Increasing Involvement in Software Process Improvement

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Agenda

- Introduction
- Software Process & SPI
- Research Questions
- Methodology
- Contributions
- Further Research
Introduction

- Software Development
- Software Process Improvement
- Different Organisations
- Different Products
Evolution of Software Development

- **3 Main Periods:**
  - Code & Fix
  - Structured Methods
  - Process Maturity

<table>
<thead>
<tr>
<th>Period 1:</th>
<th>Period 2:</th>
<th>Period 3:</th>
<th>High Maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code &amp; Fix</td>
<td>Structured methods</td>
<td>Process Maturity</td>
<td>Agile Methodologies</td>
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Software Process

Resources

Product idea

Software process

Software Product

Requirements definition

System and software design

Implementation and unit testing

Integration and system testing

Operation and maintenance

Initial version

Intermediate versions

Final version

Outline description

Concurrent activities

Specification

Formal Specification

Initial

R1

P1

T1

Proofs of transformation correctness

Formal transformations

R2

P1

T2

R3

P1

T3

R4

P1

T4

Executable Program

Final version
Software Process

- Process Maturity
  - Capability Maturity Model

- Agile Methodologies
  - Extreme Programming
Software Process Improvement

- Stimulus for improvement
- Set context and establish sponsorship
- Establish improvement infrastructure
- Appraise and characterize current practice
- Develop recommendations and document phase results
- Plan and execute pilots
- Plan, execute and track installation
- Establish process action teams
- Plan actions
- Set strategy and priorities
- Document and analyse lessons
- Define processes and measures
- Revise organizational approach

Leveraging

Initialising

Diagnosing

Establishing

Acting

Plan and track.
Research Questions

- **R.Q. 1:**
  What is the effect of involving individuals throughout the organisation in SPI?

- **R.Q. 2:**
  What is the effect of SPI in small organisations using light weight processes?

- **R.Q. 3:**
  How do light-weight processes work in practice?

<table>
<thead>
<tr>
<th>Paper</th>
<th>Research Questions</th>
<th>Research Strategy</th>
<th>Research Type</th>
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<tr>
<td>1</td>
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<td>Qual. &amp; Quant.</td>
<td>Case study &amp; Survey</td>
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<td>4</td>
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<td>Qual.</td>
<td>Case study</td>
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Research Methodology

- Qualitative & Quantitative
- Case study
- Survey
- Interviews
- Observation
- Participation
Research Contributions - I

- Involvement in Large Development Organisations
- SPI Strategy Decision Support
- SPI Information & Discrepancy Analysis
Research Contributions - II

- Decision Support for XP Introduction
- Treat Practices as Independent SPI Proposals
- Compare Perceived Effectiveness and Ease of Introduction
- Analyse and use for Introduction
Research Contributions - III

- Case for XP Introduction
- Experiences – Positive/Negative
- Real World Application of the Methodology
Research Contributions - IV

- SPI in Small Company
- Test Process
- Small Steps
- Prepare for Future
# Research Contributions - V

<table>
<thead>
<tr>
<th>Phase</th>
<th>Activity</th>
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<tbody>
<tr>
<td>Phase 3</td>
<td>Maintain System</td>
<td>Define Teams</td>
<td>Perform Inspections</td>
<td>Risk Management</td>
<td>Software Quality Assurance</td>
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<td>Phase 2</td>
<td>Create System</td>
<td>Define Roles</td>
<td>Perform Walkthroughs</td>
<td>Test Cases</td>
<td>Experience Reporting Routines</td>
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<tr>
<td>Phase 1</td>
<td>Define Syntax</td>
<td>Define Responsibility</td>
<td>Use Checklists</td>
<td>Test Plan</td>
<td>Basic Administration of Test Environment</td>
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<tbody>
<tr>
<td>Problem Reporting</td>
<td>Roles &amp; Organisation</td>
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<tr>
<td>Verification &amp; Validation</td>
<td>Test Planning</td>
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<td>Test Admin.</td>
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</table>
Research Contributions - VI

- Prepare Phase $n$ Practices
- Present Phase $n$ Practices
- Revise Practices Phase $1..n$
- Perform Phase $1..n$ Practices
- Continuous Evaluation of Practices Phase $1..n$

$n++$

$n=1..3$

Normal operation
Further Research

- Software Process

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<thead>
<tr>
<th>Period 1: Code &amp; Fix</th>
<th>Process Maturity</th>
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- Involvement and Acceptance Experiment
- Refinement/Continuation