
1st Int’l Workshop on Conducting Empirical Studies in Industry

Paul Grünbacher       Rick Rabiser

Johannes Kepler University Linz, Austria
http://mevss.jku.at
Research Context and Industrial Partner

• Christian Doppler Laboratory for Automated Software Engineering
  • Long-term collaboration between academia and industry (2006-2013)
  • Research themes derived from problems faced by companies
  • Public-private partnership model
  • Knowledge exchange in both directions

• We conducted several empirical studies with Siemens VAI Metals Technologies
  • Leading engineering company for metallurgical plants
  • 8,600 employees
  • Joint research on product line engineering
Motivation and Goals

1. Summarize and compare the empirical studies
   - Motivation
   - Research Goals
   - Object and Scope
   - Subjects
   - Industrial Impact

2. Reflect about the experiences from a researcher’s perspective

3. Understand the success factors for gaining support from companies
Five Empirical Studies

• Process for Elicitating Product Line Variability (VaMoS 2008)

• Variability Modeling Approach (ASE Journal 2010)

• Evolution of Component-based Product Lines (WICSA 2012)

• User Guidance Features in a Configuration Tool (ASE 2012)

• Awareness Support in Distributed Configuration (APSEC 2013)
Approach

1. Characterized our studies regarding their focus, method and impact

2. Related our studies using existing success factors for industry-academia collaboration (Wohlin et al., IEEE Software, 2012)

3. Discussed lessons learned

Characteristics of the Studies

- **Motivation**
  - Assess, Evaluate, Explore

- **Object and Scope**
  - Process, Modeling Approach, Tools
  - Between several hours and several months

- **Research Goals**
  - Utility and Usability

- **Research Methods**
  - Case studies
  - Usability studies
  - Experiments

- **4-12 Subjects**

- **Industrial Impact**
  - Results of study
  - Rollout of tools
  - Development of new features
  - Awareness

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Object and Scope</th>
<th>Research Goals</th>
<th>Research Method</th>
<th>Subjects</th>
<th>Industrial Impact</th>
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</thead>
<tbody>
<tr>
<td>Assess variability elicitation</td>
<td>Variability elicitation process</td>
<td>Validate usefulness of collaborative elicitation process</td>
<td>Experiment with structured workshops</td>
<td>12 software engineers and project managers</td>
<td>The elicited variability allowed development of product line models</td>
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<tr>
<td>process</td>
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<tr>
<td>Evaluate the DOPLER product</td>
<td>DOPLER approach and meta-tool for</td>
<td>Assess Utility of DOPLER for variability modeling in different domains</td>
<td>Multiple case study</td>
<td>4 product line engineers from different partners</td>
<td>The demonstrated flexibility triggered further research and an additional project</td>
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<tr>
<td>line approach</td>
<td>variability modeling</td>
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<tr>
<td>Explore developer tasks and</td>
<td>Project performing evolution of a</td>
<td>Understand evolution activities, types of change impact analyses, and tool</td>
<td>Exploratory case study</td>
<td>1 engineer and 4 developers</td>
<td>The results were used to refine and extend evolution and traceability support in</td>
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<tr>
<td>challenges of product line</td>
<td>product line</td>
<td>requirements</td>
<td>observing 30 person months of</td>
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<td>DOPLER</td>
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<td>evolution</td>
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<td>development</td>
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<tr>
<td>Assess the usefulness of the</td>
<td>User guidance capabilities of the</td>
<td>Investigate usability for end users and utility in industrial use cases</td>
<td>Usability study</td>
<td>9 business-oriented stakeholders</td>
<td>Increased awareness about the tool and many changes improving the tool’s usefulness</td>
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<td>DOPLER configuration tool</td>
<td>DOPLER configuration tool</td>
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<td>Explore dependencies in distributed</td>
<td>A bulletin board for sharing</td>
<td>Usability and utility of tool-supported collaborative derivation approach</td>
<td>Two phase usability study</td>
<td>12 industrial experts</td>
<td>The demonstrated feasibility triggered further research</td>
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<td>product derivation of multi product</td>
<td>configuration information</td>
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Relevance of Wohlin’s Success Factors

1. Champion at company
2. Champion's network within the company
3. Buy in and support from company management
4. Buy in and support from industry collaborators
5. Short term results and impact on industry
6. Organizational stability (industry partner)
7. Researcher has a visible presence in industry
8. Regular meetings
9. Relevant expertise of researcher
10. Attitude and social skills of researcher
11. Researcher’s commitment to contribute to industry needs
12. Well-organized collaborative research project
13. Research environment at the university
14. Prior experience of industry/academia collaboration

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Key factors according to our results

- ✔
- ✔
- ✔
- ✔

Key factors according to Wohlin et al.'s [9] results

- ✔
- ✔
- ✔
- ✔

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Lessons Learned

• Avoid a narrow study scope
  • Accommodating industrial partner’s needs

• Use a flexible research design
  • Risk and opportunity management

• Establish trust
  • “Relationship business” matters (Finkelstein)

• Aim for long-term funding
  • Funding programs play an important role