EASE for Industrial Excellence in Software

Activity Report 2010 for Industry Excellence Center - Embedded Applications Software Engineering

How to know when agile is efficient – a context aware model for successful agile software development

In the mid-1990s agile practices emerged as an alternative to more plan-driven development approaches aiming at overcoming their limitations. Since then many different organizations have applied different types and different levels of agility on different projects. However, the circumstances under which agile is efficient have not been well explored.

The main objective of EASE research on agile methods (project C1) is an increased understanding of agility. This will be manifested through identifying a set of agile practices that have been applied in different contexts as well as exploring their effects on specific outcome variables (e.g. customer satisfaction). It is initiated with reviewing relevant research literature in parallel with regular discussions with industrial partners of the project. The ongoing step is to define agile in terms of what practices and to what extent they truly claim being agile.

– The outcome of this research project is a general framework that will help project managers in investigating the applicability of certain agile practices based on their current situation when setting up agile projects. Furthermore, it will provide a basis for defining and measuring agility in software industry, says Samireh Jalali, PhD student in theme C.

Context awareness

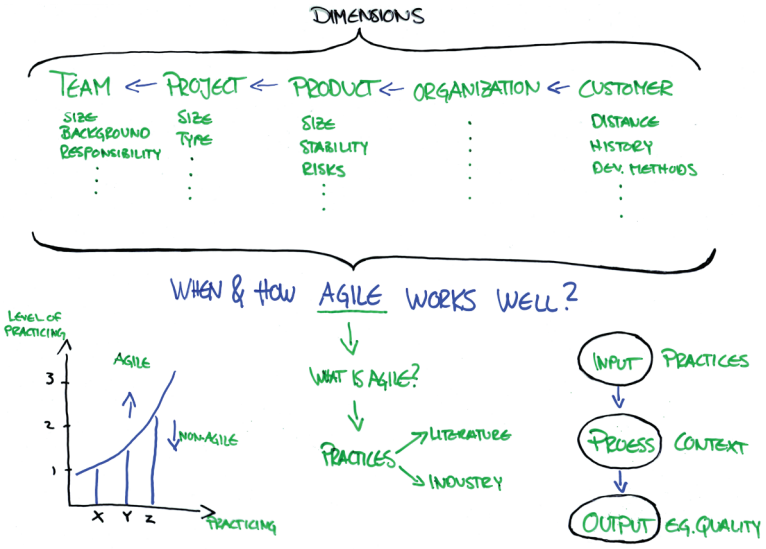
Since agile practices can be successful in one context and fail in another, the research project focuses on viewing agile software development from different perspectives such as team, project, product, organization and customer.

– One of the tricky parts will be to collect agile setups and project outcomes from a sufficient number of real projects to cover the main combinations of projects contexts. To study this we will primarily use the EASE industry partners but also other companies, says Samireh.

One of the industry partners involved in the project is Softhouse Consulting that in collaboration with their customers will assist in finding real projects to test the framework.

– The resulting framework will help us to assess and support clients wanting to improve performance based on the agile toolbox. The different perspectives and the unified model to measure agility will hopefully be a good contribution to the agile community – and to our business, says Anders Sixtensson, Business Unit Manager at Softhouse.

Samireh Jalali intends to present her licentiate thesis on the subject late 2011.



The plan for EASE research on agile development. Two publications on the subject are listed on page 2.

Deliver, evaluate, excel

Starting up a research center takes time. The academic world has a focus on long-term research and industry must deliver fast to the market, which may cause friction in the collaboration. On the other hand, the academic values of afterthought, thorough analysis and thinking "out of the box" provide new perspectives.

The industrial excellence center, EASE, has after its setup 2008/2009 started to deliver. Industry visitors to academic seminars and workshops, and academia long- or short-term visitors to industry, provide a constant flow of challenges, ideas and solutions. The results manifest themselves in prototype products, improved software engineering practices, research papers and graduated students. From the industry perspective it is an enormous advantage to get the day-to-day relation with the academia. New relations are established to influence and vitalise both the research and industry.

This is not ordinary self-praise from the center leadership. The year 2010 has also been a year of evaluations, which have given outstanding credits to EASE. The board of directors evaluated the industrial value in February, the Scientific Advisory Board did their evaluation in October, and Vinnova evaluated the center from an industry-academia collaboration point of view in November. All three evaluations were positive, and you can find some statements from the reviewers in this report.

In addition, from a pure academic point of view, both Lund University and Blekinge Institute of Technology are ranked among top 10 worldwide in JSS ranking of software engineering scholars and institutions. Counted together, we would be number 2 on the list. And EASE is Lund and Blekinge together, so now it is time to excel, and take the lead!

Per Runeson,
Director of Research

Knut Mårtensson,
Chairman of the board

Read more at http://ease.cs.lth.se
Send feed-back and questions to ease@cs.lth.se

EASE
Embedded Applications Software Engineering

Would slightly better quality be more valuable – the quality performance model

Market-driven software development is becoming more common in the software industry, and at the same time, size and complexity of today's products are continuously growing. To increase the chance of market success, it is important that the software product is released to the market at the right time, and offers a higher level of quality than the competitors' products.

The objective of the MARS research project (associated with EASE Theme D) is that by surveys, method development and pilot studies to develop an efficient method for early analysis and specification of quality requirements, a.k.a. non-functional requirements.

To support release planning of quality requirements, the project have developed the QUality PERformance (QUPER) model that incorporates quality as a dimension in addition to the cost and value (benefit) dimensions used in prioritization approaches for functional requirements.

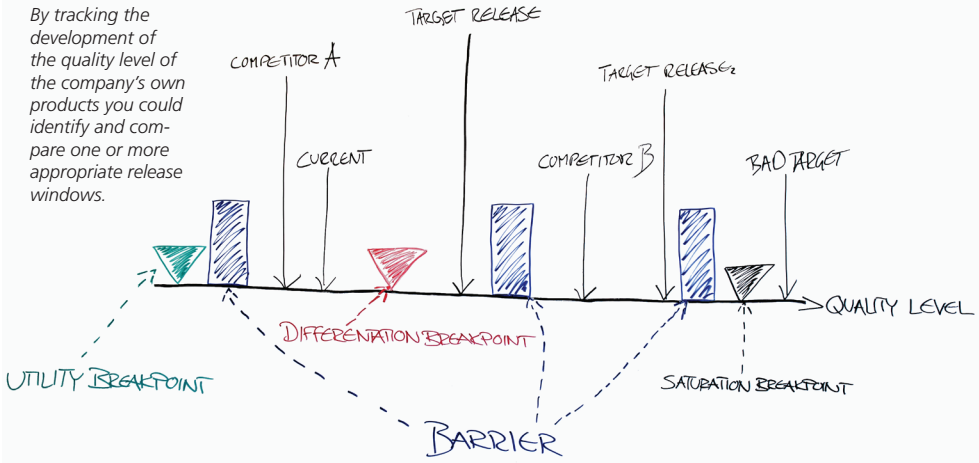
The purpose of the model is to provide concepts for qualitative reasoning of quality levels in the decision-making of setting actual targets of quality requirements for coming releases of the product, says Richard Berntsson Svensson, Ph.D student in the project.

– So far, the evaluation results of QUPER, both in the mobile handset and the electronic payment domain, indicate that QUPER is relevant in release planning, in particular the visualization of the roadmap view, which provides a clear picture of the current market situation and what level of quality to aim for, says Richard Berntsson Svensson, PhD student in the project.

The next step is to further improve the model's concepts and practical guidelines based on the evaluation results. All the improvements will be used as input to a large-scale piloting of QUPER in industry, planned to start spring 2011. In addition, to enable easier adoption of QUPER by practitioners, tool support for QUPER will also be developed.

Richard Berntsson Svensson will present his PhD thesis on the subject late 2011.

By tracking the development of the quality level of the company's own products you could identify and compare one or more appropriate release windows.



PalCom – middleware for Perva

The acronym PalCom stands for Palpable Computing wher 'palpable' means 'noticeable' and 'understandable'. One g is to empower users to comb features and services of surrounding equipment in creati or unforseen ways.

Pervasive computing put focus on the emerging situation where communicating devices and services needs to be put together in flexible ways. In heterogeneous mobile networks, devices come and go. The combined behavior needs to adjust to the changing situation and the availability of services. The behavior frequently needs to be changed in order to include new, previously unknown, types of devices and services. This kind of situations appears in your pockets, including mobile phones, mp3-players, cameras, etc., in your home including audio-video equipment etc., and in professional settings such as in healthcare and industry automation, to take just a few examples.

The PalCom architecture separate Computation (realized by services) from Assemblies that cover Configuration (what Services are included) and Coordination (how the Services interact). Communication in PalCom is providing a unified view of heterogeneous networks, and use discovery mechanisms to make assemblies react to a changing environment as services come, and go.

– The Assemblies are used to mediate between services not designed to fit together and makes it possible to combine them in new, un-planned, ways. And, most importantly, since this can be done without changing the services, it enables others than the original implement-

Published in 2010

Theme A - User Experience-Driven System Configuration

Petra Lodén: **Blodflöde i realtid**;VINNOVA-nytt No 4, October 2010

Karl Kullberg, Nick Bosma: **Calculation and presentation of cerebral blood flow in real-time**, M Sc thesis, Computer Science, Lund University, 2010

John Lindholm: **Support for multimedia streaming in PalCom**, M Sc thesis, Computer Science, Lund University, 2010

Gustav Reiz, Rikard Gustafsson: **Remote Access of Home Network from Mobile Devices using DLNA and Linux**, M Sc thesis, Computer Science, Lund University, 2010

Theme B - Flexible Execution of Software in Parallel Embedded Systems

Antoine Floch, Christophe Wolinski, and Krzysztof Kuchcinski: **Combined Scheduling and Instruction Selection for Processors with Reconfigurable Cell Fabric**, accepted to ASAP 2010, 21st IEEE International Conference on Applicationspecific System 9, 2010, Rennes, France.

Grahn, Håkan: **Transaction Memory**, as guest editor, introduction to Journal of Parallel and Distributed Computing, Vol. 70, No. 10, pp. 993-1008, 2010.

Christophe Wolinski, Krzysztof Kuchcinski, Kevin Martin, Antoine Floch, Erwan Raffin, and Francois Charot: **Graph Constraints in Embedded System Design**, accepted to Workshop inCombinatorial Optimization for Embedded System Design, in conjunction with CPAIOR2010, 7thInternational Conference on Integration of Artificial Intelligence (AI) and Operations Research(OR) techniques in Constraint Programming, June 15, 2010, Bologna, Italy.

J.K. Martinsen and H. Grahn: **Client side JavaScript workload characterization of social network applications**, School of Computing, Blekinge Institute of Technology, Sweden, July 2010.

Jan Kasper Martinsen and Håkan Grahn: **An alternative optimization technique for JavaScript engines**: Proc. of the Third Swedish Workshop on Multi-Core Computing (MCC-10), pages 155-160, November 2010, Göteborg, Sweden.

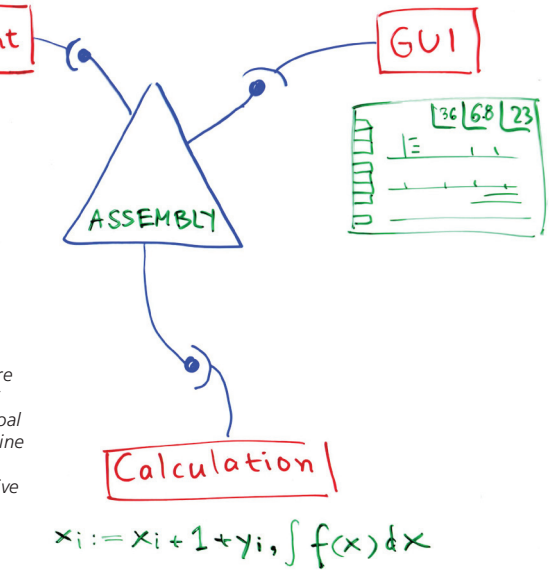
Jan Kasper Martinsen and Håkan Grahn, **A Comparative Evaluation of the Execution Behavior of JavaScript Benchmarks and Real-World Web Applications,** Poster proc. of the 28th International Symposium on Computer Performance, Modeling, Measurements and Evaluation (Performance-2010), pages 27-28, November 2010, Namur, Belgium. (poster presentation)

Jan Kasper Martinsen, Håkan Grahn, and Anders Isberg: **A Comparative Evaluation of JavaScript Execution Behavior**, school of Computing, Blekinge Institute of Technology, Sweden, November 2010.

Theme C - Efficient Software Development

S. Barney and C. Wohlin: **Alignment of Software Product Quality Goals in Two Outsourcing Relationships**, Proceedings of Evaluation and Assessment in Software Engineering (EASE), Keele, UK, April 2010.

asive Computing



ers of services to do such adjustments using a simple script language, says professor Boris Magnusson, coordinator for EASE theme A.

Health care, home and robots

The PalCom middleware was originally developed as part of an EU IST project, but have been further developed in EASE and other VINNOVA and SSF projects. It is currently used in healthcare systems such as blood flow meter, in combination with dlna equipment to enable flexible combination with remote and mobile devices, in combination with AXIS cameras and remote sensors. Current development include applications to real-time control of mobile robots in the ENGROSS project.

The main deliveries from the project will be an architecture, a reference implementation and some demonstrators. Early versions are availible as open source [http://www.ist-palcom.org].

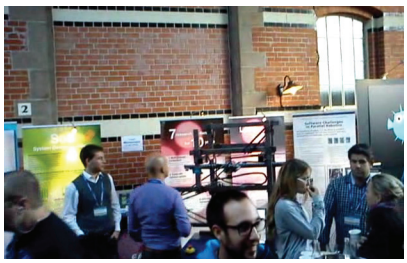
Communicated in 2010

- EASE 2010 Industry-Academy workshop and industry evaluation (45 particpants from industry and academia at Bäckaskog 2010-02-10--11)
- Licentiate Seminar: Understanding and Supporting Large Scale Requirements Management (Lund 2010-02-12)
- LUCAS-breakfast: EASE research overview 2009-2010 (Lund 2010-02-17)
- Guest lecture: Prof. Anneliese Andrews (Ronneby 2010-02-25)
- Lic. Thesis Seminar: Understanding and Supporting Requirements Engineering Decisions in Market-driven Software Product Development (Ronneby 2010-04-07)
- Lic. Thesis Seminar: Exploring Regression Testing and Software Product Line Testing Research and State of Practice (Lund 2010-05-03)
- Presentation at Qtema Stockholm (Stockholm 2010-05-13)
- LUCAS-breakfast: Constraint Programming in Embedded System Design (Lund 2010-05-19)
- EASE-presentation at Axis - Multiple presentations of results (Axis Comunication AB, Lund 2010-05-19)
- EASE was presented for VINNOVAs Director General (Sony Ericsson, Lund 2010-05-19)
- Guest lecture: Dr. Austen Rainer: Perspectives on evidence (Lund 2010-05-24)
- LUCAS-breakfast: Open source in commercial organizations - current research (Lund 2010-06-09)
- EASE presented at Mobile Heights workshop (Ystad 2010-06-30--07-01)
- PhD thesis: Implementing Lean and Agile Software Development in Industry (Karlskrona 2010-09-07)
- Multicore Day, presentations: An evaluation of four static analysis tools for Java concurrency bugs and Beyond von Neumann - weakly programmable processor arrays and their programming. (Stockholm 2010-09-09)
- Product Management Conference (IBM, Stockholm 2010-09-10)
- EASE Theme B presented at DTU: Flexible Execution of Software in Parallel Embedded Systems (DTU, Copenhagen 2010-09-16)
- EASE was presented at Lund Circuit Design Workshop (Lund 2010-09-21)
- EASE Scientific Advisory Board Meeting (Lund 2010-10-11--12)
- Embedded Conference Scandinavia 2010 (Exhibition and multiple presentations Stockholm 2010-10-19--20)

Foto: David Thibel

Per Runeson och Martin Höst moderates the Open Source Experience Workshop at the annual LUCAS-day 2010 in Lund.

- LUCAS-day 2010 (Exhibition and multiple presentations Lund 2010-10-21)
- ITQ Conference Stockholm, Keynote (Stockholm 2010-10-27)



EASE booth were exposed to 1400 industry practitioners on Öredev 2010.

- Öredev (Exhibition in cooperation with Mobile Heigts, SIGRUN and LTH Robot lab in Malmö 2010-11-08--12)
- VINNOVA Evaluation Hearing (Stockholm 2010-11-24)
- EASE findings presented at Ericsson Software Research Day (Stockholm 2010-11-25)
- Guest lectures and discussions on joint research opportunities at Aristotle University, Thessaloniki (Thessaloniki, Greece 2010-12-07--09)

S. Jalali and C. Wohlin: **Agile Practices in Global Software Engineering – A Systematic Map**, International Conference on Global Software Engineering, Princeton, USA, August 2010.

A. Orucevic-Alagic and M. Höst: **A Case Study on the Transformation From Proprietary to Open Source Software**, in proceedings of OSS 2010 - International Conference on Open Source Systems, June, 2010.

M. Höst and A. Orucevic-Alagic: **A Systematic Review of Research on Open Source Software in Commercial Software Product Development**, Proceedings of International Conference on Evaluation & Assessment in Software Engineering (EASE), Keele, UK, April, 2010.

Samireh Jalali, Cigdem Gencel and Darja Smite: **Trust Dynamics in Global Software Engineering**, 4th International Symposium on Empirical Software Engineering and Measurement, Bozen-Bolzano, Italy, September 2010.

★Best Paper Award

Nina Dzamashvili Fogelström, Emil Numminen and Sebastian Barney: **Using Portfilio Theory to Support Requrements Selection Decisions** (Short Paper), IWSPM 2010 4th International Workshop on Software Product Management, Sydney, Australia.

Mahvish Khurum, Sebastian Barney, Nina D Fogelström and Tony Gorschek: **Requirements Management for Continuous Software Product Development**, Evaluation and Assessment in Software Engineering (EASE), Keele, UK, April 2010

Theme D - Aligning Requirements and Verification

G. Sabaliauskaite, A. Loconsole, E. Engström, M. Unterkalmsteiner, B. Regnell, P. Runeson, T. Gorschek, R. Feldt: **Challenges in Aligning Requirements Engineering and Verification in a Large-Scale Industrial Context**, REFSQ2010, International Working Conference on Requirements Engineering: Foundation for Software Quality

Emelie Engström: **Exploring Regression Testing and Software Product Line Testing Research and State of Practice**, Licentitate thesis. Reviewer: Dr. Darja Smite, BTH. May 3.

Krzysztof Wnuk: **Understanding and Supporting Large Scale Requirements Management**, Licentitate thesis. Reveiwer: Mikael Svahnberg, BTH. February 12.

Berntsson Svensson, R, Höst, M, Regnell, B: Managing Quality Requirements: **A Systematic Review**, 36th EUROMICRO Conference on Software Engineering and Advanced Applications, (SEAA'10), 1-3 September, 2010, Lille, France.

Berntsson Svensson, R., Regnell, B., Aurum, A: **Towards Modeling Guidelines for Capturing the Cost of Improving Software Product Quality in Release Planning**, 11th International Conference on Product Focused Software Development and Process Improvement (PROFES 2010), June 21-23, Limerick, Ireland.

Berntsson Svensson, R., Sprockel, Y., Regnell, B., Brinkkemper, S: **Cost and Benefit Analysis of Quality Requirements in Competitive Software Product Management: A case study on the QUPER model**, 4th International Workshop on Software Product Management (IWSPM10), 27 September, Sydney, Australia

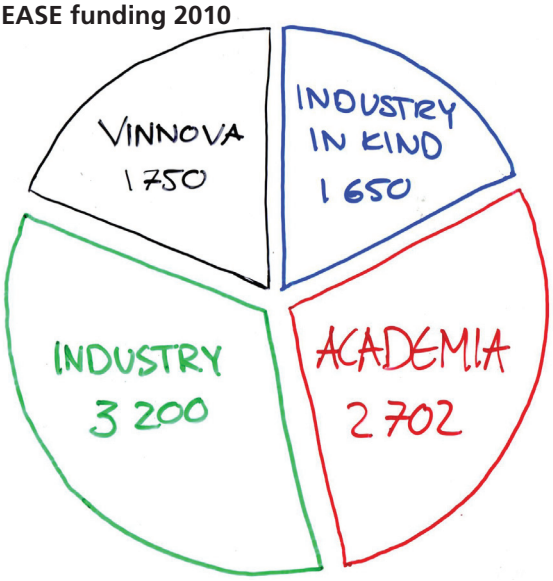
Quotes from EASE evaluations 2010

Industry evaluation 2010-02-12:
The work performed and the collaboration from the industrial partners is promising and should be maintained and improved. More collaboration and stronger involvement of industrial partners in both the definition of research themes and participation in actual research is expected in coming evaluation results.

Academic Evaluation 2010-10-12:
Centers such as EASE, bridging research and practice, are of high importance to Swedish innovation. Challenges are many in starting and running such a center but the expected benefits are enormous.

VINNOVA evaluation 2010-11-24:
The Centre has a vision to be a world-class research facility for the development of "embedded software applications with physical and logical mobility". The Centre has core competence, a regional research milieu, and industrial partners appropriate to this vision and has already demonstrated the strategy and capability to deliver on this vision through the development of technologies already taken up by it's industry partners.

EASE funding 2010



Industry: *Sony Ericsson, Ericsson, ST Ericsson, Axis Communications Softhouse Consulting.*

Academia: *Lund University/LTH, Blekinge Institute of Technology.*

Ongoing projects when entering 2011
A1: End-user system configuration
A2: Managing product line architectures
B1: Thread-level speculation
B2: Reconfigurable hardware
C1: Agile methods
C2: Open source in commercial organizations
C3: Non-functional aspects in development
D1: Problem Exploration and State-of-the-art
D2: Large-scale test to requirements linking
D3: StreamRET: Adaptive Framework for Streamlined Requirements and Test Co-optimization

People

Researchers

Boris Magnusson, Prof.
Coordinator theme A

John Lindholm, Research engineer, theme A

Håkan Grahn, Prof
Coordinator theme B

Krzysztof Kuchcinski, Prof.
Vice Coordinator theme B

Per Andersson, Post Doc theme B

Jan Kasper Martinsen, Ph D Student theme B

Martin Höst,
Dr. Coordinator theme C

Claes Wohlin, Prof.
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Sebastian Barney,
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Alma Orucevic-Alagic,
Ph D Student theme C

Samireh Jalali, Ph D Student theme C

Björn Regnell,
Prof. Coordinator theme D

Tony Gorschek,
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Per Runeson, Prof. theme D

Annabella Loconsole, Dr. theme D to 2010-05-31

Giedre Sabaliauskaite,
Post Doc theme D to 2010-03-31

Michael Unterkalmsteiner, Ph D Student theme D

Markus Borg, Ph D Student theme D

Jonas Wisbrant, Project Secretary

EASE board

Sten Minör (chair), Sony Ericsson Mobile Communications to 2010-04-30

Knut Mårtensson (chair), Sony Ericsson Mobile Communications from 2010-05-01

Gustav Kälvesten,
Axis Communications

Michael Mattsson (vice chair), BTH

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Peter Thorman,
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Jerker Wilander

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Viktor Öwall,
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Scientific Advisory Board

Prof. Lionel Briand, University of Oslo, and Simula Research Laboratory

Prof. David Notkin,
University of Washington, Seattle

Prof. Per Stenström, Chalmers University of Technology, Göteborg

This is EASE

EASE aims to be a world class applied software research facility for embedded software applications. The objective is to ensure that industrial partners have a competitive advantage with respect to competency and innovation of novel solutions and effective engineering of embedded software applications with physical and logical mobility.

The centre impacts on the innovation system through provisioning of competency, via a continuous exchange loop between industry and academia, involving research challenges, industry personnel, researchers, students and research results. These range from technical solutions that can be used in products to improved work procedures for the development.

Research themes

- **A** User Experience-Driven System Configuration
- **B** Flexible Execution of Software in Parallel Embedded Systems
- **C** Efficient Software Development
- **D** Aligning Requirements and Verification

EASE
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