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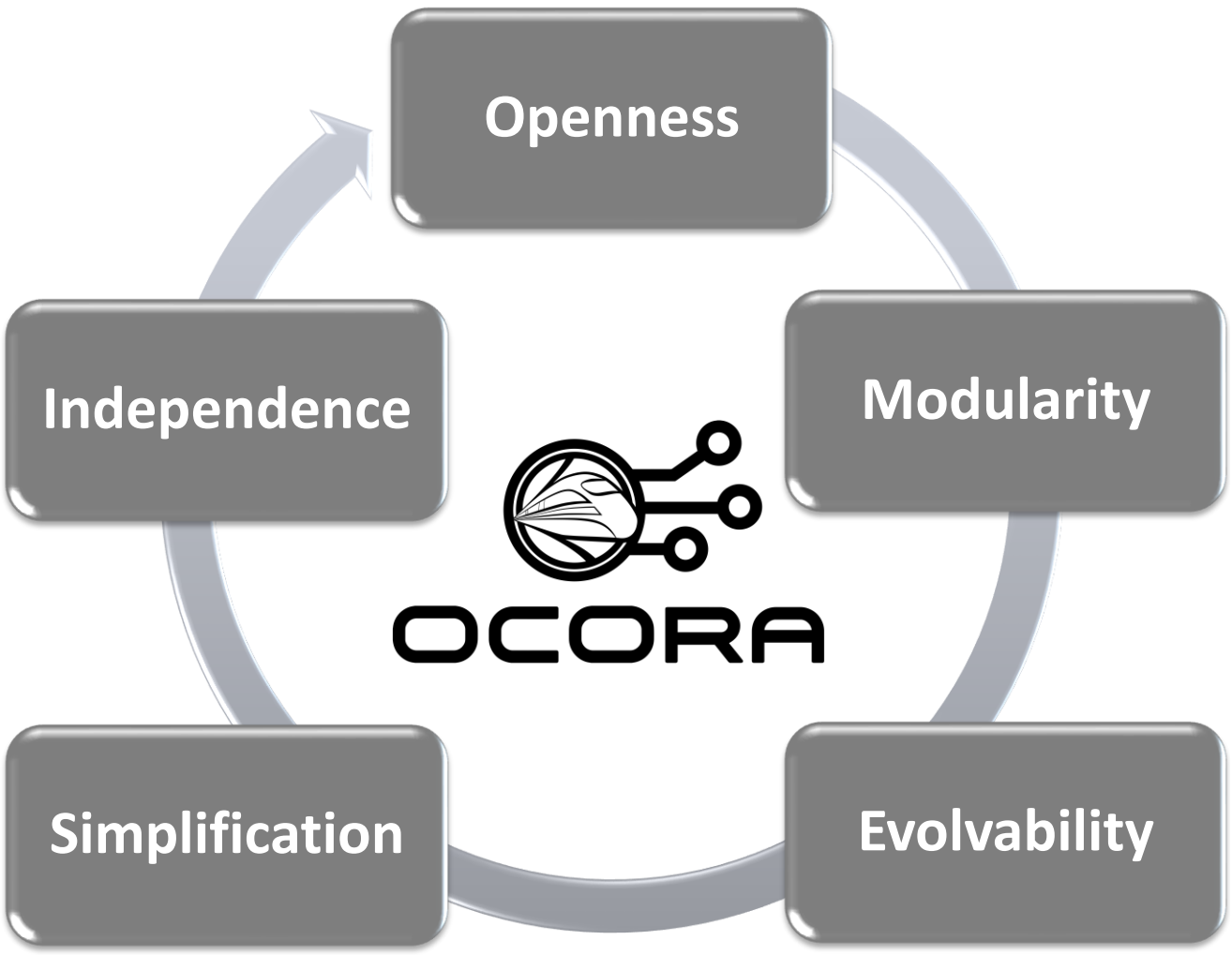
DESIGN PRINCIPLES



OCORA is an open collaboration targeting an open and powerful **CCS On-board reference architecture**.

PROBLEM STATEMENTS

Current ETCS On-board solutions:

1. are built on **incomplete, not fully standardized**, and sometimes **ambiguous specifications**
2. do not have a reasonable **total cost of ownership**
3. are **difficult to be integrated** into existing vehicles
4. are **costly** and **time consuming to adapt/change/update/upgrade**
   - In case of patching and error corrections in non SIL and SIL areas (e.g. cyber- security patching)
   - In case of baseline upgrades (e.g. ETCS baseline 2 to 3)
   - In case of functional enhancements (e.g. adding ATO)
   - In case of adaptation to new technologies (e.g. upgrade to FRMCS)
5. do **not respect different life-cycles profiles** of the different vehicle based constituents (e.g. vehicle vs. ETCS vs. connectivity)
6. are **difficult to maintain** (e.g. monitoring, diagnosis, configuration, and maintenance possibilities very limited – no remote functionality)
7. are **lacking built-in cyber security**
8. are **performing below expected quality levels**

In addition:

- The benefit of ETCS On-board only pays off, if the ERTMS rollout progresses in Europe on large scale.
- The ETCS On-board functions as such also need some improvements (e.g. braking curve, odometry accuracy, etc.) to serve current operational needs.
- Difficult, expensive and time consuming ETCS On-board fitments in general, are delaying national deployment plans, impacting trackside

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RELEASE CONTENT

Release Information

- OCORA-BWS01-010 – Release Notes
- OCORA-BWS01-020 – Glossary
- OCORA-BWS01-030 – Question and Answers
- OCORA-BWS01-040 – Feedback Form

Communication Material

- OCORA-BWS02-010 – Executive Summary Slide Deck
- OCORA-BWS02-020 – Program Slide Deck
- OCORA-BWS02-030 – Technical Slide Deck
- OCORA-BWS02-040 – Program Posters
- OCORA-BWS02-050 – Technical Posters

Program Documentation

- OCORA-BWS03-010 – Introduction to OCORA
- OCORA-BWS03-020 – Guiding Principles
- OCORA-BWS04-010 – Problem Statements
- OCORA-BWS05-010 – Road Map
- OCORA-BWS06-010 – Economic Model – Guiding Principles - Assumptions - Assessment Criteria
- OCORA-BWS06-020 – Economic Model
- OCORA-BWS06-030 – Economic Model – Model Description
- OCORA-BWS06-040 – Economic Model – User Manual
- OCORA-BWS06-050 – Economic Model – CCS System Life Cycle Costing Scenario Studies
- OCORA-BWS06-060 – Economic Model – CCS Impact on Vehicle System Life Cycle Costing Scenario Studies
- OCORA-BWS06-070 – Economic Model – Evolution of the modeling
- OCORA-BWS07-010 – Alliances
- OCORA-BWS08-010 – Methodology
- OCORA-BWS08-020 – Tooling
- OCORA-BWS09-010 – Acceptance of Global Standards – Overview
- OCORA-BWS09-020 – Acceptance of Global Standards – Focus on Safety in CCS
- OCORA-BWS09-030 – Acceptance of Global Standards – Cartography of Standards
- OCORA-BWS09-040 – Acceptance of Global Standards – Assessment of Railway Sectoral Needs

Technical Documentation

- OCORA-TWS01-010 – Design Requirements
- OCORA-TWS01-020 – Operational & System Analysis
- OCORA-TWS01-030 – System Architecture
- OCORA-TWS01-035 – CCS On-Board (CCS-OB) – Architecture
- OCORA-TWS01-040 – Capella Modelling
- OCORA-TWS01-041 – MBSE Modelling Guidelines
- OCORA-TWS01-050 – Capella Model Export
- OCORA-TWS01-100 – Localisation On-Board (LOC-OB) – Introduction
- OCORA-TWS01-101 – Localisation On-Board (LOC-OB) – Requirements
- EUG 22E126 – LOC-OB System Definition & Operational Context
- EUG 22E135 – LOC-OB Risk Analysis
- OCORA-TWS01-112 – Automated Train Protection On-Board (ATP-OB) - MLM Interface Analysis
- OCORA-TWS02-010 – CCS Communication Network – Evaluation
- OCORA-TWS02-020 – CCS Communication Network – Proof of Concept (PoC)
- OCORA-TWS03-010 – SCP – Whitepaper Computing Platform for Railway Applications
- OCORA-TWS03-020 – SCP – High-Level Requirements
- OCORA-TWS03-030 – SCP – Specification of the PI API between Application and Platform
- OCORA-TWS04-010 – Functional Vehicle Adapter – Introduction
- OCORA-TWS04-011 – Functional Vehicle Adapter – Requirements
- OCORA-TWS04-012 – TCMS – Standard Communication Interface Specification
- OCORA-TWS05-010 – Requirements – Management Guideline
- OCORA-TWS05-020 – Stakeholder Requirements
- OCORA-TWS05-021 – Program Requirements
- OCORA-TWS06-010 – (Cyber-) Security – Project Security Management Plan
- OCORA-TWS06-030 – (Cyber-) Security – Concept
- OCORA-TWS07-010 – RAMS – Modular Safety Strategy
- OCORA-TWS07-020 – RAMS – Evolution Management
- OCORA-TWS07-030 – RAMS – SRAC/AC Management
- OCORA-TWS07-040 – RAMS – Optimized Approval Process
- OCORA-TWS07-050 – RAMS – RAM Strategy
- OCORA-TWS07-060 – Configuration Management – Concept
- OCORA-TWS07-100 – CENELEC Phase 1 – Concept
- OCORA-TWS07-201 – QRAMSS – QRAMS Strategy
- OCORA-TWS08-010 – MDCM-OB – Introduction
- OCORA-TWS08-030 – MDCM-OB – SRS
- OCORA-TWS09-010 – Testing – Strategy
- OCORA-TWS09-011 – Testing – Requirements
- OCORA-TWS09-050 – Testing – Cybersecurity Testing Strategy
- OCORA-TWS09-110 – Train Adapter Block Integration Plan
- OCORA-TWS09-111 – Testing - Testplan Functional Vehicle Adapter
- OCORA-TWS15-040 – CCS-OB Retrofit - Guideline for Projects
- OCORA-TWS15-050 – PoC OMS SS-149 - Concept

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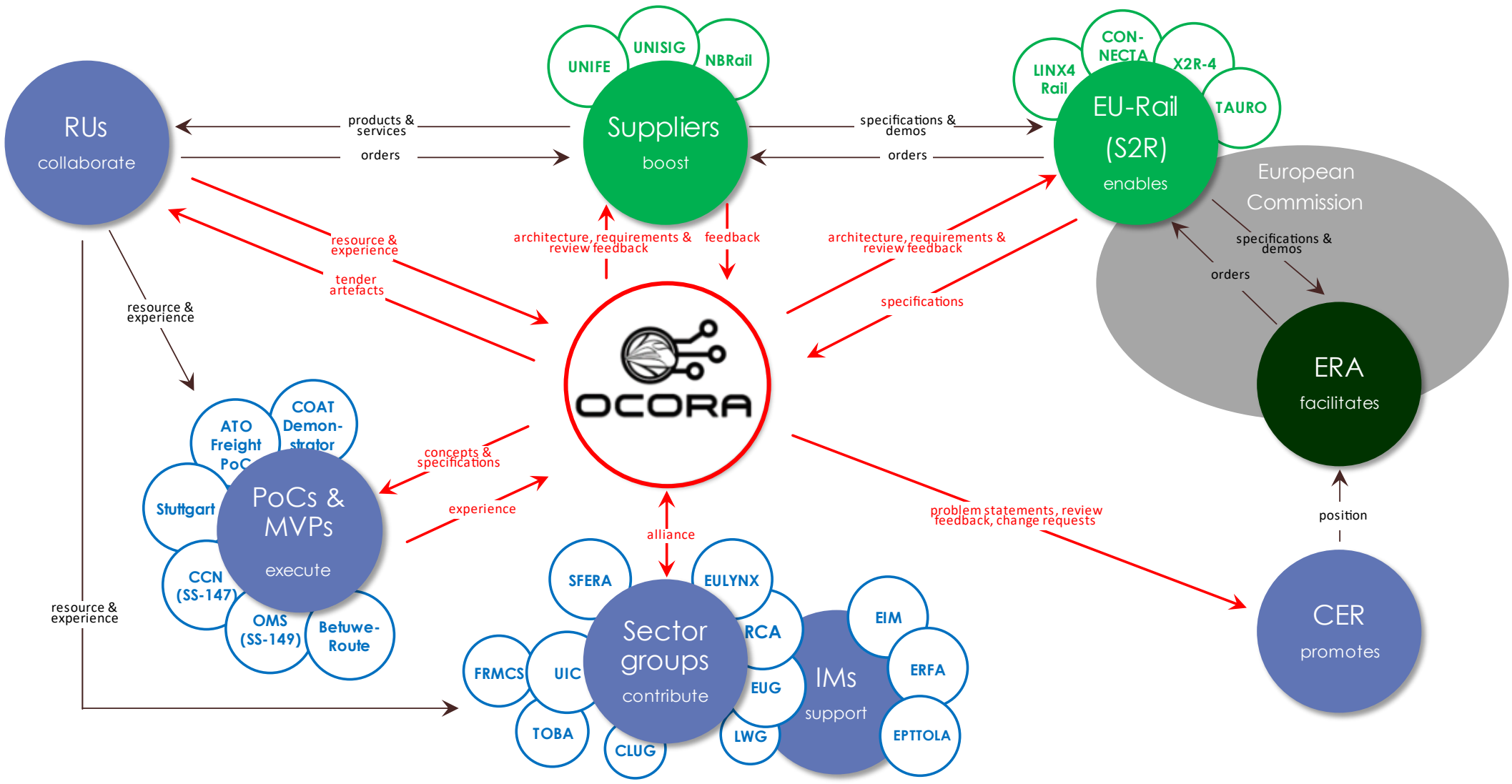
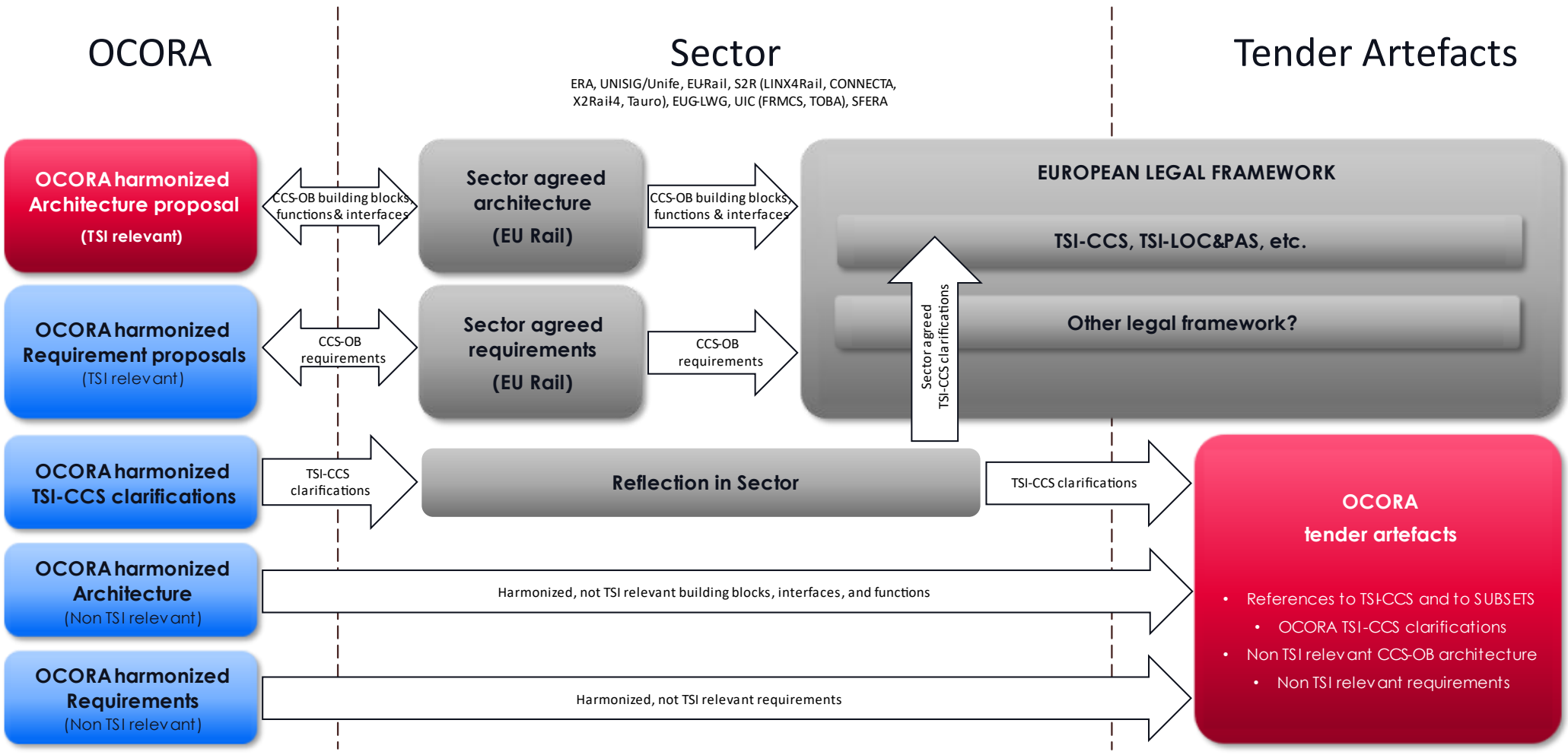
STAKEHOLDER MAP



APPROACH



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HISTORY

OCORA IS…
Open Cooperation
A set of public specifications
For the On-board CCS

OCORA IS NOT…
Not a Representative Body/Organisation
Not a product
Not for Trackside CCS

March 2019
- **Memorandum of Understanding - 5 founding members (NS, SNCF, SBB, ÖBB, DB)**
- OCORA is a **collaborative platform gathering engineering resources** working on **ERTMS and beyond**

October 2019
- **OCORA Governance** in place, with an active Steering Committee
- Open to railway companies willing to contribute to the collaboration

November 2019
- **OCORA Alpha Release**, first publication
- Alpha outlines the Who, the How and the Why

July 2020
- **OCORA Beta Release**, first comprehensive CCS On-board description
- Based on Beta OCORA starts Sector / Industry Dialogue

December 2020
- **OCORA Gamma Release**, updated CCS On-board description, including Sector / Industry feedback
- Gamma is feeding TSI 2022 and S2R-2 with qualified technical input

July 2021
- **OCORA Delta Release**, updated CCS On-board description, including Sector / Industry feedback
- Delta is again feeding TSI 2022 and prepares for Europe's Rail Joint Undertakings System & Innovation-Pillar

December 2021
- **OCORA Release R1**, updated CCS On-board description, including Sector / Industry feedback
- Prepares for Europe's Rail Joint Undertakings System & Innovation-Pillar.

July 2022
- **OCORA Release R2**, updated CCS On-board description, including industry feedback from System Pillar Ramp Up
- Serves as further input for EU-Rail System- & Innovation-Pillar.

December 2022
- **OCORA Release R3**, updated CCS On-board description
- Serves with operational input for EU-Rail and provided the concept on Configuration Management

ROADMAP