Theme 1 Continuous Delivery

Kristian Sandahl

Vision: Continuous Delivery of Software

Software Center

Challenges

- High demand for automation
- Complex machinery
- Involves many stakeholders
- Changing organization, processes, mindset
- Regulatory constraints

Agenda

- Implications of Continuous Deployment: *Agneta Nilsson*
- Enterprise Scale Continuous Integration and Delivery: *Torvald Jägtoft*
- Automated GUI--based Exploratory Testing and Visual GUI Testing: *Jan Bosch*
- Visualizations as decision support in continuous integration: *Ola Leifler*
- Behavioral Software Engineering: *Robert Feldt*

Breakout session

- We’ve invited project #27:
- Requirements engineering for large-scale agile systems development

- Welcome!

Implications of Continuous Deployment Project No:1

Agneta Nilsson

Eric Knauss

Project team

- Agneta Nilsson
- Erik Knauss

Joining for next sprint

- Gul Calikli

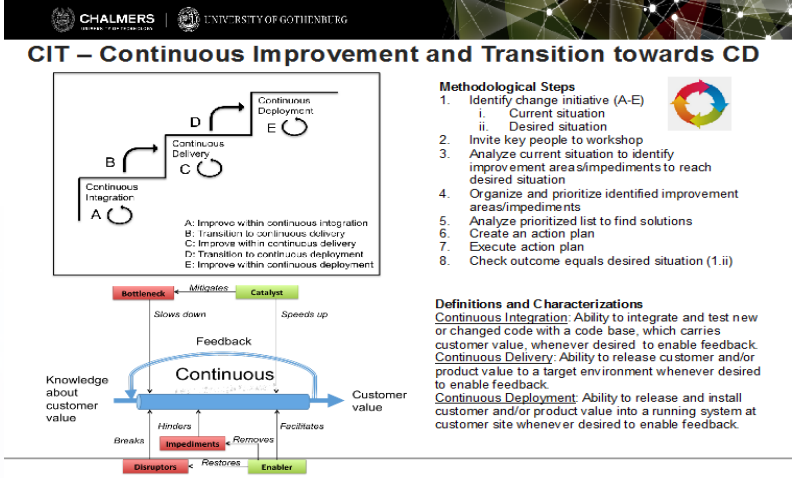
Project goals

- The focus is to facilitate and support change initiatives towards continuous integration, continuous deployment, and R&D as innovation systems.
  - What are the implications of continuous deployment?
  - How do we organize and arrange these new development processes?
  - What are the organizational and technical impediments, and what facilitates continuous deployment?

What we have done this sprint

- Packaged KACI into a change method
- Pre-study “adding value every sprint”
- Common workshop with companies and projects #1, #3, and #18
  - identified how to link bottlenecks identified in project #1 with measures identified in project #3 and visualizations developed in project #18

Results so far



- Change Method:
  - CIT - Continuous Improvement and Transition towards continuous deployment
- Benefits from “adding value every sprint” exceed efforts/costs
  - Benefits/Challenges
  - Perceptions of value
  - Practices
- Relationship to CIT – identified challenges and solutions

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Next steps

- To use the outcome of the pre-study in CIT WS to enhance continuous integration and deployment flows
- To report and publish the Continuous Improvement and Transition method (CIT)
- To support the application of CIT workshops in involved companies
- Explore common challenges and best practices for regulated (e.g. safety critical) systems
- Continue collaboration with Project #3 and #18 with new relevant results from CIT
- Explore management of customer value in continuous integration and delivery in collaboration with project #27

Enterprise Scale Continuous Integration and Delivery Project Nr: 6

Daniel Ståhl
Torvald Mårtensson
Jan Bosch

Project team

- Daniel Ståhl, Ericsson

- Torvald Mårtensson, Saab

- Jan Bosch, Chalmers

Software Center

Project goals

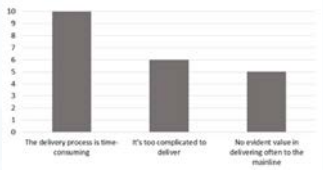
- The focus of the project is to develop and document methods and techniques facilitating systematic approaches to implementing continuous integration and delivery systems, particularly at enterprise scale.

Results previous sprints

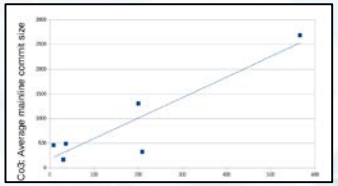
- Established divergence in continuous integration practice, interpretation and experiences
- Designed an architectural framework for continuous integration and delivery
- Documented and evaluated the open source continuous integration and delivery Framework Eiffel

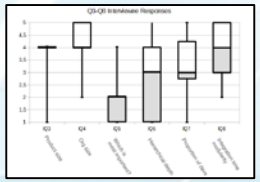
Results this sprint

- Continuous integration is not about build systems

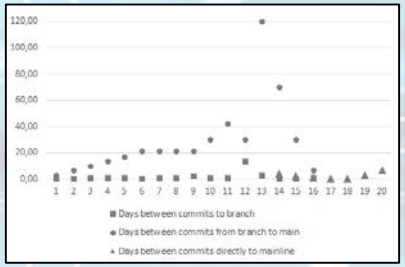


- "Continuity" of continuous integration correlates with organizational size and composition





- Continuous delivery doesn't necessarily imply continuous integration



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Next steps

- What exactly are the impediments to large scale continuous integration? What is keeping the individual developer from committing more frequently?

- Revisit literature: what are the trends on research on continuous practices, and how does it relate to e.g. embedded systems and DevOps?

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Visual GUI Testing and ORION Project Nr: 8

Prepared by Emil Alégroth

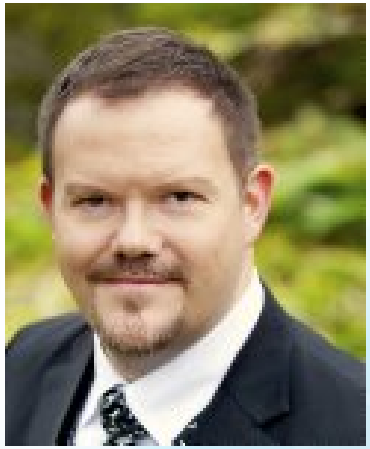
Presented by Jan Bosch

Project team and collaborators

Emil Alégroth, BTH/CTH
Project 8 leader
ORION researcher

Michael Mattsson, BTH
ORION Project manager

Jakob Axelsson, SICS
ORION Vice Project manager



Tony Gorschek, BTH
ORION Deputy Project manager

And 12 other researchers.

In collaboration with

GRUNDFOS

Tetra Pak®

Orion

Blekinge Tekniska Högskola · BTH

Swedish ICT SICS

Mälardalens Högskola Eskilstuna Västerås

AUQTUS
Automated Quality Testing of User Scenarios

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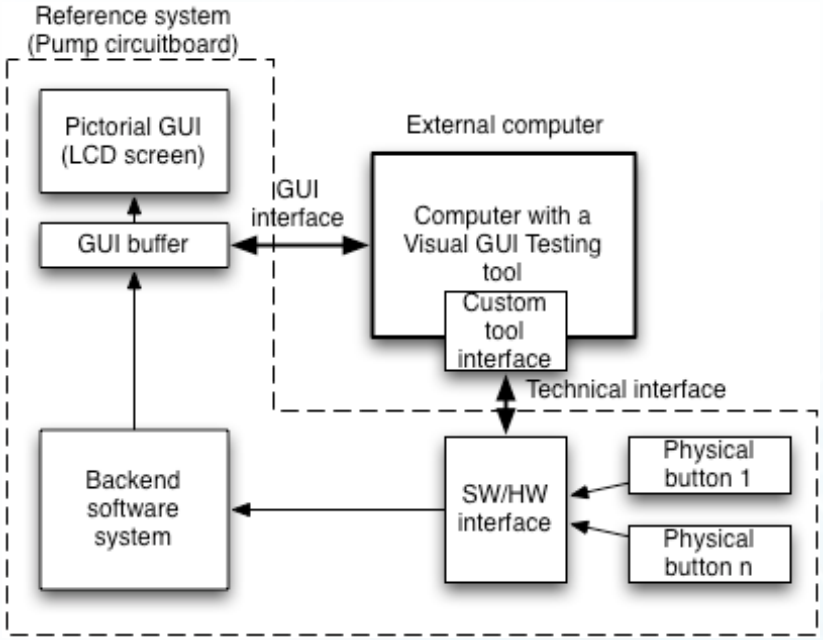
Project goals

- Visual GUI Testing (VGT) (Project 8)
  - Advance the state-of-knowledge in automated GUI-based testing with focus on automated image recognition-based testing.
  - Identify support/core-practices for VGT in continuous development
- ORION
  - Identify tools, techniques, processes and approaches to improve decision-making about technical assets in industrial practice.

What have we done in Project 8?

- Study with Grundfos
  - Can we test embedded systems with VGT?
  - Proof-of-concept, keeping it small and simple!



Architecture

Grundfos developed:

- A custom image extraction interface
  - Send image to computer folder
- A custom input interface
  - Send control cmds (Strings) to SUT

Research team developed (for JAutomate):

- Custom components to read image from folder
- Custom components to send control cmds (Strings) to SUT
- **Generalizable solution!**

Results of Proof-of-Concept

- **Cost and Benefits**
  - Manual test case development time: ~1.5 minutes per test case
  - Time to automate: ~15 minutes per test case
  - **ROI:** ~10-11 test executions
  - **1150 tests can be run in 10 hours (Nightly build)**
  - **VGT can be used to test embedded software** which opens up new possibilities to test:
    - Infotainment systems
    - Control-management systems
    - Etc.

- **Challenges**
  - Slow image extraction (15 sec) from Screen buffer (limit test execution time)
  - **Unexpected system system properties** that caused minor problems and could have been mitigated with better requirements engineering
  - **Unexpected script or SUT failure** require failure mitigation code and more technical work for a final solution

- **Outcome**
  - Grundfos are happy with the study but decided in the end to go for another solution

- **Resulting Paper:** Visual GUI Testing of Embedded Software: An Industrial Proof-of-concept Study
  - (Unfortunately not accepted at ICST main conference. Will be sent to other venue)

What is the ORION Project?

- ORION will bring **a holistic decision support system** to manage the trade-off between functionality, time to market, cost, quality, and risk **to develop competitive software-intensive systems** using components and services.

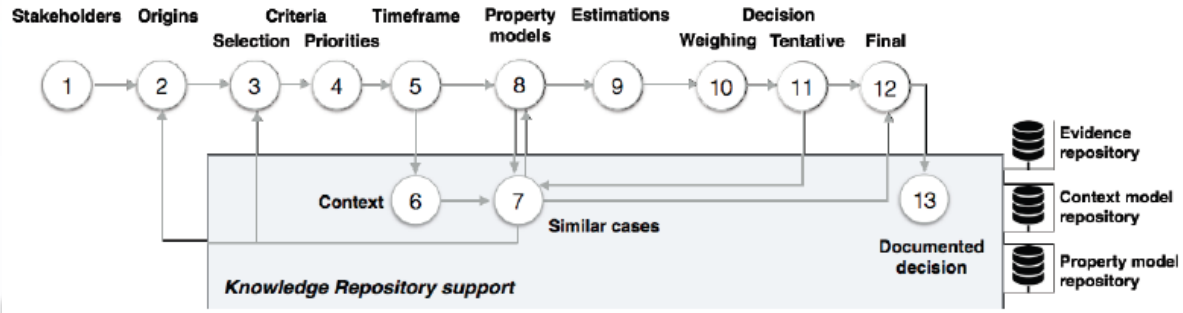
- Project funded by KK-stiftelsen

- 16 researchers from three institutions
  - Blekinge Institute of Technology (BTH) in Karlskrona
  - Mälardalen University (MDH), Mälardalen
  - SICS Swedish ICT AB, Stockholm

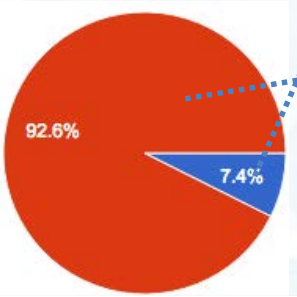
- TetraPak included as a research partner
  - Helps verify results and set the research agenda

- Project currently in the beginning of Sprint 2 out of 3

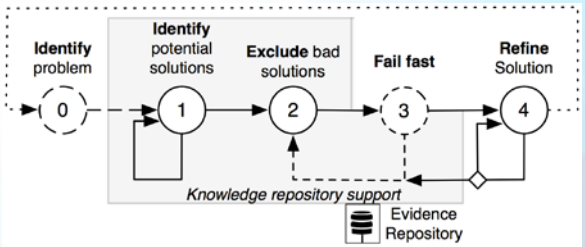
Results of ORION



A research-oriented meta-process for decision-making



92.6 percent of practitioners (Survey with 27 people from 13 companies) want a small process with the capabilities of the big process



Allows you to create detailed/ Focused processes for certain decisions

COACH Framework: Tool environment for automated creation and execution of custom decision-making processes

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What's Next? Papers!

- Towards Lean and Agile Decision-making: An Industrial Survey Study
  - Current results presented here from ORION
- On the Misalignment Between Industrial Practitioners' and Academics' Views of Industrial Needs
  - Research projects need better requirements engineering
  - **If you want to contribute** with your experiences; contact Emil! (Emil.Alegroth@BTH.se)
    - **ONLY INDUSTRIAL PRACTITIONERS ALLOWED** ;)
- Procedural Generation of Lean Processes for Contextual Decision-making
  - Outline of an approach to procedurally generate decision-making processes

Data Visualization for Continuous Integration

Kristian Sandahl
Ola Leifler

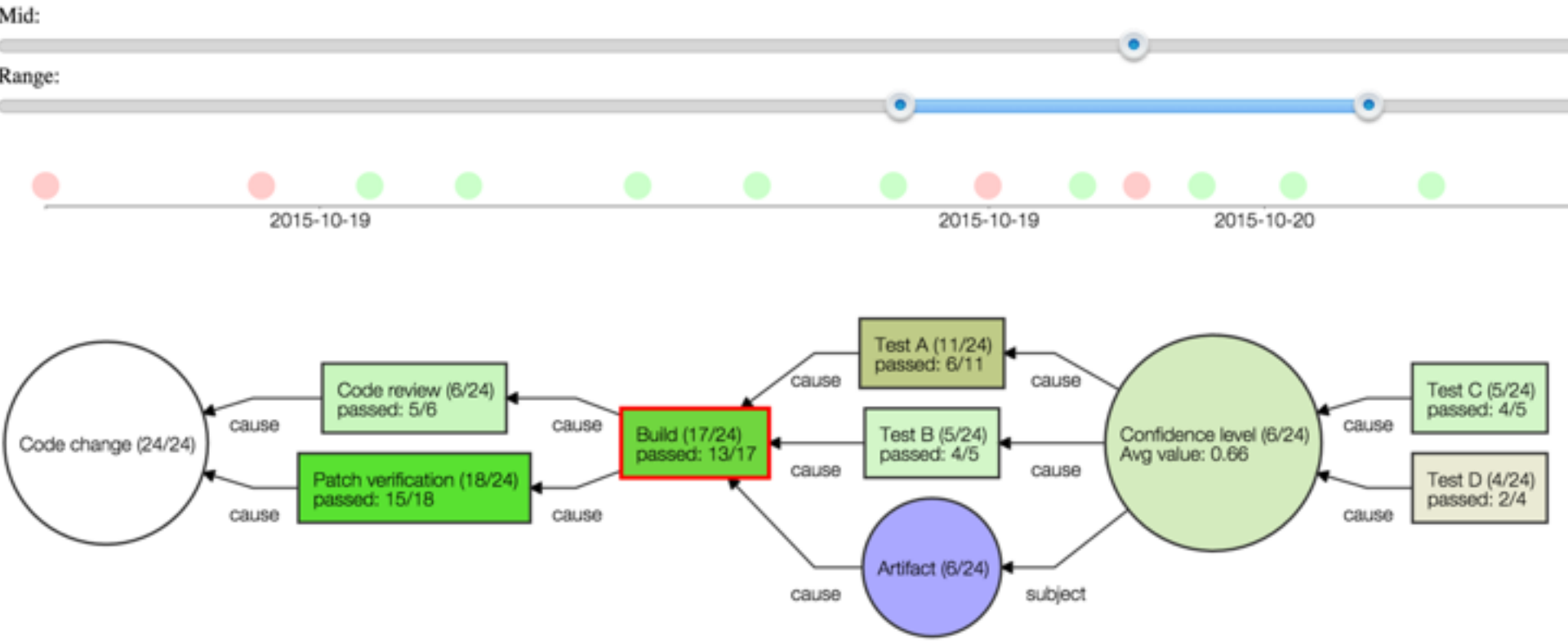
Project team

- Kristian Sandahl, Professor, Linköpings universitet
- Ola Leifler, Lektor, Linköpings universitet

Project goals

- Using advanced interaction and visualization techniques, we aim to enable more stakeholders to participate in continuous improvement processes.

Sprint 9-10



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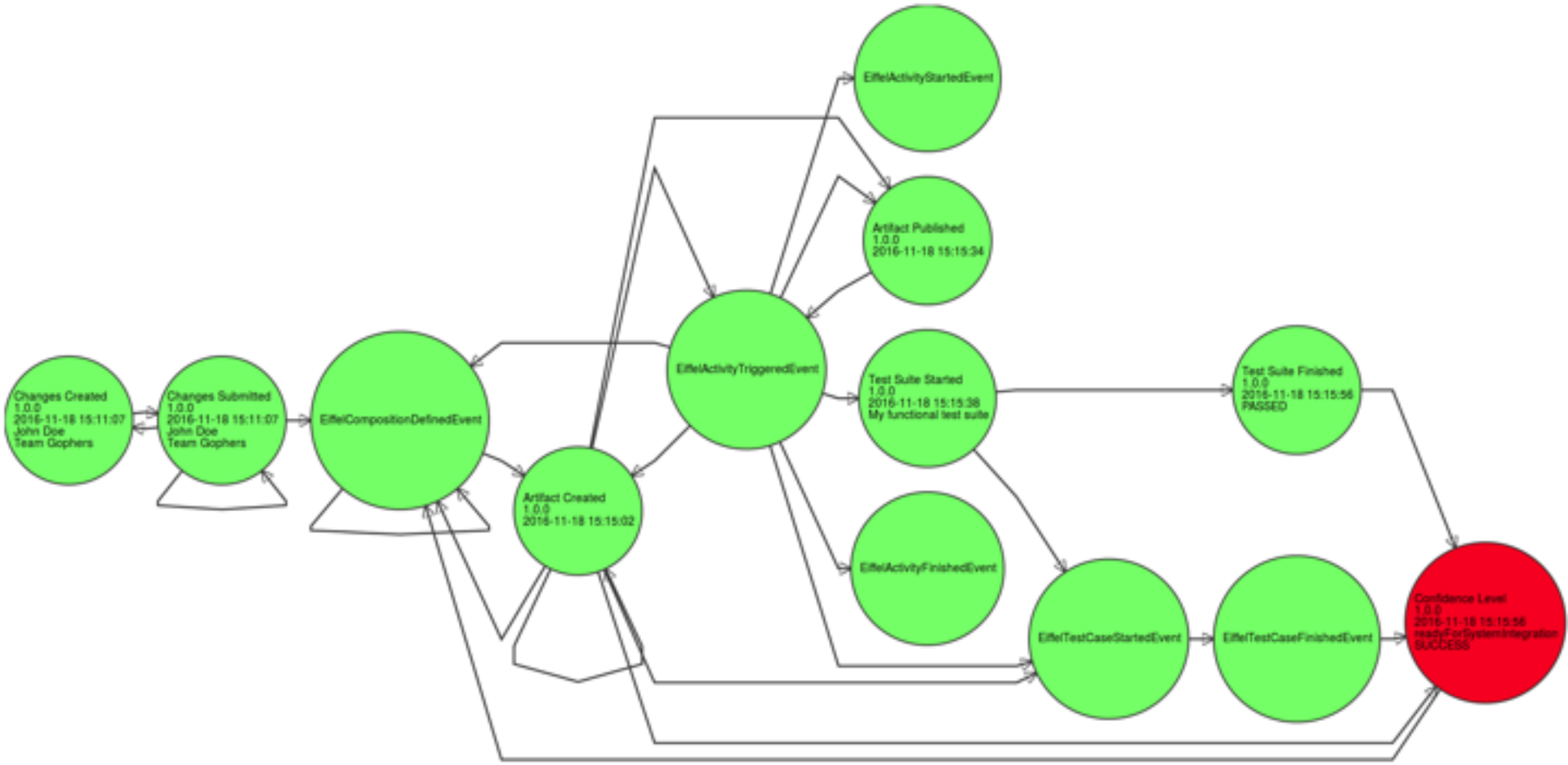
Sprint 11


EiffelActivityStartedEvent
Artifact Published
1.0.0
2016-11-18 15:15:34
Changes Created
1.0.0
2016-11-18 15:11:07
John Doe
Team Gophers
Changes Submitted
1.0.0
2016-11-18 15:11:07
John Doe
Team Gophers
EiffelCompositionDefinedEvent
EiffelActivityTriggeredEvent
Test Suite Started
1.0.0
2016-11-18 15:15:38
My functional test suite
Test Suite Finished
1.0.0
2016-11-18 15:15:56
PASSED
Artifact Created
1.0.0
2016-11-18 15:15:02
EiffelActivityFinishedEvent
EiffelTestCaseStartedEvent
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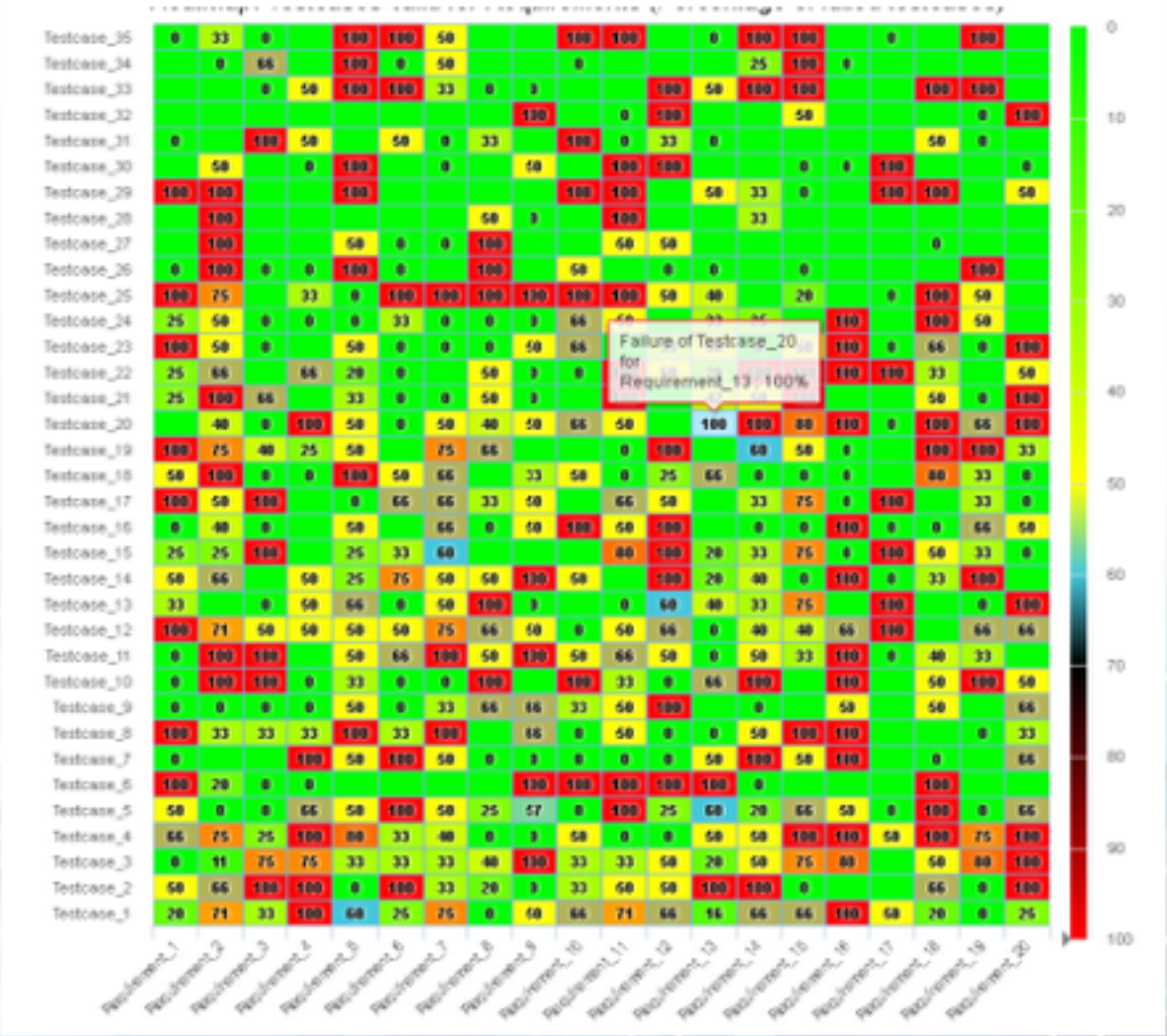
Confidence Level
1.0.0
2016-11-18 15:15:56
readyForSystemIntegration
SUCCESS


Failure of Testcase_20
for
Requirement_13 : 100%

Sprint 11

- Joint workshop with projects 1, 3, 18 & Saab, Ericsson, Axis, Volvo Cars, Grundfos, TetraPak:
  - How do build and test queues affect development throughput?
  - What causes build and test queues to grow?
  - What happens if people can instrument and monitor build and test queues?

Sprint 12

Build/test queues

Metrics on queues

Subscribers

Visualization

Notifications

Event bus

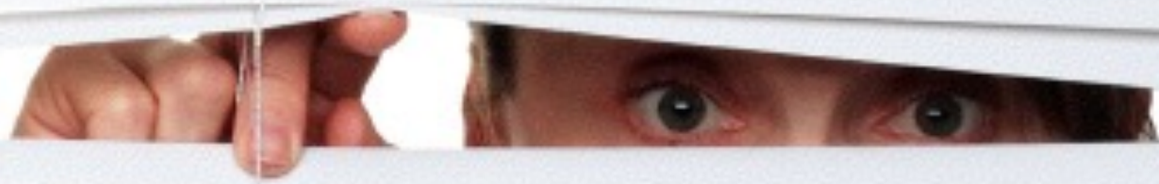
Publishers

Git commits

Jenkins builds

Test suite runs

Behavioral changes



Behavioral Software Engineering:
Let's focus on the humans…

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Let's focus on the humans…



Robert Feldt, Per Lenberg, Lars-Göran Wallgren
Chalmers, SW Center Report WS, 16-12-08

Mission & Vision

Mission & Vision

Behavioral Software Engineering:
People are not rational

Mission & Vision

Behavioral Software Engineering:
People are not rational

But majority of SE research focus on technology, process and methods

Mission & Vision

Behavioral Software Engineering:
People are not rational

But majority of SE research focus on technology, process and methods

In BSE we learn from Psychology, Sociology and Behavioural Economics

Behavioral Software Engineering =

"Study of

cognitive, emotional, and behavioural

aspects of software development work

at the level of

individuals, groups and the organisation"

Behavioral Software Engineering =

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Exclude the use and users of software, focus on developers and development tasks.

So what have we done in BSE?

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Contents lists available at ScienceDirect

Information and Software Technology

journal homepage: www.elsevier.com/locate/infsof

Links between the personalities, views and attitudes of software engineers

Robert Feldt [a,*], Lefteris Angelis [b], Richard Torkar [a], Maria Samuelsson [c]

[a] Blekinge Institute of Technology, S-372 25 Ronneby, Sweden
[b] Dept. of Informatics, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece
[c] Dept. of Informatics, University West, S-461 86 Trollhättan, Sweden

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Received 8 November 2008
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Keywords:
Software engineering
Human factors
Personality
Attitudes
Empirical study
Statistical analysis

ABSTRACT

Context: Successful software development and management depends not only on the technologies, methods and processes employed but also on the judgments and decisions of the humans involved. These, in turn, are affected by the basic views and attitudes of the individual engineers.
Objective: The objective of this paper is to establish if these views and attitudes can be linked to the personalities of software engineers.
Methods: We summarize the literature on personality and software engineering and then describe an empirical study on 47 professional engineers in ten different Swedish software development companies. The study evaluated the personalities of these engineers via the IPIP 50-item five-factor personality test and prompted them on their attitudes towards and basic views on their professional activities.
Results: We present extensive statistical analyses of their responses to show that there are multiple, significant associations between personality factors and software engineering attitudes. The tested individuals are more homogeneous in personality than a larger sample of individuals from the general population.
Conclusion: Taken together, the methodology and personality test we propose and the associated statistical analyses can help find and quantify relations between complex factors in software engineering projects in both research and practice.

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Investigating intentional distortions in software cost estimation – An exploratory study

Ana Magazinius [a], Sofia Börjesson [b], Robert Feldt [a,*]

[a] Department of Computer Science and Engineering, Chalmers University of Technology, Sweden
[b] Department of Technology Management and Economics, Chalmers University of Technology, Sweden

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Organizational factors
Organizational politics
Estimation inaccuracy
Software engineering
Empirical study

ABSTRACT

Cost estimation of software projects is an important activity that continues to be a source of problems for practitioners despite improvement efforts. Most of the research on estimation has focused on methodological issues while the research focused on human factors primarily has targeted cognitive biases or perceived inhibitors. This paper focuses on the complex organizational context of estimation and investigates whether estimates may be distorted, i.e. intentionally changed for reasons beyond legitimate changes due to changing prerequisites such as requirements or scope. An exploratory study was conducted with 15 interviewees at six large companies that develop software-intensive products. The interviewees represent five stakeholder roles in estimation, with a majority being project or line managers. Document analysis was used to complement the interviews and provided additional context. The results show that both estimate increase and estimate decrease exist and that some of these changes can be explained as intentional distortions. The direction of the distortion depends on the context and the stakeholders involved. The paper underlines that it is critical to consider also human and organizational factors when addressing estimation problems and that intentional estimate distortions should be given more and direct attention.

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Confirming Distortional Behaviors in Software Cost Estimation Practice

Ana Magazinius
Computer Science and Engineering
Chalmers University of Technology
Gothenburg, Sweden
ana.magazinius@chalmers.se

Robert Feldt
Computer Science and Engineering
Chalmers University of Technology
Gothenburg, Sweden
robert.feldt@chalmers.se

***Abstract*—Cost estimation of software projects is an important management activity. Despite research efforts the accuracy of estimates does not seem to improve. In this paper we confirm intentional distortions of estimates reported in a previous study. This study is based on questionnaire responses from 48 software practitioners from eight different companies. The results of the questionnaire suggest that prevalence of intentional distortions is affected by the organizational type and the development process in use. Further, we extend the results with information about three companies' estimation practices and related distortions collected in interviews with three managers. Lastly, based on these results and additional organizational politics theory we describe organizational politics tactics that affect cost estimates.**

I. Introduction and Related Work

Cost and effort estimation of software projects is an important, yet difficult project management activity [1]. Projects are often finished later than scheduled deadlines and over budget [2]–[7]. One of the reasons so many projects are reported to be

For example, point estimates and estimates with too narrow confidence intervals are awarded [9], and first estimates are often seen as promises rather than forecasts based on the available unclear and incomplete information [14]. This type of organizational culture might have contributed to the prevalence of *organizational politics* in information systems project cost estimation reported by Lederer and Prasad as intentional shrinking and padding behaviors caused by differing interests in project planning [1], [15], [16]. Magazinius et al [14] have further explored intentional distortions in estimates focusing on todays large, mature organizations concluding that intentional distorting of estimates exists. The authors also provided a description of preconditions and reasons for such behaviors.

In this paper we further investigate and explain prevalence of intentional estimate distortions. Since previous studies have shown the importance of the organizational context and the development processes in use we specifically want to study

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Behavioral software engineering: A definition and systematic literature review

Per Lenberg[a,*], Robert Feldt[b], Lars Göran Wallgren[c]

[a] Division of Software Engineering, Chalmers University, SE-412 96 Gothenburg, Sweden
[b] Department of Software Engineering, Blekinge Institute of Technology, Karlskrona, Sweden
[c] Department of Psychology, Gothenburg University, Gothenburg, Sweden

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Human aspects
Psychology

ABSTRACT

Throughout the history of software engineering, the human aspects have repeatedly been recognized as important. Even though research that investigates them has been growing in the past decade, these aspects should be more generally considered.

The main objective of this study is to clarify the research area concerned with human aspects of software engineering and to create a common platform for future research. In order to meet the objective, we propose a definition of the research area behavioral software engineering (BSE) and present results from a systematic literature review based on the definition.

The result indicates that there are knowledge gaps in the research area of behavioral software engineering and that earlier research has been focused on a few concepts, which have been applied to a limited number

atory

ure Cost

Estimation Practice

Ana Magazinius
Computer Science and Engineering
Chalmers University of Technology
Gothenburg, Sweden
ana.magazinius@chalmers.se

Robert Feldt
Computer Science and Engineering
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Gothenburg, Sweden
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Abstract—Cost estimation of software projects is an important management activity. Despite research efforts the accuracy of estimates does not seem to improve. In this paper we confirm intentional distortions of estimates reported in a previous study. This study is based on questionnaire responses from 48 software practitioners from eight different companies. The results of the questionnaire suggest that prevalence of intentional distortions is affected by the organizational type and the development process in use. Further, we extend the results with information about three companies' estimation practices and related distortions collected in interviews with three managers. Lastly, based on these results and additional organizational politics theory we describe organizational politics tactics that affect cost estimates.

I. Introduction and Related Work

Cost and effort estimation of software projects is an important, yet difficult project management activity [1]. Projects are often finished later than scheduled deadlines and over budget [2]–[7]. One of the reasons so many projects are reported to be

For example, point estimates and estimates with too narrow confidence intervals are awarded [9], and first estimates are often seen as promises rather than forecasts based on the available unclear and incomplete information [14]. This type of organizational culture might have contributed to the prevalence of *organizational politics* in information systems project cost estimation reported by Lederer and Prasad as intentional shrinking and padding behaviors caused by differing interests in project planning [1], [15], [16]. Magazinius et al [14] have further explored intentional distortions in estimates focusing on todays large, mature organizations concluding that intentional distorting of estimates exists. The authors also provided a description of preconditions and reasons for such behaviors.

In this paper we further investigate and explain prevalence of intentional estimate distortions. Since previous studies have shown the importance of the organizational context and the development processes in use we specifically want to study

So what have we done in BSE?

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Behavioral software engineering: A definition and systematic literature review

Per Lenberg[a,*], Robert Feldt[b], Lars Göran Wallgren[c]

[a] Division of Software Engineering, Chalmers University, SE-412 96 Gothenburg, Sweden
[b] Department of Software Engineering, Blekinge Institute of Technology, Karlskrona, Sweden
[c] Department of Psychology, Gothenburg University, Gothenburg, Sweden

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Human Factors Related Challenges in Software Engineering - an Industrial Perspective

Per Lenberg*, Robert Feldt† and Lars Göran Wallgren‡
* Corresponding Author
Div. of Software Engineering
Chalmers University, Gothenburg, Sweden
Email: perle@chalmers.se
†Dept. of Software Engineering
Blekinge Inst. of Technology, Karlskrona, Sweden
Email: robert.feldt@bth.se
‡Dept. of Psychology
Gothenburg University, Gothenburg, Sweden
Email: larsgoran.wallgren@psy.gu.se

***Abstract*—It is increasingly recognised that successful Software Engineering not only depends on technical or process issues, but requires attention to human factors. Researchers include such aspects which has led to both new theories and refined methods. However, it is not clear if professionals in the software industry agree that human factors are critical and what the related challenges and possibilities are. The purpose of the present study is**

of skill deficiencies and Increased reliance on social skills. Interestingly enough, a study by Boehm and Turner [4], which examined challenges related to the implementation of agile processes, identified no human factor issues at all.

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Software Engineers' Attitudes Towards Organizational Change - an Industrial Case Study

Per Lenberg[a,*], Lars Göran Wallgren[b], Robert Feldt[c]

[a]*Div. of Software Engineering, Chalmers University, SE-412 96 Gothenburg, Sweden, +46734379815*
[b]*Dept. of Psychology, Gothenburg University, Gothenburg, Sweden*
[c]*Dept. of Software Engineering, Blekinge Inst. of Technology, Karlskrona, Sweden*

Abstract

In order to cope with a complex and changing environment, industries seek to find new and more efficient ways to conduct their business. According to previous research, many of these change efforts fail to achieve their intended aims. Researchers have therefore sought to identify factors that increase the likelihood of success and found that employees' attitude towards change is one of the most critical.

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Ongoing / Next Steps:

Multiple studies on SE change and how attitudes and team internal/external factors affect team efficiency.

(Vinnova) Project ends in 2017 and Per plans to have his PhD defence March 2018