OCORA

Open CCS On-board Reference Architecture

High Level Methodology
Gamma Release

Document ID: OCORA-30-006-Gamma

Version: 1.10

Date: 04.12.2020

Status: Final

Revision history

Version	Change Description	Name (Initials)	Date of change
1.00	1st Gamma version based on Beta incl. comments	RM	2020-11-16
1.10	final for Gamma Release	RM	2020-12-04

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References

The following references are used in this document:

[1] OCORA-10-001-Gamma – Release Notes
[2] OCORA-30-001-Gamma – Introduction to OCORA
[3] OCORA-90-002-Gamma – Glossary
[4] OCORA Memorandum of Understanding, dated March 25th, 2019
[5] OCORA Code of Conduct, dated October 20th, 2019

1 Introduction

1.1 Document context and purpose

This document is published as part of the OCORA Gamma release, together with the documents listed in the release notes [1]. It is recommended to read the OCORA Introduction [2] first and be aware of the OCORA Glossary [3].

The purpose of this document is to provide the OCORA participants with an overview of the used methodology. It is and will remain a high level document with the aim to ensure common approach and basis and also give the freedom of choice in all not defined areas to the workstream leaders to define appropriate processes, methodology and tools if required for the specific type of work foreseen.

In the next phase OCORA methodology will be revisited in order to proof sector compatibility with other ongoing sector initiative (e.g. RCA, S2R-2).

The basis of this document is the OCORA contractual framework including the MoU [4] and the CoC [5].

2 Best Practice

In the various workstreams, documents are created and compiled by geographically distributed teams. Each member of these teams has a different background and specific ideas and goals.

When developing a documentation in a workstream, the reviewing process must take place in parallel by the members of the workstream. This is to ensure that the document is developed in alignment with the ideas and goals of each team member.

While the workstream leader has the responsibility to compile the document (unless defined differently), the other workstream members provide input and constantly ensure that their respective organisation is in line with the major decisions taken by the team. This is to avoid major surprises during the final review process.

Documents that are submitted for final review shall be made available to the review team at least 2 weeks before the final review TELCO. The review comments are due at least 1 week prior to the final review TELCO. This allows enough time for the author to incorporate all review comments, using the change tracking mode and to forward a revised version to the review team. Review team members need to be in the possession of the revised document not later than 2 days prior to the final review TELCO.

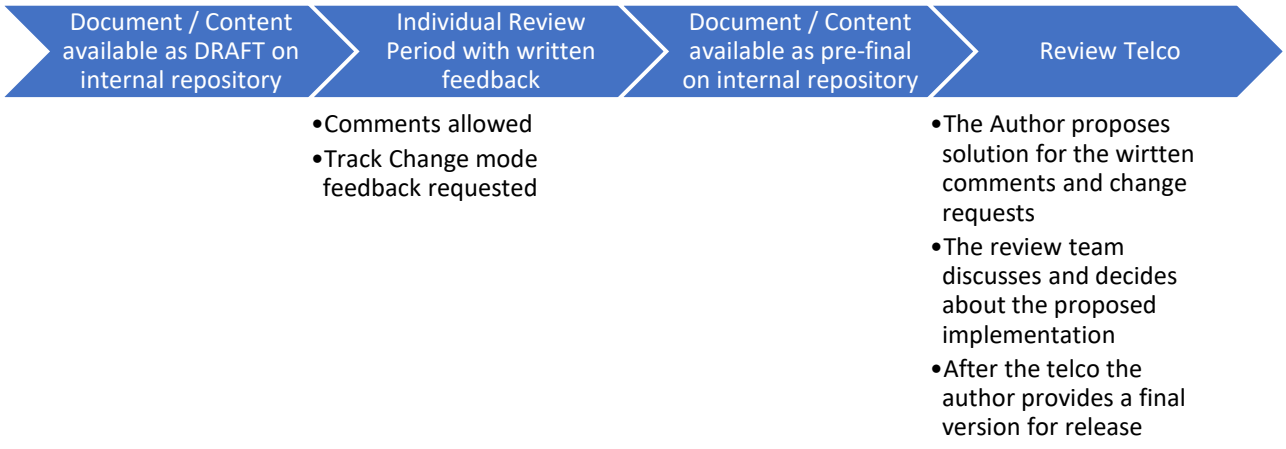

Figure 1 - Best Practice Document Review

A final review cycle is very costly, especially in respect to the time needed. A minimum of 2 weeks is needed. Therefore, the workstream leader has to make sure that documentation submitted for final review is in a perfect condition and workstream members have to ensure that their organisation's thinking is in line with the submitted documentation.

3 OSI Model

OCORA decided to follow the OSI Layer protocol specification according the international standard ISO/IEC 7498-1:1994 and used within S2R X2R1 for Subset 143.

This protocol specification is divided into separate layers. Figure 2 shows the representation of the different layers according to the Open Systems Interconnection (OSI) model.

All OCORA developments shall be compliant to the end device interface characteristics as specified in **Error! Reference source not found.**. This affects OSI Layer 1 – Layer 7.

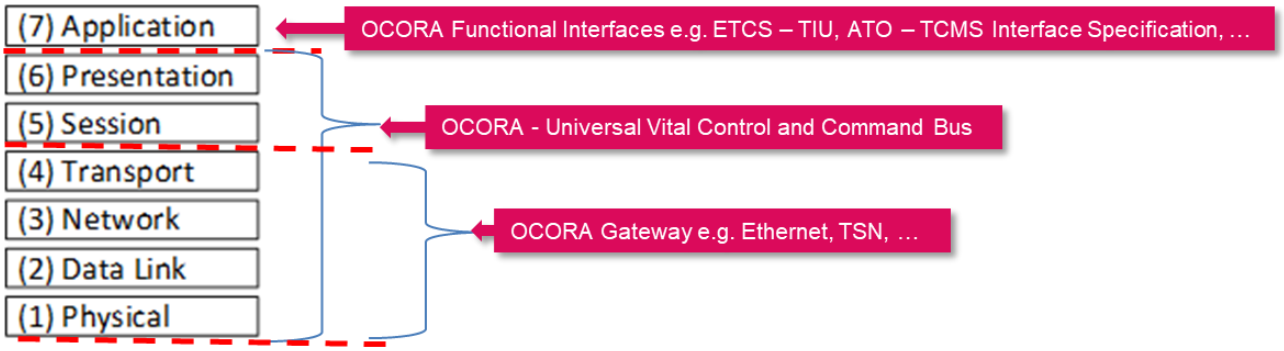

Figure 2 - OSI Layer, incl. examples

4 OCORA Quality Gates / Review Process

The following process shows the two quality gates applied on OCORA content. It is applied if content is being shared with other OCORA workstreams or external stakeholders (e.g. Shift2Rail).

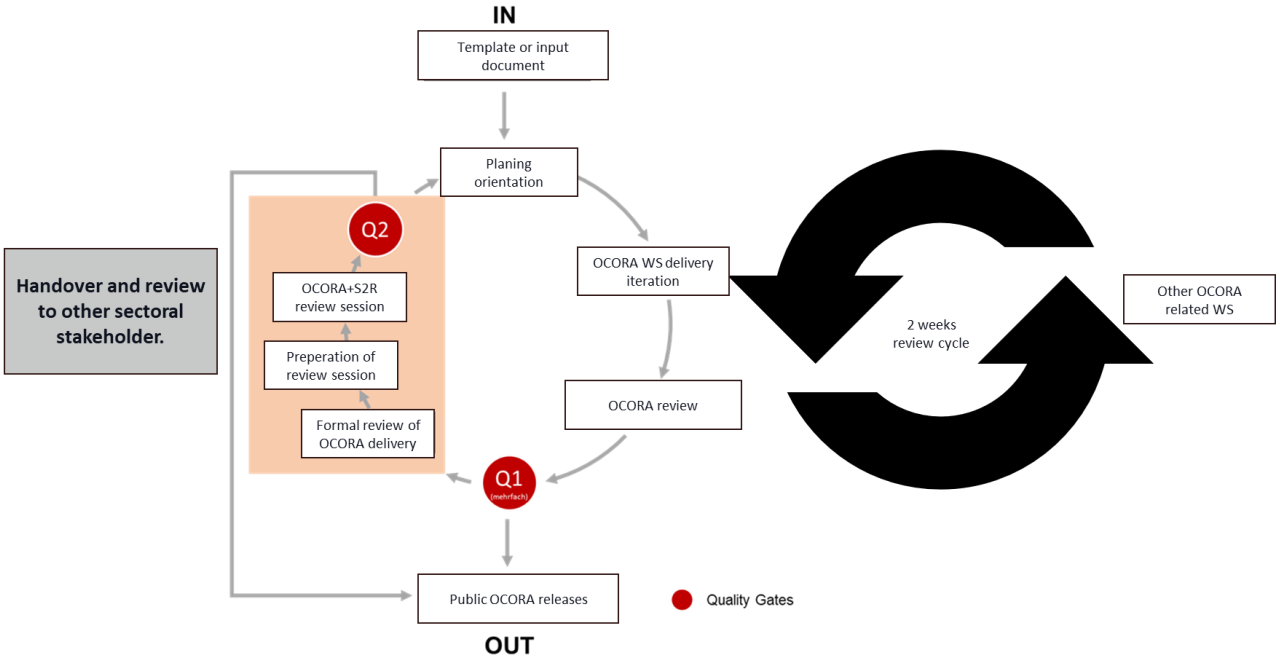

Figure 3 - OCORA review and collaboration process

5 Model Based System Engineering

In order to leverage nowadays system complexity in the CCS domain, OCORA as one of many others (e.g. EULYNX, RCA, S2R) decided to face this critical challenge in designing, managing, and optimizing by performing Model Based System Engineering, MBSE.

It is yet to be decided to what extent MBSE will be performed. OCORA can be seen, as system of systems. CCS On-board handled by OCORA as part of end to end signalling handled by RCA.

5.1 EULYNX MBSE Specification Framework

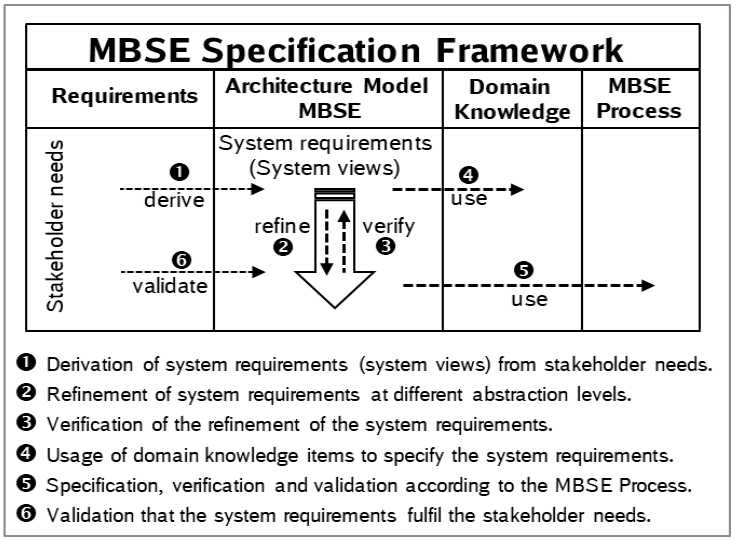

Figure 4 - EULYNX MBSE Specification Framework

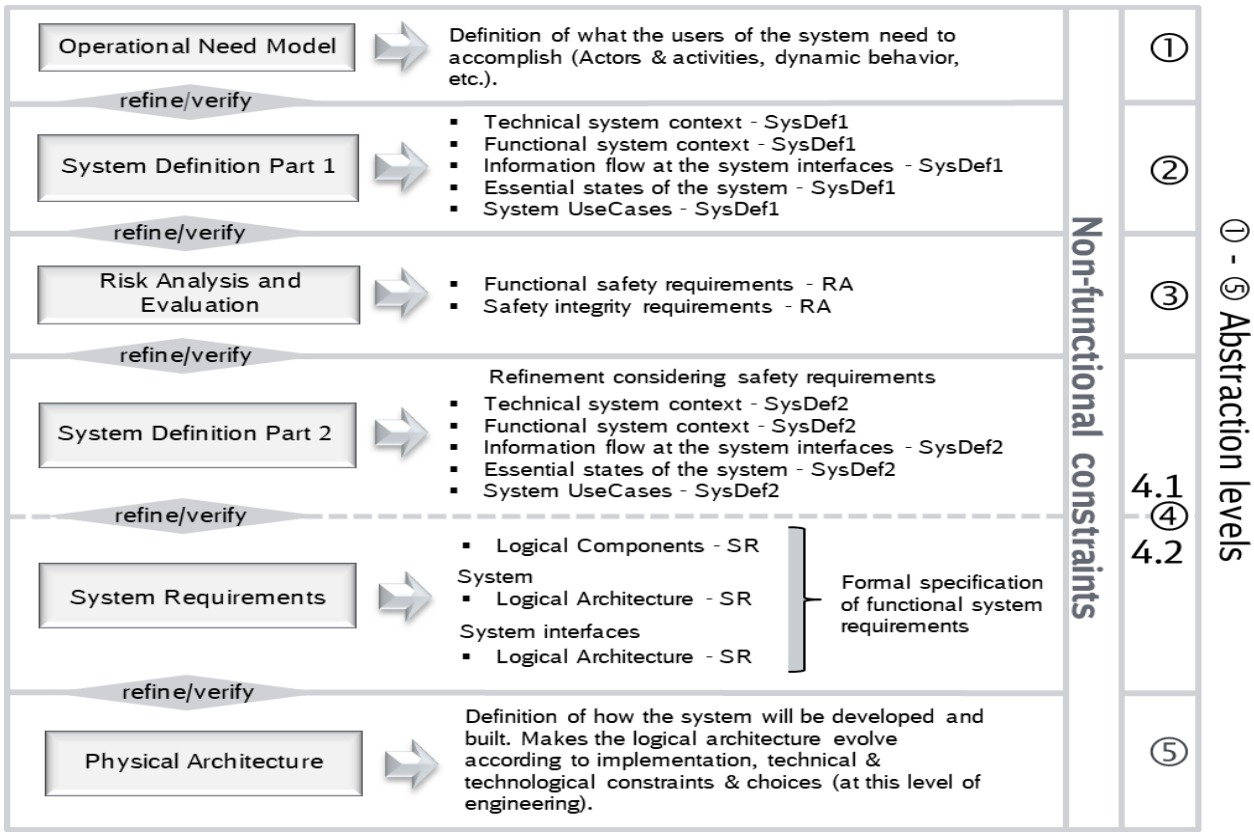

Figure 5 - EULYNX full development process

5.2 Model-based Systems Engineering: Arcadia

For the development of the detailed system level specification, MBSE is used. For the following reasons, OCORA has decided to use the Arcadia method for MBSE:

- Arcadia is a system engineering method developed for safety critical subjects and therefore relevant in the context of OCORA
- The method is supported by a dedicated tool (Capella)
- Most founding members of OCORA are using the Arcadia method in their CCS projects already

It is yet to be decided to what extent and in what phases of the product definition/development cycle the Arcadia method will be used.

6 OCORA deliverables in compliance with the CENLEC phases

OCORA prepares its architecture to be compliant to the CENELEC process as defined within the international standard and the application within the S2R IP 2 ATO GoA 3/4 activities to use for Model Based System Engineering as described in chapter 5.

It is yet to be decided to what extent (e.g. phase 1-5) OCORA will formally perform. Ensuring CENELEC compliance throughout the full development process calls for definition of an organisation including e.g. quality, RAMSS, processes, etc, both on supplier and customer side.

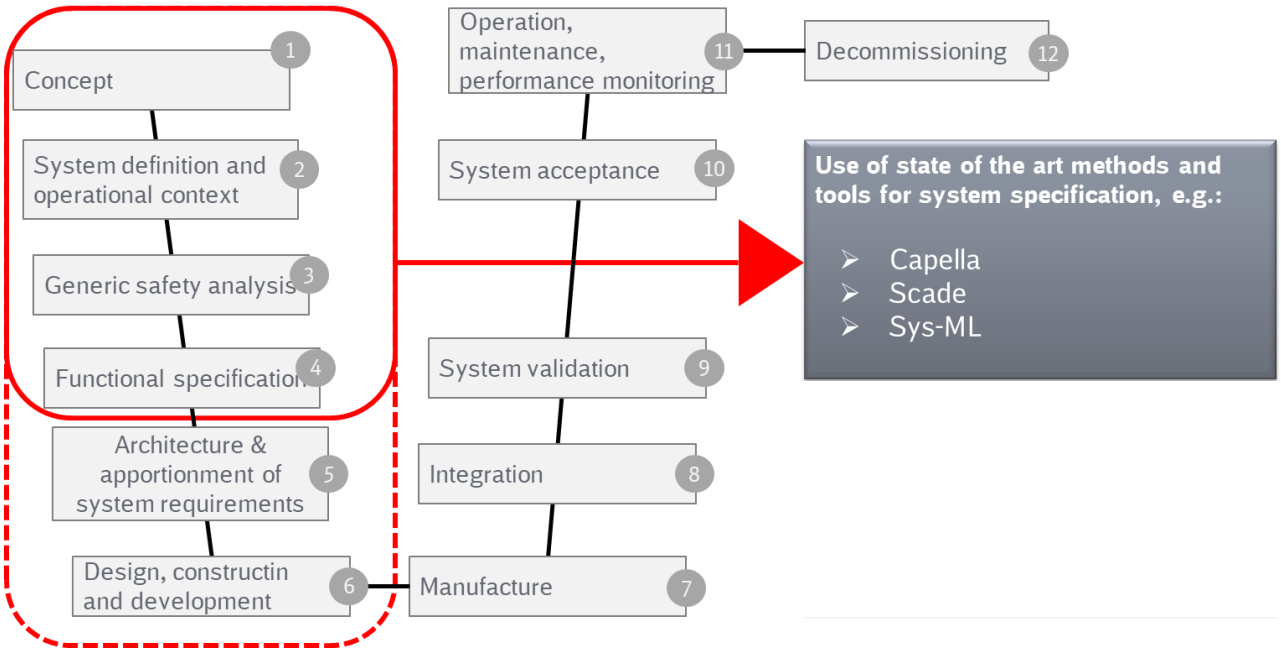

Figure 6 - CENELEC Phases 1 – 12

7 OCORA deliverables in the V cycle

The main objectives of OCORA imply creating the preconditions for successful future product development – firmly based in prevailing EU regulations and notably the Technical Specifications for Interoperability or TSI's – that answer the needs and requirements of both the RU's and the supply industry. In the relation to the supply industry, OCORA formulates the requirement specification that products and services on offer have to comply with. Requirements originate from:

- Prevailing Europe and national law and regulations, the development of which OCORA (notably the upcoming 2022 TSI CCS revision) intends to influence using the appropriate channels like ERA. These cover a wide array of functional and technical requirements:
- Business objectives of individual OCORA Members, translated into (mostly non-functional) harmonised requirements for procurement purposes.

With reference to standard systems engineering process modelling, the domain of **OCORA would extend from the specification of customer requirements down to system design** and the role of the **supply industry would be to start product development** based on this input as illustrated below.

Unless otherwise decided (ex. joint development for demonstrators or reference systems) it is assumed, that each OCORA member but also outside of OCORA, will apply OCORA specifications themselves to perform validation, testing, operation and maintenance individually.

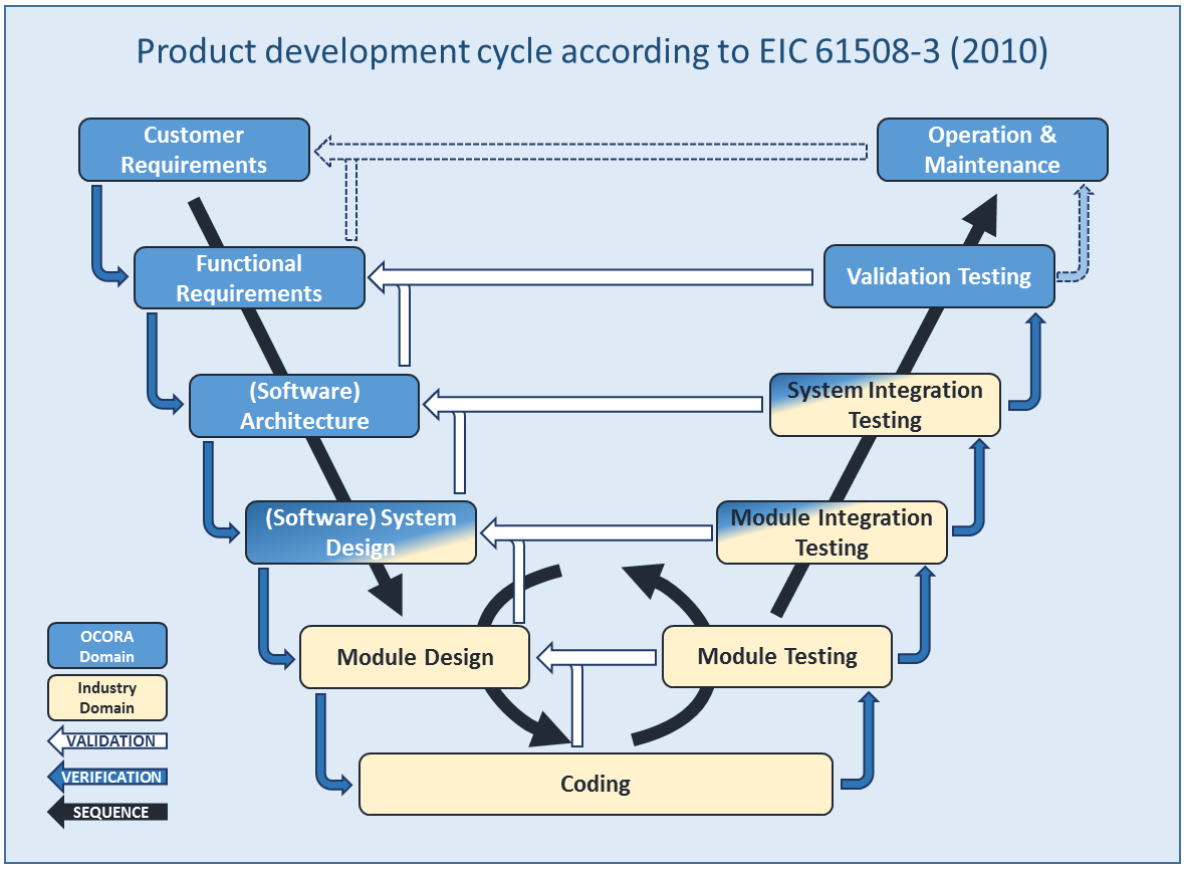

Figure 7 - OCORA preferential distribution of responsibilities in relation to suppliers