Competence Center
Requirements Engineering

Technische Universität München

Institut für Informatik
Software & Systems Engineering,
Prof. Dr. Dr. h.c. Manfred Broy
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.

- **Process Models**

- **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
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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 Dissipation of an Embedded System Artefact Model

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?