Competence Center Requirements Engineering

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Competence Centers at the S&SE Research Group

- **Architecture & Services**: Description techniques and development processes for large software systems.
- **Embedded Systems**: Design, description, analysis, and simulation of control software for technical processes.
- **Context Aware Systems**: Specification and development of context aware systems.
- **Software Maintenance**: Maintenance and development of existing software.
- **Model-Based Systems & Qualitative Reasoning**: Problem solving based on behavior models of physical or software systems.
- **Modelbased Development**: Formally founded and seamless model-based development.
- **Requirements Engineering**: Creation process of documented representations of the requirement specifications.
- **Specification & Verification & Testing**: Specification, testing, and verification of software systems.
- **Software Quality**: Specification and analysis of the quality of software systems.
- **Product Data Modeling**: Modeling of product data.
- **Tool Support**: Tool development at the chair.
Requirements Engineering

Requirements Engineering Today

- Requirements Engineering as a foundation for software quality
- Highly volatile discipline
  - Interdisciplinary stakeholders
  - Closeness to customers domain
- Low possibilities for standardisation
  → Seamless integration
  → Creation of consistent and complete requirements specifications
  → Completeness, appropriateness and accuracy of modelling techniques

Challenges addressed in Research (excerpt)

- Integration into software processes and software (process) quality
- Flexibility to cope with various situations and application domains
- Well-founded specification techniques
- Seamless, goal-oriented RE
CC Requirements Engineering

Core Team
- Dr. Daniel Méndez (coordinator)
- Jonas Eckhardt
- Henning Femmer
- Jakob Mund
- Integration of further researchers and students depending on topics of interest

Aims and goals
- Fundamental and applied research
- Knowledge transfer and dissemination
  - Practice
  - Teaching
Research Philosophy

Theory building & Conceptualisation
- System Models
- Modelling Theories

Problem Investigation / Evaluation
- Evidence-based Research

Dissemination
- Scientific Communities
- Industrial Environments
- Teaching

Seamless Integration & Operationalisation
- Artefact Models
- SW Process Models
- Quality Models
- ...
Research Topic: Seamless Goal-oriented RE
Road Map

**RE Quality Management**
Techniques and Tools for Assessment and Improvement of Requirement Specification Quality

**Since 2013: Activity-Based Quality Model**
Defining Quality of Requirement Specification based on Development Activities, AO and Fitness for Purpose

**Nov 12: AMDiRE**
Development and Dissimination of an Embedded System Artefact Model

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**2011**

**2012**

**2013**

**RE Improvement**
Evidence-based, systematic approach for RE improvement with respect to organizational needs

**Overall Directions**
- RE governance
- Seamless integration of RE into SW lifecycle
- Specification of multifunctional systems
- Rich Specifications

**Dez 12: Artefact-Orientation in Practice**
Establishing, Customizing and Implementing an Artefact-Model in Practice
Recent Results (selected)

**NaPiRE – Naming the Pain in Requirements Engineering**
- Global family of surveys in RE
- Establishment of an empirical basis of the state of the practice, inference of research and improvement goals

**Improving Requirements Engineering by Artefact Orientation**
- Goal-driven RE improvement and measurement
- Applied at, e.g., Lufthansa, Wacker Chemie, Daimler AG

**A Case Study on the Application of Artefact-based RE**
- Establishment of an artefact-based RE approach in industrial contexts hosted by Capgemini TS and Siemens (I MO CT)
- Evaluation of benefits and shortcomings of artefact-based RE in an industrial setting
Current Research Activities and Research Questions

Artefact Orientation and RE Improvement
- Which implications has the establishment of an artefact-based RE on the overall quality?
- How can artefact orientation be used for a goal-driven RE Improvement?
- What is the notion of an artefact-based RE improvement and how can an actual improvement be measured?

Quality Management
- How does the quality of RE (process and artefacts) influence the quality of the overall process and the final product/deliverable?
- Under which conditions and to which extent
  - can metrics and measurements be used for a constructive and analytical quality assurance?
  - can RE smells be systematically prevented, detected, and corrected?
- What are good indicators for RE improvement and quality assurance?
- More general: What is quality in RE?