DO WE NEED TEST SPECIFICATION LANGUAGES?!



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A-MOST @ ICST 2017, Tokyo, March 17, 2017

Please look up my yesterday's proposal for the new version of the UML Testing Profile



OUTLINE

1. About me

- 2. Do we need test specification languages ?
- 3. What is needed in addition to a test specification language ?
- 4. Where should we aim at next?



ABOUT ME

Scientiest ... in applied research

Professor ... in education

Member of academy ... for scientific recommendations

President ... for high-quality software-based systems











BACKGROUND TELECOMMUNICATION: CONFORMANCE AND INTEROPERABILITY

1. Interoperability

Interoperability is the ability of making systems and organizations to work together (interoperate). While the term was initially defined for information technology or systems engineering services to allow for information exchange, ... [Wikipedia]

2. Conformance

Confirmation that a good, service, or conduct meets the requirements of legislation, accepted practices, prescribed rules and regulations, specified standards, or terms of a contract. [Business Dictionary]

Interoperability is a precondition for the increasing integration and networking of systems and components. Conformance supports interoperability.



FUNDAMENTAL INTEROPERABILITY TEST METHOD



- A dynamic testing method
- Complements conformance testing



- 1. QE = Qualified Equipment (previously tested)
- 2. EUT = Equipment under Test (such as gateway, protocol layer, software component)



ABOUT ME

Working on Test Specification Languages for quite some time

Message Sequence Charts

Testing and Test Control Notation

response_1



UML Testing Profile











LOOKING BACK AND FORWARD

Do we need ... standardized ... test specification languages ?



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THE WORD WAS IN THE BEGINNING

And the word comes with

- A common understanding
 - A language
 - A concept space, semantics and syntax(es)
- A mind set
 - A culture
 - A set of methods and processes





MODELING LANGUAGES



Taken from Alberto Rodrigues da Silva: Model-driven engineering: A survey supported by the unified conceptual model, Computer Languages, Systems & Structures. 43(2015)139–155.



MBT 1.0



MBT 2.0



MBT 3.0 ?



TEST SPECIFICATION LANGUAGES



STANDARDIZED TEST SPECIFICATION LANGUAGES



LOOKING BACK AND FORWARD

What is needed in addition to a test specification language ?



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METHODOLOGIES ... AND AUTOMATION ... AND TRAINING

And the methodologies come with

- Tools
 - Examples
 - Guidelines
- Case studies
 - Qualitative / quantitative evaluations
 - Experience reports
- Best practices
 - Pattern / anti-patterns
 - Process (models)



TEST AUTOMATION ENGINEERING

Generic Test Automation Architecture

Test Automation Engineer Syllabus





SOFTWARE TESTING TRAINING





CERTIFIED TEST AUTOMATION ENGINEER



CERTIFIED MODEL-BASED TESTER

Introduction to Model-Based Testing	MBT Modeling	Selection Criteria for Test Case Generation	MBT Test Execution	Evaluating and Deploying an MBT Approach
Objectives and Motivations for MBT	MBT Modeling activities	Classification of MBT Test Selection Criteria	Specifics of MBT Test Generation and Execution	Evaluate an MBT Deployment
MBT Process	Languages for MBT Models	Applying Test Selection Criteria	MBT Test Adaptation	Manage and Monitor the Deployment of an MBT Approach
Integrating MBT into the Software Development Lifecvcles	Good Practices for MBT Modeling Activities			



TOOLING MAKES LANGUAGES AND METHODOLOGIES LIVE

They need to be practicable, usable and efficient

- Within established tool and process landscape
- Should respect huge amounts of legacy data being (also) models !
- Reuse the expertise of the people and teams



TOOL FRAMEWORK MODELBUS®

- 1. is a model-driven tool integration framework which allows you to build seamlessly integrated tool environments for your development process.
- 2. connects tools commercial off the shelf or in-house tools
- 3. helps automating development and quality assurance processes
- 4. uses SOA principles and well-established standards

See http://www.modelbus.org/



MODELBUS® - GENERAL CONCEPT



FOKUS

MODELBUS®- ARCHITECTURE

FOKUS



SELECTION OF CONNECTED TOOLS

- Eclipse-based Tools
- Topcased, Papyrus, ProR, ...
- Rational Software Architect
- Doors
- Rhapsody
- Simulink
- Microsoft Office (Word, Excel)
- Sparx Enterprise Architect
- AVL InMotion

- ...



METRINO

Model-driven metric definition and computation



Challenge

Identifying properties and quality of models Definition of metrics for complex models

Approach

Model-driven handling of quality attributes and properties

Definition of Metric Generation rules Usage of OMGs SMM for management of metrics

Solution

Tool front-end allows the definition and management of metrics definition of thresholds, grouping of metrics Visualization of Metric computation results in tabular way and kiviat graphs

METRINO

TRACEINO

Tool-independent traceability framework





Challenge

- Linking of development artefacts
- Definition of individual complex traceability models

TRACEINO

Approach

- Model-driven handling of traceability information
- Based on ModelBus tool integration approach to easily extend existing tools with traceability functionality

Solution

- Definition and utilization of type safe case specific traceability
- Navigation and quering through trace info
- Common Look and Feel UI (Web and Desktop)
- Graphical visualization of traces 30

REQUINO

Model-driven requirements engineering

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REQUINO

Challenge

- Structured Requirements during the whole _ system development
- **Design Space Exploration** _

Approach

- Model-driven handling of requirements _
- Graphical refinement of requirements _
- Based on SysML/UML _
- Based on ModelBus (Versioning, Notification, Locking, Fragmentation, etc.)

Solution

- Structured Definition of Requirements _
- Refinement through structural/behavioral _ diagrams
- Evaluation of different concepts _
- Common Look and Feel UI (Web and Desktop) _

AND YES







LOOKING FORWARD

Where should we aim at next?



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LOOKING FORWARD

What are your thoughts?



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LOOKING FORWARD

Where should we aim at next ?

- Automated test framework generation
- Machine / deep learning in test processes / test automation
- Data quality assurance
- Self-awareness and self-adaptation via models

Some of which may require language extensions or even new languages ...









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