

Welcome to Swedsoft's Software Technology Exchange Workshop, STEW, 2015



On November 3rd it is time for the fourth installment of STEW. This is an exciting opportunity for the top Swedish forces in software development & engineering, from industry & academia, to network and share experiences.

This year we are excited to arrange STEW at Embedded Conference Scandinavia (ECS). ECS is a two day conference with a lot of interesting presentation about Embedded Technology and software. See the conference program and exhibition list of ECS at Embeddedconference.se.

We offer a stimulating program with six prominent researchers presenting their research as well as an introduction to why software is important for Sweden and the need for Swedsoft. You find the full program below or at Swedsoft.se/event/stew-2015.

The goal of STEW is to inspire collaboration and create new future connections! STEW is open for all, so please share this invitation with your colleagues, friends and anyone you believe to be interested.

Registration is open, please register as soon as possible at Embeddedconference.se.
When registering, choose the option STEW.

Practical information

Date: November 3rd, 2015

Time: 09:15-17:00 afterwards - ECS Industry reception and The Embedded Dinner Party!

Place: Kistamässan, Kista (Stockholm)

Fee: The day is free of charge, including coffee and lunch.
The evening with The Embedded Dinner Party is 595 plus VAT.

Registration: Registration is open at Embeddedconference.se, please register as soon as possible.
When registering, choose the option STEW.

Contact and more information: www.swedsoft.se / +46 8-782 08 50 / info@swedsoft.se



Program

09:15 Swedsoft – Introduction and information

09:45 Visual GUI Testning – A new technology for a new SW Industry

Emil Alégroth, Chalmers University

10:15 Break

11:00 Open Innovation through the Lens of Open Source Tools

Hussan Munir / Johan Linåker, Lund University

11:30 Value - Engineering it!

Kris Wnuk, Blekinge Institute of Technology

12:00 Lunch and inauguration by Dr Sara Mazur, Head of Ericsson Research

13:20 ECS Keynote - The road towards autonomous transport solutions

Daniel Frylmark; Scania CV AB, Head of Driver Assistance Controls

14:00 Emergent Configurations of Connected Systems

Romina Spalazzese, Malmö University

14:30 New Foundations for Next Generation Modeling Languages and Tools

Walid Taha, Halmstad University

15:00 Break

15:30 Papyrus-RT and SMARTCore: a joint effort for boosting the benefits of Model-Driven Engineering in industry

Federico Ciccozzi, Mälardalen University

16:00 Swedsoft Members Meeting

Information and separate registration at

[Swedsoft.se/event/extra-foreningsstamma-medlemsmote](https://swedsoft.se/event/extra-foreningsstamma-medlemsmote).

17:00 ECS Industry reception

18:00 ECS Embedded Dinner Party



Abstracts

Visual GUI Testning – A new technology for a new SW Industry

Emil Alégroth, Chalmers University

The amount of software that we use in our everyday lives is continuously growing but so are our requirements on software quality and time-to-market. These factors also affect each other since shorter time-to-market leaves less time for software testing, verification and validation. A challenge that is perceived solvable with automated testing. However, currently there is a lack of tools and techniques for automated GUI testing which forces developers to use costly, tedious and error-prone manual practices. We therefore present Visual GUI Testing (VGT), a new generation of automated testing with the potential to lower both test related costs and improve software quality. In this presentation we will present the technique and support for its industrial value, acquired from research in and with Swedish software industry.

Open Innovation through the Lens of Open Source Tools

Hussan Munir / Johan Linåker, Lund University

Open Innovation (OI) is an emerging paradigm in software engineering and still little is known about what triggers software-intensive organizations to adopt it and how this affects SE practices, for example in Open Source Software (OSS) communities. We explored the involvement of a company in OSS communities from an OI perspective by studying the Jenkins and Gerrit communities, which are two central OSS tools for continuous integration.

Key findings from the study include.

- i. The process of opening up towards the tool communities correlates in time with a general adoption of OSS in the company.
- ii. Assets which are not competitive advantage nor a source of revenue are left open, and gradually, the company turns more and more open.
- iii. The requirements engineering process towards the community is informal and based on engagement.
- iv. The need for systematic and automated testing is still in its infancy, but the needs are identified.
- v. The innovation outcomes include the “free” features, maintenance and time, but increased speed and quality are also counted as OI outcomes.

Value - Engineering it!

Kris Wnuk, Blekinge Institute of Technology

Companies are faced with the challenges of being able to select what features and characteristics (quality) to select for their products. It is not unusual to have thousands of requirements



(possibilities), but only being able to select a few to be realized. How do you select the "right" ones? In a world where everyone talks about "value", most focus on cost and potential estimated revenue, and in reality "value" is an abstract concept not really used in selection of what to do. You don't agree? Ok, then what is value? What is value exactly? Ask yourself, define it, then ask a colleague and see if you agree.

This seminar deals with the value concept, challenges associated with it, and a pragmatic way forward.

The results on which this seminar is based was developed in research projects over the last five years in collaboration with Ericsson, IBM, Tolpagorni, and CGI.

ECOS: Emergent Configurations of Connected Systems

Romina Spalazzese, Malmö University

In the last few years, the number and variety of connected physical objects and devices have been growing at a fast pace. We are currently moving towards the Internet of Things (IoT) that, by its nature, imposes a drastic shift in the way we interact with such systems.

IoT systems include sets of devices with their functionalities and services that connect and cooperate temporarily. We refer to such collections as emergent configurations of connected systems (or emergent configurations for short).

Emergent configurations are hard to characterize since there is a huge amount of heterogeneous resources available that might connect. Moreover, emergent configurations change unpredictably due to the dynamic nature of IoT.

To help users to get the most out of their IoT technology, we investigate interdisciplinary approaches to understand and effectively use the emergent configurations. In particular, challenges that lie ahead are: how interact with, model, and reason about emergent configurations. This research is carried out as part of our ECOS project within the Internet of Things and People research center (<http://iotap.mah.se/>).

New Foundations for Next Generation Modeling Languages and Tools

Walid Taha, Halmstad University

Domain specific languages (DSLs) play a crucial role in the development of so-called cyber-physical systems. An expressive DSL for such domains must support hybrid (continuous/discrete) models. To express the dynamics of continuous systems at a high level of abstraction, a DSL must rely on extensive algebraic manipulation. Unfortunately, general-purpose symbolic algebra tools are not always well aligned with the traditional programming languages ideals of runtime efficiency, predictability and error reporting. Our key insight is that development of the offline strategy and the study of two-level languages helped cast partial evaluation, which is a special form of symbolic computation, into the mold of traditional programming languages. The offline strategy makes partial



evaluation significantly more efficient, predictable, and more intuitive in terms of user feedback. Two level-languages facilitate the specification and justification of the key components of offline partial evaluation: binding-time analysis and specialization.

To capitalize on this insight to build better computer algebra DSLs, we explain what is an offline strategy for an important type of symbolic computation, namely, the elimination of partial derivatives. Such constructs play a key role in modeling of complex mechanical systems such as robot dynamics and a wide range of more specialized mechanics constructions.

Both declarative and algorithmic specifications of the binding time analysis are presented and formally related. The declarative specification is used to prove soundness with respect to the specialization process. We formally establish the key properties of the strategy and identify promising directions for future work. An immediate benefit of this approach is that it provides a formal account of how existing DSLs such as Modelica process partial derivatives. Such foundations are necessary for guaranteeing the correctness of results of such systems.

This is joint work with Yingfu Zeng (Rice University), Ferenc Bartha (Rice University), and Eugenio Moggi (University of Genova).

Papyrus-RT and SMARTCore: a joint effort for boosting the benefits of Model-Driven Engineering in industry

Federico Ciccozzi, Mälardalen University

Thanks to continuous advances in both software and hardware technologies the power of modern embedded systems is ever increasing along with their complexity. Among the others, Model-Driven Engineering (MDE) has grown consideration for mitigating this complexity through its ability to shift the focus of the development from hand-written code to models from which complete implementation is automatically generated. Models are means for unification and the Unified Modeling Language (UML) was born with the ambition of providing “unified” language and methodology. The myriad of competing proprietary tools resulted in the creation of a multitude of similar but still different solutions and “dialects”, which clashes with MDE’s and UML’s ambition. A glaring example is the appalling number of action languages and code generators defined for UML.

In this talk, we describe our efforts in two synergistic research projects, Papyrus-RT and SMART-Core, run in tight cooperation with leading industrial actors (e.g., ABB Corporate Research, Ericsson AB, Alten Sweden AB), which focus on providing a unified and open source baseline for getting the best out of UML in industrial settings. More specifically, we address open challenges in modelling, code generation from models, and extra-functional properties preservation with particular attention to embedded systems on multicore.

