



COMPUTER SCIENCE
DATAVETENSKAP

ANNUAL REPORT 2017

COMMITTED TO EXCELLENCE IN COMPUTER NETWORKING,
SECURITY AND PRIVACY, AND SOFTWARE ENGINEERING



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Foreword

Karlstad University is one of the youngest universities in Sweden – dynamic, brave, and innovative. We offer one of the most inspiring university environments in the country with a friendly and open atmosphere. All forms of cultural expression are essential aspects of our university.

The close link between research, education and cooperation is a foundational feature of the whole university, and social commitment is part of our university culture. Our extensive education and research focus on important issues.

We want to contribute to regional, national and global progress by enhancing sustainability, democracy and health through socially engaged education and research.

"Computer Science at Karlstad University provides education and research with an emphasis on computer networking, privacy and security, and software engineering. Since the start of the century, we have successfully become established in the European research community, particularly in the fields of computer networking and privacy and security.

The research environment has continued to evolve successfully and has expanded considerably in recent years. In 2017, this trend continued with new projects, prestigious publications, and the recruitment of additional talented researchers.

We are happy to share our exciting year with you through this annual report!"

Stefan Lindskog, Head of the Department of Mathematics and Computer Science.





Our mission

Computer Science at Karlstad University is committed to being internationally excellent in research and education with a focus on computer networking, privacy and security, and software engineering. We will reinforce, extend, and diversify our strengths in collaboration and innovation, while striving to become recognised for addressing critical, scientifically important problems.

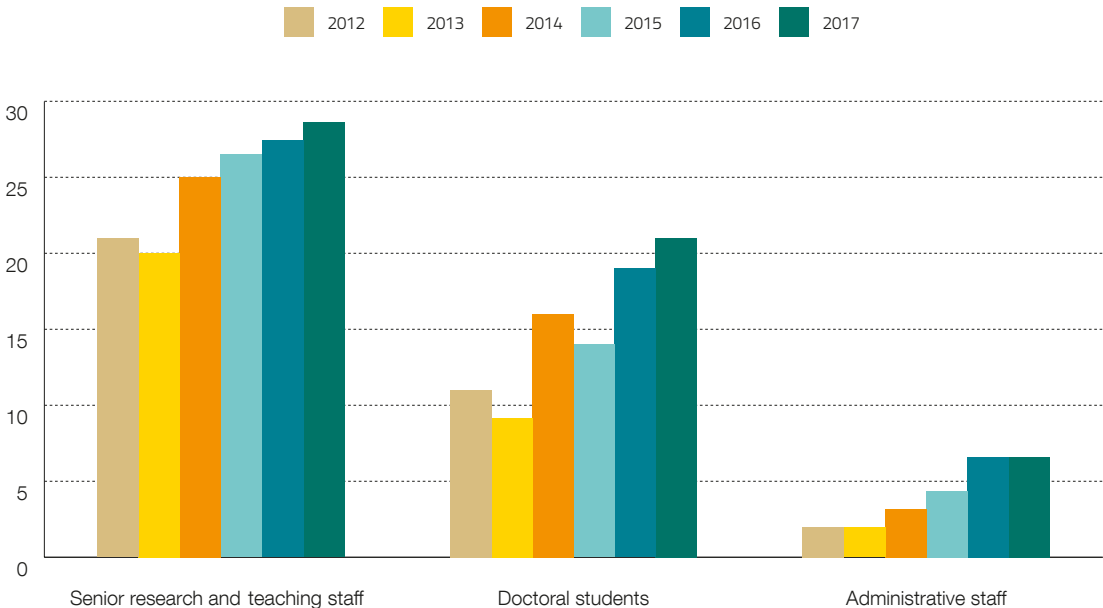
Staff

In the last couple of years, we have successfully developed our multinational, creative and cooperative computer science environment by recruiting additional talented staff members from all over the world.

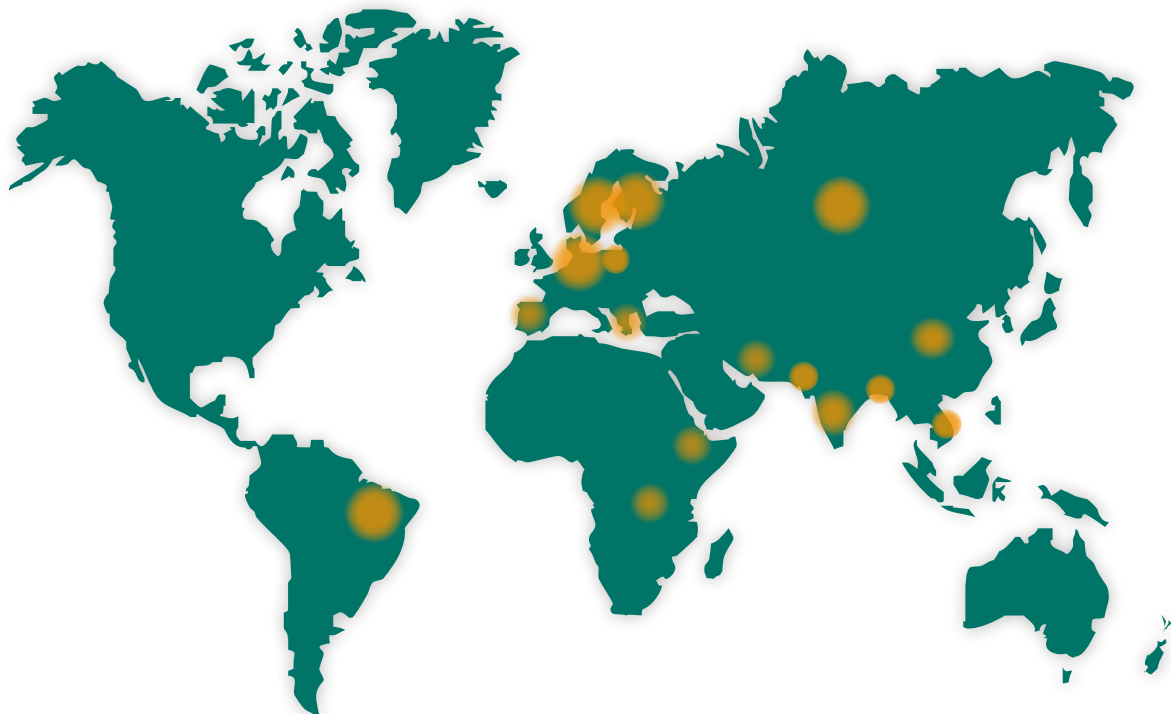
Since 2012 the number of staff members have more than doubled in the subject of computer science, partly thanks to the increased internal support we have been given as one of the appointed excellent research groups at Karlstad University. Other reasons are the establishment of a new research profile, high quality networked

services for a mobile world (HITS), and the success in getting other externally funded projects.

New staff members have continued to be recruited during 2017 and existing staff are continuously offered good career opportunities. In addition, staff members from other departments at Karlstad University have also been engaged in order to support the interdisciplinary research carried out within a number of our externally funded research projects.



Diversity



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Computer Science is a focused and purposeful excellent research group that has succeeded well in developing their activities further. One of the factors behind the group's success is the international environment with members from many parts of the world, and where the differences in experience, knowledge and perspective generate new knowledge.

Åsa Bergenheim, Vice Chancellor at Karlstad University 2011-2017.

Education

As our society becomes ever more digitalised, the competence of computer scientists becomes ever more important. Thus, the alumni from one of our four educational programmes have a wide range of opportunities ahead of them. We provide them with the opportunity to be a part of forming the technology and society of tomorrow.

We offer computer science education on both basic and advanced level. At the basic level, we provide an introduction to computers and their components, programming languages, and applications. As for the advanced level, there are three orientations: software engineering,

computer networking and IT security. Two of our programmes are suitable for those interested in pursuing doctoral studies and maybe even a research career.

"Our education and research are closely connected and the students are encouraged to take part in different research activities. We also have a well-founded relation with industry. This provides the students with opportunities to enrich their study period through different activities and relations with their future employers. Student projects are one possibility for contributing to our research and collaborating with our exciting industrial partners.

We are constantly striving to develop and refine our study programmes. In recent years we have re-structured one programme to provide a better combination of courses and use our resources more efficiently. Another programme was launched in a new format during 2017 after a significant development.

During 2017 we started two new educational projects: Development of a harmonized modular curriculum for the smart grid (DAMOC) and Web-based courses for international positioning of strategic research groups (WISR16)."

Johan Eklund, Director of Studies.



Projects and collaboration

Development of a harmonized modular curriculum for the smart grid (DAMOC) aims to develop master's level programmes at universities in South Africa and Tanzania, with a focus on smart grids. Computer Science, together with Technische Universität Dresden, contributes with expertise and development of courses and course material on information security and privacy linked to smart grids. The project is funded by ERASMUS+.

Web-based courses for international positioning of strategic research groups (WISR16) is funded by the Knowledge Foundation (KK-stiftelsen) and aims to develop and offer cutting-edge international online courses at an advanced level. Together with industrial partners, Computer Science has developed

a course which covers legislation, as well as techniques, methods and processes supporting work on compliance with the EU General Data Protection Regulation (GDPR).

Cooperation industry and IT students (SNITS) is a collaboration group with the aim to establish contacts and cooperation between IT companies in the local area and IT students at Karlstad University. It is a unique opportunity for students to build relations with the industry during their studies, and an opportunity for companies to meet future employees. SNITS offers a variety of activities, such as lunch seminars, study visits and after school activities, to promote meetings between students and industry.

Study programmes in Computer Science

At Karlstad University, there are currently four programmes to choose from when majoring in computer science.

Bachelor of Science in Engineering: Computer Science, 180 ECTS credits

Master of Science in Computer Engineering, 300 ECTS credits

Study Programme in IT Design: Software Design, 180 ECTS credits

Master Programme in Computer Science, 120 ECTS credits

In total 170 (equivalents to full time) students were enrolled in the above programs.

Research

Our mandate as a university is to generate, nurture and disseminate new knowledge. We conduct research in strong traditional academic disciplines and in multidisciplinary fields on the basis of the needs of the society. Thus we cut across traditional disciplinary boundaries.

"Research in computer science is mainly focused on: Distributed Systems and Communications (DISCO), Privacy and Security (PriSec), and Software Engineering (SERG).

Our research environment has evolved successfully in the last couple of years. It is today a highly multinational environment with internationally renowned researchers.

In 2013, we were evaluated by external experts and appointed as one of Karlstad University's two excellent research groups. We were granted additional long-term funding to further strengthen our research excellence. This commitment by the university has helped us succeed in further developing our research environment.

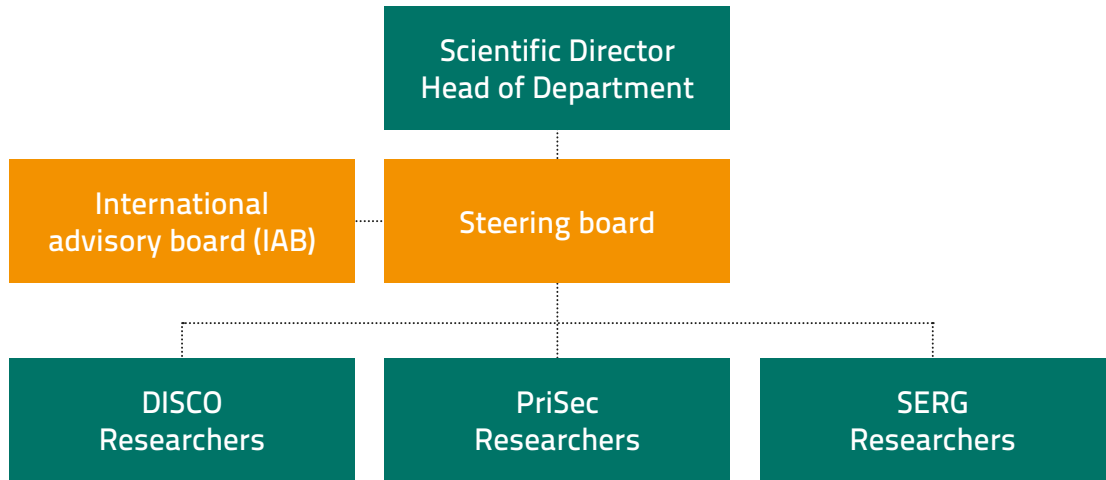
We have attracted more externally funded projects, recruited important new staff members and considerably increased the size of our doctoral study programme. This has contributed to a higher research level within our environment. We have strengthened our national and international networks and the amount and quality of the publications produced has increased significantly.

Through hard work within our three research groups and joint projects with external partners from both academia and industry, we contribute to the technology and society of tomorrow."

Anna Brunström, Scientific Director for the Computer Science Research Group



Research organisation



Members of the Computer Science Research Group steering board

Anna Brunström (DISCO)
Professor

Simone Fischer-Hübner (PriSec)
Professor

Andreas Kassler (DISCO)
Professor

Stefan Lindskog (Head of Department)
Professor

Melanie Volkamer (PriSec)
Professor

Sebastian Herold (SERG)
Associate senior lecturer

Karl-Johan Grinnemo (DISCO)
Senior lecturer and docent

Leonardo Martucci (PriSec)
Senior lecturer and docent

Lothar Fritsch (PriSec)
Associate senior lecturer and docent

Javid Taheri (DISCO)
Senior lecturer and docent

Håkan Spjuth
Grants and Innovation Office (GIO)

Research groups

Research conducted in all three of our research groups are important in the fast growing mobile and digital world we live in. Together with external partners we conduct research that enhances data communication, we for example contribute to the development of 5G and reducing latency over the Internet. Via our research on making privacy and security technologies

more user friendly we contribute to a safer Internet. In software engineering our main focus is on methods and techniques to continuously preserve, improve, and adapt quality attributes of long-living software systems in order to allow such systems to be maintained and to evolve more easily.



Distributed Systems and Communications Research Group (DISCO)

Research within DISCO focuses on the development of transport and application layer protocols, techniques for low latency communication, cross-layer interactions and the design of future 5G wireless systems, including the use of NFV/SDN and cloud-based RAN and core networks. The research is carried out in close collaboration with industrial and academic partners and applies a combination of network measurements and traffic analysis, emulation, simulation and analytical modelling and optimisation techniques. Research on network security is carried out in collaboration with the PriSec research group.

"Digital communication today underpins all aspects of our lives and the Internet and mobile communication networks constitute critical infrastructures of vital importance to society. Our research helps to ensure that the Internet continues to evolve and can support the requirements of new emerging applications and deliver a good quality of experience to its users. It capitalises on the ongoing softwareisation and cloudification of networks to help deliver solutions for tomorrows mobile networks."

Anna Brunström and Andreas Kassler, research leaders for DISCO.



Privacy and Security Research Group (PRISEC)

Research within PriSec focuses on privacy-enhancing technologies and network security whereas network security research is conducted in close cooperation with the DISCO research group. Current research directions of members of the PriSec group include but are not limited to: usability aspects of privacy-enhancing technologies; privacy and transparency in cloud computing; privacy metrics and languages; analysis and circumvention of censorship systems; privacy and security in health care.

"The PriSec group has been the first in Sweden to build up a specialised research and teaching profile in privacy-enhancing technologies for more than 18 years. The upcoming GDPR and increasing privacy debates show how important our contributions are."

Simone Fisher-Hübner, research leader for PriSec.



Software Engineering Research Group (SERG)

Research within SERG focuses on different software engineering aspects, particularly on software architecture and software evolution. The research of SERG aims at developing methods and techniques to continuously preserve, improve, and adapt quality attributes of long-living software systems in order to allow such systems to be maintained and to evolve more easily.

"The costs associated with maintaining and evolving software are incredibly high – we want to change this in different ways. For example, we investigate how to detect and mitigate architectural degradation in software. And in the REVaMP2 project, we develop new methods to support companies migrating their software-based product towards software product lines in an efficient way."

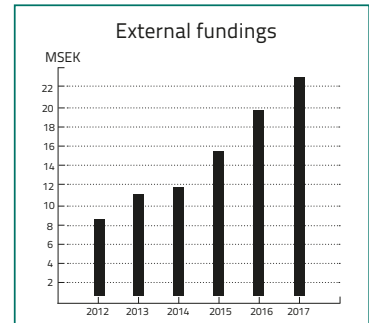
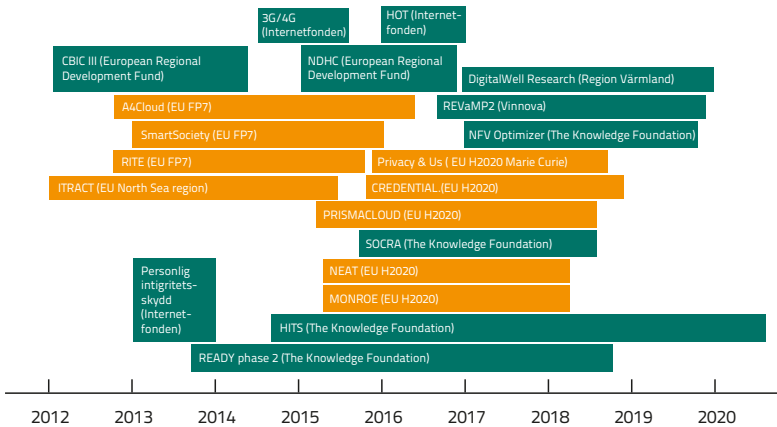
Sebastian Herold, research leader for SERG.

Research projects

Projects are one of the fundamentals of our research environment. By addressing relevant issues, we have managed to build important networks and alliances and successfully attract external research funding. Our research projects are of various characters and include partners from academia as well as from industry and the public sector. Some are locally connected

while others stretch all over the world. Some are financed by funding agencies or governments and others are initiated by, and carried out together with a single company. The composition of our project portfolio is illustrated below*, and we also highlight a few selected projects from 2017.

- International projects
- National projects



*Only externally funded projects, running for a minimum of 12 months and funding staff salaries are included in the figure.

High quality networked services in a mobile world (HITS) is a research profile initiated in the autumn of 2014. Together with five Swedish IT companies, Computer Science develops new and better network services that meet the demands of our increasingly mobile world. HITS is funded by the Knowledge Foundation (KK-stiftelsen) to strengthen the competitiveness of Swedish industry. During 2017 the research profile entered a new phase of development in conjunction with the conclusion of phase one. The profile has thrived during the first part of the project. The scientific production has been good, new projects and collaborations have been established, new knowledge was generated and used for product development. Entering phase two, and to further develop the HITS research profile, a plan for the continued work has been created together with the industrial partners.

Privacy&Us is a collaborative project that includes a consortium of nine universities and companies from Sweden, Austria, Germany, the UK and Israel. Through an international network of doctoral students, the Privacy&Us project

aims at finding solutions to give citizens the benefits of digitalisation, while still protecting their privacy. Karlstad University is the coordinator of the project which is funded by Horizon 2020, the EU Framework Programme for Research and Innovation. It forms part of the Marie Skłodowska-Curie innovative training programme for the period December 2015–November 2019.

The **Measuring stability and performance of mobile broadband networks (MONROE)** project commenced in 2015, with the aim of designing, building and running an open platform for conducting live tests on mobile broadband networks. Since the start of the project, two open calls have been arranged for external parties to apply for funding and access to the platform to run tests. As one primary target, the platform aims to identify key parameters that influence performance of mobile broadband networks, thereby facilitating reliable, realistic and meaningful assessment and evaluation of network performance. The project is financed by Horizon 2020, the EU Framework Programme for Research and Development.

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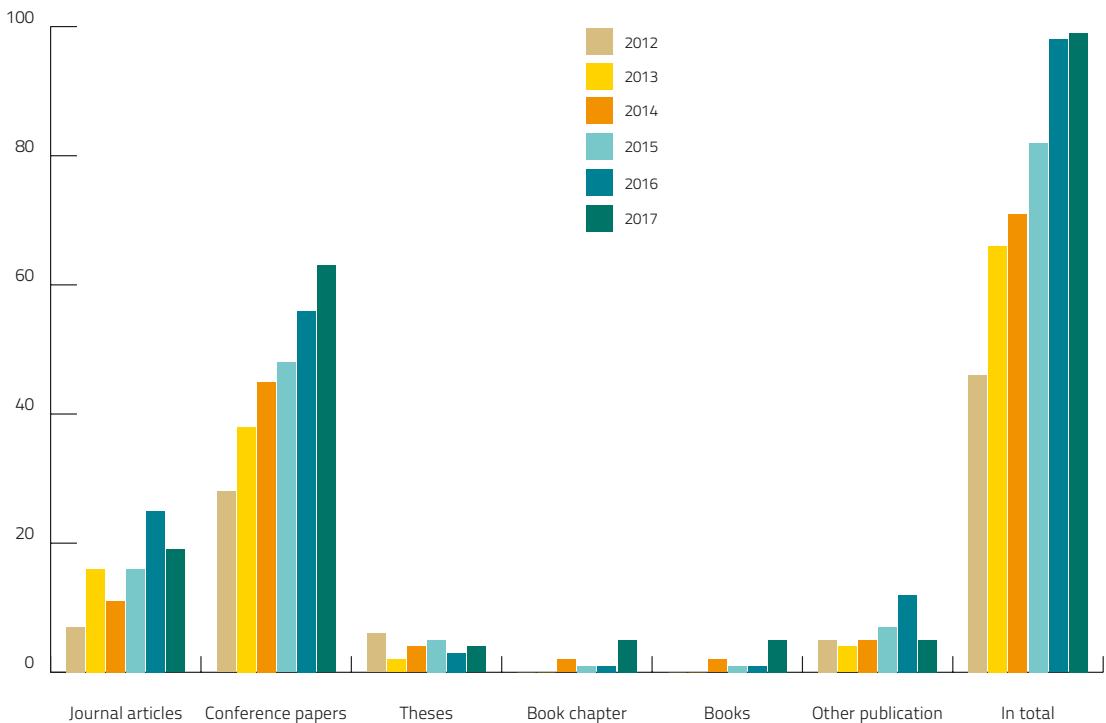
Over the years, Computer Science has proved a very strong research group, based on strong leadership and excellent research. Research and research results continue to be of interest to both academia and industry, as well as to the public sector. Computer Science is valued as an important and driving partner in both regional development and EU-funded research projects.

Håkan Spjuth, Grants and Innovation Office (GIO) and director of External Relations at Karlstad University.

Publications

As the department continued to grow this year, the number of publications have significantly increased as well. New co-workers and research projects as well as access to an extensive international network of collaborators are some of the reasons. In recent years, we have additionally developed strategies to further increase

the visibility of our research and the quality of our publications, including considerations of publication venues and types. During the year, we were acknowledged at prestigious conferences and workshops by winning both best paper and demo awards.





Best paper award at ISD conference

Computer science researchers received best paper award at the top ranked research conference Information Systems Development 2017 (ISD). The paper concerns users' perspectives on a cloud-based personal identity management and it is connected to the Credential project where Karlstad University is involved. The paper "Assessments of a Cloud-Based Data Wallet for Personal Identity Management" was produced by Farzaneh Karegar (research student in computer science), Daniel Lindgren (project assistant), John Sören Pettersson (professor in information systems) and Simone Fischer-Hübner (professor in computer science).

"The acknowledgment on an A-ranked conference is first of all prestigious and also a great opportunity to spread the research taking place within the Credential project and our research environment", says Simone Fischer-Hübner.

Best demo award at IFIP Networking

The NEAT project won the best demo award at the IFIP Networking conference, in Stockholm (June 12-15, 2017). The demo was presented by Zdravko Bozakov (Dell EMC) on behalf of all the authors. The NEAT project wants to achieve a complete redesign of the way in which Internet applications interact with the network. NEAT aims at offering a richer set of services to application developers and at enabling innovations across the protocol stack. The demo, titled "A NEAT framework for application-awareness in SDN environments", is joint work from Karlstad University and Dell EMC illustrating how NEAT can be integrated in an SDN scenario. The demo paper authors are Ricardo Santos (research student in computer science), Zdravko Bozakov (DELL EMC Research Europe), Simone Mangiante (DELL EMC Research Europe), Andreas Kassler (professor in computer science) and Anna Brunström (professor in computer science).

"This demo award shows that our work within the NEAT project is important and of high quality and we are very happy to receive it", says Anna Brunström, professor in computer science.

Doctoral study programme

"In the past two years, our doctoral programme has grown considerably in size. Our research students are engaged in all three of our research groups. The doctoral programme was further formalised into a learning-objective driven programme with faculty-level quality assurance processes.

Our doctoral students are involved in our basic teaching where they gather academic teaching experience. Through our collaborative and industry projects, research students are, in addition, exposed to industrial and applied research practice. They build a large international contact network through our partnerships with national and international research institutions. Scientific and educational networks complement our environment with related research topics, content and access to academics.

One major task during the year was the production of a doctoral programme self-evaluation for the Swedish Higher Education Authority (UKÄ) as part of the national assessment of the quality of doctoral programmes in computer science. In March 2017, the report was delivered. Preliminary feedback from UKÄ in April 2018 indicates that our doctoral programme will be evaluated as being in satisfactory compliance with Swedish government standards for doctoral education."

*Lothar Fritsch, Director of Research Education
2016-2017.*



Doctoral defence



Robayet Nasim: "Cost-and Performance-Aware Resource Management in Cloud Infrastructures", 2017-06-21

High availability, cost effectiveness and ease of application deployment have accelerated the adoption rate of cloud computing. For sustainable development of data centres and cloud infrastructure, resources need to be managed efficiently and at the same time the quality of service delivered through the data centre must be ensured. One problem is that physical resources inside cloud infrastructures often operate at low utilisation but use energy as if it was fully utilised. In his doctoral thesis, Robayet Nasim describes ways of reducing costs and energy consumption within data centres and cloud infrastructure by using algorithms, techniques, and deployment strategies for improving the dynamic allocation of virtual machines on physical machines.

Licentiate degree seminars



Zeeshan Afzal: "Towards Secure Multipath TCP Communication", 2017-04-28

The constantly increasing network traffic demands new ways of transporting data to ensure expected quality. One way is to transport data through multiple paths which is offered by the multipath transport protocol (MPTCP). The Internet of today has security middle-boxes that perform traffic analysis to detect intrusions and attacks. In his licentiate thesis, Zeeshan Afzal investigates the security risks by using MPTCP in the traditional networking environment.



Jenni Reuben: "Privacy-aware Use of Accountability Evidence", 2017-06-12

In our digitalised world more and more of our personal information is registered in network computers and servers. Stakeholders handling personal information thus need to make sure that their systems are secure and maintain the integrity of individuals. Technically, stakeholders perform automated privacy audits to ensure that privacy of the individuals is not violated. As Jenni Reuben shows in her research, these audits can themselves be subjected to privacy risks. In her licentiate thesis, she investigates these risks and proposes a formal model to prevent illegitimate access to personal data in the audit logs.



Artem Voronkov: "Usable Firewall Rule Sets", 2017-11-27

Protecting business networks is getting more and more important. But how well do firewalls actually do in protecting sensitive and confidential information? Configuring firewalls can be complicated, even for system administrators, and that can lead to security risks and opportunities for intruders. In his licentiate thesis Artem Voronkov, investigates how firewall configuration can be made more user friendly to help businesses to protect their networks.

International advisory board

An international advisory board (IAB) is connected to the Computer Science Research Group in order to provide critical feedback on both progress and future research directions. As a research environment, we are part of an international context, and external feedback and input are essential for us to continue our positive development of recent years.

Among other things, a yearly workshop is carried out together with the IAB, where the members of the advisory board are informed about our research and development progress. In return, they give feedback and interesting new thoughts and ideas on aspects that can further strengthen our research environment.

The IAB consists of six external advisors:

- Hans Einsiedler, Deutsche Telekom, Germany
- Kristin Fuglerud, professor at the University College of Southeast Norway and the Norwegian Computing Center
- Maritta Heisel, professor at Duisburg University, Germany
- Jukka Manner, professor at Aalto University, Finland
- Christian Schaefer, Ericsson Research, Sweden
- Angela Sasse, professor at University College London, UK

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"Computer Science at Karlstad University is an exciting research environment, that investigates and contributes to important research areas and issues critical to society."

Kristin Fuglerud, member of the IAB and professor at the University College of Southeast Norway and the Norwegian Computing Center.

Commissions of trust (selected)

Conference organisation

- ZEUS 2017, Feb 13-14, Lugano, Switzerland. (Jörg Lenhard, Member of Steering Committee)
- USEC 2017, Feb 26, San Diego, California. (Melanie Volkamer, Chair)
- IEEE SCN2017 - The First International Workshop on Small Cell Networking for 5G, June 12, Macau, China. (Andreas Kessler, General Chair).
- IFIP Networking 2017, June 12-15, Stockholm, Sweden. (Anna Brunström, General Chair)
- COST ACROSS Summer School on Latency Control for Internet of Services, June 26-30, Karlstad, Sweden (Andreas Kessler, Chair).
- CISIS 2017, International Conference on Complex, Intelligent, and Software Intensive Systems, July 10-12, Torino, Italy. (Javid Taheri, Track Chair)
- TrustBus 2017, Aug 30-31, Lyon, France (Simone Fischer-Hübner, Program Committee Chair)
- SAERoCon 2017, Sep 11-12, Canterbury, UK. (Sebastian Herold, Workshop Chair)
- ISPA 2017, International Symposium on Parallel and Distributed Processing and Applications, Sep 18-20, Ljubljana, Slovenia. (Javid Taheri, Track Chair)
- IFIP Summer School 2017 on Privacy and Identity Management, September 3-8, Ispra, Italy. (Simone Fischer-Hübner, General Co-Chair)
- Open Identity Summit, Oct 5-6, Karlstad, Sweden. (Lothar Fritsch, Chair).
- E-Vote-ID 2017, Oct 24-27, Bregenz, Austria (Melanie Volkamer, General Chair)
- IEEE NFV-SDN 2017, Nov 6-8, Berlin, Germany (Andreas Kessler, Demo Chair)
- CloudCom 2017, IEEE International Conference on Cloud Computing Technology and Science, Hong Kong, Dec 11-14. (Javid Taheri, Track Chair)

Boards and scientific advisory assignments

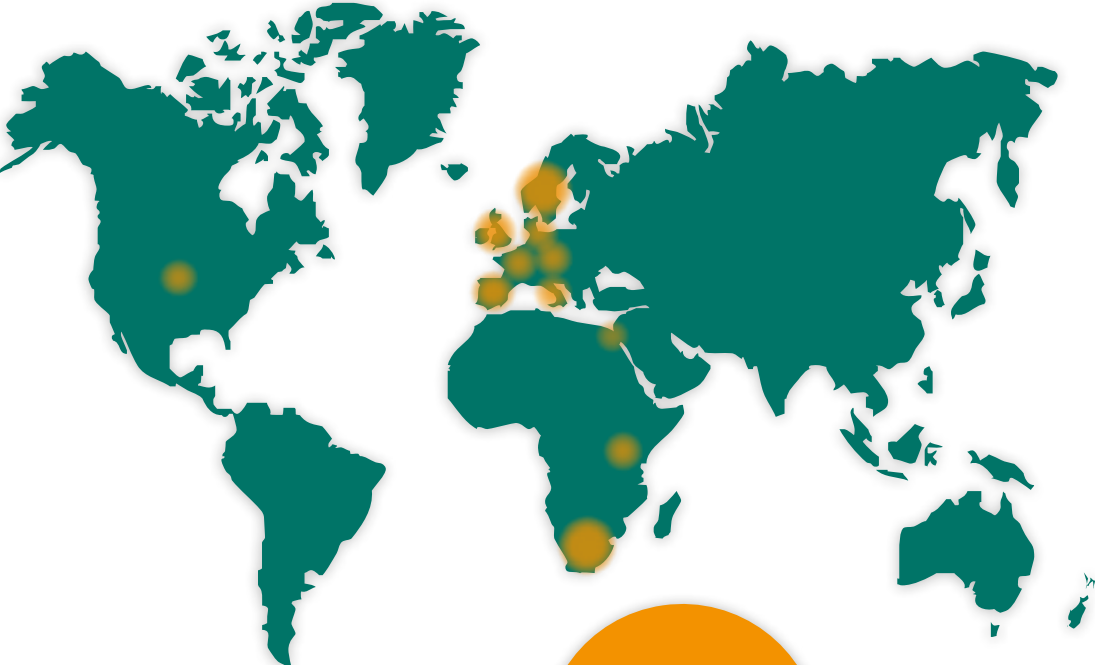
- Scientific Advisory Board member of Science Europe. (Simone Fischer-Hübner)
- Member of the Advisory Board of the SPECIAL EU H2020 project. (Simone Fischer-Hübner)

- Member of the Advisory Board of the Norwegian Network for PhD students COINS. (Simone Fischer-Hübner)
- Chairman of the Advisory Group for the ALERT project managed by Norsk Regnesentral. (Lothar Fritsch)
- Steering Committee member of Swedish National Computer Networking Workshop. (Anna Brunström)
- Steering Committee member of the NordSec conferences. (Simone Fischer-Hübner)
- Member of the PET board for the Privacy Enhancing Technology Symposia. (Simone Fischer-Hübner)
- Vice Chair of the Board of IEEE Sweden, Section Computer/Software Engineering Chapter. (Simone Fischer-Hübner)
- Swedish Representative for IFIP (International Federation for Information Processing) Technical Committee 11 (Information Security & Privacy). (Simone Fischer-Hübner)
- Member of MSB:s Informationssäkerhetsråd (Swedish Civil Contingency Agency). (Simone Fischer-Hübner)
- Adjunct Board member of Compare IT-cluster. (Anna Brunström)
- Chair of the IETF RTP Media Congestion Avoidance Techniques (rmcat) working group (Anna Brunström)

Editor assignments

- Editorial Board Member of the International Journal of Information Security, Springer. (Simone Fischer-Hübner)
- Editorial Board Member of the PoPETS (Proceedings on Privacy Enhancing Technologies) journal, de Gryter. (Simone Fischer-Hübner)
- Editorial Board Member of Elsevier Computer Networks Journal, (Andreas Kessler)
- Editorial Board Member of Scalable Computing and Communications (SCAC), Springer. (Javid Taheri)
- Editorial Board Member of IEEE Transactions on Sustainable Computing. (Javid Taheri)
- Editorial Board Member of IEEE Cloud Computing. (Javid Taheri)
- Editorial Board Member of Computing, Springer. (Javid Taheri)

Partners



Our partners
come from
seventeen countries
around the world

84 of our
partners come
from industry

32 of our
partners come
from academia



Impact

Through border-crossing research and development we educate, innovate and impact the technology and society of tomorrow. With an open environment, we produce and share research results through collaboration with local as well as global partners from industry, academia and the public sector. Our close connection between research and education enables students to participate in industrial research and development, contributing new knowledge to and gaining input from industry.

One way for us to let others benefit from our research findings is by open source based software and tools which anyone can use and modify for different purposes. We also contribute to the global development by taking part in standardisation and participating in important research and development networks.





Students develop functionality for leading IT companies

Student projects, internships and theses are often carried out together with some of our close partners within industry. Through our strong connection between research and education this is a way of contributing with our research findings to the industrial and societal development.

During the last semester towards a master's degree in computer science the three students Ricky Andersson, Filip Västlund and Sebastian Salomonsson made their degree-projects in cooperation with the company Sandvine by studying flow classification for encrypted traffic. Sandvine is a Swedish-American company which is developing and supplying systems used by network operators to monitor and manage their networks. Sandvine is also one of five partners in the HITS research profile.



Alumni collaboration - a win-win situation

Albin Zuccato was one of the first computer science research students at Karlstad University when he earned his doctoral degree in 2005. Today, Albin works as a business unit manager within IT security at the Swedish IT company Atea. After his doctoral studies, Albin has had different positions within the Swedish IT industry. He has worked both as an external consultant for customers and as an in-house expert. Still, more than ten years after finishing his doctoral studies at Karlstad University, he has a good relationship with his former colleagues.

"My doctoral studies at Karlstad University were stimulating and a great opportunity to focus on something engaging to me for a longer time period. The exciting environment at the department, engendered by my supervisor and research colleagues, was of great value to me. I frequently collaborate with Computer Science in different aspects, especially those focusing on IT security and privacy matters. I guest lecture within data security courses and I am also taking part in different research projects as an industry partner. The collaboration is a win-win situation. As a company, we need input on new knowledge and trends, and we contribute by verifying theories and give input on daily challenges within the industry."



Doctoral student recognised and thanked by Google

Toke Høiland-Jørgensen, doctoral student in computer science, has developed an open-source tool to reduce latency on the Internet. For that he was recognised by Google for his contributions to the open-source movement and the development of the Internet. For a number of years Toke has investigated reasons for latency on the Internet as well as ways of reducing latency. To test the influence of different factors on Internet traffic, he developed a tool called The Flexible Network Tester (Flent), which automates testing.

"Flent has helped me a lot in my research by simplifying experiments and the handling of the data they produce. It has been a good experience to develop the tool as open-source software, and I'm very glad that Google recognises and appreciates my work. It is also very positive that others can benefit from the work I've done in developing the tool", says Toke Høiland-Jørgensen.



Privacy expert contributes to standardisation

The purpose of the standardisation work is to spread our ideas, knowledge and research results into the standardisation community and thus indirectly to industry and society. Hans Hedbom, privacy and security researcher within computer science, has actively participated in international and national standardisation efforts.

Within the SIS/TK318 and ISO/IEC/JTC1/SC27 standardisation area the focus from our side this year is centered around standards that can support the new GDPR regulations. Within Sweden this is done by commenting and discussing suggested standardisation projects. As a chair of SIS/TK318/AG51 Hans has coordinated this work within Sweden. He has also as chair of AG51, together with others, started a best practice GDPR group that meets regularly and exchanges ideas and solutions for the implementation of GDPR. This group consists of around 20-30 companies and has been much appreciated by the participants.

Internationally, Hans Hedbom has represented Sweden in ISO/IEC/JTC1/SC27/WG5 as an expert and "head of delegation" for Sweden in WG5. The work in WG5 has mainly consisted in providing input and explaining Swedish comments and views on the standardisation projects in the group. The work of the group has resulted in well used standards in the privacy and identity management area.



Strategic research advisor to EU policymakers

Simone Fischer-Hübner, professor in computer science, is an elected member of the Scientific Advisory Committee of Science Europe, the European umbrella organisation for research funders and research-performing organisations. By this Simone Fischer-Hübner is involved in influencing the strategies and guidelines for European research. This position carries a lot of responsibility: the holder does not only represent his/her own field or university, but the research community at large.

Her experience of coordinating EU projects and a well-established international network are some of the reasons why Simone Fischer-Hübner was elected to Science Europe's Scientific Advisory Committee. "This would be a desirable position for any academic, and is proof of the high esteem in which Simone is held both by her colleagues and by the research community at large", says Eamonn McCallion, research advisor at Karlstad University.

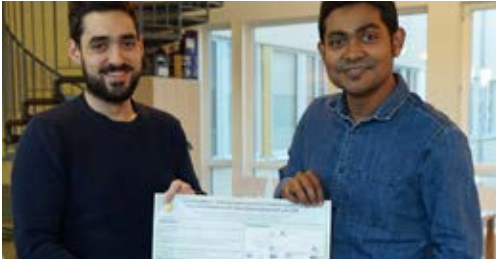


Academy for smart specialisation

Karlstad University and Region Värmland are cooperating through the Academy for smart specialisation in order to invigorate Värmland's industry, public sector and the research at Karlstad University. The academy is to make an increased use of research in order to benefit industry, the county council and the municipality, as well as strengthening Värmland's research environments.

DigitalWell Research is co-funded by Region Värmland and forms part of the Academy for smart specialisation. DigitalWell Research is part of a larger DigitalWell initiative, which creates an environment for innovation in which researchers, industry and the public sector collaborate to create new digital welfare services. The Computer Science Research Group is the leader of the research part of the initiative. Together with nursing and service development researchers, we provide research to industry and the public sector, which in turn are developing services focused on user needs.

In the news during 2017



Cristian Hernandez and Robayet Nasim

Tool for experimental research on cloud computing and networking

Researchers within computer science have developed a tool, OpenStackEmu, for experimental research on data communication networks, especially in the area of cloud infrastructure. Robayet Nasim and Cristian Hernandez, PhD students in computer science, visited IEEE Consumer Communications & Networking Conference 2017 (CCNC) 8-11 January to demonstrate the tool.



The team from Karlstad University

Karlstad University doctoral students are the best in Sweden at cyber security

By playing the role of national cyber security experts, doctoral students from Karlstad University won Cyber Challenge 2017, organised by the Centre for Asymmetric Threat Studies at the Swedish Defence University and the Swedish Civil Contingencies Agency (MSB). By winning Cyber Challenge 2017, the team from Karlstad University qualified for the European final “Cyber 9/12 Student Challenge 2017” that was held in Geneva 20-21 April.



Farzaneh Karegar

Few keep track of their personal data on the net

According to a study by computer science researchers, few people know how their personal data is collected, used, shared and accessed. The new EU General Data Protection Regulation (GDPR) includes higher demands on the possibility for users to access their own personal information. Farzaneh Karegar and her colleagues at Karlstad University have developed a tool, Data Track, to help users download and visualise their personal data from a service provider such as Google.



Tobias Pulls and Stefan Alfredsson

New university course about the General Data Protection Regulation (GDPR)

During 2017, Karlstad University received funding from the Knowledge Foundation (KK-stiftelsen) to develop and offer cutting-edge international online courses on the advanced level. The new data protection regulation brings about significant changes in the way personal data is to be handled. Computer Science therefore develops courses on how to handle personal data according to GDPR.

Doctoral student on international exchange in Tokyo

Ricardo Santos, research student in computer science was one of few doctoral students in Sweden offered a part in Japan Society for the Promotion of Science (JSPS) summer program and the opportunity to do a research exchange in Tokyo. During two months Ricardo was located in Tokyo, working together with research colleges at Tokyo Institute of Technology.



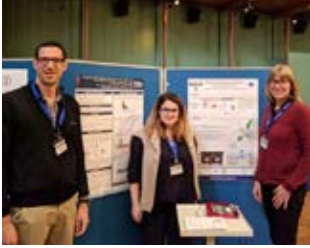
Ricardo Santos



Klervie Toczé

Future network services in multiple cloud-based environments

Internet services are becoming a greater part of our daily lives and the more complex the service, the higher the demands placed on the systems and networks behind the services. During 26-30 June, Computer Science at Karlstad University arranged the ACRO 2017 - International Summer School on Latency Control for Internet Services that focused on the control and management of network traffic and latency linked to future network services in multiple cloud-based environments.



Represents from the MONROE project

Platform for testing mobile broadband networks

There is a great need to test the stability and performance of mobile broadband networks. A transnational European platform for testing mobile broadband networks has been developed by the MONROE project. The platform is open and accessible to external actors and the opening was announced during the 2017 Internet Measurement Conference (IMC) which was held in London on 1-3 November.

Research on the network architecture transformation presented during conference

On 6-8 November researchers from Karlstad University presented several papers at IEEE Conference on Network Function Virtualization and Software Defined Networks 2017. The rapid digitalisation we are experiencing right now demands extreme capacity from communication networks. To meet these demands new and more automated and flexible network architectures are needed.



Participants within the DAMOC project

African study visit for the development of smart grids

Computer Science has a lot of expertise in online privacy and security, and therefore researchers and teachers from South Africa and Tanzania visited the department during November 2017. Their visit was based on the need to improve energy supply in Africa and to develop training on smart grids. The study visit forms part of the DAMOC project.





COMPUTER SCIENCE

DATAVETENSKAP