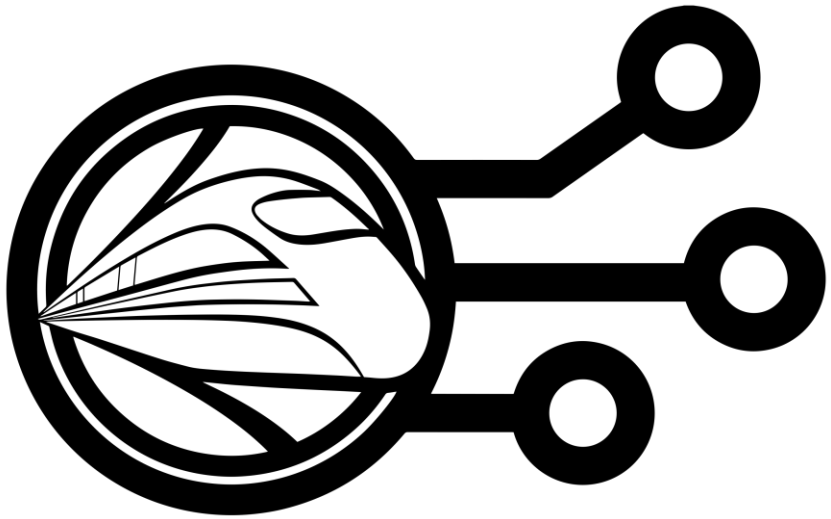


OCORA

Executive Summary Slide Deck

OCORA-BWS02-010 / v1.01 / 06.12.2022 / Release R3

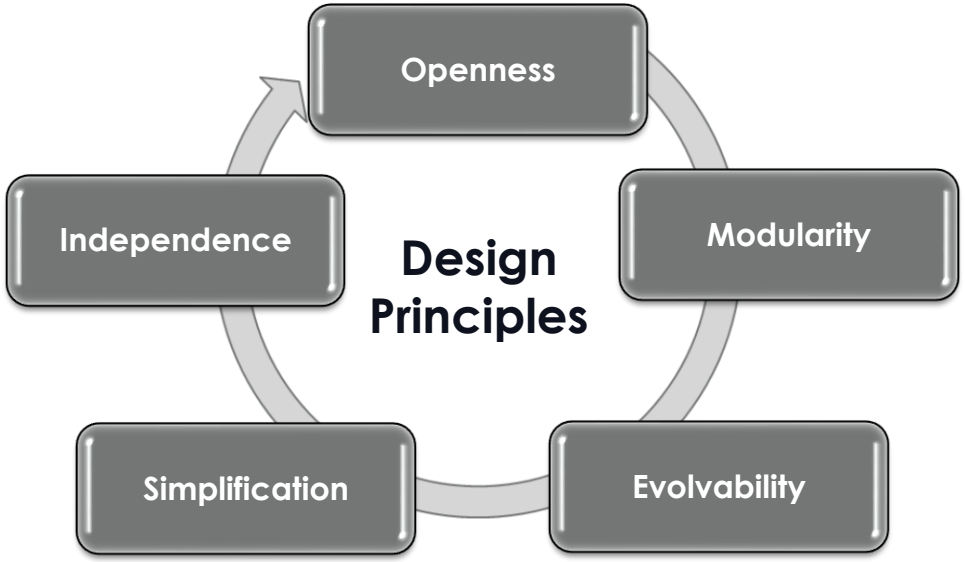
OCORA Release R3 - OnePager

https://github.com/OCORA-Public/Publication

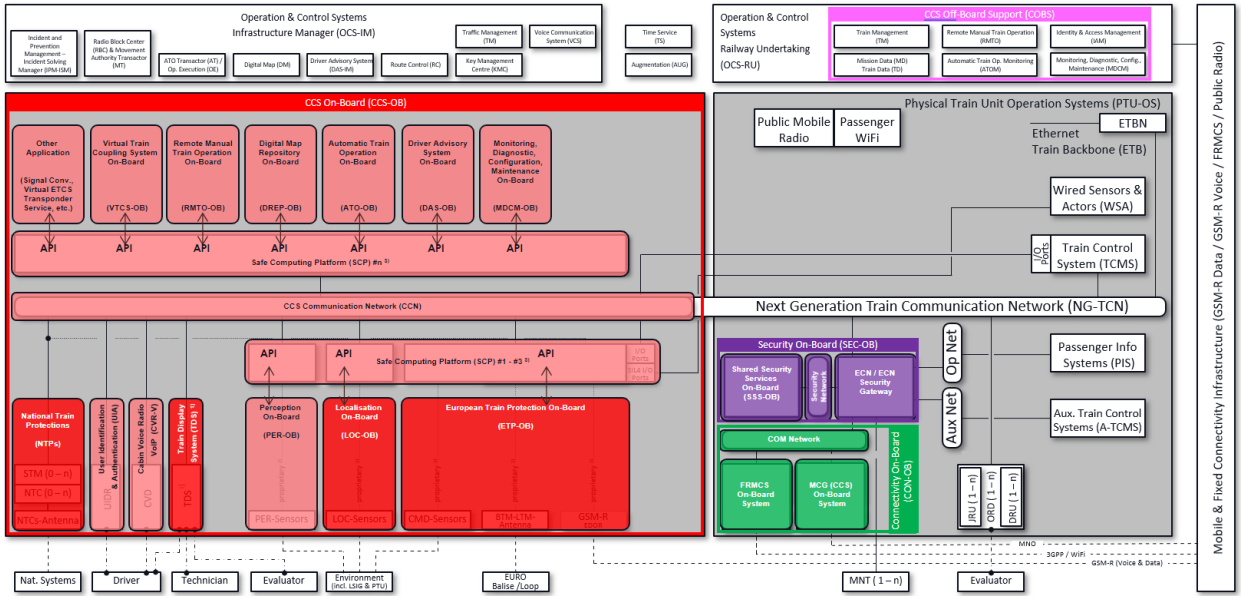
Founding Members

OCORA, the "**Open CCS On-board Reference Architecture**" initiative, whose signatory founding Members are NS, SNCF, DB, SBB and ÖBB, has reached a next important milestone with the **Release R3** of the specifications of the OCORA architecture.

OCORA aims to **reduce life-cycle costs** and **facilitate** the introduction of **innovation** and **digital technologies** beyond the current proprietary interfaces, by establishing a **modular**, **upgradeable**, **reliable** and **secure CCS on-board architecture**.



The **OCORA Release R3** descripts **CCS On-board** and includes **sector feedback,** especially from the **System Pillar Ramp Up** activities. It **is laying out the foundation for EU-Rail's System- & Innovation-Pillar** and provides the **concept on Configuration Management**



OCORA deliverables are published under the **European Union Public License** (EUPL) and are consequently available for all stakeholders.
The OCORA **Release R4** is planned for **mid of 2023.** It is expected to be reduced by the already transferred EU-Rail activities.

Introduction

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 investments, and postponing ERTMS rollouts.

Introduction

OCORA - 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

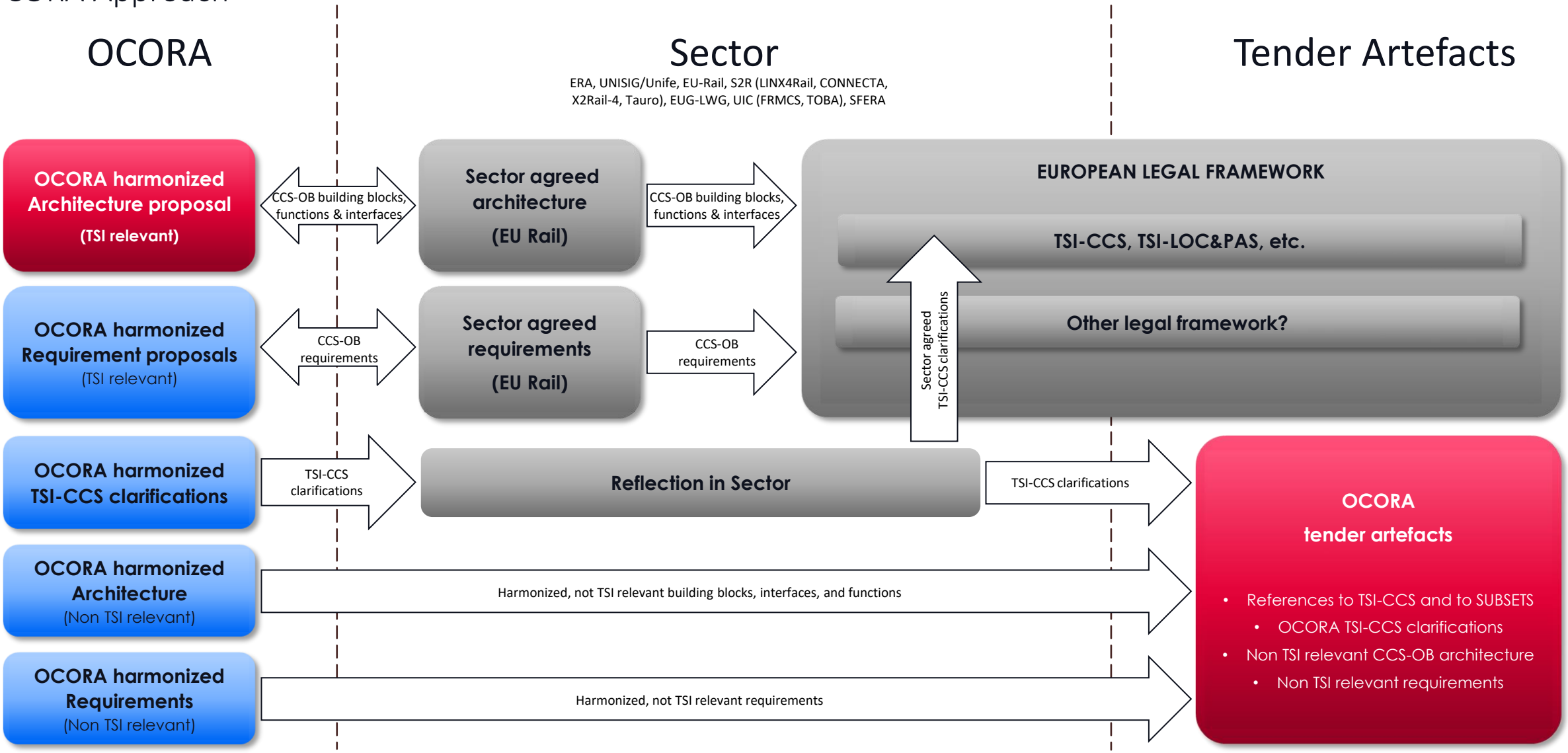
December 2021
- **OCORA Release R1**, updated CCS On-board description, including Sector / Industry feedback
- Prepares for Europe's Rail Joint Undertakings System- & Innovation-Pillar.

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

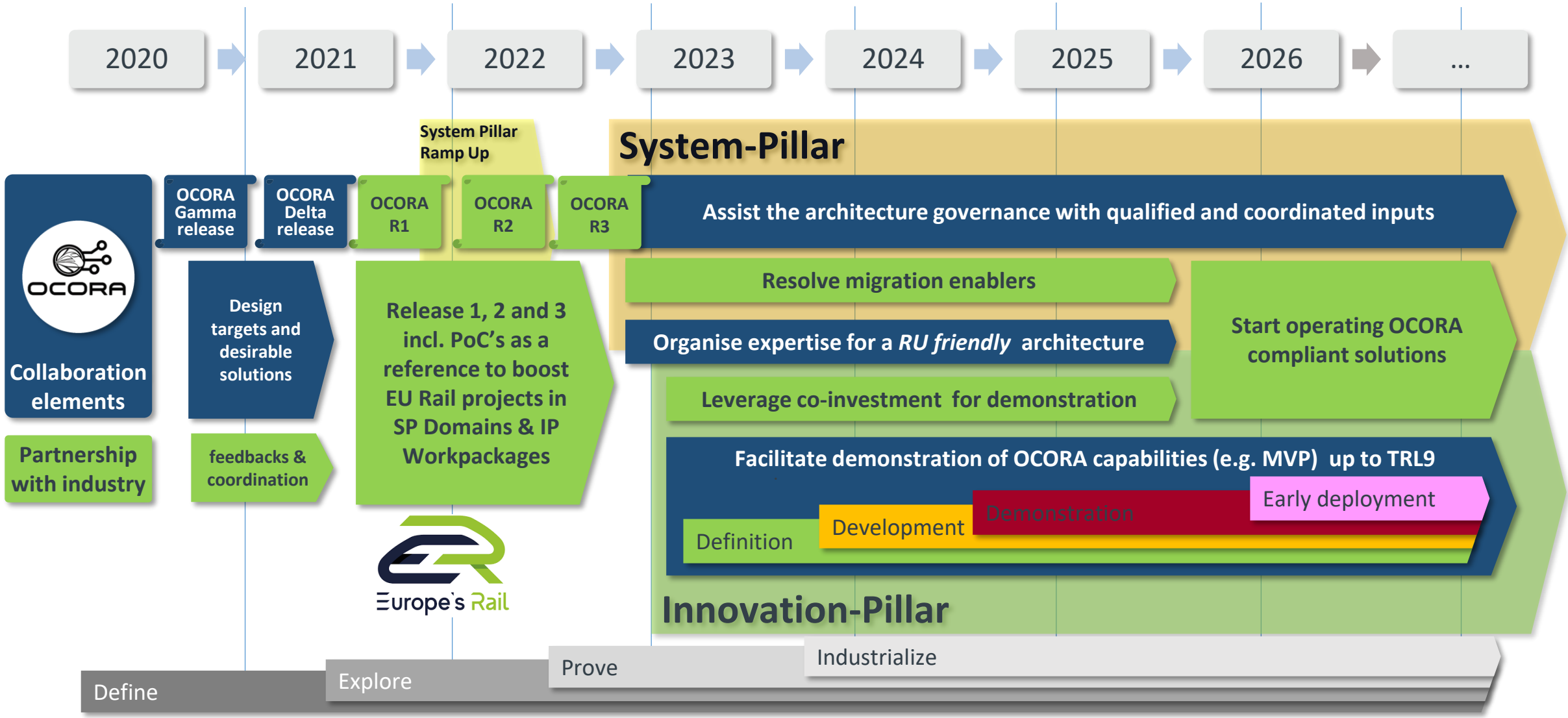
Introduction

OCORA Approach



Roadmap

With an architecture framework, EU-Rail will be the collaborative platform supporting technological migrations



Release Overview

OCORA Business and Technical Workstreams, Work Packages and RU Projects

Business Workstreams

BWS01	Core Team
BWS02	Communication
BWS03	Introduction to OCORA
BWS04	Problem Statements
BWS05	Roadmap & Planning
BWS06	Business Model
BWS07	Alliances
BWS08	Methodology & Tooling
BWS09	Acceptance of Global Standards

Technical Workstreams

TWS01	System Architecture
TWS02	CCS Communication Network
TWS03	Computing Platform
TWS04	Functional Vehicle Adapter
TWS05	Requirements
TWS06	(Cyber-) Security
TWS07	RAMS
TWS08	MDCM
TWS09	Testing
TWS15	Prototyping

Architecture Work Packages

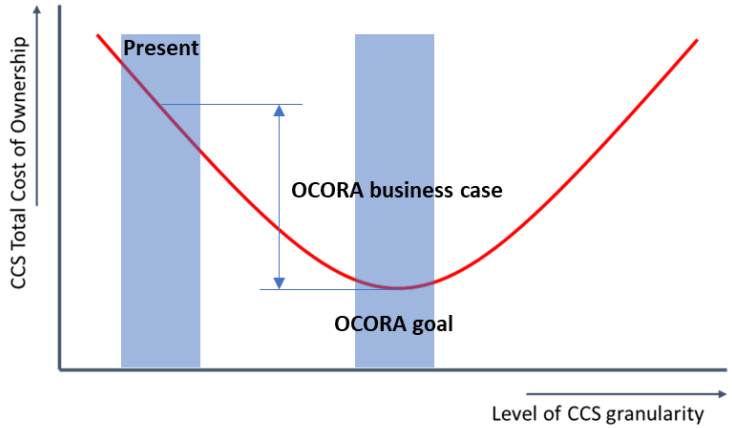
WP00	CCS-OB Architecture
WP01	ATP-OB Architecture
WP02	LOC-OB Architecture
WP03	ATO-OB Architecture
WP10	MBSE Preparation
WP11	System Capabilities
WP12	Connectivity

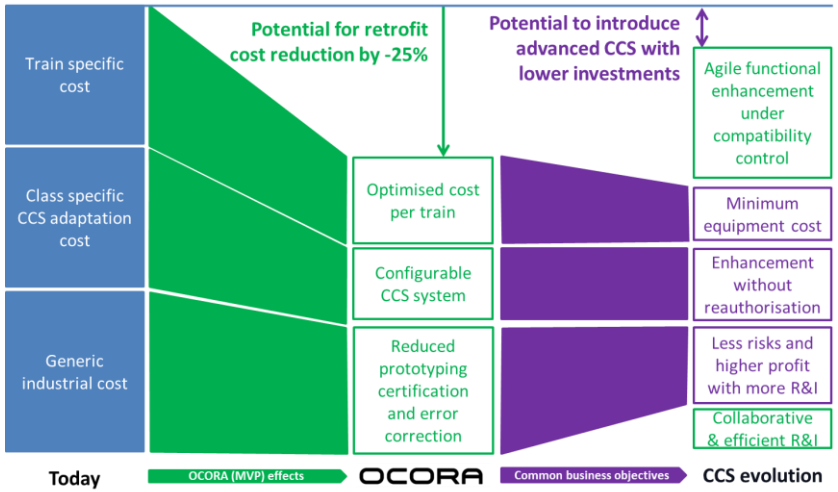
RU Projects

DB Cargo	ATO Freight GoA2+4+RCS
DB Regio	Stuttgart ETCS + ATO GoA2
SBB	PoC OMS SS-149

Economic Model

An economic model to discuss the optimal level of granularity



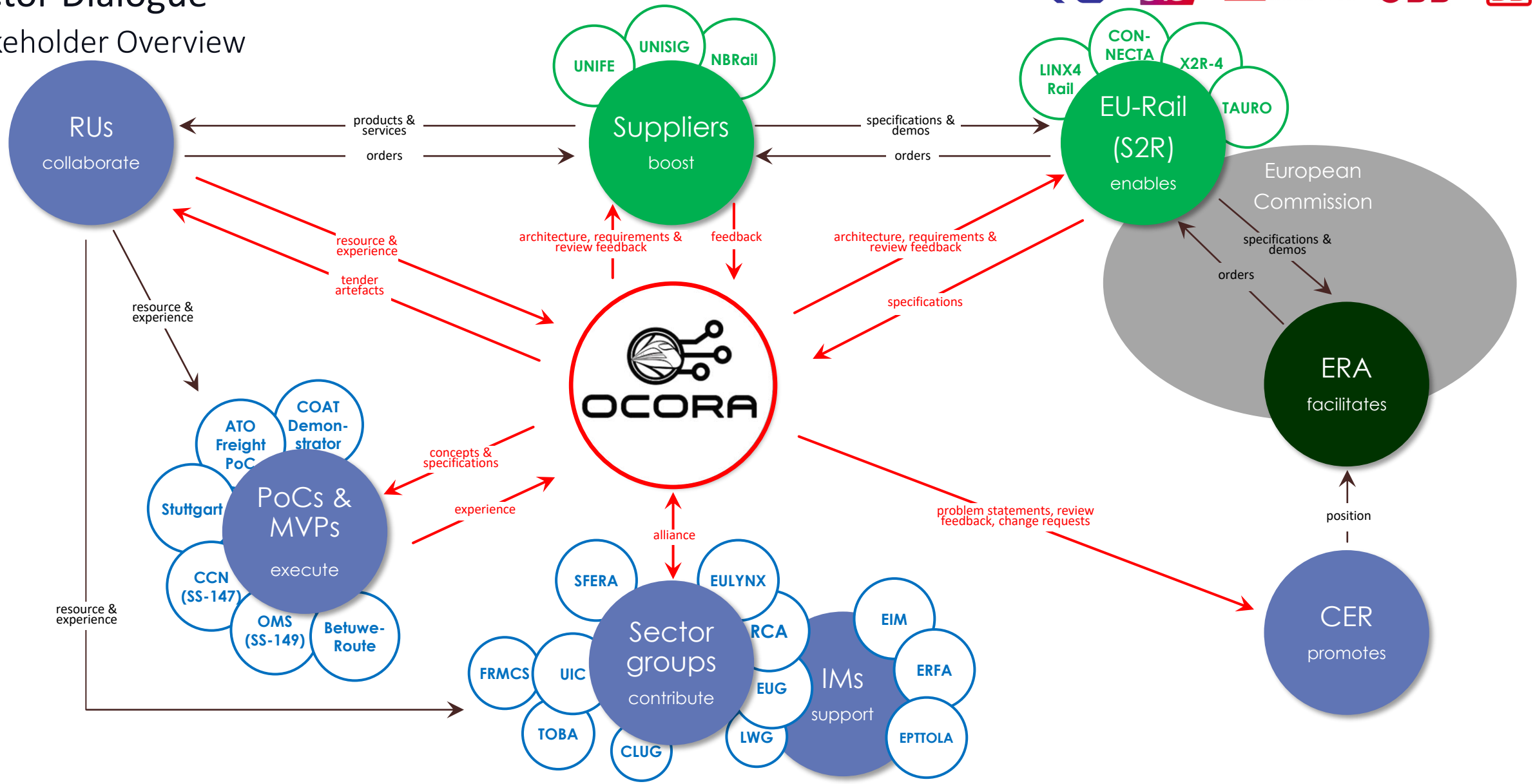


The development of the OCORA economic model, intends to provide tools for:

- Getting a clear view on the economic driver for the modularization of the on-board. To this end the model focus on 3 cost categories:
  - Generic industrial cost for developing certified CCS onboard sub systems
  - Cost for authorising operation with a new CCS configuration in a class of vehicle
  - Train specific cost for fitting or upgrading CCS building blocks
- Studying the impact of technology life cycle on the total cost of ownership. To this end scenario are defined for comparison purpose:
  - Todays situation with slow deployment and small project size, based on reference values derived from EC studies on ERTMS.
  - OCORA MVP scenario to model the economic impact of the modularisation of CCS onboard architecture
  - CCS evolution scenarios allowing to investigate impact of larger market, enhanced functionalities and accelerated upgrade scheme
- Optimising the contribution of OCORA breakthrough to Common business objectives. An open dialogue with the industry creates mutual benefit.

Sector Dialogue

Stakeholder Overview



Sector Dialogue

OCORA Release Imprint

- Publisher: OCORA Cooperation
- Channel: OCORA publishes exclusively over https://github.com/OCORA-Public/Publication
- Any feedback for OCORA is welcome!
  If you would like to attend a workshop or give a feedback, please contact rolf.muehlemann2@sbb.ch.
  For specific feedback the OCORA-BWS01-040 Feedback Form shall be used.
- For active collaboration (within the OCORA framework) the OCORA Code of Conduct must be accepted and signed.
  In case of interest for active collaboration and you are eligible to become a partner according to the OCORA Code of conduct, please drop a "interest of becoming a OCORA member by mail" to rolf.muehlemann2@sbb.ch.
- All OCORA deliverables and work will be published and licensed under the dual licensing Terms EUPL 1.2 (Commission Implementing Decision (EU) 2017/863 of 18 May 2017) and the terms and condition of the Attributions- ShareAlike 3.0 Unported license or its national version (in particular CC-BY -SA 3.0 DE).