: At least the document owner shall be named personally.

OK

ITEA2
INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT

ITEA2 Project
Call 6 11025
2012 – 2015

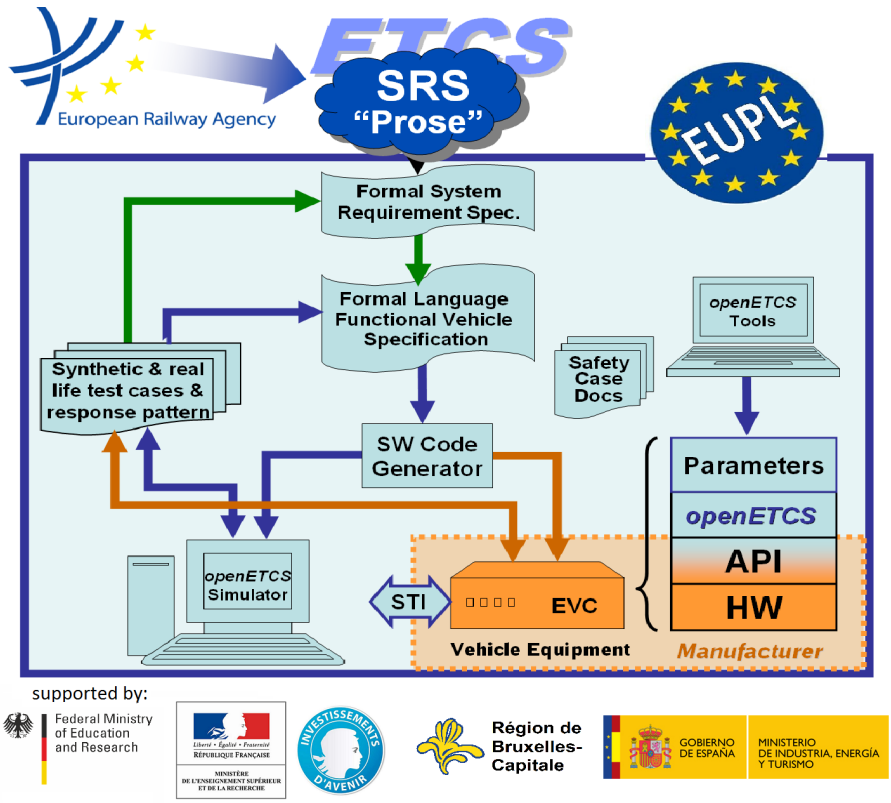
OETCS/WP1/D1.3.1

Work-Package 1: “Management”

Project Quality Assurance Plan

Izaskun de la Torre

May 8, 2013



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openETCS

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Work-Package 1: “Management”

OETCS/WP1/D1.3.1
May 8, 2013

Project Quality Assurance Plan

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Description of work

Prepared for ITEA2 openETCS consortium
Europa

Contents

Document History

Version	Date	Chapters modified	Reason	Name
0.0.0	15.11.2012	All	First Steps on frame evaluation	Rico Kaseroni (DB) Peyman Farhangi (DB)
0.1.0	27.11.2012	All	First Steps on Content	Rico Kaseroni (DB) Jan Welte (TUB) Peyman Farhangi (DB) Matthias Kuhn (DB)
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1 Introduction

1.1 Purpose

Guidance: This document contains the procedures and control methods to achieve the end products of the OpenETCS project with the desired levels of safety and quality. It also describes the processes, methods and tools to develop such products in accordance to CENELEC Standards and following Open Source principles.

1.2 Scope

The OpenETCS main objective is the development of an “open proofs” platform that integrates technologies from various stakeholders and enables the use of formal verification techniques in order to dramatically improve the software quality for embedded control systems in terms of reliability, maintainability, safety, and security.

JW: Since their have been long discussions concerning the goal the first sentence showed by revised. It is unclear what a "open proofs” platform should be.

IT: OK

The openETCS results will be:

1. Creating a formal specification of the ETCS OBU functionality according to UNISIG Subset 026
2. An executable software package generated from the formal specification and a non-vital implementation of that software for laboratory test, simulation and reference purposes
3. A tools chain supporting both previous bullet points including code, test case and document generation meeting CENELEC EN50128:2011 (T3) requirements and certifiable for SIL4 software applications for signalling equipment (Certification itself is not part of the project)

JW: The goals shall be reformulated to respect the formulations and priorities defined at Paris.

IT: OK

1.3 Intended Audience

Guidance: This document applies to the whole development life-cycle of the project and it addresses all the stakeholders involved in the project. This document should be available to all of them in read access mode and it provides operational guidance and access to QA procedures.

JW: The part " should be available to all of them in read access mode ” shall be deleted, since this is clear and always given in an open project public repository.

IT: OK

JW: at the following part "for all people participating in the OpenETCS project. The formulation"operational guidance and access to QA procedures” should be clarified and extended on.

IT: OK

1.4 Evolution

Guidance: Frequency, method, responsibilities,...

JW: Please at an example, as I don't see the purpose of this part.

IT: OK. An example will be provided

CC: What is this part related to? Does the evolution concern only the quality documentation, or the whole project outcomes?.

IT: Only to the Quality Documentation

1.5 References, Guidelines and Standards

Guidance:

Type	Document
Standard	EN 50128
Standard	ISO 9001
Reference	Full Project Proposal (FPP)
Reference	Configuration Management Plan
Procedure	Review Process
Guidelines	Contribution guidelines
Guidelines	Committer Election Guideline
Text1	Text2

JW: At least add EN 50128 and ISO 9001, but how is references meant?

IT: OK. Documents used as reference in QA Plan

1.6 Definitions and acronyms

Abbreviation	Meaning
ASR	Assessor
CCS	control-command and signalling subsystems
DES	Designer
ERTMS	European Rail Traffic Management System Train signaling system equipment based on a single Europe-wide standard for train control and command systems.
ERA	European Railway Agency
ETCS	European Train Control System It is a signalling, control and train protection system designed to replace the many incompatible safety systems currently used by European railways

EUPL	European Union Public Licence
EVC	European Vital Control
GSM-R (train radio)	Global System for Mobile Communications - Rail(way) It is an international wireless communications standard for railway communication and applications.
HR	Highly Recommended
HW	Hardware
IMP	Implementer
INT	Integrator
MVB	Multifunction Vehicle Bus It is a part of the Train Communication Network (TCN), and it takes part in digital operation in the train. MVB is the bus part in each coach, and the Wire Train Bus (WTB) allows connecting the MVB parts with the train control system.
NA	Not Applicable
OBU	On-Board Unit
PMP	Project Management Plan
REQ	Requirements Manager
R&D	Research and Development
SCMP	System Configuration Management Plan
SIL	Safety Integrity Level
SME	
SRS	Software Requirements Specification
SW	Software
SW-SIL	Software-Safety Integrity Level (EN 50128:2011)
TSI	Technical Specification for Interoperability
TST	Tester
VAL	Validator
VER	Verifier
V&V	Verification and Validation
WP	Work Package
FM	Formal Methods
IP	Intellectual Property
IP Clean	No IP without permission in writing

2 Project Organization

JW: A short (two sentences) introduction is needed to explain the relation between all following points.

IT: OK

2.1 Project structure diagram

JW: A diagram (graphic) has to be added.

IT: OK

CC: This part refers to the Project Management Plan. What is this document? Is that the configuration Management plan? Is that document still created?

IT: It can be updated FPP where the updated description of the Project Plan is available.

Guidance: Refer to the PMP(Project Management Plan) and/or to the Full Project Proposal where the Project Organisation is described in detail. In this chapter include only the way compliance to CENELEC and SCRUM high level requirements at organisational level is achieved. i. all organisations are ISO 9001, how independency between roles is achieved within the structure,...

2.2 Committers assignment and responsibilities

Guidance: Introduce the concept of Committers as the way to guarantee the required competences are available within the context of the large project, with many organisations involved in the context of a EU project and with an open source environment. Introduce the concept of Contributors also and the difference between them. Refer to the document where the process to become a Committer and/or contributor is detailed.

JW: To cover all open source roles also the user have to be introduced.

JW: Section covers only open source rules. A short decription of the relations to the project structure and CENELEC rules is needed.

CC: What is the document to refer to for the committer assignement? The needed competencies matrix, the actual competencies matrix and the training plan will be included in this document?

IT: This is an open source project and at the same time it is a EU project. This means that "participation" is not "mandatory" as in a "real life project". In this chapter we would like to emphasize/show the way/means OpenETCS has put in place to guarantee or at least control the effective participation of the "experts". The Required Competence Matrix (RCM) is specifically included later but actual competence matrix can be obtained by comparing the effective committers and contributors with the RCM. By "Document" we mean the place where the "process" and the "requirements" to become contributor or committer are explained. In this moment there is not "written document" so we will explain it here.

2.3 Project QA Management

Guidance: Provide a description of the tasks to be developed by the project QA organisational structure jointly with the QA tasks to be performed by the team to guarantee project procedures/... are met. This means to detail the overall QA strategy.

3 Life Cycle

JW: A short (two sentences) introduction how these two life cycles are related.

IT: OK

3.1 Project Life Cycle

JW: A short text before referring to the document (naming of WPs and the overall concept).

IT: OK

Guidance: Refer to a separate document (PMP and Full Project Proposal) that describes the WP structure, refer to the Iterative process; relation between WPs and Results; WP/Project Backlog creation and maintenance and Scrum implementation.

3.2 Product Life Cycle

JW: Not to long, just short introduction, please.

IT: OK

Guidance: Refer to a separate document that describes the life cycle. Consider EN50126 and EN50129 Requirements, include Deployment and Maintenance, include activities to "adapt" the generic/abstract software to a concrete implementation. In this chapter, if applicable, include justification to "potential deviations" to CENELEC standards.

3.2.1 Life Cycle of the OpenETCS Software

Guidance: Prepare a separate document with a complete description of phases of the the SW development life-cycle, including V&V, QA and Safety processes. This description shall contain the activities to be performed by each role. In the preparation of this document, contribution of the different WPs is necessary (i.e. WP2 for the Design and development phase and WP4 for the V&V activities). In this chapter, if applicable, include justification to "potential deviations" to standard (EN50128) standards.

JW: Reference to D 2.3.

IT: OK

3.2.2 Life Cycle of the OpenETCS Tools chain

Guidance: See 3.2.1

JW: Reference to the respective documents of WP 7.

IT: OK

3.3 QA Management

Guidance: Refer to the procedures to implement the QA activities identified within the above mentioned development life-cycle.

CC: The parts §2.3 (Project QA management) and 3.3 (QA management) could be both in the same part (2 or 3). For us, the Quality Assurance has to refer to both project life-cycle and Software life-cycle.

IT: In chapter 2.2, the idea is to introduce the QA Organisation Roles (both project and software, as you say). In chapter 3.3 we will explain the QA activities

4 Roles

CC: The SCRUM and open source part of the roles described in the §4.1 are missing. The 2 paragraphs (roles within Software and within ToolChain) allow to make the connection between the competencies matrix and the training plan (shortly described in the §4.1), which is a good point. Moreover, the §4.4 should be a refinement of the CENELEC role for the quality manager, and thus be integrated in the previous paragraphs.

IT:

In the template (see Annex) we have considered SCRUM Roles as a secondary feature, as every "participant" has to comply (from a competence point of view) to several roles at the same time: Functional/CENELEC role, a SCRUM Role, an Open Source Role and an OpenETCS project role.

In order to simplify and provide more clarity, we will prepare separate competence tables.

4.1 OpenETCS Roles

JW: Introduction needed that relates the openETCS project structure based on the open source principles to the needed CENELEC roles. For the specific competencies and the listing the reference can be made to the Annex.

IT:

OK, we will do it. Anyhow, please consider this to assess the structure we propose:One participant can be: Committer and/or Contributor to any WP and at the same time has a CENELEC Role. (Incompatible situations should be detected and avoided).

For instance, from the project point of view, an expert can be WP4 Contributor, WP2 Committer and Requirements Manager from a CENELEC point of view.

In relation to SCRUM, he/she can act as SCRUM leader and/or SCRUM Team. SCRUM Roles should be considered aside

There exist certain relations between CENELEC roles and WP activities. For instance WP2 committers are more likely to adopt a role of requirements engineers that WP4 ones, but it may occur that an expert is committers to two different WPs, so we prefer not to stablish "mandatory" relations but only references.

Guidance: Refer to Annex with the Role/Competence Matrix at project level. Besides, in this chapter, outline or refer to the procedure that will be used to maintain this matrix up to date; identify (refer and/or outline) the measures and/or mechanisms in place to record the competencies of the personnel assigned to the different roles (i.e. each company has to maintain training records) and measures and/or mechanisms to identify and fill gaps (i.e.maintain a project specific incorporation programme; maintain a training programme)

4.2 Roles within the Development process of the openETCS Software

Guidance: Refer to Annex with the Role/Competence Matrix of the OpenETCS software. Besides in this chapter, outline key specific competences demanded by the ETCS software development to the different roles.

4.3 Roles within the Development process of the openETCS Tools Chain

Guidance: See Chapter 4.2

4.4 QA Activities

Guidance: Describe the measures applied to monitor/verify people assigned to the different roles meet the requirements imposed by the role and have an active/qualified participation to the project (i.e. committers: assess effective contribution activities; gap analysis;. . .).

5 Methods, measures and tools for quality assurance (product + open ETCS software + Tools chain) + Justification of chosen Tools and Methods

JW: The Annex does/can not provide the needed information. The references have to be made to the WP 2 and WP3 deliverables, which actually provide these information in depth

IT: We agree that the full and detailed description will be included in the deliverables. However, a summarised version with the key elements (methods, tools and short justification) should be included in this document as annex. Within this point, we consider the proposal of Merlin is very appropriate

CC: Why add a QA activities at the end of each of thoses paragraphs, whether the QA activities are exactly le scope of this document? For instance, the following titles are proposed for replacing the "QA Activities":

- §5.1: "evaluation tools"
- §6.3: "Configuration Management Plan"
- §7.3: "Review process"

IT: OK. I think there is an error in the template. Instead of QA Activities, it is Quality Control and Monitoring Activities.

MP: My suggestion would be, for each software life cycle phase (see below), give appropriate Methods/Technique for SIL4 and give a justification why this Method(s) is (or are) the best one.

- Software Requirements Specification
- Software Architecture Specification
- Component Design and Implementation
- Software Verification and Modul Testing
- Software Integration Testing
- Overall Software Testing
- Software Validation
- Data Preparation
- Software deployment

IT: That´s great. OK

Guidance: Refer to Annex where for each phase in the development life-cycle identify methods and tools as well as justification for selection

JW: There should be again sections for the openETCS model, software (are the product) and Tools chain.

IT: OK.

5.1 QA Activities

Guidance: Describe the measures to monitor the appropriate implementation of the selected methods and tools.

JW: This is a broad topic, the main issues will be covered by the verification, validation and safety plan. This aspect should introduce the general principals and tools and then reference those documents.

IT: OK. I think there is an error in the template. Instead of QA Activities, it is Quality Control and Monitoring Activities.

6 Documentation

6.1 Documentation Structure within the development process of the openETCS Software

Guidance: Prepare a separate document with a complete description of labelling; definitions and acronyms; control information to include in each document; documents QA criteria; documentation matrix

6.2 Documentation Structure within the development process of the openETCS Tools chain

Guidance: See Chapter 6.1

6.3 QA Activities

Guidance: Describe the methods to review the documentation structure

JW: For me this should not be the review of the documentation structure, but the documentation quality control activities. These are looked at in detail over the next to chapters, therefore this should be a general overview.

IT: OK

7 Documentation Control

Guidance: Refer to Control Process Document where the function develop by authors, reviewers is provider

JW: This sentence is hard to understand. From my point of view the three section make no sense since there should be the same process for all kinds of documents. This section should name the main control activities (review, approval, dissemination, archiving) and the main tools used for this. Then it should refer do the respective documents (like the great review process).

IT: OK, we will clarify this sentence.

7.1 Documentation Control within the Development process of the openETCS Software

Guidance: Refer to the list of active documents of the openETCS software

7.2 Documentation Control within the Development process of the openETCS Tools chain

Guidance: Refer to the list of active documents of the openETCS tools chain

7.3 QA Activities

Guidance: Describe the methods to monitor both the control and process

8 Tracking and tracing of deviation

8.1 Traceability (openETCS software + Tools chain)

Guidance: Provide a description of traceability requirements, as well as how the traceability will be achieved, implement, maintained and verified. At this stage, exceptions if they exist should be justified.

8.2 Configuration Management

Guidance: Refer to SCMP (System Configuration Management Plan). Overview table with the summary of main features of SCMP.

JW: SCMP has to be written. This mainly includes an explanation of the proper github working processes.

IT: OK, it will be included in the backlog we are preparing.

Describe the QA activities

8.3 Fault Management

Guidance: Refer to Incident Management Process. Overview table with the summary of main features of the procedure

JW: What shall be the be the focus of the "Incident Management", since deal with safety development and Vand V activities, the word incident is mainly used in a safety sense. Here specifically procedures how to handle software bugs and faulty behaviour discovered during the V and V process has to be described.

IT: OK, that you say is correct. We will change the naming.

Describe the QA activities

8.4 Grievance Handling

Guidance: Refer to the specific procedure.

Describe the QA activities

8.5 Modification and change control

Guidance: Refer to external procedure; Overview table with the summary of main features of the procedure.

JW: What is meant with "external procedures"? This topic is closely related to the document related responsabilities and the github use. Therefore it is very close to the Configuration Management, which maybe makes it hard to separate these topics.

IT: OK. We agree

describe the QA activities to be developed.

9 Supplier Control

Guidance: Requirements to external suppliers and how they will be verified

JW: What are the suppliers in OpenETCs and what activities are needed here?

IT: It is only to be considered if any supplier is needed

describe the QA activities to be developed.

JW: Im missing sections for the Quality Assurance during the product maintenance and the deployment of the software and the tool chain.

IT: Product Maintenance and deployment phased will be covered in Chapter 3.2

10 ANNEXES

10.1 ANNEX A -Role Matrix at project level-

MP: I assume by "role" you mean the roles within the project openETCS. In Fact you distinguish between these roles: At project level:

- Project Leader
- Project office

for each WP:

- WP-Leader

within each WP:

- Task-leader
- Task-Major Participant
- Task participant
- Task Committer

IT: Yes.

Role Project role

SCRUM if applicable scrum role

Functions Responsibilities of the role

Competences Profiles Required identifier of the competence profile described in the competence matrix

Role	SCRUM	Functions	Competence Profiles Required
Users	-	• create a viable ecosystem around an openETCS project, • encourage additional open source and commercial organizations to participate • ...	CPR01, CPR03

Adopters	-	• Reuse of the frameworks (within the companies that are contributing to the project and outside of the project), • Reuse of the tools (within the companies that are contributing to the project and outside of the project, • ...	CPR03 and CPR04
Project Leader	Product owner	Text3	CPRXX
Project Assistant	OpenETCS Scrum master	Text3	CPRXX
Project Contributor	OpenETCS Scrum team	Text3	CPRXX
Project Committer	-	Text3	CPRXX
WP1 Leader	WP1 product owner	Text3	CPRXX
WP1 Assistant	WP1 Scrum master	Text3	CPRXX
WP1 Contributor	WP1 Scrum team	Text3	CPRXX
WP1 Committer	-	Text3	CPRXX
WP2 Leader	WP2 product owner	Text3	CPRXX
WP3 Assistant	WP3 Scrum master	Text3	CPRXX
WP3 Contributor	WP3 Scrum team	Text3	CPRXX
WP3 Committer	-	Text3	CPRXX
WP4 Leader	WP4 product owner	Text3	CPRXX
WP4 Assistant	WP4 Scrum master	Text3	CPRXX
WP4 Contributor	WP4 Scrum team	Text3	CPRXX
WP4 Committer	-	Text3	CPRXX

WP5 Leader	WP5 product owner	Text3	CPRXX
WP5 Assistant	WP5 Scrum master	Text3	CPRXX
WP5 Contributor	WP5 Scrum team	Text3	CPRXX
WP5 Committer	-	Text3	CPRXX
WP6 Leader	WP6 product owner	Text3	CPRXX
WP6 Assistant	WP6 Scrum master	Text3	CPRXX
WP6 Contributor	WP6 Scrum team	Text3	CPRXX
WP6 Committer	-	Text3	CPRXX
WP7 Leader	WP7 product owner	Text3	CPRXX
WP7 Assistant	WP7 Scrum master	Text3	CPRXX
WP7 Contributor	WP7 Scrum team	Text3	CPRXX
WP7 Committer	-	Text3	CPRXX
Configuration manager	-	Text3	CPRXX

JW: "Project Contributor/OpenETCS Scrum team" row –> This are more external or short term contributers, which do not belong to the team.

JW: "Project Committer" row –> This should be the scrum team.

IT: We are changing the tables

10.2 ANNEX B -Competence Matrix at project level-

Profile Identifier unique identifier

Competence Description description of the necessary competences for each profile

Profile identifier	Competences
CPR01	Infrastructure (track and signalling) management companies/organisations
CPR02	• experience with requirements management process • experience with requirements management tools • knowledges, experience and deep understanding with subset 026 • experience in railways sector • ...
CPR03	Systems/Subsystems designers and manufacturers
CPR04	Companies/Organisations that provide solutions/services to rail industry
CPR05	• needs to be able to explain the needs and requirements to the developer and must be able to give answers to their questions about details. This does not mean that they need to know everything but a good WP leader knows who knows • needs to be able to make decisions on the spot if this is necessary. And a WP leader needs to take responsibility for these decisions, • must look at the whole picture and all stakeholders and be able to know which brings the most business value to the product • prepared to be involved in conflicts. The biggest challenges in this role just come from the fact that the many different interest and stakeholders are concentrated into a single role • ...
CPR06	Text6
CPR07	Text6
CPR08	Text6

10.3 ANNEX C -Role Matrix of the OpenETCS software-

CENELEC Roles	SCRUM	Functions	Competence Profiles Required
Project Leader	Product owner	Text3	CPRXX
Project Assistant	Scrum master	Text3	CPRXX
Requirement manager	Scrum team	• see cenelec annex • ...	CPRXX

Designer	Scrum team	Text3	CPRXX
Implementer	Scrum team	Text3	CPRXX
Tester	Scrum team	Text3	CPRXX
Integrator	Scrum team	Text3	CPRXX
Verifier	Scrum team	• see cenelec annex • ...	CPR09
Validator	Scrum team	Text3	CPRXX
Assesor	Scrum team	Text3	CPRXX

10.4 ANNEX D -Competence Matrix of the OpenETCS software-

Profile identifier	Competences
CPR09	• must be able to deduce the verification types from the specifications • must be competent in various verification methodologies and able to identify the most appropriate method or combination of methods to the context • see cenelec annex • ...
CPRXX	Text6
CPRXX	• see cenelec annex • ...
CPRXX	Text6
CPRXX	Text6
CPRXX	Text6
CPRXX	Text6
CPRXX	Text6
CPRXX	Text6
CPRXX	Text6

10.5 ANNEX E -Role Matrix of the OpenETCS Tools chain-

CENELEC Roles	SCRUM	Functions	Competence Profiles Required

Project Leader	Product owner	Text3	CPRXX
Project Assistant	Scrum master	Text3	CPRXX
Requirement manager	Scrum team	• see cenelec annex • ...	CPRXX
Designer	Scrum team	Text3	CPRXX
Implementer	Scrum team	Text3	CPRXX
Tester	Scrum team	Text3	CPRXX
Integrator	Scrum team	Text3	CPRXX
Verifier	Scrum team	Text3	CPRXX
Validator	Scrum team	• see cenelec annex • ...	CPR09 and CPR12
Assesor	Scrum team	Text3	CPRXX

10.6 ANNEX F -Competence Matrix of the OpenETCS Tools chain-

Profile identifier	Competences
CPRXX	Text6
CPRXX	Text6
CPRXX	Text6
CPRXX	Text6
CPRXX	Text6
CPRXX	Text6
CPRXX	Text6
CPRXX	Text6
CPR12	• model knowledges • ...
CPRXX	Text6

10.7 ANNEX G -Methods and tools/Justification for selection-

Software Design and Implementation		
Method/Technique	SIL 4	Justification
Modular Approach	M	Text6

Components	HR	Text6
Design and Coding Standards	M	Text6
Strongly Typed Programming Language	HR	Text6
Formal Methods	HR	Text6
Modeling	HR	Text6

Quality mechanisms for Safe deployment	Technique & Approach
Software Self-identification Mechanisms (9.1.4.11)	
Error detection and/or avoidance mechanisms during deployment process (store, transfer, transmission and/or duplication of code operations) (9.1.4.20)	
Automatic detection and safe management of incompatible components/versions (9.1.4.8, 9.1.4.9)	
Provision of appropriate and accurate diagnostic information	
Safe Roll back capabilities	

Quality mechanisms for Maintainability	Technique & Approach
Coding Standards	
Impact Assessment	Before each implementation
Data register and analysis	Creation and maintenance of a project history register
Design method selection mechanisms to facility the maintainability (7.3.4.28)	
Attenuation actions mechanisms (9.2.4.20)	
Mechanisms for evaluating the appropriateness of the methods, tools and techniques used in the modification/maintainability (part of 9.2.4.2 and CENELEC 126 phase 13)	
SW description mechanisms (7.1.1.1)	
Control mechanisms to guarantee the corrective actions adoption (6.6.4.1)	
Provision of appropriate and accurate modification management system (6.6.4.1) and configuration management system (6.5.4.12)	

