WP7 MODEL-EVALUATION

SYSML / PAPYRUS

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15.04.2013

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The Approach

- Language
  - Systems Modeling Language (SysML)
  - Standardized by OMG, current version 1.3 (June 2012)
  - Extends UML 2.0 via profile extension mechanism
  - Models can be exchanged via XML Metadata Interchange (XMI)
- Tools support
  - Commercial tools: Enterprise Architect, Magic Draw, IBM Rational Rhapsody, etc.
- Reviewed tool
  - Papyrus (Eclipse Juno)
  - Version 0.9.2

Potential uses in the openETCS Process

- Describing the system architecture and software design
  - System and Subsystems
  - Hardware, Software, Interfaces, etc.
- Behavior
  - State Chart, Activity Diagrams
  - Opaque Behavior with a formal language
- Requirements
  - Dedicated requirements diagram
  - Tracing of design an V&V
- Validation done with external tools

Benchmark Report

- SRS SUBSET-26-3 – Management of Radio Communication
- Architecture / Structure
  - Blocks, Block Diagram and Internal Block Diagram
  - Interface between blocks
  - OBU, BTM, EURORADIO, MORC
- Behavior (State Charts, Activity Diagram)
  - Conditions for establishing radio communication
  - Initiating radio communication
- Requirements
  - Mapping of SRS document (partially) requirements to SysML
- Validation
  - No validation or tests done with an external tool

Results of Benchmark (Language and Tool)

- Cons
  - SysML is a modeling language but not a methodology
    - At least some best practices needed
  - Usability not on a par with commercial tools
  - For V&V external tools are necessary

- Pros
  - Industry acceptance (on tool and user side)
  - Already integrated into Eclipse
  - Extendibility via plugins, open source
  - Transformation languages can be used
    - M2T: Acceleo, Xtend, “pure” Java, etc.
    - M2M: QVTo, ATL
  - CEA is in the project

Issues to consider

- Collaboration
  - Limited with Eclipse SCM support (EGit, Subversive, etc.)
  - CDO integration status unknown (database backend)
    - Persistence, Multi-User, Transaction, Scalability
  - EMFStore integration unknown (model repository)
- Large Models
  - Not sure if applicable for openETCS
  - CDO could be an option
- Integration with formal tools
  - Probably plugins and transformation necessary

Coverage of WP2 requirements (1/2)

Requirement	Description
Open Source	Licensed under Eclipse Public License.
Portability	Available for Windows, Mac and Linux (32 and 64 bit).
Cooperation with other tools	Transformation languages (M2T and M2M) can be used. Plugin API.
Robustness	We experienced some problems with previous version.
Modularity	Software modularity via plugins.
Documentation management	Documentation can be linked.
Distributed software development	Simple SCM possible. CDO or EMFstore integration unknown.
Issue tracking	With Eclipse plugin (e.g Mylyn with plugins).
Model diffs	Papyrus Compare Editor (probably based on EMFCompare).
Version management	With SCM plugins.

Coverage of WP2 requirements (2/2)

Requirement	Description
Concurrent version management	With SCM plugins.
Model based version control	CDO and EMFstore integration unknown.
Model traceability	Hyperlinking to external files.
Tool chain integration	Integrated into Eclipse platform.
Scalability	Sometimes performance issues.
Certifiability	Further investigation needed.

THANK YOU

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