OETCS/WP7/O7.1.9 – 00/02

openETCS

ITEA2
INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT

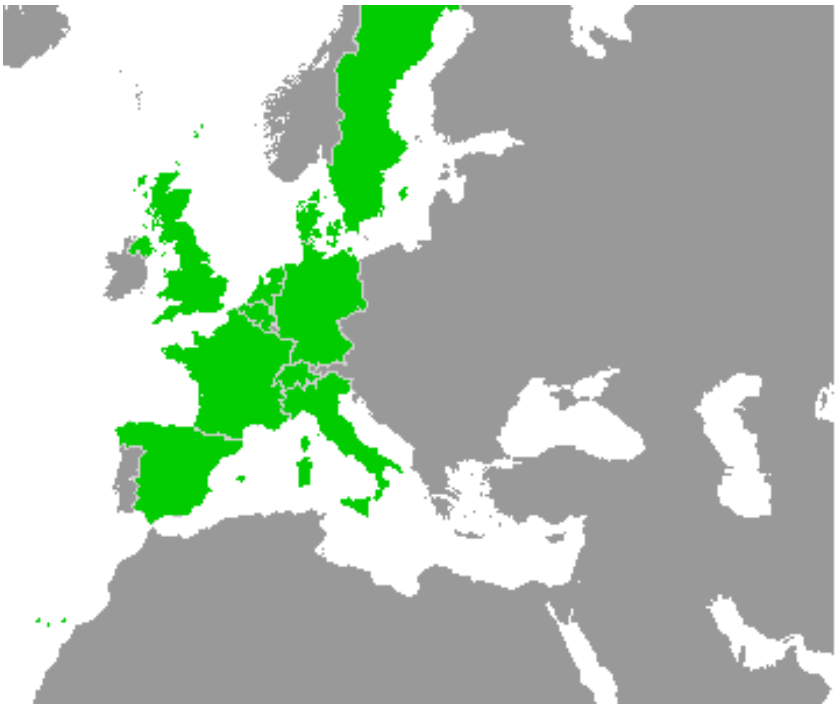
ITEA2 Project
Call 6 11025
2012 – 2015

Work-Package 7: “Primary tool chain”

Evaluation of the tool platform against the WP2 requirements

List of criteria on tool platform and results on the benchmark

Cécile Braunstein June 2013



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Evaluation of the tool platform against the WP2 requirements

List of criteria on tool platform and results on the benchmark

Cécile Braunstein

University Bremen

Definition

Prepared for ITEA2 openETCS consortium
Europa

Abstract: This document gives elements to evaluate the tool platform according WP2 requirements and presents the results of the evaluation of each tool platform.

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Figures and Tables

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Document information	
Work Package	WP7
Deliverable ID or doc. ref.	O7.1.9
Document title	Evaluation of the tool platform against the WP2 requirements
Document version	00.00
Document authors (org.)	Cécile Braunstein (Uni. Bremen)

Review information	
Last version reviewed	00.01
Main reviewers	

Approbation			
	Name	Role	Date
Written by	Cécile Braunstein	WP7 Contributor	01.06.2013
Approved 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	28/05/2013	C. Braunstein	Document creation

1 Introduction

This document is the results report of the evaluation of the tool platform. This work is the first part of the tool platform selection as described in the WP7 description of work [1]. This task aims at evaluating tool platform integration capabilities, regardless the primary and second tools that will be chosen for the tool chain implementation.

The tool platform should provide mechanisms to integrate various tools. The tool platform is not the primary nor secondary tools, nor the tool chain. It is the support for the tool chain implementation, it shall help to integrate the of tools into a seamless tool chain. The evaluation will focus on the integration capabilities of the tool platform.

This document will set up a way to evaluate tool platform and to determine the set of best candidate according to the WP2 requirements [2]. This task will be followed by finding the best tool platform candidates, e.g.finding the best the adequacy between primary and secondary tools and the tool platform.

1.1 The tool integration problem

The tool platform raises the question of tool integration. Wassermann [3] defines the 5 problems of tool integration that must be addressed:

1. Platform integration: How to deal with heterogeneous OS ?
2. Data integration: How to share data and how to manage their relationships ?
3. Presentation integration: How to unify the user-interface, the “look and feel” ?
4. Control integration: How to enable service sharing between tools and how to notify one another of events ?
5. Process integration: How to support engineering process within the tool platform ?

More recently Asplund and al. in [4] add some metrics to evaluate the tool chain integration. Following these propositions **the tool platform evaluation will focus on these integration capabilities**.

Moreover, one of the openETCS’s goal is to develop a tool chain to generate a software meeting the CENELEC EN 50128:2011 requirements and certifiable SIL4. **The tool platform shall help to support the EN 50128 standard**.

This standard imposes the qualification of each tool within the tool chain. Nevertheless as shown by Asplund and al. in [5], the tool integration may lead to new safety issues that have to be taken into account. This implies that the tool chain should be considered as a whole and not only individual tools. Moreover, Asplund and al. as well as Slotoch and al. in [6] shows that taking a holistic approach and use some rearrangement or extension of the tool chain allow to avoid the qualification of all tools and mitigate the certification process. The evaluation of **The tool platform with regards to the tool chain analysis capabilities** will be made.

1.2 List of terms

Notation	Description
GUI	Graphical User Interface.
IDE	Integrated Development Environment.
OS	Operating System.
SIL	System Integrity Level.

1.3 Structure of the document

Chapter 2 presents the template of the evaluation criteria. The appendix show the evaluation of each tool platform :

- Eclipse
- SCADE
- TopCased
- RTP-Cesar
- File systems

1.4 Reference documents

[1] Michael Jastram, Marielle Petit-Doche, Jonas Helming, and Jan Peleska. openETCS toolchain WP7 descritpiton of work. Defin D01, openETCS, February 2013.

[2] Sylvain Baro and Jan Welte. Requirements for openETCS. Requirements D2.6, openETCS, April 2013.

[3] AnthonyI. Wasserman. Tool integration in software engineering environments. In Fred Long, editor, *Software Engineering Environments*, volume 467 of *Lecture Notes in Computer Science*, page 137–149. Springer Berlin Heidelberg, 1990.

[4] Fredrik Asplund, Matthias Biehl, Jad El-Khoury, and Martin Törngren. Tool integration beyond wasserman. In Camille Salinesi and Oscar Pastor, editors, *Advanced Information Systems Engineering Workshops*, number 83 in Lecture Notes in Business Information Processing, pages 270–281. Springer Berlin Heidelberg, January 2011.

[5] Fredrik Asplund, Jad El-khoury, and Martin Törngren. Qualifying software tools, a systems approach. *Computer Safety, Reliability, and \ldots*, page 340–351, 2012.

[6] Oscar Slotosch, Martin Wildmoser, Jan Philipps, Reinhard Jeschull, and Rafael Zalman. ISO 26262-tool chain analysis reduces tool qualification costs. *Automotive 2012*, 2012.

2 Template Description

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.

2.1 Presentation

This section gives a quick presentation of the tool.

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

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

License %%Kind of license%%

Abstract

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

Publications

Short list of publications on the approach (5 max)

2.2 Use of the Tool

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-X-36)				
Cooperation of tools (D2.6-X-38)				
Robustness (D2.6-X-41)				
Modularity (D2.6-X-41.1)				
Documentation management (D.2.6-X-41.2)				
Distributed software development (D.2.6-X-41.3)				
Simultaneous Multi-users (D.2.6-X-41.4)				
Issue tracking (D.2.6-X-41.5)				
Concurrent version development (D.2.6-X-41.8)				
Model-based version control (D.2.6-X-41.9)				
Role traceability (D.2.6-X-41.10)				
Safety version traceability (D.2.6-X-41.11)				
Scalability				

2.3 Platform integration

Capabilities of the tool platform to be integrated to common operating systems.

1. The tools chain shall be portable to common OS.
2. The tool chain shall run stable on all main OS.
3. The tool chain shall run with a good performance on all main OS.
4. Data produce on an OS should be readable by an other OS.

	Author	Assessor 1	Assessor 2	Total
Portable (R-WP2/D2.6-X-37)				
Stable (R-WP2/D2.6-X-37.1)				
Same performance (R-WP2/D2.6-X-37.2)				
Easy exchange				

2.4 Data integration

How the tool platform supports the data integration ?

2.4.1 How to share data ?

1. Files contains all info and are read/write when needed.
2. A central repository contains all data (maybe distributed in a set of files).
3. A common database is shared among tools
4. Tools communicate via messages.
5. A meta-model is defined to harmonized the data input/output
6. Representational State Transfer (REST), distributed architecture (like the web) and data access by an unique identifier (URL-like).

	Author	Assessor 1	Assessor 2	Total
File based sharing				
Shared repository				
Database based sharing				
Message Passing				
Meta-Model based sharing				
REST architecture style				

2.4.2 Data definition

1. Definition of a common data format
2. All possible input and output formats of a tool have to be documented.
3. Automatic parser/generator support compliant with a common format.
4. All possible input and output formats of a tool have to be documented.

	Author	Assessor 1	Assessor 2	Total
Common data format				
Common data format documentation(R-WP2/D2.6-X-38.1)				
Generator/parser				
Open data format (R-WP2/D2.6-X-38.2)				

2.5 Presentation integration

The tool chain would be easier to use if the tool may share a common "look and fell'.

1. The tool platform proposes a common GUI.
2. The tool platform proposes some presentation guidelines
3. The tool platform provides a user interface creation toolkit
4. The tool platform integrates new tools as plug-in of the IDE.

	Author	Assessor 1	Assessor 2	Total
Common GUI				
Presentation guidelines				
User interface toolkit				
Plug-in support				

2.6 Control integration

The mechanism that allows tools to notify and activate others tools.

1. Tools may subscribe to some notification.
2. Tools may notify changes.
3. The change may be logged and traced.
4. The tool platform provides a version management.
5. Script based change control.

	Author	Assessor 1	Assessor 2	Total
Service Subscriber				
Service Notifier				
Change traceability				
Version Management				
Script control				

2.7 Process integration

2.7.1 Support for engineering process

Support for a well-defined software engineering process.

1. Process definition support.
2. Integrated process : the process is transparent to the users.
3. Process Management support.
4. Script based process: the process is implemented via scripts.
5. The defined tool chain may be analyzed within the tool platform.

	Author	Assessor 1	Assessor 2	Total
Process Definition				
Process Management				
Integrated Process				
Script based process				
Tool chain Analysis				

2.7.2 Support for EN 50128 standard

Specific mechanism related to EN 50128 standard

1. Each tool in the tool chain shall be classified among T1, T2 and T3 depending on its usage in the process.
2. For T2 and T3 tools 7 , the choice of tools shall be justified, and the justification shall include how the tools failures are covered, avoided or taken into account (ref. to EN 50128 6.7.4.2).
3. All T2 and T3 tools must be provided with their user manuals.
4. For all T3 tool, the proof of correctness or the measure taken to guarantee the correctness of the output w.r.t. their specification and the inputs shall be provided. The tool platform provides output/input comparison or other mechanism to guarantee the correctness.
5. Is it possible to test the test platform.

	Author	Assessor 1	Assessor 2	Total
Integrated Tools classification (R-WP2/D2.6-X-50)				
Document production (R-WP2/D2.6-01-042.01)				
Automatic information on tools (R-WP2/D2.6-01-042.02)				
Measure for correctness (R-WP2/D2.6-01-042.03)				
Test of the tool platform				

2.8 Tool chain Analysis

Is the tool platform able to analyze the tool chain.

1. The tool platform provides a met-model to represents tool chain
2. The tool platform provides a graphical representation of the tool chain
3. The tool platform provides a textual description of the tool chain
4. The tool platform may help to analyze the tool chain by means of the tools inputs and outputs.
5. The tool platform allows the rearrangement and/or the extension of the tool chain
6. Previously define tool chain may be re-use and their confidence too.

	Author	Assessor 1	Assessor 2	Total
Tool chain Meta-Model definition				
Tool chain graphical representation				
Tool chain textual representation				
Tool's Input/output Analysis				
Tool chain Analysis				
Tool chain rearrangement and extension				
Confidence preservation				

2.9 Other comments

Please to give free comments on the approach.

