEE, DOI: 10.24251/HICSS.2018.405.

Tomforde, S., Dehling, T., Haux, R., Huseljic, D., Kottke, D., Scheerbaum, J., Sick, B., Sunyaev, A., & Wolf, K.-H. (2018). Towards Proactive Health-Enabling Living Environments: Simulation-Based Study and Research Challenges. In *Proceedings of the 31st International Conference on Architecture of Computing Systems.*

Sunyaev, A., Dehling, T., & Schmidt-Kraepelin, M. (2018). Verbraucherorientierter Datenschutz: Identifizierung von Verbraucherarchetypen zur effektiven Kommunikation von Datenschutzpraktiken. In C. Bala & W. Schuldzinski (Hrsg.), *Jenseits des Otto Normalverbrauchers: Verbraucherpolitik in Zeiten des "unmanageable consumer".* Düsseldorf: Verbraucherzentrale, DOI: 10.15501/978-3-86336-920-0_8.

Roßnagel, A., Sunyaev, A., Batman, A., Lins, S., Maier, N., & Teigeler, H. (2018). AUDITOR-Kriterienkatalog - Entwurfsfassung 0.7 (Research report). *Karlsruhe, Germany: KIT,* DOI: 10.5445/IR/1000083222.

- 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)

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