Artefact-based Requirements Engineering Improvement

Habilitation — Concluding talk

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RE improvement: Terms and principles

RE “Best Practice” Norm

1. Solution orientation
2. Problem orientation

RE improvement principles

Paradigms (simplified)

A. Activity orientation
B. Artefact orientation
Problem-driven, artefact-based RE improvement

Why?

Why problem orientation
» Notion of RE quality is something relative to context
» Reluctance against solution orientation in practice*

„External [standards] do not really fit our needs.“

Why artefact orientation
» Supports, e.g., flexibility and consistent project results

Problem
Potential and limitations of problem-driven, artefact-based RE improvement still unknown

* http://re-survey.org
Habilitation
Research questions

RQ1. What is a good RE and how can artefact orientation contribute to it?

RQ2. How can we improve RE in a specific context via artefact orientation?

RQ3. What are the benefits and limitations of improving RE via artefact orientation?
**Habilitation Research agenda**

**RQ 1**
- Practical Problems and Expectations in RE
- Survey
- Literature Analysis
- Project Analysis

**RQ 2**
- Artefact-based RE Improvement Approach

**RQ 3**
- Tool-Support (Assistance)
- Empirical Case Study

**RQ 1.** What is a good RE and how can artefact orientation contribute to it?

**RQ 2.** How can we improve RE in a specific context via artefact orientation?

**RQ 3.** What are the benefits and limitations of improving RE via artefact orientation?
Habilitation
Summary of results

RQ 1
Practical Problems and Expectations in RE

Survey

RQ 2
Artefact-based RE Improvement Approach

Literature Analysis

Project Analysis

RQ 3
Tool-Support (Assistance)

Empirical Case Study

Controlled Experiments

Reference to publication in essay

Teaching
Research Communities

Academia
(Research and Education)

Dissemination

RQ 1

Problems & Effects

Practical RE Goals & Metrics

Strength & Weakness Classification for Artefact Orientation

RQ 2

Artefact-based RE Improvement Approach

RQ 3

Tool-Support (Assistance)

Empirical Case Study
Habilitation
Summary of results

RQ 1
Practical Problems and Expectations in RE
- Problems
- Effects

Practical RE Goals & Metrics

Strength & Weakness Classification for Artefact Orientation

RQ 2
Artefact-based RE Improvement Approach

RQ 3
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Empirical Case Study

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Survey

Literature Analysis
Project Analysis

Literature Analysis
Project Analysis

RQ 2
RQ 1 What is good RE and how can artefact orientation contribute to it?

Family of RE surveys (“NaPiRE”)
- Status quo in RE
- Practically relevant problems, causes, and effects

Analysis of RE phenomena
- RE success factors & improvement goals
- Implications on emp. investigations in RE

Empirical evaluation
- Experiment
- Case study
- 2 independent replications

Results to RQ 1
- ✔️ RE improvement goals better supported by artefact orientation than by activity orientation
- ❌ Long-term effects not investigated
Threats to validity

1. Answers to survey subjective
2. Limited control of basis on which respondents rely their answers and potential misconceptions
3. Instrument potentially unreliable and data analysis might be biased

Counter measures

1. Survey conducted anonymously
2. Disclosed raw data for external examination, and check of results against available studies
3. Instrument validation via pilot studies and researcher triangulation during analysis
Habilitation
Summary of results

RQ 1: Practical Problems and Expectations in RE
- Problems
- Effects

Practical RE Goals & Metrics
- Controlled Experiments

Strength & Weakness Classification for Artefact Orientation

RQ 2: Artefact-based RE Improvement Approach
- Literature Analysis
- Project Analysis

RQ 3: Tool-Support (Assistance)
- Empirical Case Study

Teaching
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Dissemination
RQ 2 How can we improve RE via artefact orientation in a specific context?  
RQ 3 What are the benefits and limitations of improving RE via artefact orientation?

**Results to RQ 3**
- ✔ Structured approach to problem-driven improvement: context-specific goals achieved
- ❌ Long-term effects not investigated
Habilitation
Summary of results
Dissemination

Teaching and research communities

Teaching
• Lectures (e.g., Requirements Engineering), seminars, tutorials
• Student work: 28 theses & guided research
• Interdisciplinary student projects

Research communities
• Active involvement in, e.g., ISERN, PCs, co-organisation of events and advanced schools, …
  » Initiation of research collaborations
NaPiRE (RE survey)
• 22 Institutions
• 14 Countries
Habilitation
Summary of results

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Teaching
Research Communities
Academia (Research and Education)

Controlled Experiments

Practical RE Goals & Metrics
Strength & Weakness Classification for Artefact Orientation

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Habilitation
Publication overview (excl. grey literature)

RQ 1
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* Special issue invitation / Best paper nomination
** Journal article

Teaching
Research Communities

Academia (Research and Education)

Dissemination

Controlled Experiments
Critical Reflection
Fuzzy notion of good RE

Facets made explicit:
• There is no such thing as universally good RE
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- RE phenomena and their dependencies
Fuzzy notion of good RE

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Fuzzy notion of good RE

New (open) challenges:
Fuzzy notion of good RE

New (open) challenges:
• What are the effects beyond the RE?
Fuzzy notion of good RE

New (open) challenges:
• What are the effects beyond the RE?
• To what extent do project participants rely on artefacts and artefact models?
Future research perspectives

» Increase our understanding of improvement facets we barely can control (yet)
  • Long-term effects
  • Subjective (also social and cognitive) facets
» Support further scaling up to practice
Conclusion

Vision: Comprehensive theory

Artefact-based RE

(Improvement)
context variables

Effects

Practical RE Goals & Metrics

Strength & Weakness Classification for Artefact Orientation

Practical Problems and Expectations in RE

RQ#1

RQ#2

RQ#3

Artefact-based RE Improvement Approach

Tool-Support (Assistance)

Empirical Case Study

• Approach to conduct an artefact-based RE improvement
• Benefits and limitations in specific contexts
• RE success factors and improvement goals
• Effects of artefact-based RE in specific contexts

Academia (Research and Education)

Teaching

Research Communities

Support further scaling up to practice (Generalisation)

Dissemination

• Integration into teaching
• Disclosure of raw data, tools & instruments
• Coordination of replications
• Dissemination to academia

Principle

Reasoning and decisions based on
• (subjective) indicators
• thorough understanding of context
over hard metrics and measurements

Support further scaling up to practice (Generalisation)