OCORA

Open CCS On-board Reference Architecture

Alliances

Revision history

Version	Change Description	Initial	Date of change
0.01	First draft	JBS	26.10.2020
0.02	▪ Final draft adapted in final review	JBS	27.11.2020
1.00	Official version for OCORA Gamma Release	RM	04.12.2020
1.10	▪ Preparation for Delta Release	RM	27.05.2021
1.90	▪ Minimal adjustments, version ready for review	JBS	17.06.2021
2.00	Official version for OCORA Delta Release	RM	25.06.2021
2.01	▪ Preparation for release 1	JBS	08.11.2021
2.02	▪ Comments from DBS	DBS	25.11.2021
3.00	Official version for OCORA Release R1	JBS	03.12.2021
4.00	Decoupled document from a specific OCORA release	RM	15.06.2022
4.10	Update alliance relation with X2-Rail-4, EUG LWG, LinX4Rail, EU-Rail System- & Innovation-Pillar	RM	09.11.2022
4.11	Update after coreteam review	RM	01.12.2022
4.21	Update alliance relation with EuroSpec, EU-Rail System- & Innovation-Pillar	RM	15.05.2023

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References

Reader's note: please be aware that the numbers in square brackets, e.g. [1], as per the list of referenced documents below, is used throughout this document to indicate the references to external documents. Wherever a reference to a TSI-CCS SUBSET is used, the SUBSET is referenced directly (e.g. SUBSET-026). OCORA always reference to the latest available official version of the SUBSET, unless indicated differently.

[1]   OCORA-BWS01-010 – Release Notes

[2]   OCORA-BWS01-020 – Glossary

[3]   OCORA-BWS01-030 – Question and Answers

[4]   OCORA-BWS01-040 – Feedback Form

[5]   OCORA-BWS03-010 – Introduction to OCORA

[6]   OCORA-BWS03-020 – Guiding Principles

[7]   OCORA-BWS04-010 – Problem Statements

[8]   OCORA-TWS01-030 – System Architecture

1   Introduction

1.1   Purpose of the document

This document focuses on OCORA organisational and technical interfaces with other sector organisations and initiatives.

OCORA liaisons and alliances with other sector organisations are necessary to find common understanding and complementarity at expert, corporate and institutional level.

This document aims to provide the reader:

- An overview of OCORA collaboration with other entities (e.g. sector projects or associations).

- Details on why those collaborations contribute to OCORA value creation, what are the collaboration elements and how they allow to find common understanding and complementarity on a sector scale.

- Perspectives on how the OCORA collaborative approach is intended to be scaled.

- This document is addressed to experts in the CCS domain and to any other person interested in the OCORA concepts for on-board CCS. The reader is invited to provide feedback to the OCORA collaboration and can, therefore, engage in shaping OCORA. Feedback to this document and to any other OCORA documentation can be given by using the feedback form [4].

- If you are a railway undertaking, you may find useful information to compile tenders for OCORA compliant CCS building blocks, complete on-board CCS system, or on-board CCS replacements for functional upgrades or life-cycle reasons.

- If you are an organisation interested in developing on-board CCS building blocks according to the OCORA standard, information provided in this document can be used as input for your development.

1.2   Applicability of the document

The document is considered informative. Subsequent releases of this document will be developed, evolving within the progress of the OCORA collaboration.

1.3   Context of the document

This document is published as part of an OCORA Release, together with the documents listed in the Release Notes [1]. Before reading this document, it is recommended to read them. If you are interested in the context and the motivation that drives OCORA we recommend reading the Introduction to OCORA [5], the Guiding Principles [6], and the Problem Statements [7]. The reader should also be aware of the Glossary [2] and the Question and Answers [3].

2 Overview of OCORA collaborations with other groups

OCORA covers only the onboard part of the overall CCS infrastructure needed for a safe and automatic railway operation (i.e. ATP and ATO). A good integration in the overall CCS environment is therefore essential and requests a good collaboration and liaison with related activities, in particular with the following:

- EUG (ERMTS Users Group)
- Localization: EUG working group "Localization"
- FRMCS: UIC working group "Telecom On-Board Architecture", TOBA
- ERA: Topical Working Group train architecture through Community of European Railway, CER CCS SG
- S2R (Shift2Rail): LinX4Rail, LinX4Rail
- EuroSpec
- EU-Rail: System-Pillar and Innovation-Pillar

Prior to OCORA Release R1, alignment was done with RCA, FRMCS and EUG. As a result, a common view is shared and the identified Problem Statements [7] are aligned. Collaborative meetings and joint alignment groups are in progress to reach a pragmatic and efficient cooperation. It has started and continues in Shift2Rail through LinX4Rail and X2-Rail-4, and the EU-Rail: System-Pillar and Innovation-Pillar.
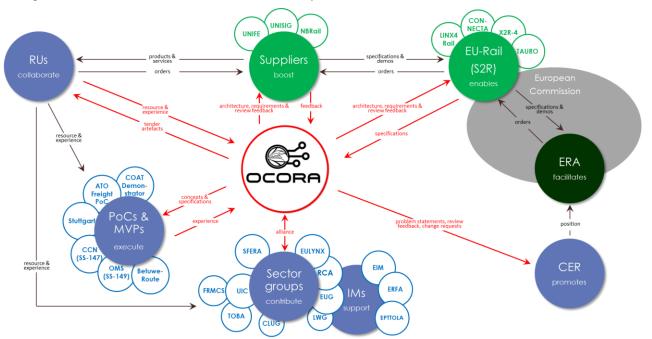

Figure 1   high level OCORA stakeholder environment

OCORA partners target complementarity between sector activities. OCORA can gain and provide support through collaboration with other sector groups:

- Sector groups driven by operators can contribute to the definition of OCORA external interfaces, in particular for components of mutual interest;
- CER as representative body is a forum to position OCORA deliverables into the regulatory environment;
- ERA will support the market uptake of OCORA compliant solutions with optimised acceptance based on optimized rules;
- EU-Rail is the place for industry dialogue and partnering activities (e.g. model, PoC, demonstrator, prototype, MVP…) and harmonization of the architectural approaches;
- Proactive contributions from suppliers will boost OCORA results. Indeed, manufacturers experience is essential for achieving informed architectural decisions.

3 Description of OCORA collaborations with other groups

3.1 Regulatory and institutional domain interest groups

3.1.1 Community of European Railways (CER)

OCORA input for future TSI revisions are channelled through CER. OCORA Coreteam members act on behalf of CER as speakers in CER working groups, and groups where user input is infused through CER, such as the ERA Topical Working Groups. CER is of paramount importance to OCORA by providing a voice for the OCORA collaboration in the European theatre and informing and involving colleague railways in the progress and activities of OCORA. Thus, OCORA intends to support and reinforce wherever necessary the role of CER as the voice of European railways and will continue to provide resources to enable CER to act in an effective way in the European arena.

3.1.2 ERMTS Users Group (EUG)

EUG is the technical body gathering ERTMS users and leading specialised expert working group on TSI specification. OCORA input for the TSI revisions is coordinated with EUG in order not to duplicate activities while keeping consistency on a CCS system scale.

EUG Localization working group (LWG) is a group of experts in charge of settling common railway requirements and exploring innovative solutions to fulfil them in a cost-effective way. These requirements relate to the expected behaviour of a localisation system in an ERTMS and OCORA environment and will tackle current criticalities and possible future needs.

3.1.3 Union internationale des chemins de fer (UIC)

UIC is a technical body for the railway operating community. In the CCS domain, their contribution to design future radio communication systems is essential for ERTMS enhancement. OCORA is interfaced with the activities of the group of experts involved in the definition of telecom onboard architecture. Today, no formal liaison is defined for synchronising the groups. However, the coordination is managed on an expert level, thus enabling consistency, synergy and complementarity between the two initiatives.

3.1.4 European Rail ISAC (ER-ISAC)

OCORA is also collaborating on the topic of cyber-security with ER-ISAC, a non-profit organisation hosted/sponsored by UIC. It provides a central resource for:

- gathering information on cyber threats;
- allowing a two-way sharing of information between the private and the public sector about root causes, incidents and threats;
- sharing experience, knowledge and analysis.

The liaison between OCORA and ER-ISAC allows sharing information, analysing new threats and finding common awareness and contributions on cybersecurity domain.

3.1.5 EuroSpec

EuroSpec is an initiative of several European railway companies with the aim to develop common and explicit technical specifications for train systems and components. The work program includes doors, parking noise, TCMS, seating comfort and the revision of published specifications. The jointly developed specifications support and facilitate the process of purchasing trains.

The functional requirements for rail vehicles of the EuroSpec specifications are used in procurement, in addition to the technical specifications for interoperability, the EN standards and the National Notified Technical Rules (NNTR). OCORA foresees making available harmonised tender artefacts based on EuroSpec methodology for CCS OB and published on the EuroSpec website.

3.2 Industry interest groups

Various industry actor can bring valuable experience benefitting OCORA. Rolling stock suppliers, CCS OB manufacturers, NoBos and Independent labs can bring valuable contributions on OCORA definition and demonstration.

OCORA is the opportunity to define a pragmatic path for a new and promising market. With its open architecture and iterative releases, OCORA offers the possibility for a constructive dialogue with the industry. The arising concrete solutions are needed to meet OCORA objectives and create wealth for the industry.

3.2.1 Union Industry of Signalling (UNISIG)

As the holder of ERTMS specification subset, UNISIG collaboration is an asset for fast progress in a sectoral move on the CCS OBU architecture. UNISIG organisation (membership and working groups) and access to knowledge (return of experience on solutions and market forecast) would facilitate OCORA development. Feedbacks and contributions from UNISIG are therefore of key interest for OCORA.

The OCORA releases provide a description on how a CCS OBU architecture should be. Steps are taken for building a common vision with UNISIG on how OCORA will help building relevant harmonised material blueprints / tender artefacts for procuring CCS onboard configurations and implementing them in existing or newly build trains.

3.2.2 Union des Industries Ferroviaires Européenne (UNIFE)

The UNIFE is an association acting as the representative body for the European supply industry. Thus, it can:

- facilitate consensus building within the EU industry;
- help disseminate and promote OCORA results;
- support through constructive input.

Technology providers, rolling stock suppliers, CCS component manufacturers and many other UNIFE members would benefit following and contributing to OCORA. Indeed, OCORA proposes design objectives and requirements, and exploratory elements on how new industrial solutions for a digital CCS can fit in existing and future trains.

While OCORA will continue to acknowledge UNIFE's position, close collaborations with the industry is ongoing in EU-Rail. Thus, it will be possible to:

- get inputs and create a dialogue for an optimised economic model;
- collect proposals to refine the architecture definition;
- collect intermediate solutions supporting migration.

3.3　Sector development organisations

The Europe's Rail Joint Undertaking is seen by OCORA as a key opportunity to scale and boost its industry dialogue.

3.3.1　Europe's Rail Joint Undertaking (EU-Rail)

S2R has already facilitated first sector discussions on OCORA proposal (e.g. through the LinX4Rail project) and starts to provide support to OCORA. Europe's Rail Joint Undertaking (EU-Rail) is the opportunity to intensify and accelerate industry resolutions of OCORA Problem Statement [7] and proposals.

The System-Pillar is foreseen as a process that will allow sector alignment for the market uptake and migration towards new modular CCS onboard solutions. To meet this purpose, it will help OCORA to define, demonstrate and disseminate specification, engineering tools and methodology that will facilitate deployment and industrialisation. An important enabler for the adoption of those specifications, methods and tools will be to find a common understanding on new business cases involving modularity. An added value would be to accelerate standardisation and improve regulations.

The Innovation Pillar is foreseen as a Research & Innovation delivery mechanism allowing to develop technical enablers and demonstrators up to TRL9. The Innovation Pillar will be a workbench for preparing OCORA demonstrators and increasing technical and deployment readiness of OCORA.

OCORA technical proposals are now acknowledged and should be used as reference for future activities in the EU-RAIL.

4 State of play OCORA liaisons

Sector interest group	Collaboration area	Liaison in place
CCS SG (CER)	Preparing TSI revisions Setting sector governance for CCS architecture	OCORA experts sharing achievements for endorsement
TWG Train Modular Architecture (ERA)	Sounding TSI-CCS On-board preparation	OCORA experts present as CER speakers
FRMCS (UIC)	On-board telecommunication architecture Safe and secure communication capabilities Migration from GSM-R	Coordination done through experts involved in both initiatives.
Localisation WG (EUG)	Mission requirement for onboard localisation Interface for localisation peripherals	Coordination done through experts involved in both initiatives.
X2Rail-4 (Shift2Rail)	ATO Architecture	Alignment and collaboration ongoing
Europe's Rail Joint Undertaking (EU-Rail)	Coordinate acknowledgement and review	System-Pillar: Pool of experts Innovation-Pillar: Proposals and Projects

Table 1 State of play OCORA liaisons