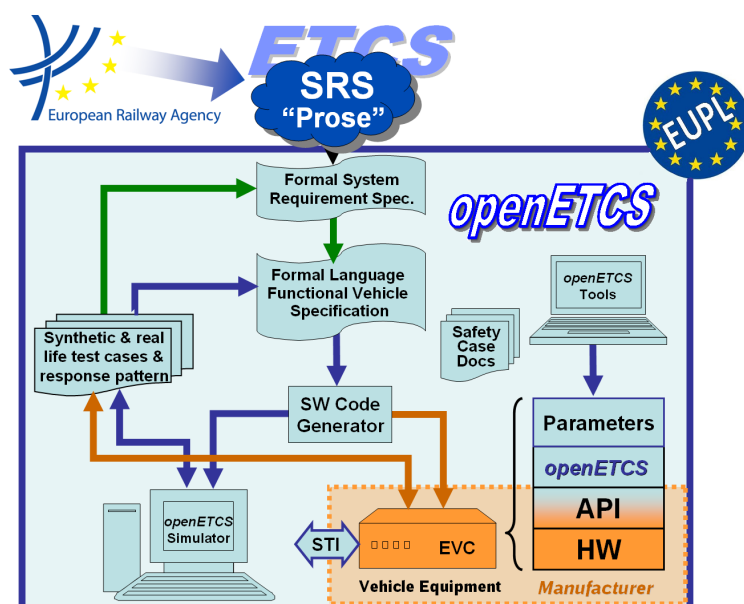


Evaluation of supporting tools and methods against the WP2 requirements and task 1

Marielle Petit-Doche, all participants of the benchmark and all participants of VnV and Safety process

October 2013



Funded by:



Federal Ministry
of Education
and Research

Région de
Bruxelles-
Capitale

GOBIERNO DE ESPAÑA

MINISTERIO
DE INDUSTRIA, ENERGÍA
Y TURISMO

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Work-Package 7: “Secondary tools - Safety”

**OETCS/WP7/O7.2.1 – 00/05
October 2013**

Evaluation of supporting tools and methods against the WP2 requirements and task 1

List of criteria on supporting tools and methods and results on the benchmark

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Evaluation

Prepared for openETCS@ITEA2 Project

Abstract: This document gives elements to evaluate the tools and methods to complete the primary toolchain and to support verification and validation activities, safety activities, model transformation and data management for the whole project. Evaluation on the means and tools of benchmark is also described.

This document focusses on means and tools to support safety analyses.

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Figures and Tables

Figures

Tables

Document information	
Work Package	WP7
Deliverable ID or doc. ref.	O7.2.1
Document title	Evaluation of supporting tools and methods against the WP2 requirements and task 1 - Safety
Document version	00.05
Document authors (org.)	Marielle Petit-Doche (Systerel)

Review information	
Last version reviewed	00.04
Main reviewers	

Approbation			
	Name	Role	Date
Written by	Marielle Petit-Doche	WP7-T7.1 Sub-Task Leader	
Approved by	Michael Jastram	WP7 leader	

Document evolution			
Version	Date	Author(s)	Justification
00.01	19/07/2013	M. Petit-Doche	Document creation
00.02	09/09/2013	M. Petit-Doche	Major evolutions in all document
00.03	19/09/2013	M. Petit-Doche	Issues: 167, 168, 170
00.04	23/09/2013	M. Petit-Doche	Issues: 164, 169, 174, 175, 177, 178
00.05	01/10/2013	M. Petit-Doche	Split of document O7.2.1. Safety part

1 Introduction

The aim of this document is to report the results of the evaluation of means and tools for the secondary means and tools, i.e. the means and tools which complete the primary tool chain dedicated to formal model and software design.

This evaluation task is part of work package WP7, task 2 "Secondary tools analyses and recommendations". According to the results of WP2, especially the OpenETCS process and the requirements on language and tools [?], and the results of T7.1 on the primary toolchain [?], the aim of this task is to determine the best candidates to complete and support the primary toolchain for the following activities:

- verification and validation (WP4)
- safety activities support (WP4)
- data, function and requirement management (SSRS, WP3 and WP4)
- model transformation and code generation (WP3 and WP4)

This document is dedicated to tools and means to support safety analyses.

1.1 Organisation of the document

The chapter 2 provides a template to describe the means and tools and a list of criteria according WP2 requirements on language, models and tools, and T7.1 primary tool chain decision. The objectives of this description and criteria are to allow to determine the best means of description and associated tool for a given activities.

The chapter 3 resumes the results of the evaluation at the end of the benchmark activities.

In Appendix, a chapter is dedicated to each models produced during the benchmark activities :

- Rodin and Pluggins
- CPN tools
- Goal Structuring Notation (GSN)
- Safety Architect

2 Template

2.1 Instructions

Author Author of the approaches description %%Name - Company%%

Assessor 1 First assessor of the approaches %%Name - Company%%

Assessor 2 Second assessor of the approaches %%Name - Company%%

In the sequel, main text is under the responsibilities of the author.

Author: Author can add comments using this format at any place.

Assessor 1: First assessor can add comments using this format at any place.

Assessor 2: Second assessor can add comments using this format at any place.

When a note is required, please follow this list :

- 0 not recommended, not adapted, rejected
- 1 weakly recommended, adapted after major improvements, weakly rejected
- 2 recommended, adapted (with light improvements if necessary) weakly accepted
- 3 highly recommended, well adapted, strongly accepted
- * difficult to evaluate with a note (please add a comment under the table)

All the notes can be commented under each table.

2.2 Presentation

This section gives a quick presentation of the approach and the tool.

Name %%Name of the approach and the tool%%

Web site %%if available, how to find information%%

Licence %%Kind of licence%%

Abstract

Short abstract on the approach and tool (10 lines max)

Publications

Short list of publications on the approach (5 max)

2.3 Common criteria on secondary means and tools

This section discusses the common criteria of the means and tools according to the project requirements on tools and the results of T7.1.

2.3.1 Project and WP2 requirements

The objectives of this list of criteria is to check if the proposed means and tools meet the main criteria of the project: open-source approaches, usability, modularity, coverage of the objectives,...

According WP2 requirements, give a note for characteristics of the use of the tool (from 0 to 3) :

	Author	Assessor 1	Assessor 2	Total
Open Source (D2.6-02-074)				
Portability to operating systems (D2.6-02-075)				
Cooperation of tools (D2.6-02-076)				
Robustness (D2.6-02-078)				
Modularity (D2.6-02-078.1)				
Documentation management (D2.6-02-078.02)				
Distributed software development (D2.6-02-078.03)				
Simultaneous multi-users (D2.6-02-078.04)				
Issue tracking (D2.6-02-078.05)				
Differences between models (D2.6-02-078.06)				
Version management (D2.6-02-078.07)				
Concurrent version development (D2.6-02-078.08)				
Model-based version control (D2.6-02-078.09)				
Role traceability (D2.6-02-078.10)				
Safety version traceability (D2.6-02-078.11)				
Model traceability (D2.6-02-079)				
Tool chain integration				
Scalability				
User Friendliness				

2.3.2 Qualification

This section discusses how the tool can be classified according EN50128 requirements (D2.6-02-085). Some qualification shall be mandatory if the tool is involved to design a SIL4 software.

	Author	Assessor 1	Assessor 2	Total
Tool manual (D.2.6-01-42.02)				
Proof of correctness (D.2.6-01-42.03)				
Existing industrial usage				
Model verification				
Test generation				
Simulation, execution, debugging				
Formal proof				

Which scope of qualification is expected according EN50128 (section 6.7) ?

Score :

3 already qualified for this level

2 qualification possible to this level, but some elements shall be provided

0 qualification not recommended for this level

	Author	Assessor 1	Assessor 2	Total
class T1				
class T2				
class T3				

Other elements for tool certification

2.3.3 Complementarity with primary toolchain

The objectives of this list of criteria is to check if the proposed means and tools can be easily integrated to the primary toolchain.

2.3.3.1 Language

According to the decisions and the propositions of T7.1, how the mean and approach can be adapted to or can complete the chosen language and methods:

	Author	Assessor 1	Assessor 2	Total
SysML				
Scade method				
EFS language				
B Method				
C language				

SysML

How the means or tools can complete SysML ?

Scade, EFS, Classical B

How the means or tools can complete the current proposals for formal modeling language ?

C language

How the means or tools can complete or be adapted to SIL4 software in C language ?

2.3.3.2 Tools and platforms

According to the decisions and the propositions of T7.1, how the mean and approach can be integrated to or can complete the chosen tools and platforms:

	Author	Assessor 1	Assessor 2	Total
Eclipse				
Papyrus				
Scade				
EFS tools				
B tools				

Eclipse

How the means or tools can be integrated to the Eclipse platform ?

Papyrus

How the means or tools can complete Papyrus ?

Scade, EFS, Classical B

How the means or tools can complete the current proposals for formal modeling tools ?

2.4 Means and tools for safety activities support

This section defines the criteria for the means and tools dedicated to support of safety activities, in the WP4 workpackage.

Criteria of this section are defined according [?].

2.4.1 Safety activities

Which safety design activities are covered by the mean or tool (see [?] section 1.2) ?

	Author	Assessor 1	Assessor 2	Total
Preliminary Hazard Analysis				
System Hazard and Risk Analysis				
Risk Assessment				
Specification of System Safety Requirements				
Define Safety Related Functional Requirements				
Specify Sub-System and Component Safety requirements				
Verify System, Sub-System and Component Safety requirements				
Validate System Safety Requirements				
Establish Safety Case				

2.4.2 Input Artifacts

Which artifacts are used as input of the mean or tool (see [?] section 1.4) ?

	Author	Assessor 1	Assessor 2	Total
Safety Requirement				
Hazard log				
Safety Case				

2.4.3 Output Artifacts

Which artifacts are used as output of the mean or tool (see [?] section 1.4) ?

	Author	Assessor 1	Assessor 2	Total
Safety Requirement				
Hazard log				
Safety Case				

2.4.4 Expressiveness

Which degree of formalisation is given to the artifacts by mean or tools (see [?] section 1.4) ?

	Author	Assessor 1	Assessor 2	Total
Informal				
Semi-Formal				
Formal				

2.4.5 Other criteria

According to [?] section 2.2, provide some complement on the mean or tool:

	Author	Assessor 1	Assessor 2	Total
Top-Down approach				
Bottom-up approach				
Database capability				
Database query ability				
Safety requirement VnV				
Traceability				
Generation of documentation				

2.5 Other comments

Comment. This section is available for the author or the assessors to complete the description and criteria.

3 Conclusion

Comment. MPD : Todo

The sequel is let as an example is this early version.

Criteria to discuss here are those which concerns all the secondary tools as open-source issues, compatibility with primary tool-chain, compatibility with eclipse,...

This conclusion give a sum up of the evaluation results for each approach. The detailed results of each approach are given in the appendix.

Minus mark "-" means this criteria as not been evaluated for this approach.

Star mark "*" means this criteria has been difficult to evaluate for this approach.

The highest score is **9** and means that the criteria is fully respected, the lowest score is **0**.

3.1 Main usage of the approach

Comment. MPD : Todo

The sequel is let as an example in this early version.

Score and results shall be corrected latter.

This section discusses the main usage of the approach.

According to the figure ??, for which phases do you recommend the approach (give a note from 0 to 3) :

	GOPRR	ERTMSFormalSpecs	SysML with Papyrus	SysML with EA	SCADE	EventB	Classical B	System C	Petri Nets	GNATprove
Verification	5	1	7	9	3	9	3	2	6(9)	2 (3)
Validation	9	9	6	7	9	9	5	5	6(9)	3 (4)
Safety analysis	9	0	6	7	9	6	9	9	6(9)	6(9)
Data, function or requirement management	9	0	3	3	9	3	9	6	2 (3)	6(9)
Model or code transformation	9	0	3	3	9	3	9	6	2 (3)	6(9)