Software Quality Research: from Processes to Model-based Techniques

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From Processes to Model-based Techniques

- Internet of Things (IoT)
  - Digital economy
  - Features, functions, user interface solutions
  - User-centred elicitation of requirements
- Process-based software quality is gaining momentum
- Scientific disciplines: computer science, discrete mathematics, operations research, statistics, psychology, …, and economics
Model-based Engineering (MBE)

- Product-based evidence of software quality
- Productivity gains
- Model-based Development (MDD)
  - Code generation
  - Testing (MBT)
- Functional and partial views of the System under Test (SUT)
- Implementation-centred view
- HOW to perform a task rather than WHAT the task should achieve
Model-based Systems (MBS)

- Software quality tools that implement the HOW itself
- Tasks
  - Simulation
  - Prediction
  - Reasoning about the software product
- Prominent applications
  - Physics
  - Electrical engineering
  - Most recently in the field of software
Process-based software quality - Experience

- Bug and issue tracking for a vendor of simulation tools [2]
- User-centred software development in healthcare [3]
- Structured test case design for railway interlocking systems [1]
Model-based systems - Experience

• Facilitating the use of effort estimation techniques for end-users [4]
• Configuration of embedded software for electronic control units [5]
Model-based Testing - Experience

• Test case generation in the automotive industry [7, 8]
• Test case generation for VoIP telephony [6]
• Smart monkey testing with capture & replay tools [9]
Lessons Learnt

• The domain knowledge matters
• Simple and intuitive modelling is key to success
• Short feedback cycles inspire practical use
• Constraints, processes and human factors are essential for tool prototyping
• Pilot projects are more convincing than benchmarks
• A good solutions needs a lead user
• Generalization is the task of academia
Discussion

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References


