Academic Education of Software Engineering Practices
Towards Planning and Improving Capstone Courses Based upon Intensive Coaching and Team Routines

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Dit project is mede gefinancierd met steun van het Europese Fonds voor Regionale Ontwikkeling van de Europese Unie.
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- MSc Computer Engineering (Dipl.-Inf.)
- MA Project Management
- Past: 4 years R&D engineering at Nokia
- Now: Process Coach, PMO & PhD Candidate

Interest: R&D Management

- Knowledge Creation and Innovation
- Project Management
- Teamwork
Introduction

- Academic Education of SE Practices
- Practical education & academic reflection

What we know

- Learning stages: declarative and procedural (Anderson, 1982)
- Students struggle with process
- Learning in team works well (Richards, 2009)

Agile Practices as Team Routines

- Learning through repeated interaction
- Support both learning stages
- Agile: SE practices in a single framework (Hazzan and Dubinsky, 2007)
Objectives

- Agile practices provide a framework to address procedural knowledge, but how to make it academic?

Research Questions

1. **Course**: How can we plan software engineering courses so that using agile process improvement techniques we can improve education and contribute to research at the same time?

2. **Experiment**: What are the implications of individual intra-team stand-up meetings on coaching success and team satisfaction compared to bigger inter-team stand-up meetings?
Study Context: SDPM Course

- Master-level Capstone: SE & PM
- Real-world: From idea to demonstrator
- Declarative knowledge: Regular Lectures
- Procedural knowledge: Intensive Coaching

Coaching Routine

- Stand-up Meetings (5-15min)
- Iteration Reviews
Methodology: Embedded Experiment

- 30 students, 6 iterations, 6 teams, 2 groups
- **SIndividual**: Individual Stand-up meetings
- **SUUnited**: Collective Stand-up meetings
- Better knowledge transfer and interaction?

<table>
<thead>
<tr>
<th>Project Planning and Initial Design</th>
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<tr>
<td>02-02-2011: (Session 1) Introduction</td>
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<tr>
<td>16-02-2011: (Session 2) Project Bid</td>
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<td>22-02-2011: (Session 3) Project Plan</td>
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<tr>
<th>Development</th>
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<tr>
<td>29-02-2011: Sprint 1</td>
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<td>07-03-2011: Sprint 2</td>
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<th>Delivery</th>
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<td>15-03-2011: System Demonstration and Trade Fair</td>
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Methodology: Data Collection

Qualitative data: Observations, informal interviews, artifacts

Quantitative questionnaire (weekly): Comparable Likert scale data on satisfaction:

- How satisfied are you with the project?
- How satisfied are you with the teamwork in your team?
- How satisfied are you with the information exchange in this project?
Figure 4: Satisfaction with the information exchange.

Figure 5: Perceptions on the usefulness of standup meetings.

Figure 6: Would you prefer to have the standup meetings in bigger or in smaller groups?

Table II: Standup meeting notes, week 4

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<thead>
<tr>
<th>Group 1</th>
<th>Last Actions: Project plan, Kentico CMS</th>
<th>Impediments: -</th>
<th>Next Actions: Implementation, easy requirements first</th>
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<tbody>
<tr>
<td>Group 3</td>
<td>Last Actions: Project plan</td>
<td>Impediments: -</td>
<td>Next Actions: Interface Prototype</td>
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<tr>
<td>Group 4</td>
<td>Last Actions: Project plan, exploring platform -¿ requirements</td>
<td>Impediments: Tight schedule, balance between documentation and development</td>
<td>Next Actions: Page layout, reduce text main page, OpenStudy</td>
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<td>Group 5</td>
<td>Last Actions: Project plan, decided on key deliverables, decided on local and stable demonstrator</td>
<td>Impediments: Final constraint: time, C only known to two people</td>
<td>Next Actions: Follow project plan, Divide work, Start on monday</td>
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<tr>
<td>Group 6</td>
<td>Last Actions: Project plan, High level software specifications; Defined implementation strategy with Java</td>
<td>Impediments: Time pressure, Platform unknown, Need to learn</td>
<td>Next Actions: Work on the demonstrator, set up development environment, Need to verify if Java is the best option for implementation</td>
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Longitudinal data Excel

30 (students) x 6 (sprints) Allows t-test for significant difference!
Results: Experiment

**SIndividual**: More satisfied, longer more elaborated discussions

**SUnited**: Waiting for the next group to finish, groups coming late

**Significant**: Satisfaction with project & information exchange

**Not significant**: Satisfaction with teamwork
Discussion RQ1:

How can we plan software engineering courses so that using agile process improvement techniques we can improve education and contribute to research at the same time?

- Intensive coaching using notion of team routines
- Explore concrete SE techniques in context (Collaboration, Google Docs, Dropbox)
- Intensive coaching justified by contribution to science and PhD maturity
Discussion RQ2:

What are the implications of individual intra-team stand-up meetings on coaching success and team satisfaction compared to bigger inter-team stand-up meetings?

- Individual groups more focused and on time
- Possible knowledge gain overridden by less satisfaction
- Team should feel comfortable for a good knowledge exchange and interaction
- Standups: Identification of impediments early on (Sharp and Robinson, 2007)
Conclusions:

Course
- Our experience balancing practical coaching and academic reflection
- Planning and improving capstone courses based on intensive coaching and notion of routines
- Contributes to student and educator/PhD maturity

Experiment
- SUnified: Knowledge gain overridden by lass satisfaction
- Intensive coaching shorter and more appealing

Data Collection Method
- Approach allows quantitative data collection even with smaller groups (longitudinal)
Conclusions → Future Work

*Increasing importance of routines in creating knowledge*
- How improve to study routines in-class?
- How to visualize/model the practices?

*Collaboration amongst coaches in bigger groups*
- How do these results relate to bigger group size?
- How to embed peer-assessment?
- How to address different student learning types?
Questions?

Thank you for your attention!

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References


