

SOFTWARE CENTER ANNUAL REPORT | 2019



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Blogs

Jan Bosch: <http://janbosch.com/blog/>

Metrics: <http://metrics.blogg.gu.se/>

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Jan Bosch,
Director of Software Center
Department of Computer Science and Engineering,
Chalmers/University of Gothenburg



End of year message 2019

2019 has been an amazing year for Software Center. Now, let's get ready for another groundbreaking year together where we build a technologydriven, meaningful future for our companies, universities and society at large. Because, as you all know, the future is where we spend the rest of our lives.

2019 has been an amazing year for Software Center. During the year, we added Wärtsilä and Scania as new members, we completed the negotiations for the next phase of Software Center (phase IV), we kicked off a lot of work around artificial intelligence and had great academic output, both in quantity (such as published papers) and quality (such as best paper awards) and, last but not least, Software Center was awarded the IEEE Technical Council on Software Engineering Distinguished Synergy Award. Also, we organized two reporting workshops that were well attended and where we are constantly increasing the engagement of all partners and especially the companies.

One of the focus areas for 2019 was to drive the development and growth of the communities in Software Center. The senior leaders community workshops this year were held at the Bosch IoT campus in Berlin and at Axis Communications. The workshops delivered on their purpose, were well attended and everyone left with actionable insights to take home. The systems engineering community really came together this year with workshops at Saab and at AB Volvo as well as the first collaborative workshop with INCOSE. I am immensely grateful to Anders Kvist from Ericsson and Magnus Timmerby from Tetra

Pak who agreed to be the industrial champions of the community. I can't wait to see how the community will take shape during 2020 under their leadership. The product management community had a good year where the focus was on improving the use of data and where the first initiatives around artificial intelligence took shape. The focus for next year will likely be around business models and the transition from transactional to continuous business models.

The largest community in Software Center is of course the Software Engineering community where the majority of activity can be found as well. In this community, numerous great things happened over the year, including dozens of published papers, great presence at academic conferences, lots of activity around the Eiffel framework and several cross company knowledge exchange events. The award from the IEEE Technical Council on Software Engineering is a wonderful recognition of the high quality and impactful work that is conducted in this community.

With the new year 2020 upon us, we're entering phase IV of Software Center and year 9 of the collaboration stronger than ever. Today, Software Center today consists of 14 companies and five universities. We are aligned around a highly compelling strategy

concerning accelerating the pace of digitalization at the European Software Intensive Systems industry and we have an exciting set of goals for 2020, including further development of the engagement in the communities, again adding more partners, accelerating the work on artificial intelligence and maybe even the first Software Center hackathon!

All in all, we can look back on another great year for Software Center. My thanks go out to all of you that have made this happen, the companies, the researchers, the steering committee, the task force, the communities and the coordination team. Rather than mentioning names, I rather mention the groups as you all know who you are. Software Center is such a wonderful collaboration because all of us invest our time and resources under the trust that it will result in positive outcomes for all of us.

I wish everyone a wonderful Christmas break and an amazing start of 2020! Enjoy the time off, recharge and let's get ready for another groundbreaking year together where we build a technology-driven, meaningful future for our companies, universities and society at large. Because, as you all know, the future is where we spend the rest of our lives. Let's make sure it's a worthy future that we, and those who come after us, get to live in.

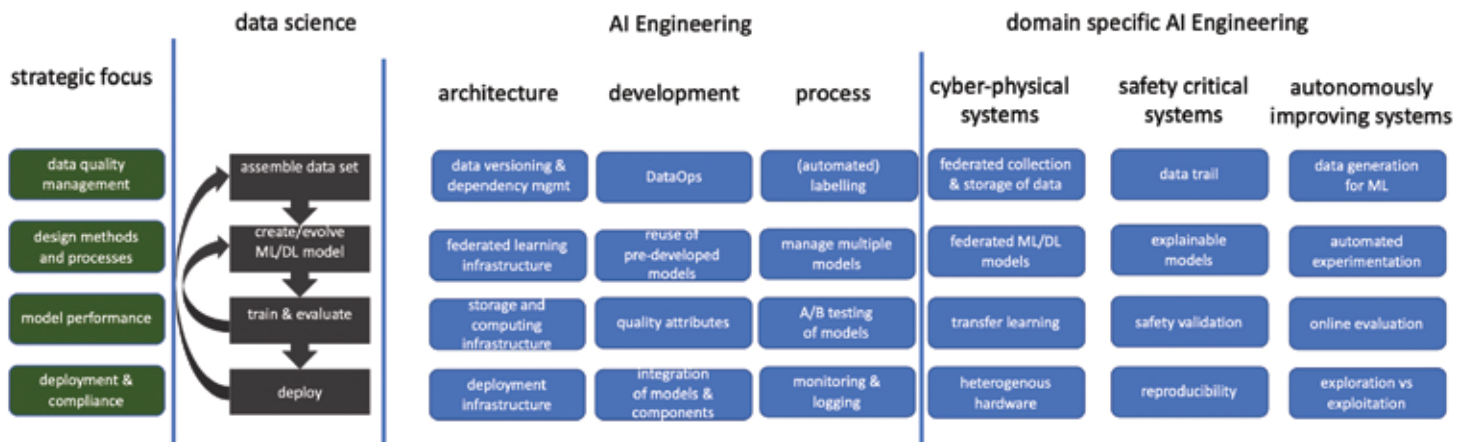


Theme leader:
Jan Bosch

New research area: AI Engineering

Artificial intelligence (AI) and machine learning (ML) are increasingly broadly adopted in industry. However, in our research we have learned that deploying industry-strength, production quality ML models in systems proves to be challenging. Companies experience challenges related to data quality, design methods and processes, performance of models as well as deployment and compliance. To address this, a new, structured engineering approach is required to construct and evolve systems that contain ML/DL components. We refer to this as AI Engineering, i.e. an extension of Software Engineering with new processes and technologies needed for development and evolution of AI systems, i.e. systems that include AI components.

During the last year, in Software Center, we have built up a team of 10 people working on AI engineering, funded by Vinnova, WASP and CHAIR. An overview of the research activities is shown in the figure below. Currently, we conduct research federated learning, DataOps, automatic labelling, A/B testing of models, monitoring & logging, transfer learning, heterogeneous hardware, automated experimentation and autonomously improving systems. We are always looking for more companies to become involved, so please reach out in case you want to learn more and get involved.





Theme leader:
Kristian Sandahl
Linköping University

Continuous Delivery

The use of agile and flexible development methods has increased the demand for frequent integration and testing to maintain the quality of the resulting code. As a result, companies have gradually invested more in the organization and automation of continuous delivery capabilities. Nowadays, continuous delivery systems are complicated systems themselves and many co-workers are dependent on them in their daily work.

In the theme we are working to find solutions to minimize the feed-back from automated testing. This is done by investigating methods for test-case selection and automation of so called flaky tests. We are also doing case studies on how automated testing can be engineered in a large scale development organization with many stakeholders and test activities with different purposes. Implementing the continuous delivery environment is addressed both from the perspective of the system architecture as well as processes and attitudes among developers.

To operate and maintain continuous integration systems many stakeholders need information to monitor the progress, identify bottlenecks, perform troubleshooting, or verify that intended operations were actually carried out. Our long-term vision is to develop a suite of real-time data visualization tools that can be used all over a company to supply the stakeholders with the information they need in a convenient way.

We are also hosting two associated projects in the areas of modeling and analyzing collaborative autonomous systems, and human aspects of software engineering.

Projects

- Visualization of Continuous Integration: Azeem Ahmad, Linköping University
- Aspects of Automated Testing: Kristian Sandahl, Linköping University
- Enterprise Scale Continuous Integration and Delivery: Torvald Mårtensson, Saab Aeronautics
- Modeling and Analyzing Collaborating Machines: Marian Sirjani, Mälardalen University
- An Analysis of Team-based Development within an Activity Based Working Environment Robert Feldt, Chalmers



Theme leader:
Jan Carlson
Mälardalen University

Continuous Architecture

improve their processes, methods and technologies related to software architecture, in order to support development of increasingly complex products and to react and adapt quicker to changed market needs.

Research within the theme includes, for example:

- How architectural debt can be identified, managed and reduced in different software domains.
- How model-driven development can be efficiently combined with agile practices such as continuous integration.
- How functional safety can be considered together with security, and the impact from continuous deployment on safety work.

Projects

- Managing Architectural Technical Debt
- Safety Assurance in Continuous Deployment
- Managing Modelling Inconsistencies



Theme leaders:



Miroslaw Staron,
Chalmers



Wilhelm Meding,
Ericsson

<http://metrics.blogg.gu.se/>

<http://metrics.blogg.gu.se/>

Metrics

Innovation and improvement in software development need effective and efficient measurement. In the age of continuous deployment and focus on speed, ecosystems and data, one of the cornerstones is the development of new metrics (data), processes (speed) and infrastructure (ecosystems) to support modern software development. The metrics theme addresses needs of data collection, analysis and visualization. Our research team supports the development and introduction of new methods as well as organizes knowledge exchange workshops to help cross-company knowledge sharing.

The metrics theme focuses on:

- Measurement, assessment and visualization of product and organizational performance
- Use of machine learning to improve software engineering
- Smart techniques for data management and decision support (e.g. machine learning)
- Infrastructure for continuous experimentation and simulation of organizational performance (e.g. metrics portfolio, self-healing)
- Optimization of measurement processes in modern software development enterprises (e.g. measurement program robustness assessment)
- Pro-active complexity reduction in large scale software development
- Prediction and assessment of impact of metamodel changes on product cost and quality

Projects

1. Continuous Product and Organizational Performance, Miroslaw Staron, Chalmers | University of Gothenburg
2. DeVeLoP, Development of Machine Learning Systems in Cars, Darko Durisic, Volvo Cars
3. Improving Communication challenges between metrics teams and Stakeholders, Dina Koutsikouri, Nataliya Berbyuk Lindström, University of Gothenburg
4. Metrics Team Maturity Model, Wilhelm Meding, Ericsson





Theme leader:
Helena H. Olsson,
Malmö University



Customer Data- and Ecosystem-Driven Development

In this theme, we explore the shift towards continuous software engineering practices and the ways in which the increasing digitalisation of industries requires companies to adopt new ways-of-working.

We focus our research on methods, processes and tools that help software-intensive companies to accelerate the adoption of new development practices and we provide support for how to move beyond agile development and towards continuous deployment of software. We take a holistic approach in which we study both technical and organizational implications and we provide support for R&D teams as well as managers in software organizations.

In the different projects, we study the role of customer and product data as a means to digitally enhance existing products and services and as the basis for new innovations, we study how strategies for managing business and software ecosystems are becoming increasingly important to maximize value between stakeholders, we develop best practices to manage requirements and related knowledge in large-scale system development and we provide industrial partners with support for how to build an API strategy that involve both internal and external stakeholders.

Also, and in order to facilitate and accelerate knowledge sharing between companies in Software Center and other large research initiatives, we conduct research on self-experimentation in autonomous systems in collaboration with Wallenberg Autonomous Systems and Software Program (WASP).

Projects

- Accelerating Digitalization Through Data: Helena H. Olsson, Malmö University
- Strategic Ecosystem-Driven R&D Management: Helena H. Olsson, Malmö University
- Data-Driven Continuous Evolution of Autonomous Systems of Systems: David Issa Mattos, Chalmers
- API Strategies: Jennifer Horkoff
- Requirements Engineering for Large-Scale Agile System Development: Eric Knauss, Chalmers | University of Gothenburg
- HoliDev: Jan Bosch, Chalmers

www.software-center.se

Director

Jan Bosch, Department of Computer Science and Engineering, Chalmers/University of Gothenburg

Steering Committee

Chair: Anders Caspár, Ericsson
Vice chair: Fredrik Wising, Saab AB
Linda Svedberg, Axis Communications AB
Robert Lagerstedt, Bosch AB
Axel Franke, Bosch AB
Stefan Carlsson, CEVT
Charlotte Wiberg, Chalmers
Ivica Crnkovic, Chalmers
Catrin Granbom, Ericsson AB
Mats Lindén, Ericsson AB
Allan Agerholm, Grundfos AB
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Anders Forsman, Jeppesen AB
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Hans Alminger, Volvo Cars
Kent Niesel, Volvo Cars
Tomi Vuollet, Wärtsilä
Jonatan Rosgren, Wärtsilä
Jonas Åkerman, Wärtsilä

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Axel Franke, Bosch AB
Robert Lagerstedt, Bosch AB
Staffan Lindgren, Bosch AB
Stefan Carlsson, CEVT
Catrin Granbom, Ericsson AB
Jonas Wigander, Ericsson AB
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Gert Frost, Siemens Gamesa
Anders Forsman, Jeppesen
Kristian Sandahl, Linköping University
Jan Carlsson, Mälardalen University
Helena Holmström Olsson, Malmö University
Peter Thorngren, Volvo



Vangel Cukalevski,
Axis Communications



Linda Svedberg,
Axis Communications



Ola Söder,
Axis Communications



Axel Franke,
Bosch



Robert Lagerstedt,
Bosch



Stefan Carlsson,
CEVT



Lennart Krook,
CEVT



Staffan Lindgren,
Bosch



Jan Bosch,
Chalmers



Ivica Crnkovic,
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Catrin Granbom,
Ericsson



Mats Lindén,
Ericsson

Organization



Wilhelm Meding,
Ericsson



Daniel Ståhl,
Ericsson



Jonas Wigander,
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Niels Jørgen Strøm,
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Anders Forsman,
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Kristian Sandahl,
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Andreas Jacobsson,
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Helena Holmström Olsson,
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Jonas Lindgren,
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Torvald Mårtensson,
Saab



Sven Nilsson,
Saab



Fredrik Wising,
Saab (Vice chair)



Görel Wranne,
Saab



Christoph Elsner,
Siemens AG



Cornel Klein
Siemens AG



Gert Frost,
Siemens Gamesa



Frances Paulisch,
Siemens Healthineers



Anders Fridh,
Tetra Pak



Anders Henriksson,
Volvo AB



Magnus Johansson,
Tetra Pak



Johan Persson,
Tetra Pak



Ted Kruse,
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Jens Svensson,
Volvo AB



Peter Thorngren,
Volvo AB



Ruben Alexandersson,
Volvo Cars



Hans Alminger,
Volvo Cars



Jonn Lantz,
Volvo Cars



Kent Niesel,
Volvo Cars



Jonatan Rösgrén,
Wärtsilä



Jonas Åkerman,
Wärtsilä

Software Center reporting workshop December 5, 2019: Gothia Towers, Gothenburg

- 10:00-10.15** **Welcome & introduction: Jan Bosch**
- 10:15-10.45** **Industrial perspectives:**
up-dates from Software Center partners on the impact of digitalization:
• Wärtsilä: Tomi Vouillet
• Scania: Viktor Kaznov
- 10:45-11.15** **Theme presentations and overview of projects:**
• Continuous Delivery: Kristian Sandahl
• Continuous Architecture: Jan Carlson
• Metrics: Miroslaw Staron
• Customer Data- and Ecosystem-Driven Development: Helena Holmström Olsson
- 11.15-12.30** **Software Center exploration space**
– overview of Software Center projects
- 12:30-13.30** **Lunch**
- 13:30-15.00** **In-depth community sessions**
• Product management: Helena Holmström Olsson
• Software engineering: Miroslaw Staron, Kristian Sandahl, Jan Carlsson
• Systems engineering: Anders Kvist & Magnus Timmerby
- 15.00-15.15** **Coffee**
- 15:15-16:15** **AI and Machine learning in Software Center:
AI4SE, SE4AI, & Data management:**
• Opening: Jan Bosch
• AI for SE and systems management: Miroslaw Staron and Wilhelm Meding
• Unsupervised learning for test case diversity: Francisco Gomes
• AI and Data-driven development: Helena Holmström Olsson
• Non-Functional Requirements for Machine Learning & Human Factors
in Autonomous Drive: Jennifer Horkoff
• AI research & CHAIR: Ivica Crnkovic
- 16.15-16.45** **Company perspectives on AI**
• AI-powered R&D at Ericsson: Henric Stenhoff, Head of DSI Analytics (DU Networks)
• Saab: Emil Rosenberg
• Bosch Sensortec & AI: Staffan Lindgren, Teamleader
• CEVT: Shafiq Urréhman
• Volvo Cars: Ashok.C Koppisetty
- 16.45-17.00** **Summary and closing: Jan Bosch**

Jan Harding Gliemann, Deif A/S

I have previously been an industrial partner in Software Center and now I am here with Deif A/S to explore how the company can be involved in Software Center. We need to implement new methods and technology to be more unified in software development. Software Center offers a network of companies and research organisations that facilitates transformation through concrete collaboration, important areas for us are software architecture and testing.



Terese Besker, researcher at Chalmers

For me as a researcher the Reporting Workshop is a great opportunity to meet with the industrial partners in Software Center. The discussions are important to understand how representatives for the companies think and work. It is always nice to come here and the workshop is a good place for informal meetings and discussions.

These events give me new angles to my research by meeting and getting to know our industrial partners from several companies. By discussing and listening we as researchers can understand which kind of requirements there are and what we can do to address them in our common projects!

Ted Kruse, Volvo

Software get more important every day and development within the field is fast. A significant part of the future technology solutions within Volvo is software driven or enabled by software. Software Center contributes to improving development within Volvo.

Artificial intelligence is one example. Advanced data analytics, AI and machine learning are used to strengthen our R&D capabilities in most of our technology areas, not only in the area of autonomous vehicles.

Volvo has already a million connected trucks all over the world continuously feeding us with data. Partly, this data is an unexploited resource from an data driven development point of view.

Our software development capacity and efficiency is in rapid development but if we would try to do everything ourselves we would not be fast enough. Cooperation and partnership in research and development is very important.



Linda Svedberg, Axis

The reporting workshops is a great opportunity to introduce more colleagues to Software Center and to the projects. The presentations give us an instant up-date about the fore-front in research and development and we get to meet experts from both companies and universities.

– To meet at the reporting workshop is a great way to get fresh ideas to the projects and also get inspiration for new projects. The collaboration with the other companies and with the research is really important, both to understand how others deal with their challenges and to get a confirmation that we are on the right way with the work we do within Axis.

– The difference to other similar forums is that we meet every 6 months in Software Center, once per sprint. You don't have to wait for several years to learn about results. Another benefit is that there are several universities involved in the center and that they join force in the projects.



Martin Grohs, Bosch

Big changes are taking place within this area which continues to make collaboration more important to find solutions. To meet at the Reporting workshop is inspiring and an opportunity to get insights in how experts in the field reason, both researchers and experts in the other companies.

To meet and have the opportunity to discuss is probably the best about these events.

The main benefit of being a Software Center partner is the unique meeting platform. I don't know of any others that resemble this setting where you have access to both academic and industrial experts and at the same time have the opportunity to run collaborative projects.



Wilhelm Meding, Ericsson

– No matter how good you are, there is always something that is missing. Take 5G for example, that Ericsson develops. How could I do this kind of work without a broad network? No companies can work isolated these days. You need to ask yourself if you want to be good, or if you want to be the best. A prerequisite to be among the best is the ability to network. Previously you could sit alone and do your development work, but nowadays work requires more and Software Center is an important arena to network and learn from others.



Roger Holmberg, Ericsson

Either you are a member of the winning team or not. Ericsson is a proud partner of Software Center and the network and content within the center is amazing!

Still we need to get better and continue to develop, software is a field in rapid development and here we can learn from each other.



Highlights

Workshops



Jan Carlsson, Mälardalen University



Viktor Kaznov, Scania



Henric Stenhoff, Ericsson



Emil Rosenberg, SAAB



Ashok.C Koppisetty, Volvo Cars



Miroslaw Staron, Chalmers, and Wilhelm Meding, Ericsson, with Malin Rosqvist



Tomi Vuollet, Wärtsilä



Eduard Enoiu, Mälardalen University, and Kristian Sandahl, Linköping University



Ivica Crnkovic, Chalmers AI Research Centre



Staffan Lindgren, Bosch Sensortec & AI

In-depth community sessions:

Product management:

Chair: Helena Holmström Olsson

- Opening – Jan Bosch
- Requirements Engineering for Large-Scale Agile System Development (#27): Eric Knauss
- Accelerating Digitalization Through Data (#5): Helena H. Olsson
- Data-Driven Continuous Evolution of Autonomous Systems of Systems (#19): David Issa Mattos
- Industrial presentations by Volvo Cars, Wärtsilä and Axis Communications
- Discussion and closing

Software engineering:

Chairs: Jan Carlsson, Kristian Sandahl, Miroslaw Staron

- Investigation of exploratory testing with several companies: Torvald Mårtensson
- Flaky tests detector + analysis of test smells at two companies: Azeem Ahmad
- Test prioritization using machine learning: Khaled Al-Sabbagh
- Combinatorial testing: Eduard Enoiu
- Managing Architectural Technical Debt: Antonio Martini
- Managing Modelling Inconsistencies: Robbert Jongeling

Systems engineering:

Chairs: Anders Kvist, Magnus Timmerby

- Re-visit workshop from last sprint on AB Volvo: All participants
- Model-Driven Iterative Development of Cyber-Physical System: Marjan Sirjani
- Goals for coming sprint: Anders Kvist
- Coming workshop on Tetra Pak: Magnus Timmerby



Projects

Continuous Architecture

- #34, Safety Assurance in Continuous Deployment:
- Managing Architectural Technical Debt: Antonio Martini, Terese Besker
- Managing Modelling Inconsistencies: Jan Carlson, Robbert Jongeling

Continuous Delivery

- #29, Modeling and Analyzing Collaborating Machines: Marjan Sirjani, Ali Sadaghat
- #18, Data Visualization for Continuous Integration: Kristian Sandahl, Azeem Ahmad
- #6, Enterprise Scale Continuous Integration and Delivery: Daniel Ståhl, Torvald Mårtensson
- #30, Aspects of automated testing: Kristian Sandahl, Azeem Ahmad, Francisco Gomes
- Human aspects of project development (associated project): Robert Feldt, Per Lenberg

Customer Data- and Ecosystem-Driven Development

- #26, API Strategies: Jennifer Horkoff, Juho Lindman, Eric Knauss
- #5, Accelerating Digitalization Through Data: Helena H. Olsson
- #27, Requirements Engineering for Large-Scale Agile System Development: Eric Knauss, Jennifer Horkoff, Rashidah Kasauli, Jan-Phillip Steghofer, Rebekka Wohlrab
- #19, Data-Driven Continuous Evolution of Autonomous Systems of Systems: David Issa Mattos
- #9, Strategic Ecosystem-Driven R&D Management: Helena H. Olsson
- #33, HoliDev: Ivica Crnkovic

Metrics

- Continuous Product and Organizational Performance: Miroslaw Staron, Gul Calikli
- Longitudinal Measurement of Agility and Group Development: Lucas Gren
- Quasar@Car - Quantifying meta-model changes: Miroslaw Staron, Darko Durisic
- DeVeLOP: Machine learning components in modern cars: Miroslaw Staron, Darko Durisic
- RAWFP - Resource Aware Functional Programming: Patrik Jansson
- Size and Quality between Software Development Approaches: Regina Hebig
- VISEE - Verification and Validation of ISO 26262 requirements at the complete EE system level: Rakesh Rana



Mingel and discussion in the Exploration space.



Helena Holmström Olsson, Malmö University



Shafiq Urréhman, CEVT



Johan Paulsson, Chief Technology Officer at Axis, introduced the company to the workshop participants and described relevant challenges and opportunities regarding AI, Machine Learning and Deep learning.

Senior leaders workshop at Axis, Lund: Data and AI from a business perspective

Linda Svedberg hosted the October instance of the Software Center senior leaders' workshop which took place at the brand new headquarters of Axis in Lund. The theme of the workshop was Implications of Digitalization: Data and AI from a business perspective. Digitalization not just affects products and services. It requires a fundamental reinvention of the organization. In fact, we are moving towards a new business operating system focused on speed, data, ecosystems and empowerment. Intent of the workshop:

Agenda

- 09.00 Check-in & coffee
- 09.30 **Welcome & Introduction:**
Mikael Ek, Director of software R&D, Axis & Jan Bosch, Software Center
- 09.45 **Axis expanded product:**
Johan Paulsson, VP Products & CTO, Axis
- 10:30 **Axis DevOps journey:**
Mikael Ek, Director of software R&D, Axis
- 11.15 **Software Center: status and results:**
Jan Bosch
- 13.00 **Break-out discussions in groups I**
- 14.15 **First summary from break-outs**
- 14.30 **Coffee and guided tour of Axis Experience Center**
- 15.00 **Break-out discussions in groups II**
- 15.50 **Second summary from break-out discussions**
- 16.15 **Summary and closing:**
Jan Bosch

- Increasing awareness concerning the company- and industrywide implications of digitalization
- Facilitating acceleration of the digitalization agenda at the Software Center member companies
- Improving support and create a knowledge exchange platform between the Software Center companies.

More about Axis:
www.axis.com

Tracability workshops

During autumn, project #27, Requirements Engineering for Large-Scale Agile System Development, arranged two workshops on tracability at Chalmers. The project is run by Eric Knauss, Jennifer Horkoff, Rashidah Kasauli, Jan-Phillip Steghofer and Rebekka Wohlrab. The workshops helped participants to reflect on challenges, get new insights into how others address them, and discuss best practices. It allowed the researchers to gather valuable data for a paper on collaborative traceability practices that has already been used to inspire a follow-up survey. Together with the literature overview, the participants received feedback on their way of thinking and what the impact on the organisations could be. Follow-up work to find suitable guidelines for large organisations and complex information models was identified and will be conducted in the next sprints.



Ericsson Global Hackathon

On Ericsson Global Hackathon, one of the teams used the opportunity to better understand the HYPEX model, developed within the Software Center project "Accelerating Digitalization Through Data". The model was applied on one feature included in the Ericsson Microwave product MINI-LINK. The team analyzed the product goals and discussed different ways to do corresponding measurements.

Senior leaders workshop in Berlin: IoT, AI and Blockchain



In March, senior leaders from the Software Center partner organizations travelled to Berlin for a visit to the Bosch IoT Campus, HQ of the Bosch Software Innovation. Theme of workshop was Implications of Digitalization: IoT, AI and Blockchain. Martin Grohs at Bosch was hosting the workshop.

More than 300 employees work on the Bosch IoT Campus in Berlin Tempelhof – mainly on projects related to the Internet of Things and Digital Transformation. The IoT experts advise and accompany customers in the development and implementation of projects for networked solutions and focuses on bringing the entire IoT ecosystem together.

Learn more about the Bosch IoT Campus in Berlin: <https://bosch.io/about-us/locations/berlin/>
Bosch Software Innovation: <https://bosch.io/>



Agenda

09:00-10:00 Welcome, opening and round of introductions:

Jan Bosch, Director of Software Center

10.00-10.30 This is Bosch Software Innovations and Campus:

Michael Hahn, COO / General Manager

10.30-11.15 Guided tour to Bosch IoT Campus

11.15-12:00 Pitch presentations by start-up companies within the area of DLT – Distributed Ledger Technology; Blockchain, AI, etc:

– Phantasma: <https://phantasma.global/>

– Zksystems: <http://zksystems.io/>

– Bote: <https://www.thebote.de/>

12.00-13:00 Lunch

13.00-13:30 The business side of IoT – introduction to workshop:

Steffen Schmickler, Vice President Customer Success Services

13.30-16.30 Workshop in groups based on participants interest and input

- Using data for R&D effectiveness
- New ecosystem partners due to digitalization
- Implications of adopting AI/ML/DL

16.30-17.00 Retrospective, feedback and next steps

Software Center testing workshop

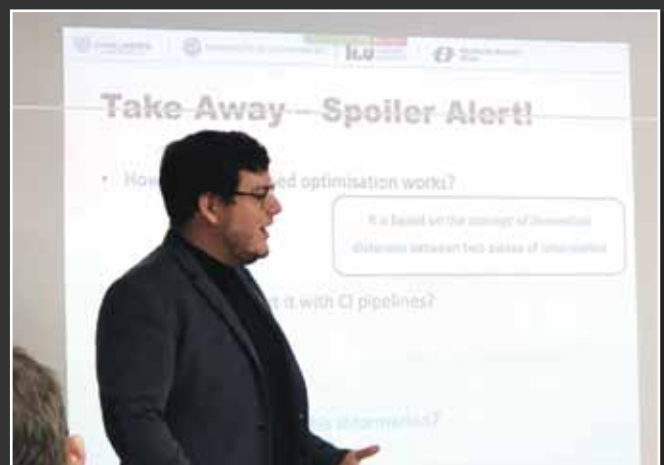
A workshop around research in software testing with five companies, three universities, and two of the Software Center themes. The workshop was hosted by Linköping University, Kristian Sandahl and Torvald Mårtensson, Saab. The workshop included presentations from Saab and also research presentations from the themes Continuous delivery and Metrics. In addition, there was a tool demonstration about how to work with similarity-based (or diversity-based) testing. We also had a discussion about flaky test cases and about factors causing them. We collected data in this matter by the participants.

Test automation research for industry

A large workshop with several initiatives in automated testing hosted by Ericsson and Sigrid Eldh, senior specialist and coordinator of the European Testomat project. The meeting brought several Swedish initiatives in automated testing together. Besides the Software Center, we listened to presentations from TESTOMAT (ITEA3), STAMP (KTH, Castor), and XIVT (ITEA3) plus specialized technical presentations. Azeem Ahmad and Francisco Gomes made one presentation each. Outside we had a poster and demo area, similar to the reporting workshops. The event was documented in the YouTube channel for the European project Testomat Project: <https://www.testomatproject.eu/>

Software Center workshop on automated testing

Software Center workshop on automated testing Francisco Gomes, Chalmers/University of Gothenburg hosted a workshop with a thorough walk-through of results obtained by Grundfos and Axis data. The workshop focused on test-case selection and flaky test behaviour. To summarize the discussions a wish list from the companies was put together and will set out the direction for the research area for next spring.



Best paper awards

Best Paper award Software Quality Days

Mirosław Staron & Wilhelm Meding

Best Paper award at SEAA:

“Impediments to Introducing Continuous Integration for Model-Based Development in Industry”

Robbert Jongeling, Jan Carlson, Antonio Cicchetti

Best Paper award at the ECMFA application track

“Lightweight Consistency Checking for agile Model-Based Development in Practice”

Robbert Jongeling, Federico Ciccuzzi, Antonio Cicchetti, Jan Carlsson

Best paper award in International Conference on Software Quality (Springer, Cham):

“Improving Defect Localization by Classifying the Affected Asset Using Machine Learning”

Sam Halali, Mirosław Staron, Mirosław Ochodek, Wilhelm Meding



IEEE TCSE award

In 2019, Software Center was awarded the TCSE Distinguished Synergy Award for “Outstanding and sustained contributions to the software engineering community”.

The IEEE Computer Society is the world’s largest professional organization devoted to computer science and the TCSE is the voice of software engineering within the IEEE and the Computer Society.

The picture shows Ivica Crnkovic from Software Center together with Rick Kazman, Chair of TCSE at the award ceremony.

<http://www.cs-tcse.org/2019-cs-tcse-awards>



Software Center at Sweden-German Business Day in Berlin

On November 21, Software Center was represented at the Sweden-German Business Day that took place in Berlin, Germany. The event took place at the Swedish Embassy and gathered companies and officials from both Sweden and Germany with the purpose to discuss important development areas which are part of the cooperation agreement on Innovation between the two countries. Jan Bosch gave a keynote presentation on both results and about the unique cooperation model in Software Center, including partners from Germany and Sweden. There was also a focus on AI and Big Data, both in the keynote presentation and in the workshop that took place in the afternoon with some 30 participants. The meeting was arranged by Business Sweden and hosted by the Swedish Embassy in Berlin, in collaboration with the German-Swedish Chamber of Commerce.



Keynote presentations

SEAA conference:

“Digitalization: Software, data and AI”

Helena Holmström Olsson, Malmö University

SOFSEM:

“Action research in Software engineering: Metrics’ perspective”

Mirosław Staron, Chalmers

European Conference on Computer Based Systems:

“Action research in Software engineering”

Mirosław Staron



New members

Wärtsilä

Wärtsilä is a global leader in smart technologies and complete lifecycle solutions for the marine and energy markets. By emphasising sustainable innovation, total efficiency and data analytics, Wärtsilä maximises the environmental and economic performance of the vessels and power plants of its customers. In 2019, Wärtsilä has operations in over 200 locations in more than 80 countries around the world, with approximately 19,000 employees. Wärtsilä is listed on Nasdaq Helsinki and consists of two businesses: Marine Business and Energy Business.



Scania

Scania is a world-leading provider of transport solutions. Together with partners and customers Scania is driving the shift towards a sustainable transport system. Founded in 1891, Scania now operates in more than 100 countries and employs some 51,000 people. Research and development are concentrated in Sweden, with branches in Brazil and India. Production takes place in Europe, Latin America and Asia, with regional production centres in Africa, Asia and Eurasia.



New book by Mirosław Staron

Software Center provided me with a possibility to work very closely with several industrial partners. The partnerships resulted in publications, products and a lot of diagrams. However, none of this would be possible if we did not follow a strict research methodology – Action Research. The methodology has been around for a number of years, but not widely used in software engineering. It sets up research activities in such a way that both research and practice benefits. The researchers contribute to theory building and academic body of knowledge, whereas the practitioners apply research results in their ways of working and in their products.

This book provides a description of how to conduct action research projects in industry. It contains both the theoretical underpinnings and the applications of it. It contains examples, which can help the reader to use the book in a specific project. It also contains checklists and good practices for the action researchers and practitioners. These can be helpful to set up and to assess the projects.



<https://www.springer.com/gp/book/9783030326098>

Meetings

- Steering committee meets 4 times per year. Once mid-sprint, once at end of sprint.
- Task force meets 2 times per year, one to two weeks before the end-of-sprint steering committee meeting.
- Coordination team meets once per month.
- Reporting workshops take place every sprint; we organize a full day reporting workshop offering all interested parties at the SC companies an opportunity to learn about the ongoing research. This workshop is held one day before the task force meeting.
- Community workshops are arranged every sprint:
 - Senior management
 - Product management
 - Systems engineering
- Theme, project specific meetings and intra-company meetings are out of scope

Meeting schedule Sprint 16

- January 14: Coordination team meeting
- February 18: Coordination team meeting
- March 11: Coordination team meeting
- March 19: Senior leaders workshop (Bosch, Berlin)
- April 1: Mid-sprint steering committee meeting
- April 8: Coordination team meeting

- May 13: Coordination team meeting
- May 24: Deadline for NEW project proposals
- May 31: Deadline Sprint 17 project proposals
- June 13: Reporting workshop for all companies and other interested parties
- June 14: Task force meeting for planning sprint 17
- June 17: Steering committee meeting
- June 17: Coordination team meeting

Meeting schedule Sprint 17

- August 19: Coordination team meeting
- August 19: General Assembly and strategy workshop
- September 16: Coordination team meeting
- October 2: Senior leaders workshop (Axis, Lund)
- October 7: Mid-sprint steering committee meeting
- October 14: Coordination team meeting
- November 18: Coordination team meeting
- November 22: Deadline for NEW project proposals
- November 29: Deadline Sprint 16 project proposals
- December 5: Reporting workshop for all companies and other interested parties
- December 6: Task force meeting for planning sprint 16
- December 9: Coordination team meeting
- December 9: Steering committee meeting



Publications 2019

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Software Center

Software Center is a research collaboration between 14 companies and 5 universities with the express intent of helping its partner organizations to survive and thrive in the digitalization transformation.

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