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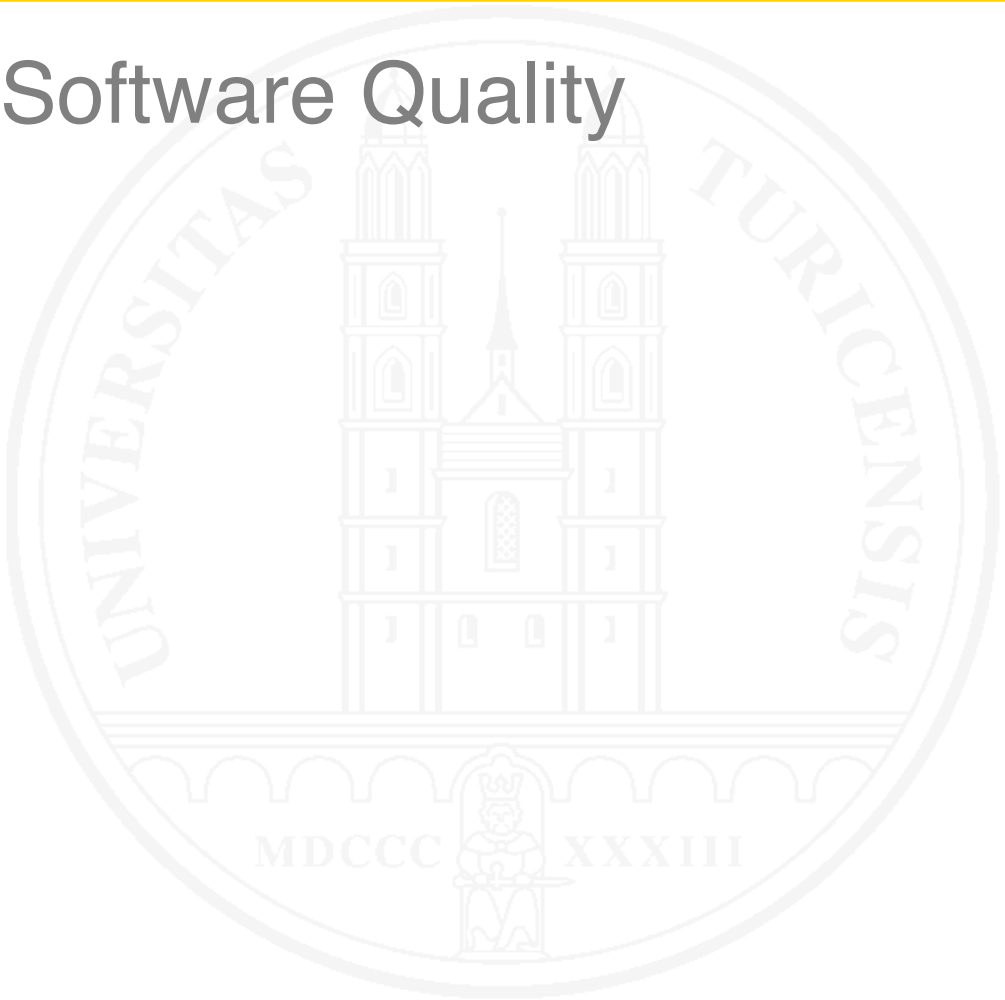
Software Quality

Chapter 7

Quality in Agile Development

7.1 The Role of Software Life Cycle Models

7.2 Agile Software Quality



Quality and software life cycle models

- Classic software quality management assumes a classic software life cycle model
  - Phased, waterfall-style model with single delivery, or
  - Iterative, evolutionary model with incremental delivery; typical delivery cycle > 6 weeks
- Focus on comprehensive documentation
- Testing and integration are phases in the development cycle
- Upfront quality planning

Quality in evolutionary software development

- Exploiting the benefits of shorter feedback cycles
- Less upfront planning required
- Can adapt to changing quality needs
- Otherwise: classic software quality management

Agile development is different

Agile software development is characterized by

- Iterative development in fixed-length cycles
- Cycle length typically 1-6 weeks
- Focus on programming
- Little documentation
- No or little upfront planning; focus on refactoring
- Requirements specified by stories and test cases
- Continuous testing and integration

7.1 The Role of Software Life Cycle Models

7.2 Agile Software Quality

Quality in agile software development

- Opportunities:
  - Very short feedback cycles
  - Focus on people: quality culture instead of document-based quality management
  - Early prototypes
- Problems:
  - Frequent re-validation required
  - Not all quality problems can be fixed by refactoring
  - Real stakeholders have to be represented by product owner or on-site customer representative

Agile quality management

- Feedback-oriented development
  - Customer representative or product owner on site
  - Small increments – rapid feedback
  - Continuous integration
  - Regularly held retrospectives
- People-focused quality culture
  - Quality over functionality
  - Realistic planning and workload
  - Joint responsibility for results
  - Team as a learning organization
  - Intrinsically motivated developers work faster and better

Agile quality management – 2

- Testing from the very beginning
  - Tests define required system behavior
  - Tests are written prior to coding or in parallel with coding
  - Continuous regression testing
- Catching faults early
  - Inspection of code prior to committing
  - Pair programming (⇒ continuous inspection)
  - Unit testing prior to committing
- Explicit quality improvement
  - Quality improvement refactorings

Quality problems – Architecture

- Growing a system into an architectural mess
- Structure follows people structure instead of problem structure (Conway's law*)
- Major architectural mistakes cannot be fixed by refactoring

* Conway (1968): How Do Committees Invent?

The new city has been built in a rapid and agile fashion – unfortunately, the settlers forgot to reserve space for streets

Source: Morris: Lucky Luke – Auf nach Oklahoma
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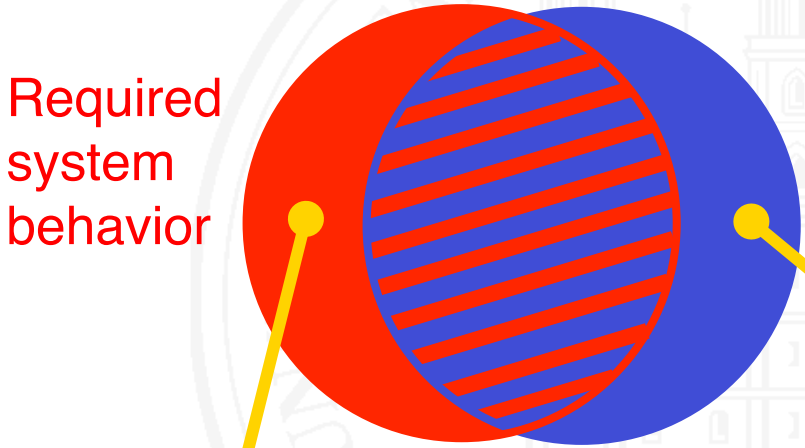
Quality problems – Specification by testing

- Specification by testing
  - focuses on required behavior
  - neglects unwanted behavior



Required, but
- not implemented or
- wrongly implemented

behavior is typically detected in agile testing

Not required, but implemented behavior can be harmful (e.g., for security) and is typically not detected with agile testing

Quality problems – regulatory compliance

The need for regulatory compliance (for example, in the healthcare or transportation domains) may

- require a full requirements specification
- require classic system testing
- confine agility to agile design and coding

Tooling

Quality-aware agile development is impossible without adequate tools for

- Configuration management
- Continuous integration
- Test automation
- Problem report management

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