
Europe's Rail
EUROPE'S RAIL
GENERAL ASSEMBLY
ONLINE
5-6
December
2023
@EURail_JU
Europe's Rail Joint Undertaking

AGENDA

Europe's Rail General Assembly 2023

DAY 1

14.00 - 14.10	**Welcome from the Governing Board Chair** *Kristian Schmidt - Director for Land Transport, European Commission*
14.10 - 14.45	**JU State of Play from the JU Executive Director ad interim** • *Objectives of 2022-3 and achievements* • *Objectives and work programme for 2023-4* • *Q&A* *Giorgio Travaini - Executive Director a.i., Europe´s Rail Joint Undertaking*
14:45 – 15:00	**Cooperation, Synergies and common approaches between Horizon Europe Partnerships - View from DG RTD** *Andrea Gentili - Clean Partnerships Manager and Deputy Head of Unit, DG RTD, European Commission*

AGENDA

Europe's Rail General Assembly 2023

DAY 1

15.00 - 16.00	**Advisory Bodies Activities** • *Scientific Steering Group* *Juan de Dios Sanz Bobi - Vice-Chair, Europe's Rail Scientific Steering Group* • *States Representatives Group* *Miroslav Haltuf - Chair, Europe's Rail States Representative Group*
16.00 - 16.15	**Coffee break**
16:15 – 16:45	**EU-Rail Synergies with other Programmes** *Andreas Boschen - Executive Director, SESAR 3 Joint Undertaking* *Josef Doppelbauer - Executive Director, European Union Agency for Railways* *Rodrigo Da Costa - Executive Director, European Union Agency for the Space Programme* *Arjen Boersma - CIO/ICT Director, ProRail – RNE representative*

AGENDA

Europe's Rail General Assembly 2023

DAY 1

16.45 - 17.25	**European DAC Delivery Programme Masterplan** *Javier Ibáñez de Yrigoyen - Senior Programme Manager, Europe's Rail Joint Undertaking* *Mark Topal-Gökceli - Programme Manager, European DAC Delivery Programme*
17:25 – 17:30	**Closing Words** *Keir Fitch, Head of Rail Safety and Interoperability Unit, DG MOVE, European Commission*

WELCOME FROM THE GOVERNING BOARD CHAIR

Kristian Schmidt

Director for Land Transport, DG MOVE, European Commission

JU STATE OF PLAY FROM JU EXECUTIVE DIRECTOR A.I.

Giorgio Travaini

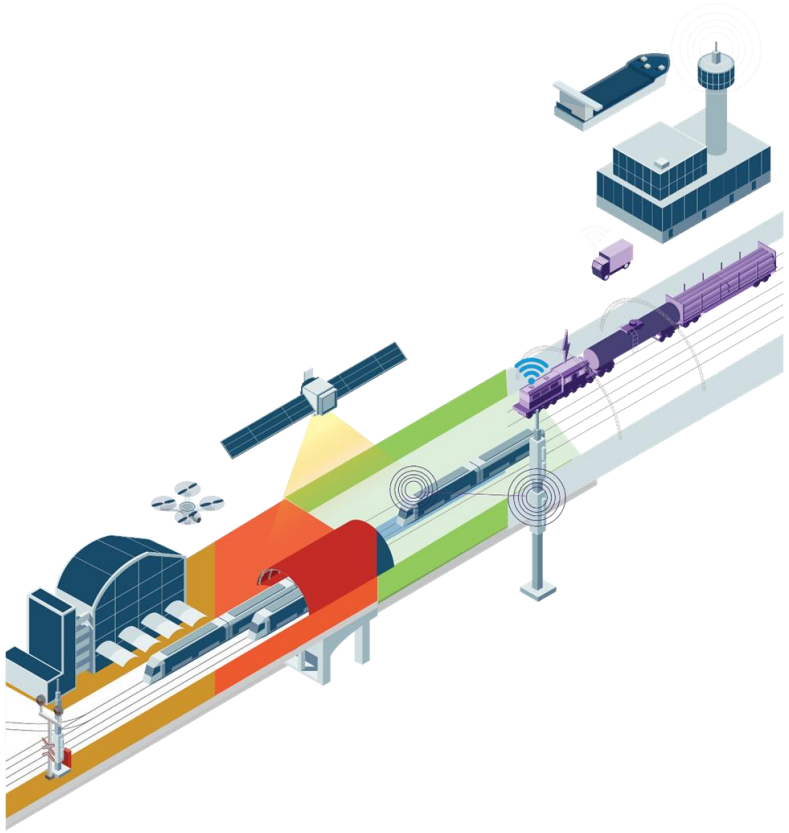
Executive Director a.i., Europe's Rail Joint Undertaking

Objectives:

- Implement and obtain final results on technologies demonstrated under the S2R Programme;
- Launch the first Flagship Projects with R&I activities identified in the MAWP in the horizon up to 2026;
- Explore new areas of R&I that will contribute to fostering the system transformation of railway;
- Launch the System Pillar activities and set the basis for its future work;
- Set up and activate the new governance structure of the JU, especially the System Pillar Steering Group and Deployment Group;
- Consolidate the work of the European DAC Delivery Programme and engage with the community
- Foster close collaborations with ERRAC, ERA, other programmes and partnerships, different associations representing key stakeholders, and third country programmes.

Shift2Rail Programme status:

- All Shift2Rail resources committed for the Programme activities, **30 projects to close** (with Reporting and Payment) or running as of 2023;
- **IPs 1-5:** TDs progressed significantly with an overall completion of about 95%;
- **CCA:** WAs progressed towards finalisation with an overall completion estimated at 97%;
- **IPX** - Disruptive Innovation and Exploratory Research: 2 projects running in 2023 and 2 projects that finalised their activities at the end of 2022 to close.



IP1 Cost-efficient and Reliable Trains, including high-capacity trains and high speed trains

IP2 Advanced Traffic Management and Control System

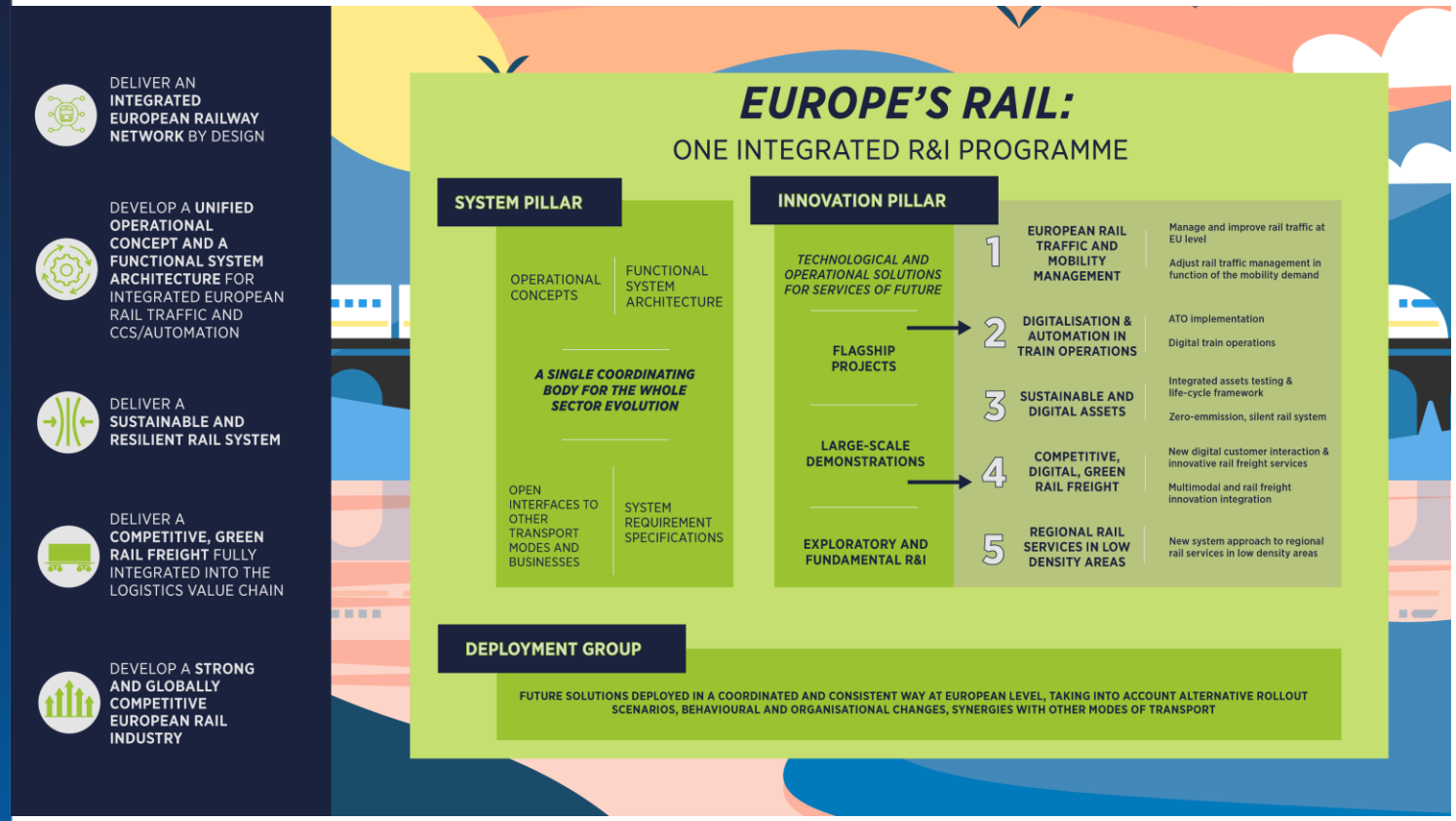
IP3 Cost-efficient, Sustainable and Reliable High Capacity Infrastructure

IP4 IT Solutions for Attractive Railways Services

IP5 Technology for Sustainable and Attractive European Rail Freight

CCA Cross Cutting Activities

EU-Rail Programme status:



- ✓ First **6 Flagship Projects** granted and running / new monitoring process;
- ✓ **8 Explorative and disruptive research projects** started;
- ✓ Call 2023 launched with **7 topics** and first real **joint call topic** with SESAR 3 JU;
- ✓ Prepared call 2024;
- ✓ Delivery of first **System Pillar** results;
- ✓ **EDDP** participation increased, technical and harmonization results obtained;
- ✓ Agreed on establishment and selection process for the **Deployment Group.**

Innovation Pillar

- **FP1:** Overall in **green** status, started all its activities. Point of attention: alignment with RNE activities, following SP works;
- **FP2:** Overall in **green** status, started all its activities. Attention to be put on FPs and SP alignment and prompt delivery of technical requirements for EUSPA EGNOS services;
- **FP3:** Overall in **green** status, some resources/timing issues reporting on some WPs;
- **FP4:** Overall in **green** status;
- **FP5:** In partial **yellow** status, focus on finalisation of operational requirements, architectural specs for “Full Digital Freight Train Operation” and updated FP5 time plan;
- **FP6:** Overall in **green** status, started all its activities. Point of attention on impact of ČD participation within FA6.

Innovation Pillar

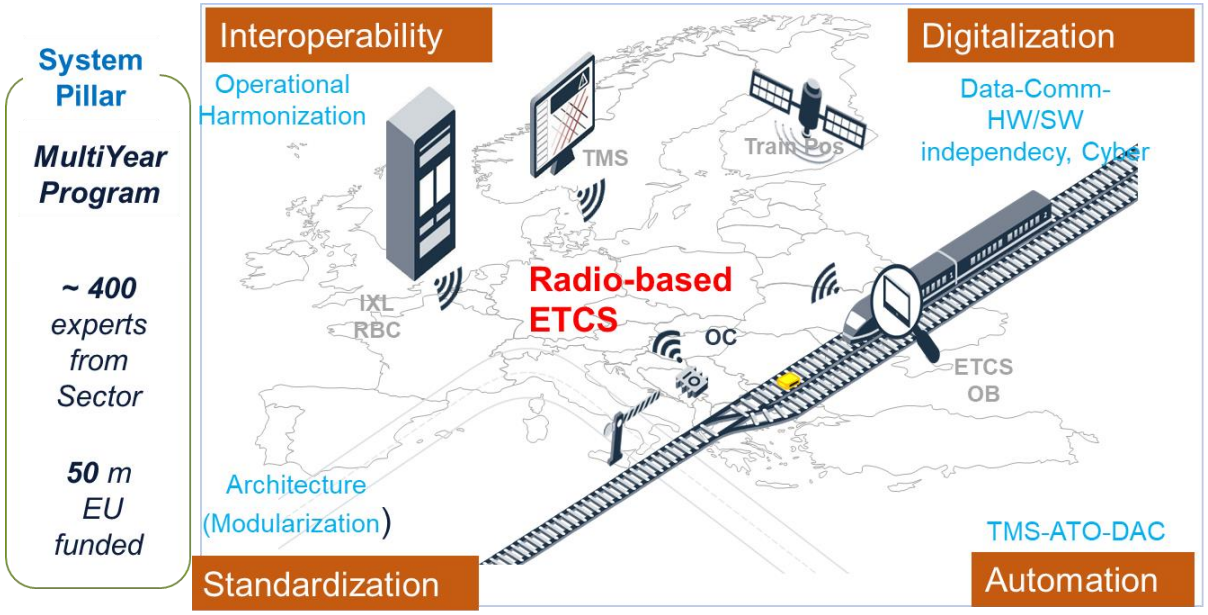
Pods4Rail	Pods4Rail	Concept Development of a System for Pods and Pod-Carriers to be used as Moving Infrastructures mainly for Rail, but as well for Road and Ropeways
RAIL4CITIES	RAIL4CITIES	Railway stations for green and socially inclusive cities
InBridge4EU	InBridge4EU	Enhanced Interfaces and train categories for dynamic compatibility assessment of European railway bridges
ESEP4Freight	ESEP4Freight	European Shift Enabler Portal for Freight
Academics4Rail	Academics4Rail	Building a community of railway scientific researchers and academia for ERJU and enabling a network of PhDs (academia teaming with industry)
LEADER 2030	LEADER 2030	Learnings for European Autonomy to Deliver Europe's Rail in 2030
	DACcord	DAC migration roadmap towards deployment and related activities
MaDe4Rail	MaDe4Rail	Maglev-Derived Systems for Rail

FA7 and Exploratory Research: Overall in green status. Activities started in Q3-2023.

1. Objectives of 2022-2023 and achievements

✓ Operationalisation of the System Pillar:

Full set up of the System Pillar achieved to support the development of European standards and specifications underpinning the digital transformation of rail



General, horizontal and Task 1 Railway System

- As-is Rail System Architecture, version 1
- Energy saving in Rail
- System Engineering Management Plan v1 and v2
- Common business objectives
- Operational vision for CCS and TMS
- Safety guidelines for SP work

Task 2. CCS

- Operational harmonisation principles and working methods
- Harmonisation concepts for 12 of 31 areas of operational processes
- Principles about the future harmonisation process
- Logical architecture and modularity of CCS
- Interfaces for trackside assets, EULYNX Baseline 4 release 2
- Potential harmonized API for decoupling of hardware/software
- Basic rules for secure component specification
- Functional scope of driver assistance systems
- FRMCS report - Alignment on timing and content of V2 and V3 specifications with UIC, UNITEL, MOVE, ERA and sector
- […]

Task 3. TMS / TCS

- Traffic Management System Concept
- Functional allocation for the major CCS and TMS logical components

Task 4. DAC / TDTFO

- High level requirements for digital coupling concerning integrity and train length
- Analyses for Central Instance
- Alignment with European DAC delivery Programme and FP5

What to expect from the Innovation Pillar:

- The monitoring and performance analysis of the first FPs' results of 2022-2023, in preparation for the demonstration activities of 2025 and 2026; Collaboration with EUSPA and ESA; Collaboration with IMs and RNE to operationalise digitalisation of capacity and traffic management, following EC regulation on on the use of railway infrastructure capacity in the Single European Railway Area
- The ramp-up, following the conclusion of the grant agreements in 2024, of the projects resulting from the Call 2023-1 that complement the FPs with additional Exploratory research activities;
- The launch of the Call 2024-1 (Q1), followed by the conclusion of the grant agreements, to enlarge the FPs with additional anticipated activities of the related areas, as well as to provide a platform for more disruptive innovation in hyperloop technologies and concepts; Synergies with the European Smart Networks and Services (SNS) JU;

+ The contractual closing of the Horizon 2020 project activities launched under Shift2Rail.

What to expect from the System Pillar:

- The first Standardisation and TSI Input plan, setting out the strategic view of the outputs of EU-RAIL, agreed with the EC, ERA, and the sector
- Continuing to improve the organisational structure and processes
- Inclusion of new subject: Harmonised European Railways Diagnostics
- Delivering, building upon the first results of the System Pillar Tasks and Domains

General, horizontal and Task 1. Railway System
- Requirements management plan
- Update system concepts and PRAMS plan
- Refinement of RAMS rules
- Further development of security specifications
- First draft to-be architecture (includes gamechangers)

Task 3. TMS / TCS
- More detailed logical architecture
- Interfaces between TMS and traffic control and supervision systems (functional requirements)
- Analyses of current cross border architectures

Task 4. DAC / TDTFO
- Elaborations of EU harmonised operation procedures (rulebook)
- Operational architecture related to ERTMS, ASO/ATO
- First design of Central Instance (Software downloads)

Selection. Sources:
- WP2024_draft20231107
- contract consortium SC2.3

Task 2. CCS
- Finalization of the operational harmonization concepts and harmonized processes (ends 2024)
- Functional and logical architecture down to single subsystems
- Operational processes for upgradeability and HW/SW decoupling
- Migration requirements and needed features
- Precise requirements and functional definition for migration plateau
- Traffic CS
  - system capabilities, functions and system requirements.
- Train CS logical architecture
  - Definition of interfaces (physical architecture)
  - Specs for authorisation, integration and upgradeability of modular Train CS systems
- Computing environment
  - operation concept, system analyses.
  - Specification of concrete APIs
- Trackside Asset Update BL4 release2 specifications
- CCS/TMS data model definition
- CCS/TMS diagnostic, data and system component interfaces
- Configuration management methods
- Rules and system definition for Railways system user interfaces

What to expect from the Deployment Group:

- The Deployment Group aims to accelerate the pace of bringing rail innovation into the market. It focuses on:
  - Diversity of situations across the EU, human factors, and other risks and opportunities;
  - Needs in relation to European coordination of deployment;
  - Deployment packages, including technical/operational migrations plans to a level to be determined;
  - Investment Plan, funding, and financing.
- Following the GB decision, the process to set up the Deployment Group has been presented at the 5 December Governing Board.
- The Deployment Group will consider the first topic(s) to focus on, which, for example, could include FRMCS/future radio.

+ DAC: EU-Rail support to the EC to developing a comprehensive migration strategy to coordinate deployment, following the EC Greening Freight Transport communication

What to expect for new members:

- The JU will work in 2024 for the preparation of a call for expression of interest to select Associated Members, in accordance with articles 7 and 87(1) point c of the SBA, to be launched at the end of the first half of 2024
- An in-depth assessment of the EU-Rail Programme, with an update of the Multi-Annual Work Programme (MAWP), will allow the identification of possible gaps to be filled by new entities' commitment.

Where EU-Rail will showcase its results:

- Call 2024 Info Day – February 2024;
- General Assembly – December 2024.

External events:

- Connecting Europe Days (Brussels, 2 - 5 April 2024);
- Transport Research Arena (Dublin, 15-18 April 2024);
- International Transport Forum (May 2024) – TBC;
- InnoTrans (Berlin, 24-27 September 2024): EU-Rail will share a stand with the European Commission (DG MOVE) and ERA;
- Rail Live (November 2024) – TBC.

Q&A

COOPERATION, SYNERGIES AND COMMON APPROACHES BETWEEN HORIZON EUROPE PARTNERSHIPS - VIEW FROM RTD

Andrea Gentili

Clean Planet Partnerships Manager and Deputy Head of Unit, DG RTD, European Commission

ADVISORY BODIES ACTIVITIES

Juan de Dios Sanz Bobi

Vice-Chair, Europe's Rail Scientific Steering Group

Legal Framework: implementation under Horizon Europe

- The Scientific Committee is adopted in the EU-RAIL Governance based on Regulation (EU) 2021/2085 (1) whereas it is declared

- Clause 33 the scientific advisory body concept in the Joint Undertakings in Horizon Europe

  - Joint undertakings should be able to set up an advisory body with a scientific advisory function.
  - That body or its members should be in a position to provide independent scientific advice and support to the respective joint undertaking.
  - The scientific advice should concern, in particular, annual work programs and additional activities, as well as any other aspect of the joint undertakings' tasks, as necessary

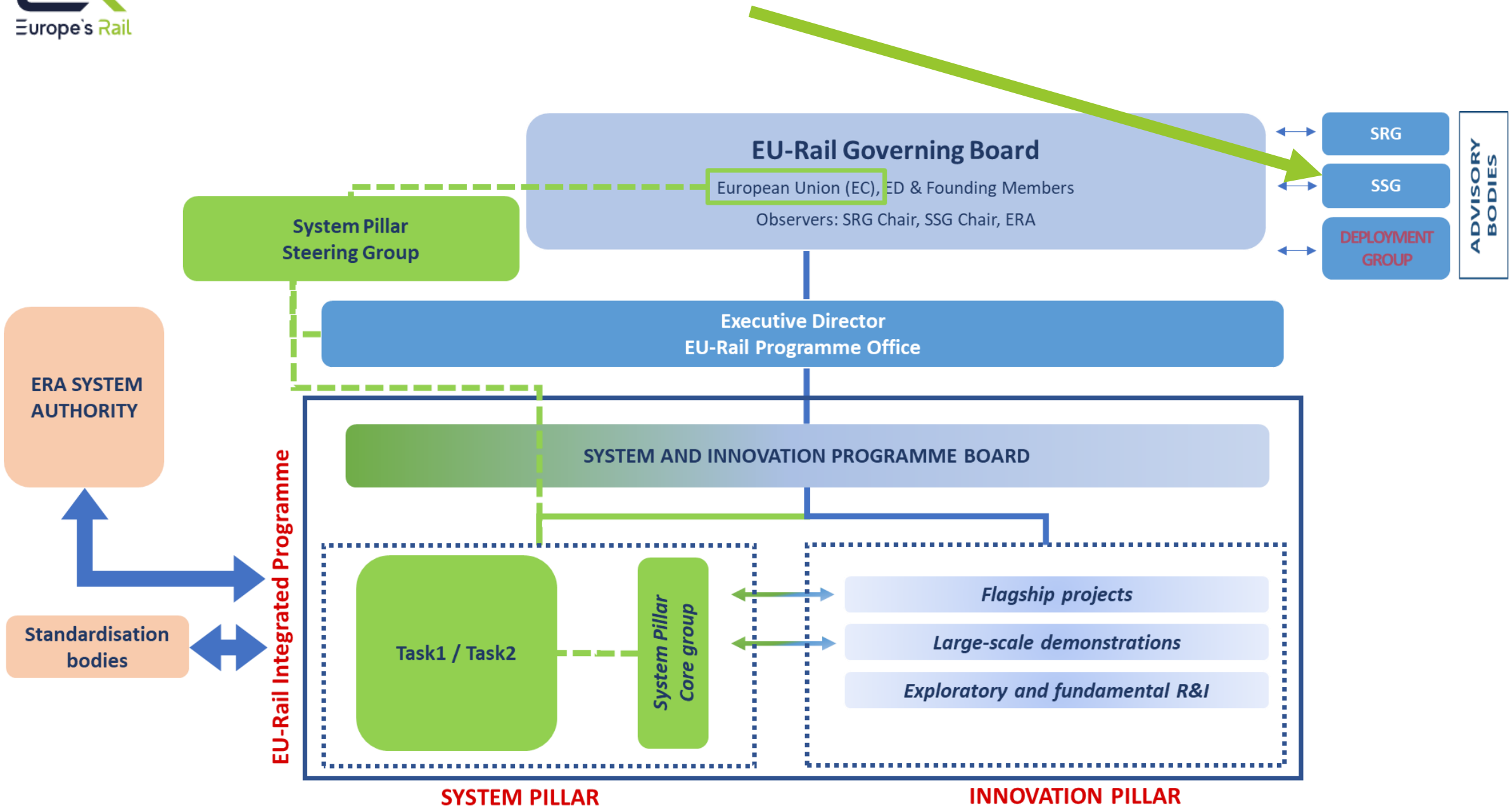
- Article 21 defines the term and the action for the Scientific Advice

  - Independent Scientific advice
  - Two possible actions: an advisory body or an "ad hoc" request for independent expertise

- Article 91, Bodies of the Europe's Rail Joint Undertaking, clause 2, opens the extension of the Scientific Advisory Body

(1) Council Regulation (EU) 2021/2085 of 19 November 2021, establishing the Joint Undertakings under Horizon Europe and repealing Regulations (EC) No 219/2007, (EU) No 557/2014, (EU) No 558/2014, (EU) No 559/2014, (EU) No 560/2014, (EU) No 561/2014 and (EU) No 642/2014

SSG in EU-RAIL GOVERNANCE



Mission of the Scientific Steering Group

SSG mission is to provide advice and recommendations to the Governing Board (GB) and the Executive Director (ED) on the implementation of the EU-Rail Research and Innovation Programme,

- **What does it means this request for advice and recommendation?**
  - Advice and recommendation that concerns the progress, implementation, delivery approach, including with regard to the relation between the Industrial Research, Innovation and Exploratory Activities and Other Activities.

- **SSG interaction with EU-Rail Governance**
  - The Scientific Steering Group shall advise the GB and the ED on any scientific matter in relation to the EU-Rail Programme at their request or at the initiative of the Group itself.

Composition and Organisation of the Scientific Steering Group

- The SSG composition has resulted from the Call for expressions of interest on the appointment of the members of the Europe's Rail Scientific Steering Group and on the adoption of a reserve list, that was launched on 15 March 2023.
- The call was closed on 30 June 2023. The procedure was finalized on 19 October 2023, with a Decision of the Europe's Rail Governing Board that appointed the candidates to form the Scientific Steering Group of the Europe's Rail Joint Undertaking,
- First meeting was on November the 15th to formally constitute the group with two decisions:

1. The adoption of the Rules of Procedure of the Scientific Steering Group of Europe's Rail Joint Undertaking

2. Chair, Angela DI FEBBRARO and Vice-Chair, Juan de Dios SANZ BOBI, were elected under consensus of the rest of members of the group - Nacima BARON, Michele CARBONI, Mathijs DE WEERDT, Alessandro FANTECHI, Luis FERREIRA, Matthias LANDGRAF, Klaus MOESSNER, Ladislav ROUTIL and Marielle STOELINGA.

- All information is available in public EU-Rail Domain visiting ***https://rail-research.europa.eu/about-europes-rail/europes-rail-structure-of-governance/scientific-steering-group/***
- In this first meeting, Executive Director (ad interim) formally asked to SSG members to provide the scientific advice for the incoming EU-RAIL activities.

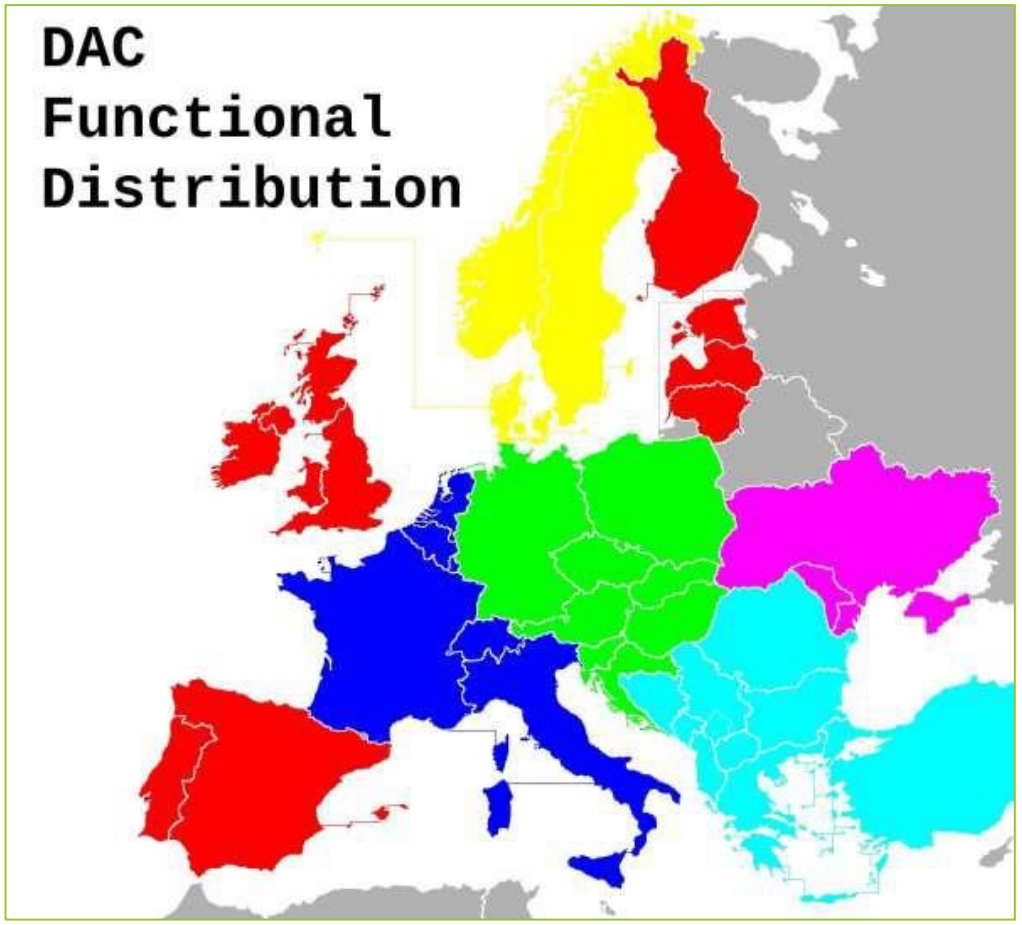
ADVISORY BODIES ACTIVITIES

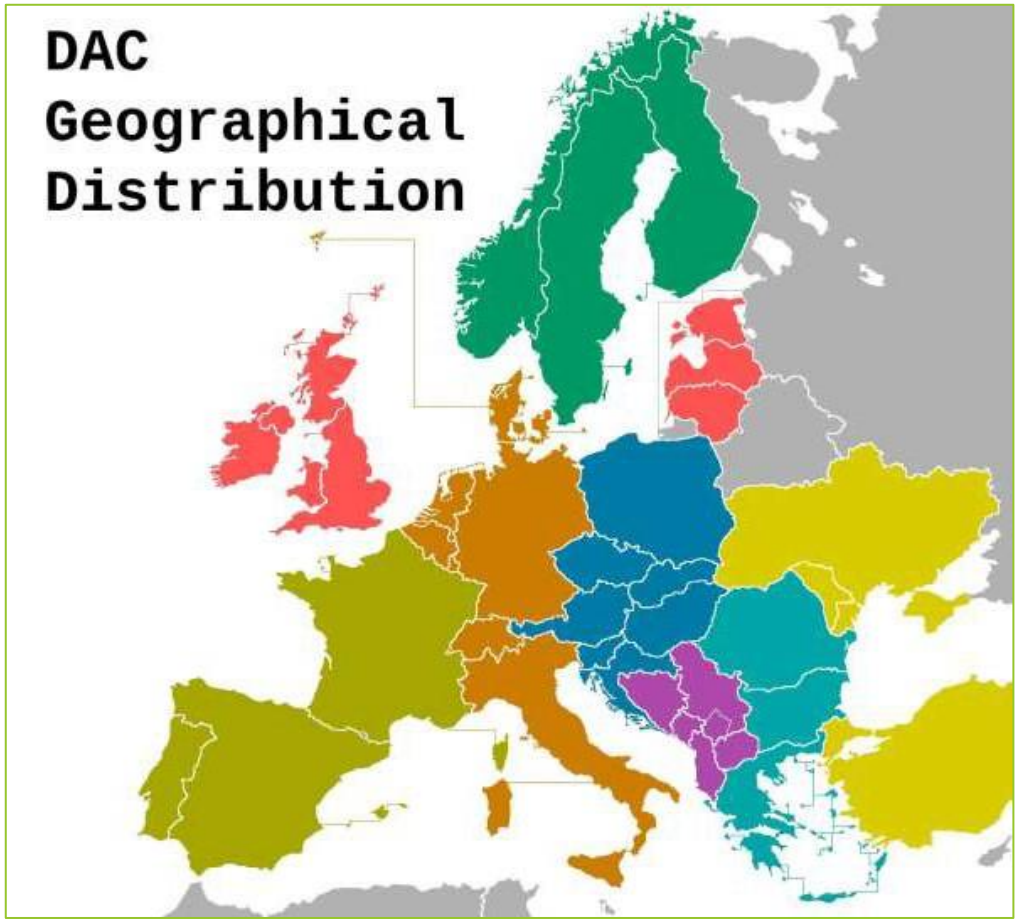
Miroslav Haltuf

Chair, Europe’s Rail States Representative Group

Information about the SRG members work activities in the SRG and its subgroups

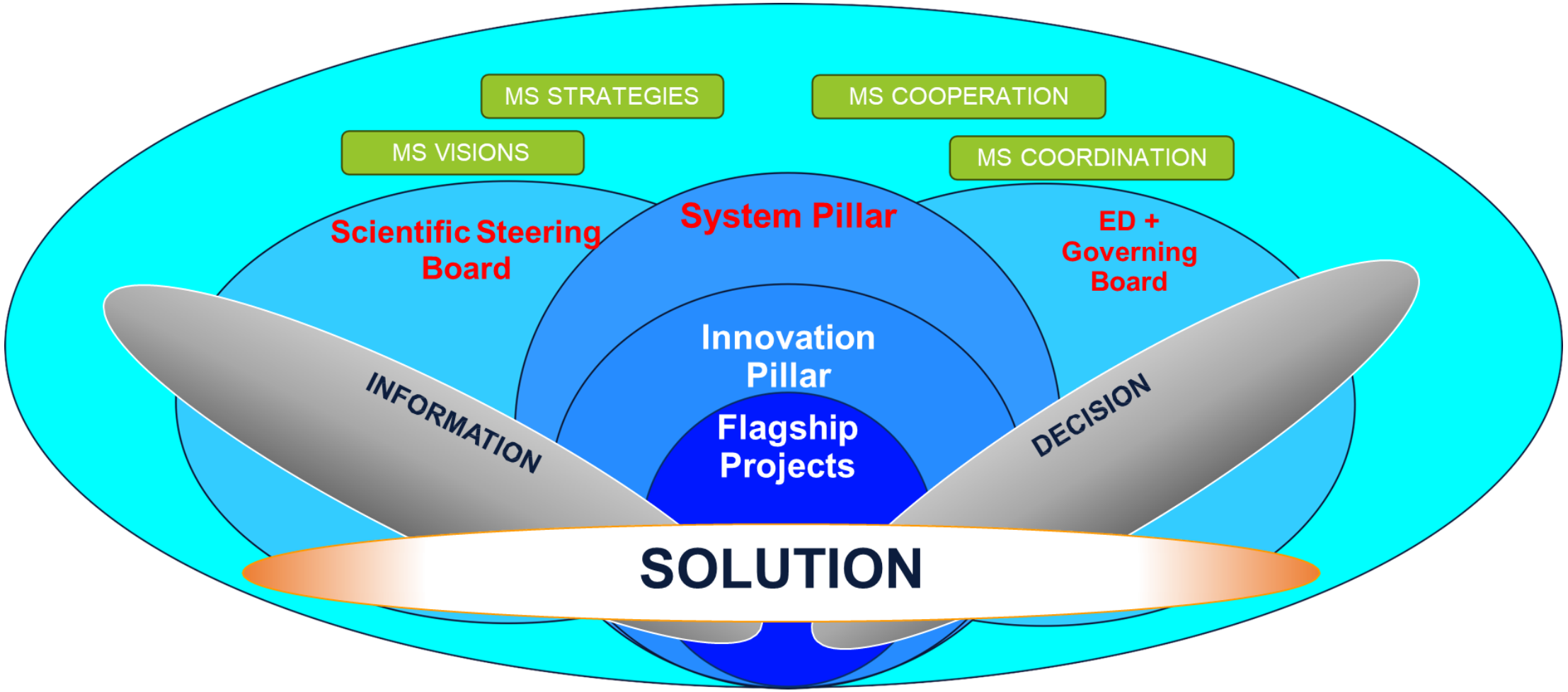
DAC SRG Subgroups





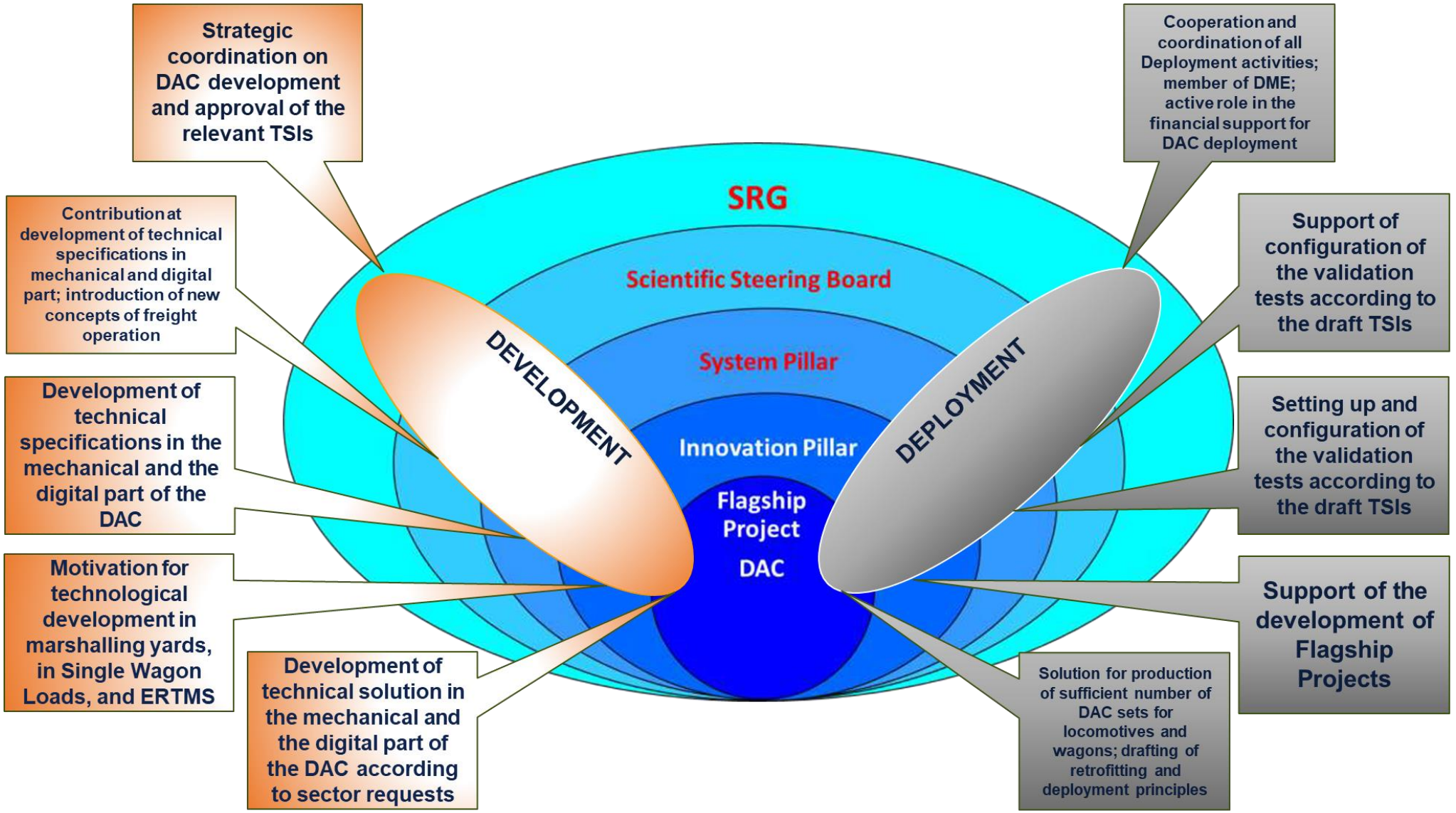
SRG new perspectives

SRG New Perspectives



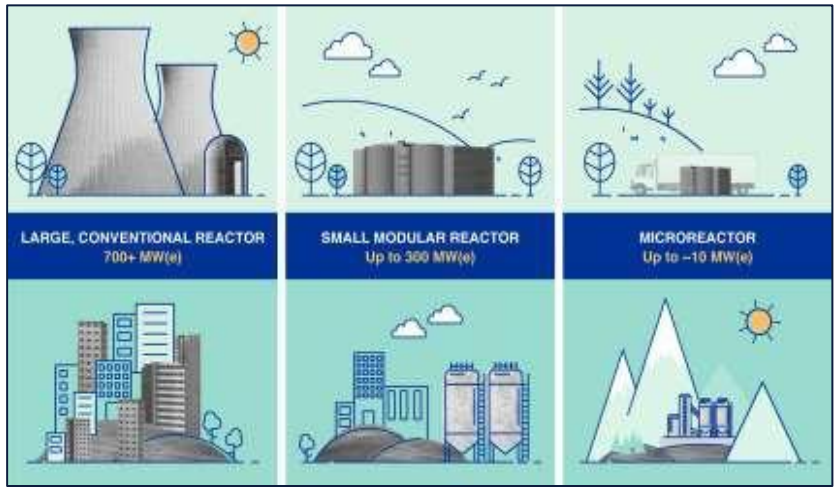
FINAL STEP: REVISION OF (SBA) + EU-Rail bodies RULES OF PROCEDURES NEEDED !

DAC SRG Subgroups



Proposal of New SRG Workstreams for 2024

1 NEW RAIL ENERGY SUPPLY CONCEPT – INITIAL STUDIES ON MODULAR NUCLEAR REACTORS

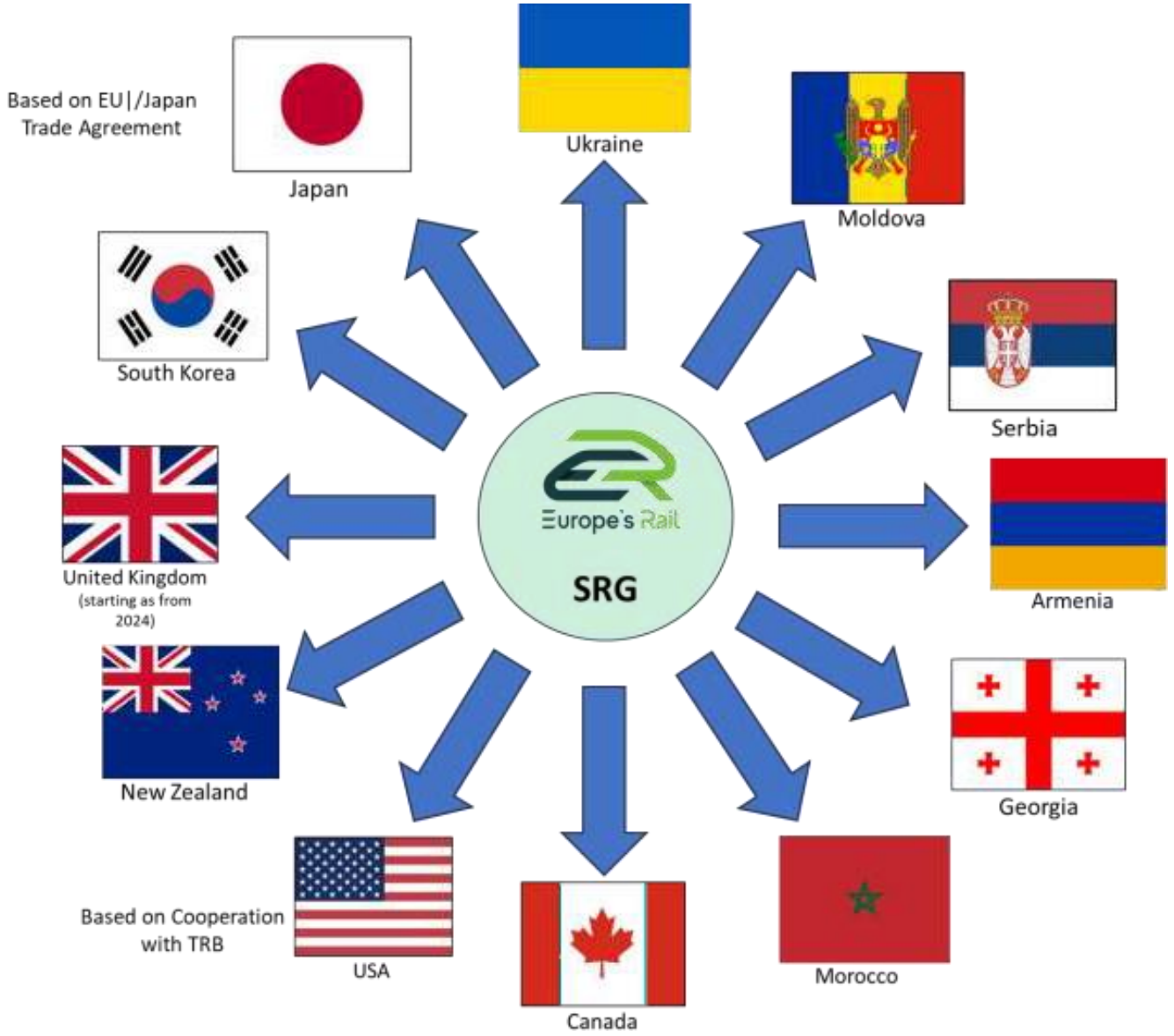


Small modular reactors (SMRs) have a power capacity of up to 300 MW(e) per unit. Many SMRs, which can be factory-assembled and transported to a location for installation, are envisioned for markets such as industrial applications or remote areas with limited grid capacity

2 DECARBONIZATION ON NON-ELECTRIFIED LINES AND CROSS BORDER - METHODOLOGY

SRG New Perspectives in Cooperation

New Proposed SRG Partners Worldwide



Election of the SRG Vice-Chair

- In compliance with Art. 4(1) of the SRG Rules of Procedure:
  - Mr. Adnan Jelin (DK) was successfully elected as SRG vice-chairperson

SRG Member States Reporting

- Reports on national R&I activities' list and their potential synergies with EU-RAIL JU Programme
- All contribution will be consolidated in one position document in view of the annual General Assembly

Members States - SBA Reporting


AL – General Questionnaire = Y


AT - General Questionnaire = Y; Specific Questionnaire = Y


BE - General Questionnaire = WiP; Specific Questionnaire = WiP


BG - Not providing any answer


CY - Not participating in the SRG activities


CZ - General Questionnaire = Y ; Specific Questionnaire = Y


DE - General Questionnaire = Y; Specific Questionnaire = Y

Members States - SBA Reporting


DK - No relevant R&I programmes/projects funded by the JU


EST - Not providing any answer


ES - General Questionnaire = Y


FI - Not providing any answer


FR - Not providing any answer


HR - Not providing any answer


HU - Not providing any answer

Members States - SBA Reporting

 ★ IRL - Not providing any answer

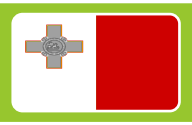
 ★ IL - Not providing any answer

 ★ IT- Not providing any answer

 ★ LV - Not providing any answer

 ★ LT - Not providing any answer

 ★ LU - Almost no information from the LU R&I body

 MT - Not participating in the SRG activities

 ★ NL - General Questionnaire = Y; Specific Questionnaire = Y

Members States - SBA Reporting

- NO - General Questionnaire = Y; Specific Questionnaire = N
- PL - Not providing any answer
- PT - General Questionnaire = N; Specific Questionnaire = N
- RO - Not providing any answer
- SI - Not providing any answer
- SK - Not providing any answer
- SE - General Questionnaire = Y
- TR - Not providing any answer

Summary of MS Reporting

Number of Member States in the SRG: **30**

 8

 3

 17

2 Member States are not participating in the work of the SRG (CY, MT)

Reports on national R&I activities' list and their potential synergies with EU-RAIL Programme

Consolidated version

- ✓ **According to Article 171 of the Single Basic Act (SBA), 9 MS provided their reports on national R&I activities' list and potential synergies with EU-RAIL JU Programme (AL, AT, CZ, DE, ES, NL, NO, PT, SE). Other reports will follow in 2024.**

- ✓ **About 30 programmes were identified by the MS, of which the following are open for call for submission, or will be in the upcoming months:**
  - Rail4Climate: Digitalization and automatization of the rail system. To be published in 2024. Budget: 5M/year.
  - DOPRAVA 2030: Modernizing the transport sector regarding sustainability, safety and societal needs (2023-2030). https://www.tacr.cz/program/doprava-2030/
  - TREND: Increase the international competitiveness of companies (2020-2027) https://www.tacr.cz/program/program-trend/
  - Z-SGV: Future of rail freight transport to promote innovation (until 2024) Budget: 29.6M https://www.eba.bund.de/DE/Themen/Finanzie-rung/Z-SGV/z-sgv_node.html
  - MFund: data-based innovations in the areas of mobility, logistics and infrastructure (until 2024) Budget: 42M https://www.bmvi.de/DE/Themen/Digita-les/mFund/Ueber-blick/ueberblick.html
  - ZIM: Increasing innovative strength and competitiveness of SMEs (until 2024). Budget 700M https://www.zim.de/ZIM/Naviga-tion/DE/Home/home.html

- Digital test fields in ports: Dev. Technical infrastructure for testing Logistics 4.0 (until 2024). Budget: 15M https://www.digitest-ha-fen.de/
- PT 2030 Programme (Structural funds – ERDF): R&I collaborative calls are foreseen for all subjects
- InfraSweden: Strategic innovation program for a smart, sustainable, resilient and competitive transport infrastructure. One call per year until 2027. https://www.infrasweden.nu/

✓ **More than 50 projects were identified by the MS, of which several synergies are expected by the SRG members, here below few examples that will be further enlarged during the course of 2024, with a specific action plan:**

- With EU-Rail FP2:
  - ERTMS ASAP for the implementation of a new European train safety system (until 2050)
  - CK04000088: Increasing of tunnel safety using continuous accurate vehicle location (2023-2025).
  - FW08010072: Wagon 5G communication unit (2023-2025).
  - CK04000082: Advanced cyber security methods in tunnel systems as a part of critical transport infrastructure (2023-2025).

- With EU-Rail FP3:
  - CK03000168: Intelligent methods of digital data acquisition and analysis for bridge inspections (2022-2024).
  - CK04000082: Advanced cyber security methods in tunnel systems as a part of critical transport infrastructure (2023-2025).
  - CK03000182: Research of construction-technical requirements for the use of TEN-T ground infrastructure to solve large-scale crisis situations (2022-2025).
  - CK04000109: Predictive diagnostics of ITS technological equipment using IA approaches (2023-2025).
  - CK02000218: Wayside diagnostic of railway vehicles running gear (2021-2023).
  - FW06010422: Simulation and design of structures from digital concrete (2023-2025)

- With EU-Rail FP4:
  - CK02000044: Progressive development of hydrogen economy in transport in the CZ (2021-2023).
  - CK04000107: Research and development of advanced composite cylinders for alternative fuels (2023-2025).

- With EU-Rail FP5:
  - CK04000041: SmartRail – Automated data analysis related to rail freight traffic (2023-2025).
  - DAC4EU (Digital Automatic Coupling for Europe): testing the use of digital automatic coupling in rail freight transport (2020-2024).

EUROPE'S RAIL GENERAL ASSEMBLY 2023

Coffee Break

Back at 15:35

EU-RAIL SYNERGIES WITH OTHER PROGRAMMES

Andreas Boschen

Executive Director, SESAR 3 Joint Undertaking

Josef Doppelbauer

Executive Director, European Union Agency for Railways

Rodrigo Da Costa

Executive Director, European Union Agency for the Space Programme

Arjen Boersma

CIO/ICT Director, ProRail – as RNE representative

EUROPEAN DAC DELIVERY PROGRAMME MASTERPLAN

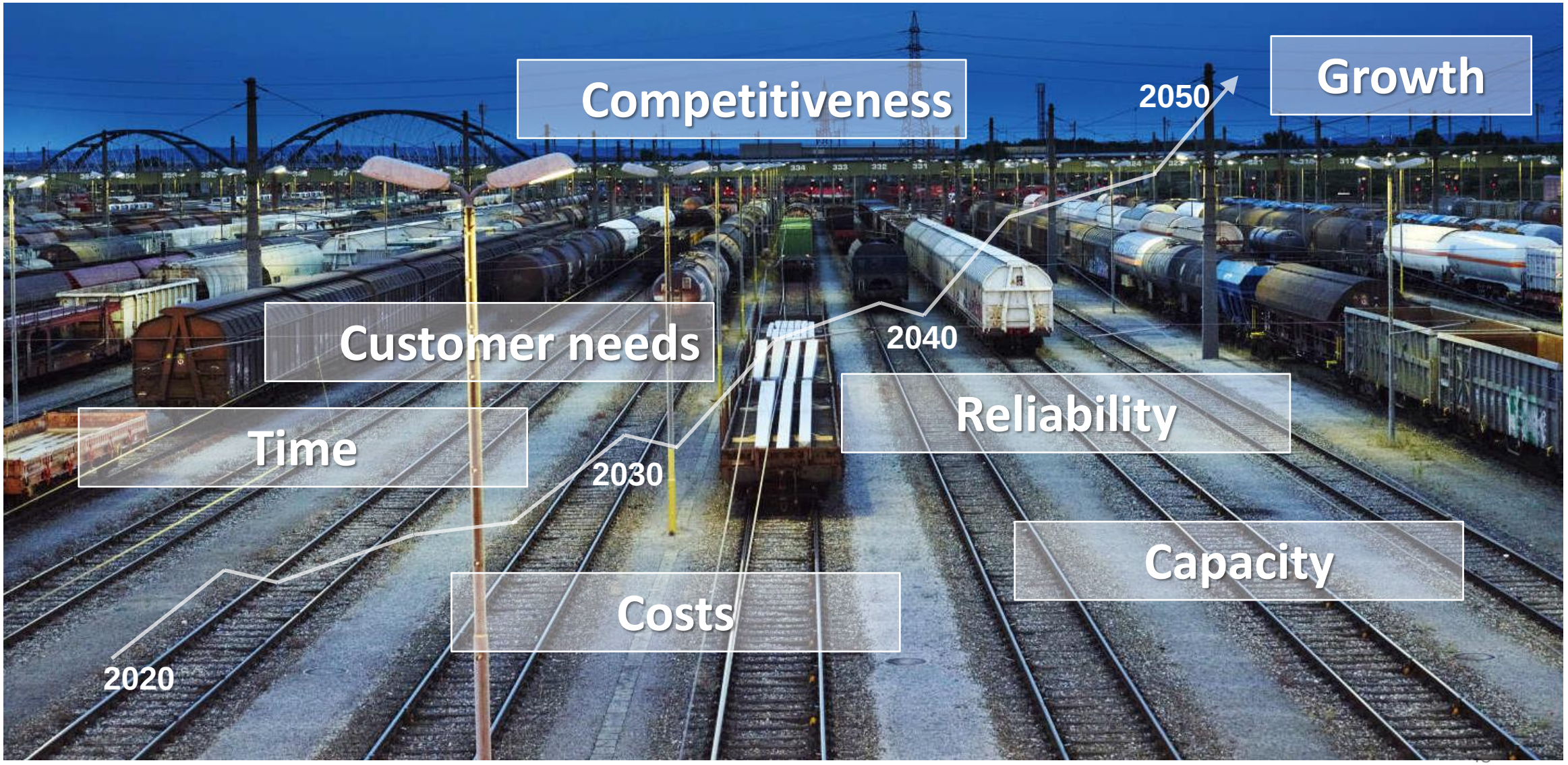
Javier Ibáñez de Yrigoyen

Senior Programme Manager, Europe's Rail Joint Undertaking

Mark Topal-Gökceli

Programme Manager, European DAC Delivery Programme

The challenges for EU rail freight on the way to achieve Green Deal objectives

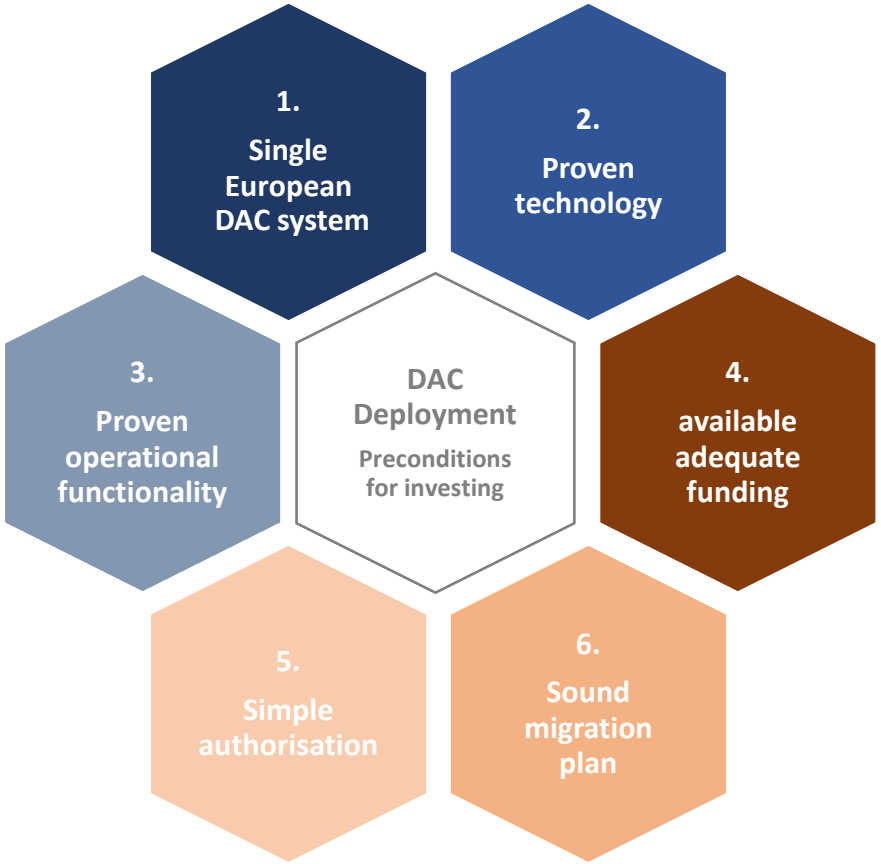


The challenges for EU rail freight…
on the way to achieve Green Deal objectives

The challenges for EU rail freight…
DAC is a key enabler of the transformation

Preconditions for investing in DAC deployment

(= everything that needs to be proven before investment decisions will be taken)



1. DAC-Technology (incl. additional DAC based technology) and DAC-operations/ functionalities are clearly defined (tech. package) and **harmonised (Single European DAC System)**
2. The **technology** meets all essential requirements - in particular in the area of RAMS (reliability-availability-maintainability-safety/security) - proven through large demonstrations
3. The **operational functionalities/use cases** bring the expected benefits - proven through large demonstrations incl. safety aspects
4. Positive **CBA at Union (socio.econ. effect) and company level, on the basis of which adequate funding and financing needs** to be **secured**
   - to address the different needs of the different actors
   - to all European wagon & locomotive operators (RU) & keepers (as they will have to invest)
   - in order to generate positive business cases in a maximum 10y perspective
   - considering the individual/regional conditions such as the cases where upgrading is not possible/feasible
5. Simple, suitable **"fast-lane" authorisation** procedures are available & authorisation risks are mitigated **procedures** for wagons and locos (incl. availability of relevant documentation)
6. A **sound migration plan** is set, guaranteeing simultaneous deployment in Europe (sector agreement and legal framework) based on available & adequate funding programmes, established capacities for production and upgrading of wagons and locomotives, staff training, and availability of required infrastructure & IT adaptations

Various potential use cases
Challenge: trade-off “benefit-cost-complexity-feasibility-time”

DACcord

benefits =

gains in the processes (time, system time, cost savings, capacity, reliability, quality, safety)

+ induced modal shift

DAC core system

- **Automated coupling & manual uncoupling and digital backbone**
- **Recording of train composition**
- **Automatic (in-train** and remote**) uncoupling**
- **Heavier & longer trains (within existing infra limitations)**
- Increased payload
- Increased speed via improved longitudinal forces

DAC shunting

- Automated parking brake
- Rear view camera for train driver
- Proximity detection
- Sound signals when train in motion

DAC train preparation

- **Automatic brake test & calculation of brake capacity**
- Automated technical wagon inspection

DAC train run

- **Train integrity**, enabling ETCS L3 moving block operations
- Increased speed via better braking performance
- Multiple loco traction and trains up to 1500m
- Derailment detection

DAC telematics (wagon & goods monitoring)

- Predictive / preventive maintenance
- detection of cargo condition
- Cargo surveillance, intrusion alarm
- Wagon data & loading information on mobile device

DAC loading & unloading

- Automatic loading/unloading processes (replacement of hydr/pneum components, electro-mechanical actuators for bridge plates, automated cargo securing, heating elements for defrosting, …) via ext. energy supply
- illumination for worker's safety & interior

red colour = component of the DAC basic package

3. DAC basic package

› "**DAC basic package"** for demonstrator trains and pre-deployment trains
& being the minimum package for full deployment
(whereas further design principles like e.g. upgradeability, modularity, interchangeability* could be added for the full deployment, as long as interoperability and performance of the basic system will be maintained):

- **DAC coupler incl. energy/data system****
- **Train composition/wagon order detection**

- **Automated brake test**
- **Train integrity & train length determination**

- **Automated uncoupling (uncoupling in-train from loco)**

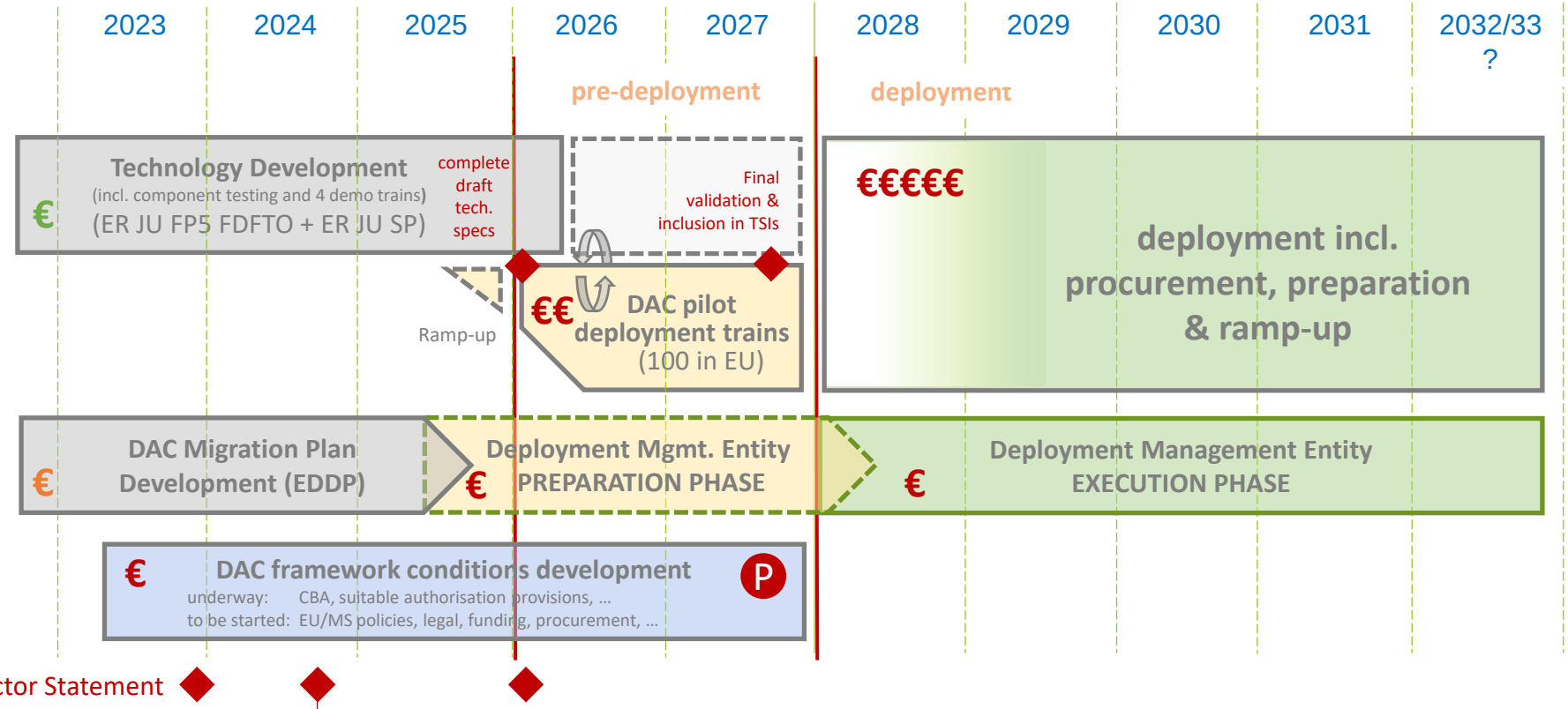
Notes:

** modularity, interchangeability, upgradeability & options for centralised software updates (e g over-the-air) will be discussed in separate expert groups*

*** coupler with mechanical or push-button uncoupling from wagon side and incl. "prevent coupling" function*

The DAC General Master Plan 01 [June 2023]

DACcord



DAC Legal Package:
TSIs final (technical + migration + operations)
Deployment Management Entity Deployment Funding Instrument
Suitable authorisation provisions

Major amendments/NEW:

- DAC pilot deployment projects
- DAC framework conditions development
- Deployment Management Entity

€ Budget and resource need (already funded)

€ Budget and resource need (currently mainly unfunded)

P Determining milestone:
DAC Legal **P**ackage to be implemented before this deadline

existing
to be prepared

All DAC-related activities

DACcord

Europe's Rail Flagship Project 5	EDDP	EC/ERA	Europe's Rail System Pillar	ESOs
	development/follow-up of migration roadmap, sector–wide coordination, risk management, prep. of decision-making			

FP5TRANS4M-R

DAC/"Full Digital Freight Train Operations"

target operat. proc.
functional requ'mts
system architecture
tech. development
testing & demos
tech. specification
authoris. dossiers

FP 5 FDFTO sounding boards

Technology (mirroring & sector feedback)

Operational Procedures (mirroring & sector feedback)

DAC migration roadmap

11 actions

- Fleet Analyses & rtf Engineering (rtf readiness)
- Retrofit capacity plan (workshops, work-force, components)
- Funding & Financing plan
- CBA (updates)
- Infrastructural & IT adaptations
- Retrofitting plan (traffic & customer sidings analysis, operational plan)
- Investment plan & procurement framework plan
- Placing into service plan (safety, workforce training, rulebooks etc.)
- Other regulatory & legal framework plans

EUROPEAN UNION AGENCY FOR RAILWAYS

development of efficient & suitable authorisation provisions & requirements

preparing TSI drafts for the EC

TSI revision

operational procedures standardisation (plan & execution)

Technical harmonisation: preparing inputs for ERA TSI drafting process & driving EU standardisation

alignment of rail & DAC system architecture

CEN CENELEC ETSI

Executing European standardisation

State of play of the DAC-related activities

EDDP	**2020/21 - …**	**> 80 companies/20 European countries**
› Coupler head type selection & developing the basic DAC specification		2021
› Development of basic **migration scenarios**		2021/22
› **Positive Cost-Benefit Analysis**		2021/22/23 (iterations)
› **European Investment Plan for DAC** recommending Deployment Mgmt. Entity		2022
› **“Basic package” definition taken for (pre)deployment (DAC + automation functions)**		2023
› Technical **analysis of the vehicle fleet** (readiness for retrofit)		ongoing (very challenging)
EU-Rail Flagship Project 5 (FP5-TRANS4M-R)	**2022 - 2026**	**27 beneficiaries/71 partners**
› **DAC target operational procedures** for the first DAC use cases ready		2023
› **DAC technology development** (mechanical/pneumatical, energy, communication)		ongoing
› **Demonstration of Digital Freight Trains** in with DAC Type 4 & 5 incl. Energy and Data Supply, Hybrid Coupler and Automated Brake Test		2025
› **Operational DAC tests** took/are taking place in European countries		**S2R, DAC4EU, etc.**
System Pillar (Task 4)	**2022/23 -…**	
› “central instance” concept, OPE procedures harmonisation, standardization plan		started

Main next steps

Flagship Project 5

› technology development completion (“basic package” first) incl. demo
→ Techn. Ready for pre-deployment trains

EDDP

› Organising the 100 pre-deployment trains

› Migration roadmap continuation (especially fleet & European traffic analysis)

› Options for funding/financing and for a Deployment Management Entity

› Stakeholder dialogue

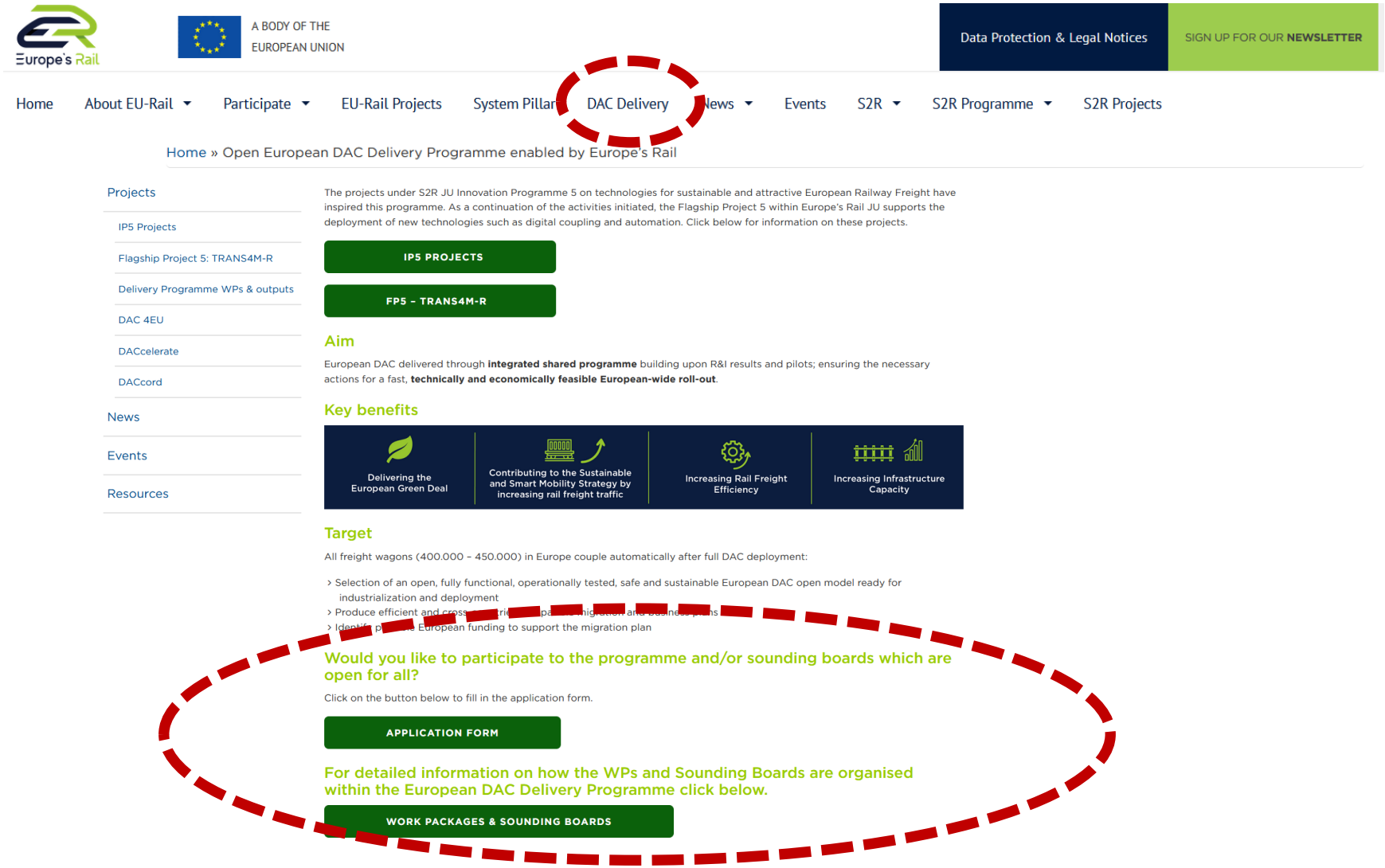
System Pillar

› OPE procedures, Standardisation & TSI input plan, ….

A single entry point for all Europe and beyond

DACcord

https://rail-research.europa.eu/european-dac-delivery-programme/



Any questions?

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More information: https://rail-research.europa.eu/european-dac-delivery-programme/

CLOSING WORDS

Keir Fitch

Head of Rail Safety and Interoperability Unit, DG MOVE,

European Commission

Founding Members


Europe's Rail
EUROPE'S RAIL
GENERAL ASSEMBLY
ONLINE
5-6
December
2023
@EURail_JU
Europe's Rail Joint Undertaking

AGENDA

Europe's Rail General Assembly 2023

DAY 2

9.00 - 10.15	**Innovations from Shift2Rail R&I results** • *Connected Driver Advisory Systems (C-DAS) - Philipp Nowak and Bernd Foissner* • *Intelligent Video Gates for Railway Checkpoints - Behzad Kordnejad* • *Automated Train Operations (up to GoA4) - Benoît Bienfait* • *Commercialisation of Ticket Vending Machine (TVM) - Zbigniew Jancewicz* • *Silicon Carbide (SiC) Traction Systems - Laurent Nicod* • *Intelligent Asset Management System equipped with decision support methodologies and algorithms for anomaly detection - Marco Borinato*

AGENDA

Europe's Rail General Assembly 2023

DAY 2

10.15 - 11.00	**Implementation of the EU-Rail Programme – Innovation Pillar – State of Play and 1st Year Results** • ***Flagship Areas 1 & 2*** *- Léa Paties - Senior Programme Manager, Europe's Rail Joint Undertaking* • ***Flagship Areas 3 & 4 and Exploratory Research*** *- Sébastien Denis - Senior Programme Manager, Europe's Rail Joint Undertaking* • ***Flagship Areas 5, 6 & 7*** *- Javier Ibáñez de Yrigoyen - Senior Programme Manager, Europe's Rail Joint Undertaking*
11.00 - 11.15	**Coffee break**
11:15 - 11:45	**Implementation of the EU-Rail Programme – System Pillar – State of Play and 1st Results** • *Ian Conlon - Head of System Pillar, Europe's Rail Joint Undertaking* • *Christoph Klose - System Pillar Core Group Representative* • *Paolo Ciucci - System Pillar Core Group Representative* • *Steffen Schmidt - System Pillar Core Group Representative*

AGENDA

Europe’s Rail General Assembly 2023

DAY 2

11.45 - 12.00	**Implementation of the EU-Rail Programme – EU-Rail Synergies Between Flagship Projects, Exploratory Research and System Pillar** • *Léa Paties - Senior Programme Manager, Europe’s Rail Joint Undertaking* • *Sébastien Denis - Senior Programme Manager, Europe’s Rail Joint Undertaking* • *Javier Ibáñez de Yrigoyen - Senior Programme Manager, Europe’s Rail Joint Undertaking*
12:00 - 12:25	**Communication and Dissemination Plan** • *Catherine Cieczko - Chief Stakeholder Relations and Dissemination, Europe’s Rail Joint Undertaking* • *Zanda Litvina - Communication and Finance, Europe’s Rail Joint Undertaking*
12:25 - 12:30	**Closing Words by the JU Executive Director Ad Interim** • *Giorgio Travaini - Executive Director a.i., Europe´s Rail Joint Undertaking*

INNOVATIONS FROM SHIFT2RAIL R&I RESULTS

Connected Driver Advisory Systems (C-DAS)

Philipp Nowak and Bernd Foissner

Driver Advisory System

Basic information

- Objectives
- Background information

Demonstrator @ DB Cargo

- Information & Equipment
- Functionality
- Feedback Train-Drivers
- HMI

Results & Continuation

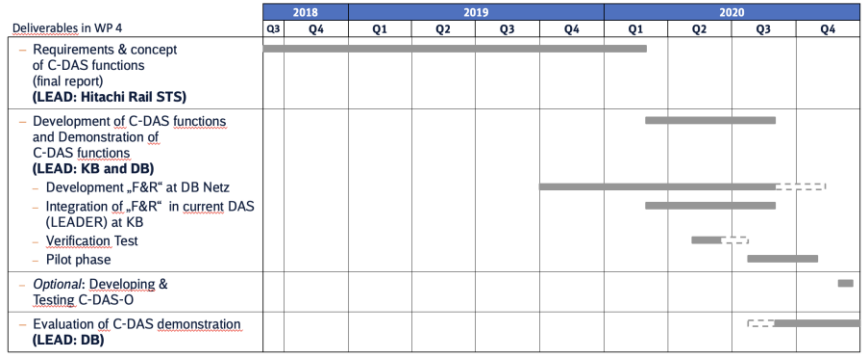
- Energy Savings
- Continuation and market uptake

Management Summary of the C-DAS Development within Fr8Rail II

Objectives

- Define requirements, system concept and demonstration for a Connected Driver Advisory System
- …based on the real time data exchanged with TMS, to evaluate speed profiles in accordance to real traffic conditions
- …to ultimately increase service efficiency and energy savings

Besides Covid everything was finished in time



Partners

DB

TRAFIKVERKET

Hitachi Rail STS

BOMBARDIER

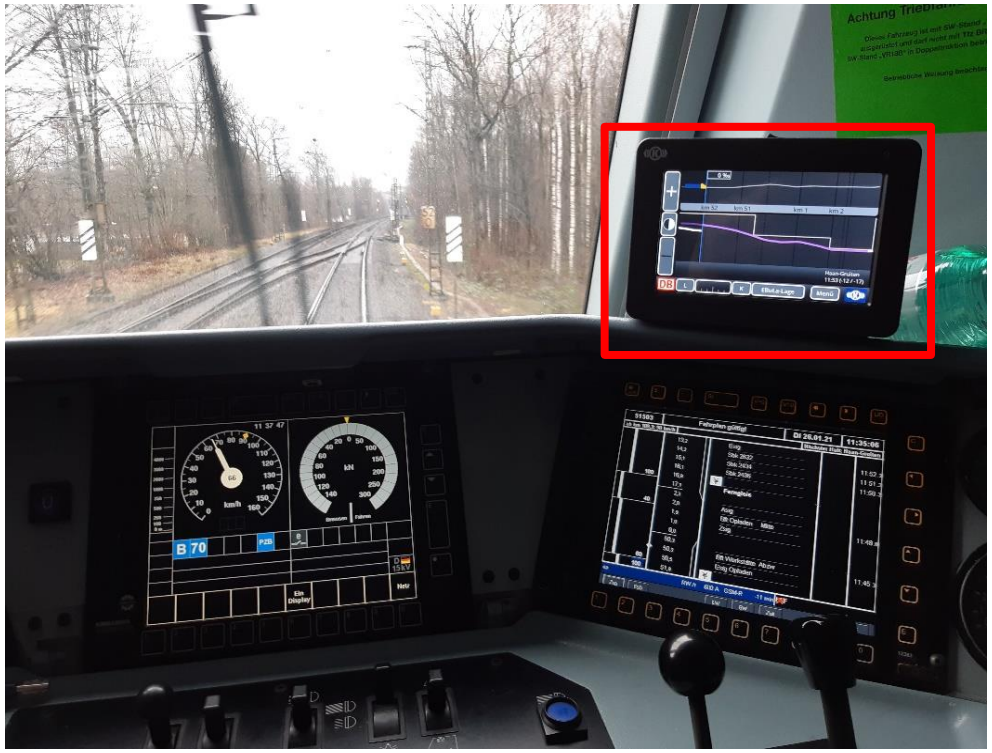
KNORR-BREMSE

Milestones (IP5, Fr8Rail II, WP4)

- D4.1, D4.2 Requirements & concept (intermediate & final report)
- D4.3 Demonstration of C-DAS functions
- D4.4 Evaluation of C-DAS demonstration

We had equipped 650 locos with LEADER – And tested 100 locos with Farsight & Rearview

Current LEADER (red box)



Currently equipped series at DB Cargo

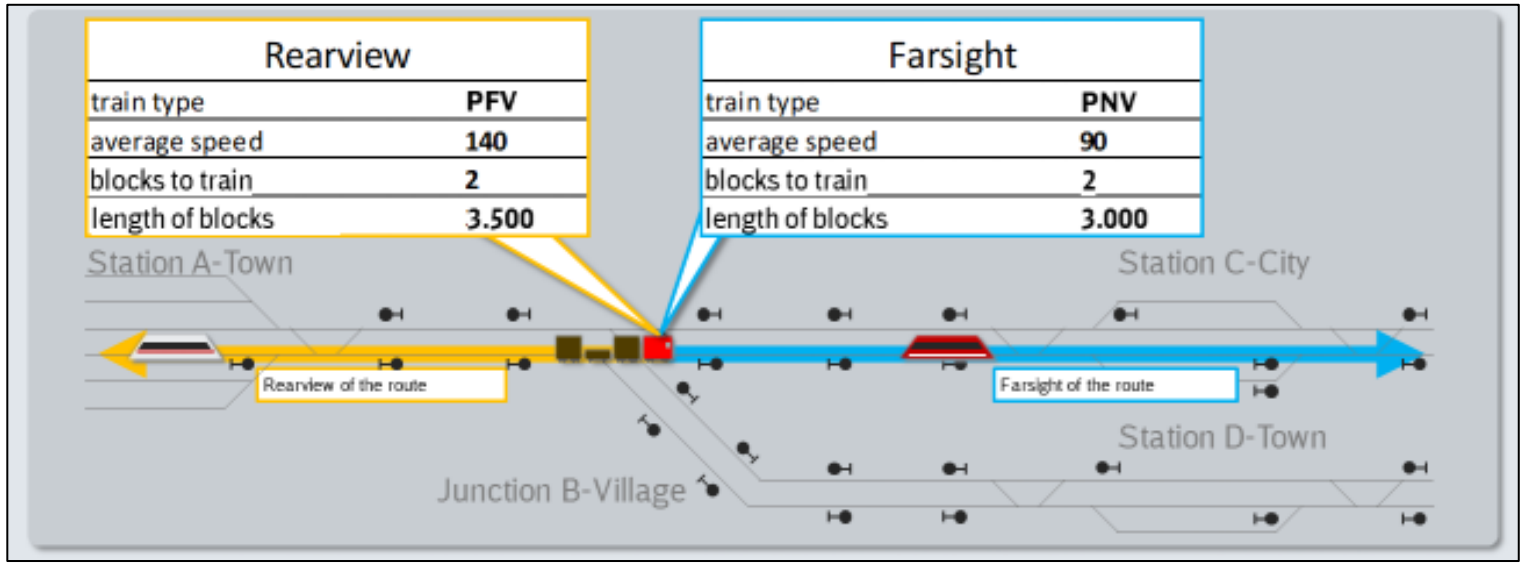
BR 145

BR 152

BR 185

BR 187

Rearview and Farsight information for the train driver



- Information about other trains that are **now** in the preview or rearview area on the path of the train
- Distance information refers to the last location messages

Rearview/Farsight is a **development** Project.

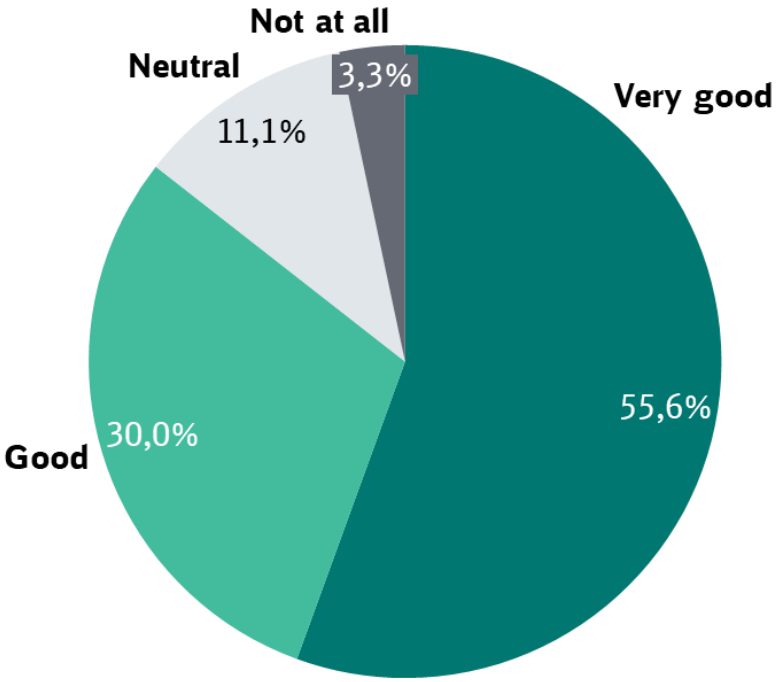
Rearview/Farsight is **not usable** for driving recom-mendations.

Only information!

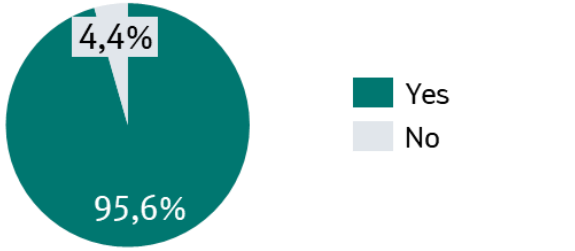
In the pilot phase we received predominantly positive feedback from our train drivers

Number of responses: 90

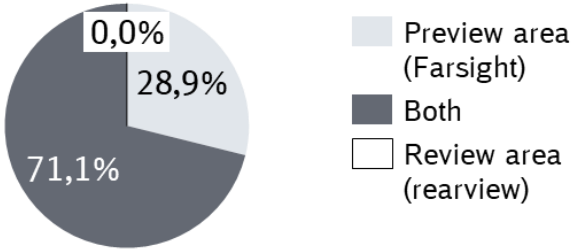
How do you like F&R in general?



Do you like the visualisation?

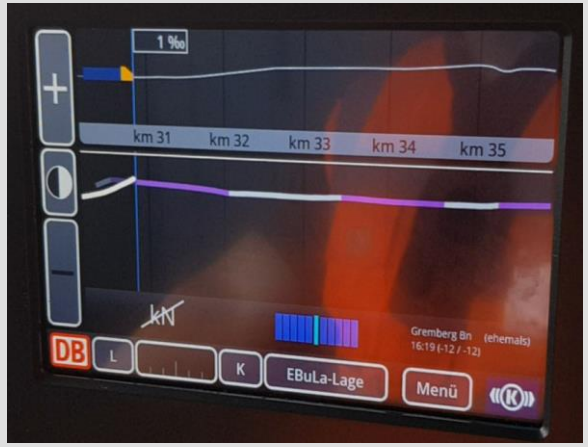


Which area is more important for you to see?



The F&R function was developed under constant involvement of our train drivers in the pilot phase

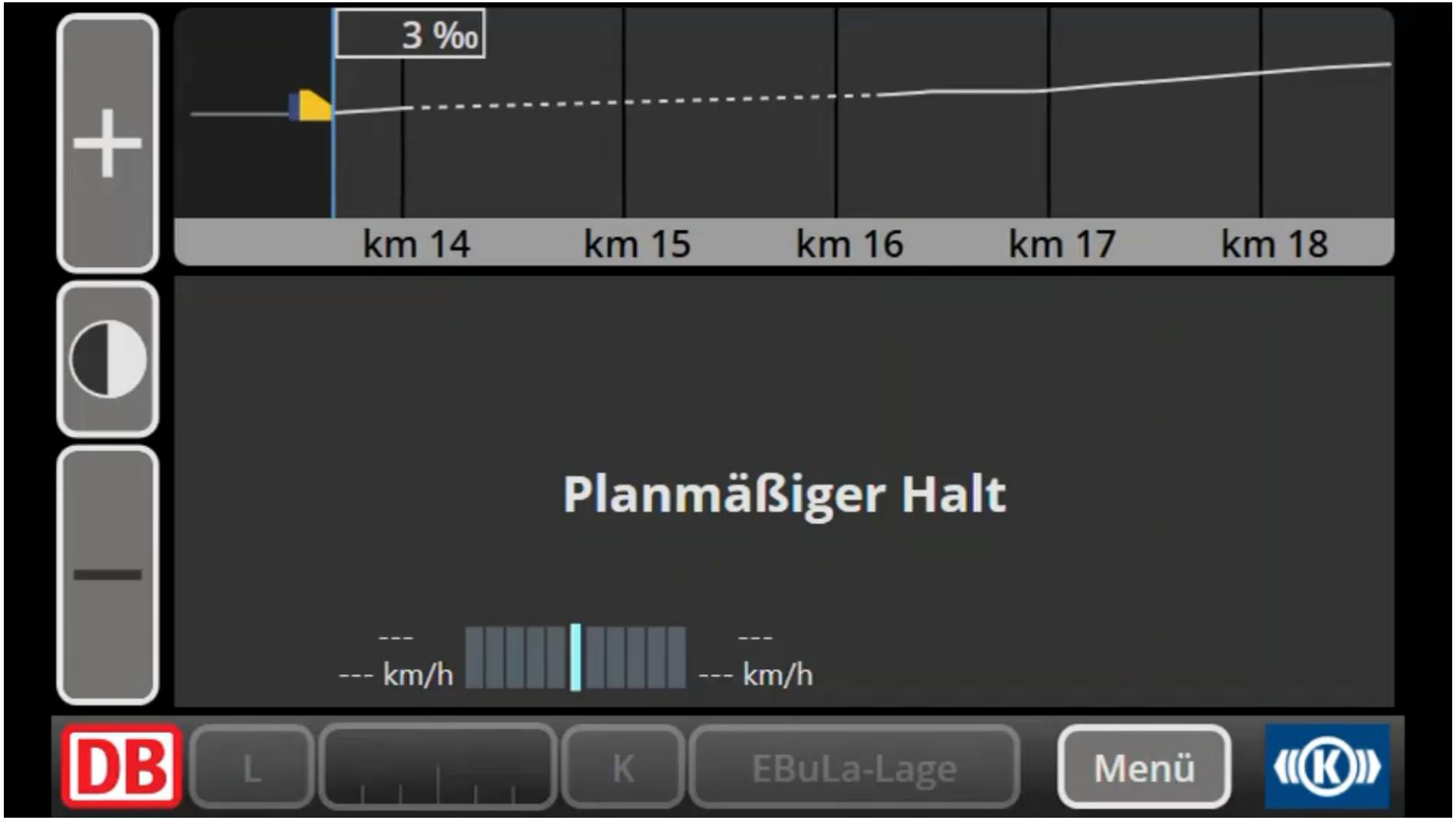
19.06.2020



21.07.2020

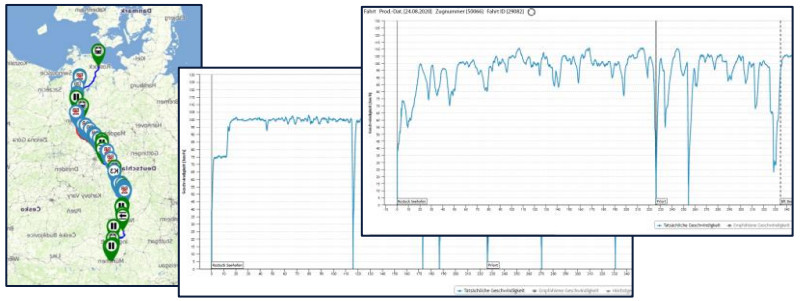
20.08.2020

Demonstration of the LEADER F/R development



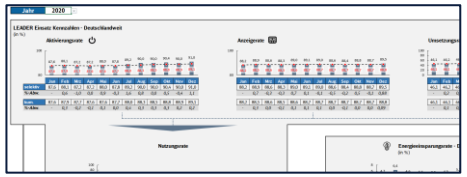
To get an overview about the impact we used two approaches

1. Analysis of train drives (manual evaluation)



Strong **indication** for **reduced number** of stopps

2. Analysis of energy savings (automated evaluation)



Comparison of **train pairs** with **the following criteria:**

- the weight of the trains must not differ by more than 50 tonnes
- the length must not differ more than 100 m
- they must have taken the same route for at least 50 km
- the drives must be close to each other in terms of time

! Only **indication** due to **little number** of **pairs for comparison**

Energy saving **DAS LEADER: 6,16 %**
Energy saving with **F&R: 8,86 %**

Indication that Farsight and Rearview **leads to more energy savings**

Further output into the market & industrialization efforts

Maturity level at the end of IP5/ Fr8Rail II/ WP4:

- Prototype for demonstration purpose
- Short and incremental development cycles
- Quick feedback loops from the field testing (“green banana”)
- Not too much focus on testing and documentation

Industrialization:

- Last fine-tunings in reaction to the feedback of the end-users
- Increase of robustness
- Maintainable implementation
- Vast system testing
- Documentation
- Training effort

Greener and more efficient freight transport with F&R - The outcome for the people in the EU

Benefits for the people in the EU with „F&R“

More climate protection


European Commission

English

Mobility and Transport

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Home > News & Events > News > Green Deal: Greening freight for more economic gain with less environmental impact

NEWS ARTICLE | 11 July 2023 | Directorate-General for Mobility and Transport

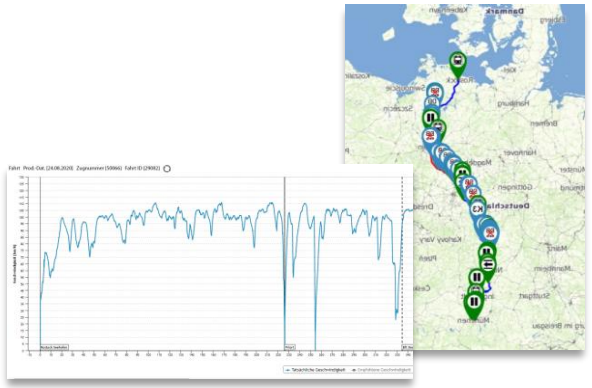
Green Deal: Greening freight for more economic gain with less environmental impact

German government backs rail in fight against climate change

Germany's Climate Cabinet agreed measures to fight climate change on September 20, which includes a major boost in rail investment to encourage a switch from road and air. David Briginshaw analyses what will this mean for Germany's railway network.

- ✓ Additional Energy savings **up to 2.5 %**
- ✓ Reduces Braking, reduceing nois level

More capacity



- ✓ Train and track capacity
- ✓ F/R increases the flow, thus capacity

Modal shift

- ✓ Freight trains emit **less than 1/5** CO_2 than truck transport

INNOVATIONS FROM SHIFT2RAIL R&I RESULTS

Intelligent Video Gates for Railway Checkpoints

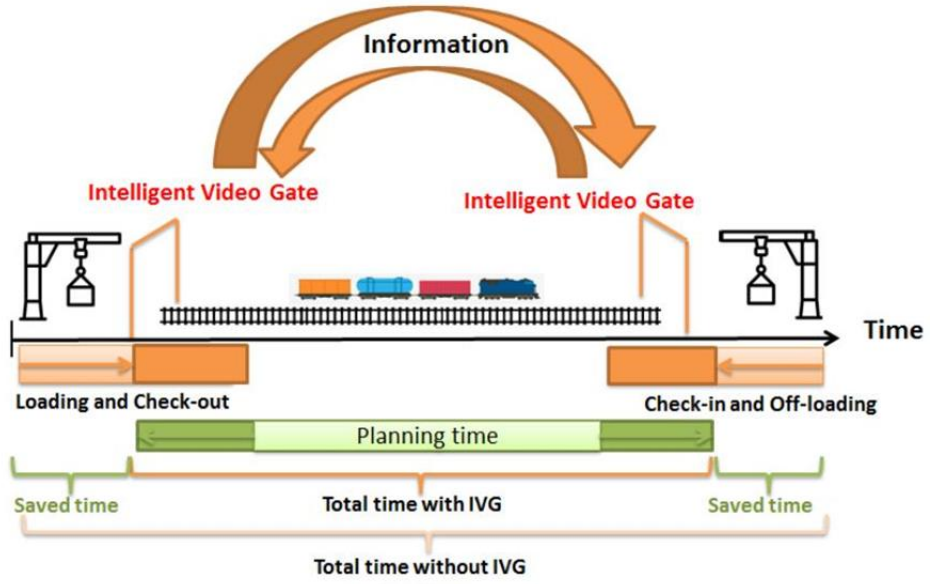
Behzad Kordnejad

Development of Intelligent Video Gates for railway checkpoints within Shift2Rail

Improved Processes through IVG

Technologies
- ➔ OCR – Image analysis, Machine learning
- ➔ RFID
- ➔ Data sharing platform (Deplide)

Useful information from the IVG
- ➔ Wagon code, sequence
- ➔ Load unit code, sequence
- ➔ Numbers and codes
- ➔ Dangerous goods placards
- ➔ Damage detection
- ➔ etc.



- ➔Automatized and digitalized processes
- ➔Improved handling of deviations and checks in and out
- ➔Improved data quality
- ➔Optimized transshipment plans and interface towards road haulers
- ➔More precise departure times and ETAs
- ➔Increased operational efficiency
- ➔Sharing of logistical information etc.

*Concept for capturing **logistic and maintenance data** from a gate equipped with **cameras and RFID readers** that enables the stakeholders to **improve operations** and enhancing their offer to the market*

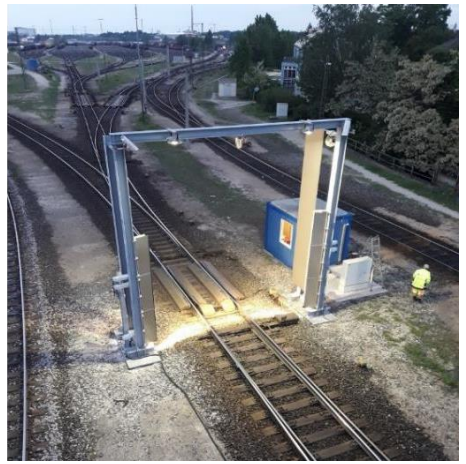
Installed gates in Sweden and Germany were used for testing of the developments

FR8HUB WP4 (2017-2019)

Concept showcased on model train at Innotrans 2018

FR8Rail III WP3 (2019-2022)

Gothenburg, Sweden



Nüremberg, Germany

Artificial Intelligence is supporting the image processing of IVGs

AI for Image processing

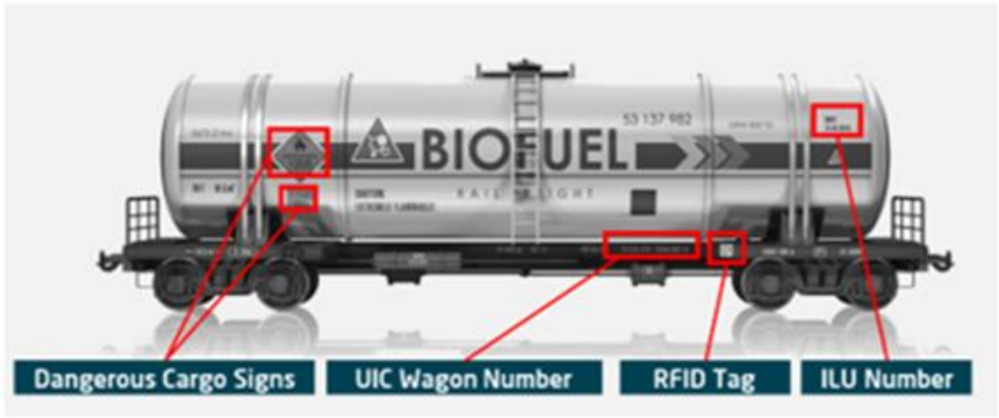


Image processing module Details

OCR engine for ILU, UIC and ADR codes for each wagon and container (trained with real images)

Computer Vision Algorithms for Detecting and Classifying Dangerous Goods Plates (Trained with real images)

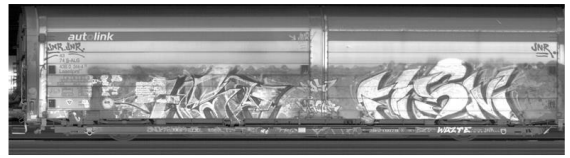
Wagon and container type characterization

Deep Learning models deployed on the cloud solution to detect and classify dangerous goods plates and possible damages and defects to containers.

External needs
Images (DB, TKV….)

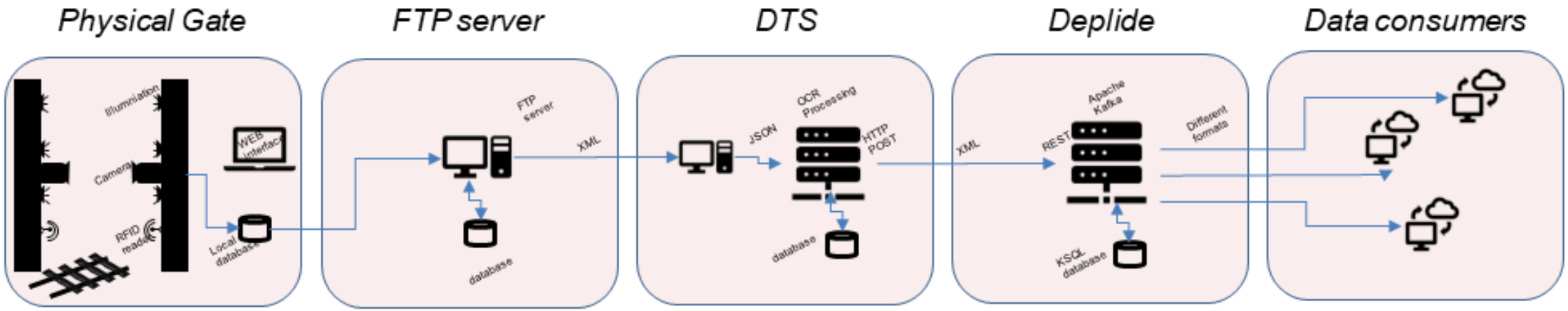
ILU, UIC and ADR+IMO codes

Damages on containers and tanks (Graffiti Detector)



Data captured from the IVGs are shared with a FTP server structure

Data sharing



Data exploitation: Use cases developed within Fr8Rail III

Use case	Description	Results
Information to customers	An **information system gives customers** of railway undertakings and terminal operators the possibility to access **timestamped information about ILUs, wagons and trains** gathered by IVGs, along with **estimated deviations** from their planned time of arrival	**User interface** developed.
Planning 	IVGs located at sending terminals or along railway lines can provide useful information for **the transshipment planning** at intermodal terminals.	The IVG correctly **identifies ~80 % of the wagons and ~85 % of the ILUs** (excluding damaged codes)
Damages	Detection of **damages, initially graffiti**.	Graffiti detector based on Deep Learning has achieved an accuracy of **>98%** for notifying when damaged wagons and containers are found
Dangerous goods	Information collected by IVGs can help infrastructure managers with more **accurate status of dangerous goods**.	The IVG correctly identifies **~70 % dangerous goods**
Dangerous goods and TMS	Use of IVGs to improve and **optimize the scheduling** of transits with dangerous goods for reducing **the exposure risk**.	**The alarm** together with new schedule suggestions can be sent to TMS for timetable planning. Use case identified recommended **installation locations.**
Use cases for the IVG at yards	IVG is currently used to speed up and digitalize the reporting process of the **maintenance** ordering unit. By identify the damages on the high-resolution images, risks for the employees' health and the amount of unnecessary paperwork can be reduce.	Most important use cases of IVG at Yards identified

Intelligent Video Gates are a key enabler for digitalisation and AI usage in rail freight

Impact of the innovation

- The innovation led to **less administrative burdens**, enhanced and more **correct costumer information** and a tool for better port- and terminal **efficiency and maintenance developments.**

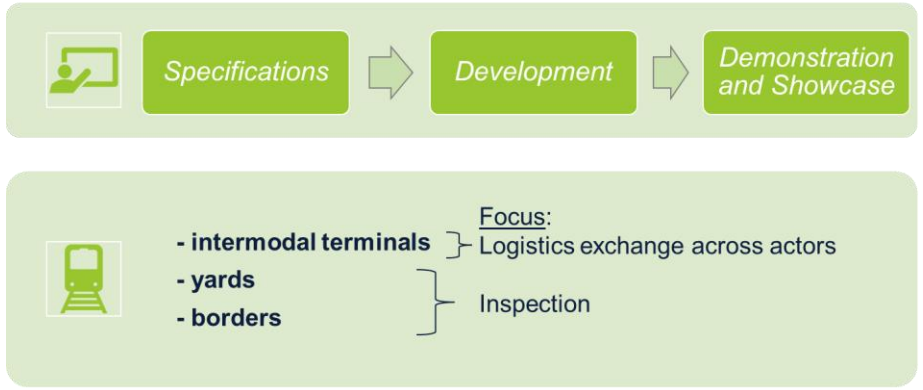
- **Faster Processing** for
  - Terminal Operations
  - Maintenance Ordering at yards
- **Better Documentations** of damages and vehicle conditions
- **Additional view** on the wagon from above
- Increase of **safety**: Reduction of operations at the track
  - Less workers at the tracks
- **Real-Time data for transport planning** at Terminals
  - Optimized transshipment movements at terminals
- Possibility of Europe-wide **data sharing**
  - Tracking of wagons
  - Condition Monitoring of vehicles
- **Cooperation across locations** for the Maintenance Ordering

https://youtu.be/u9VoDDXuAUw

The development of IVGs continues within Europe´s Rail FP5

- Further development within Europe´s Rail FP5 **TRANS4M-R**, in the Seamless operations work stream and ***WP29 Standardised European Railway Checkpoints at Operational Stops***

Work structure:



Gates:
- Spain
- Netherlands
- Sweden
- Germany
- …

+ Corridor showcase

Consortium partners:

Composition of FP5 – TRANS4M-R Standardised European Railway Checkpoint consortium partners are encircled. Affiliated partners of FRET SNCF, Thales and Trafikverket are not included in this picture.

INNOVATIONS FROM SHIFT2RAIL R&I RESULTS

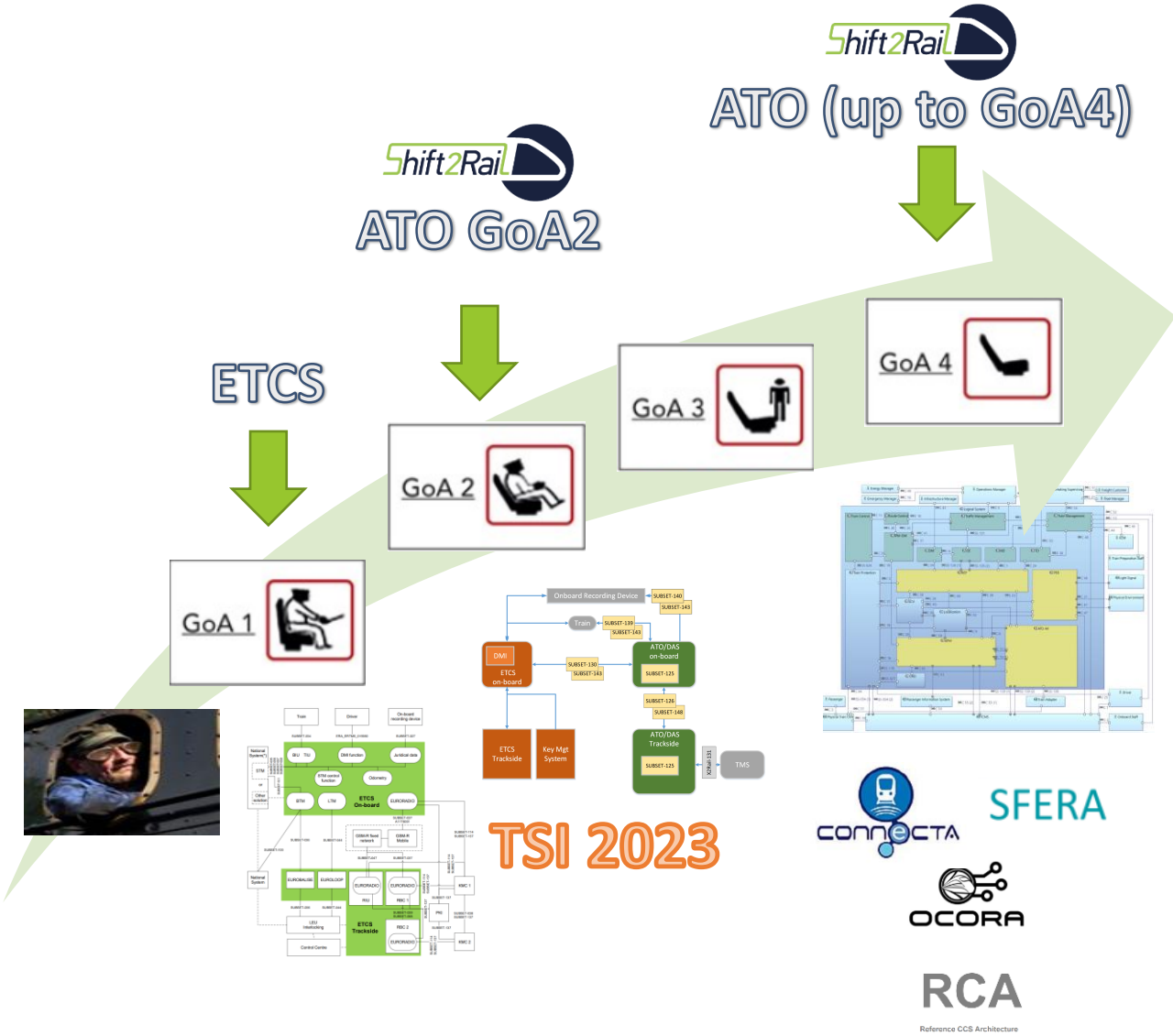
Automated Train Operations (up to GoA4)

Benoît Bienfait

Agenda

1. Grades of automation and migration (incremental logical architecture)
2. Focus on ATO (up to GoA2)
3. GoA2 Pilot tests
4. ATO (up to GoA4) Pilot tests
5. Conclusion

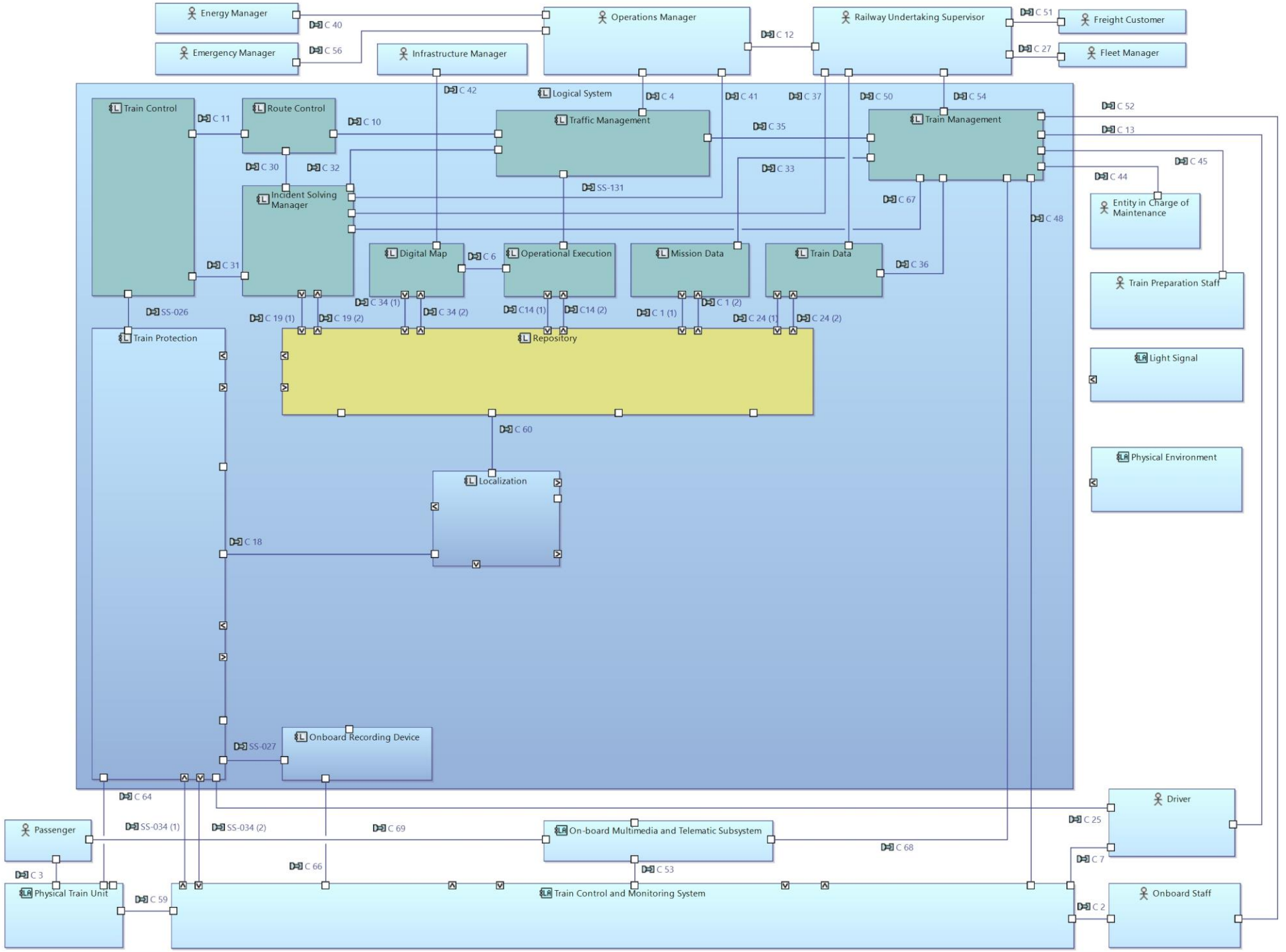
Grades of automation and standardisation process



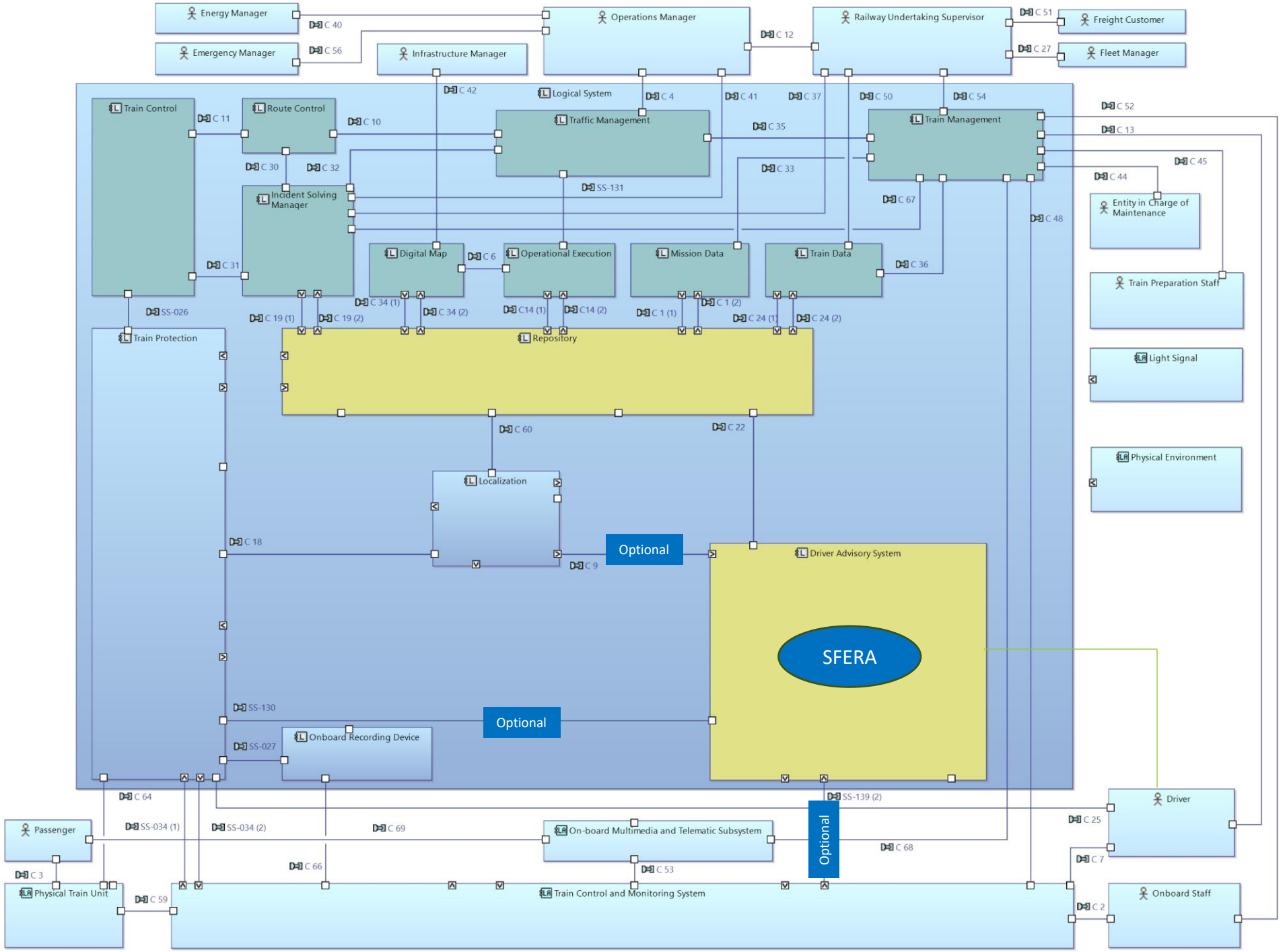
Europe's Rail

Large scale demonstrations

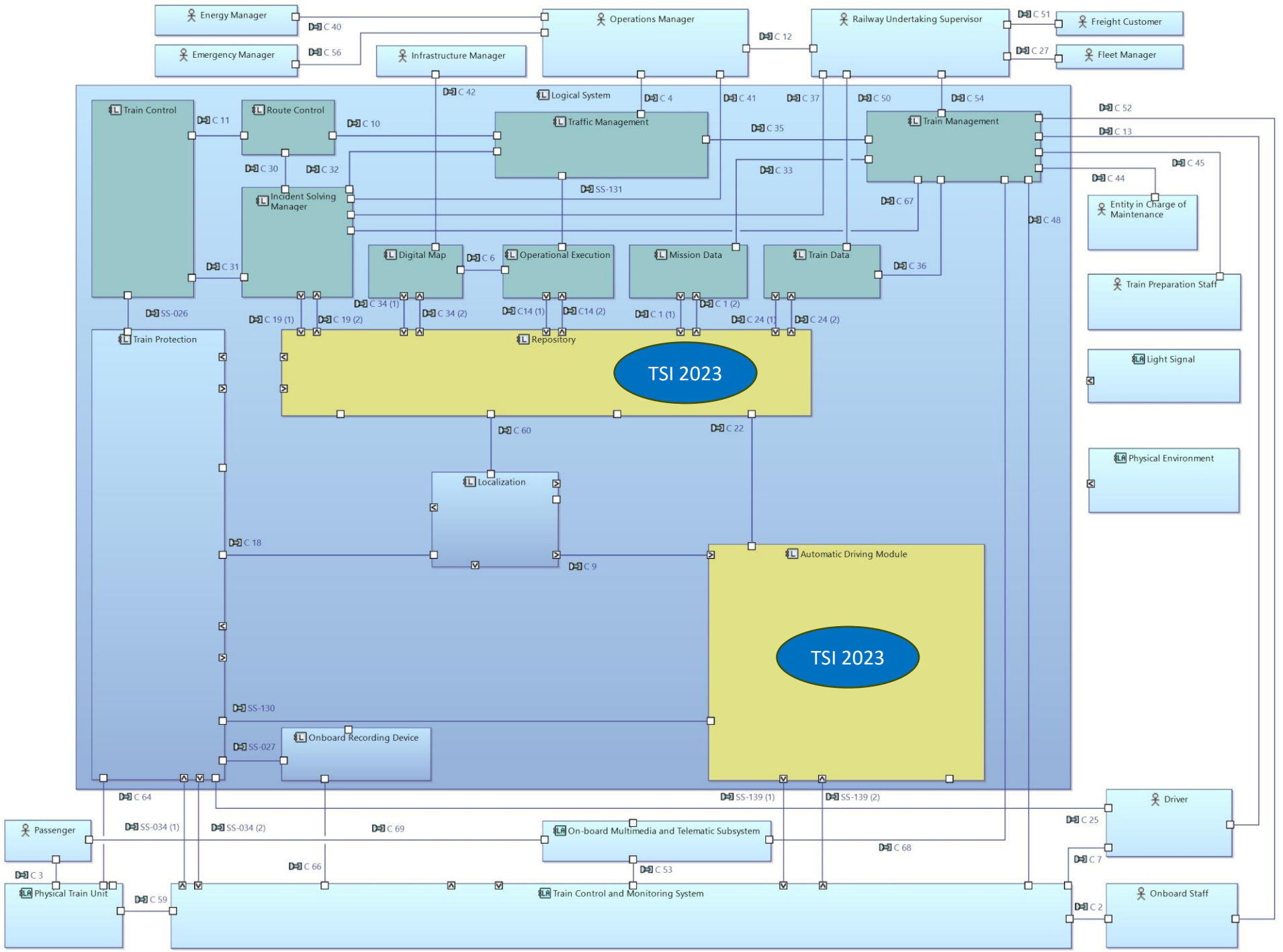
GoA1 Logical Architecture



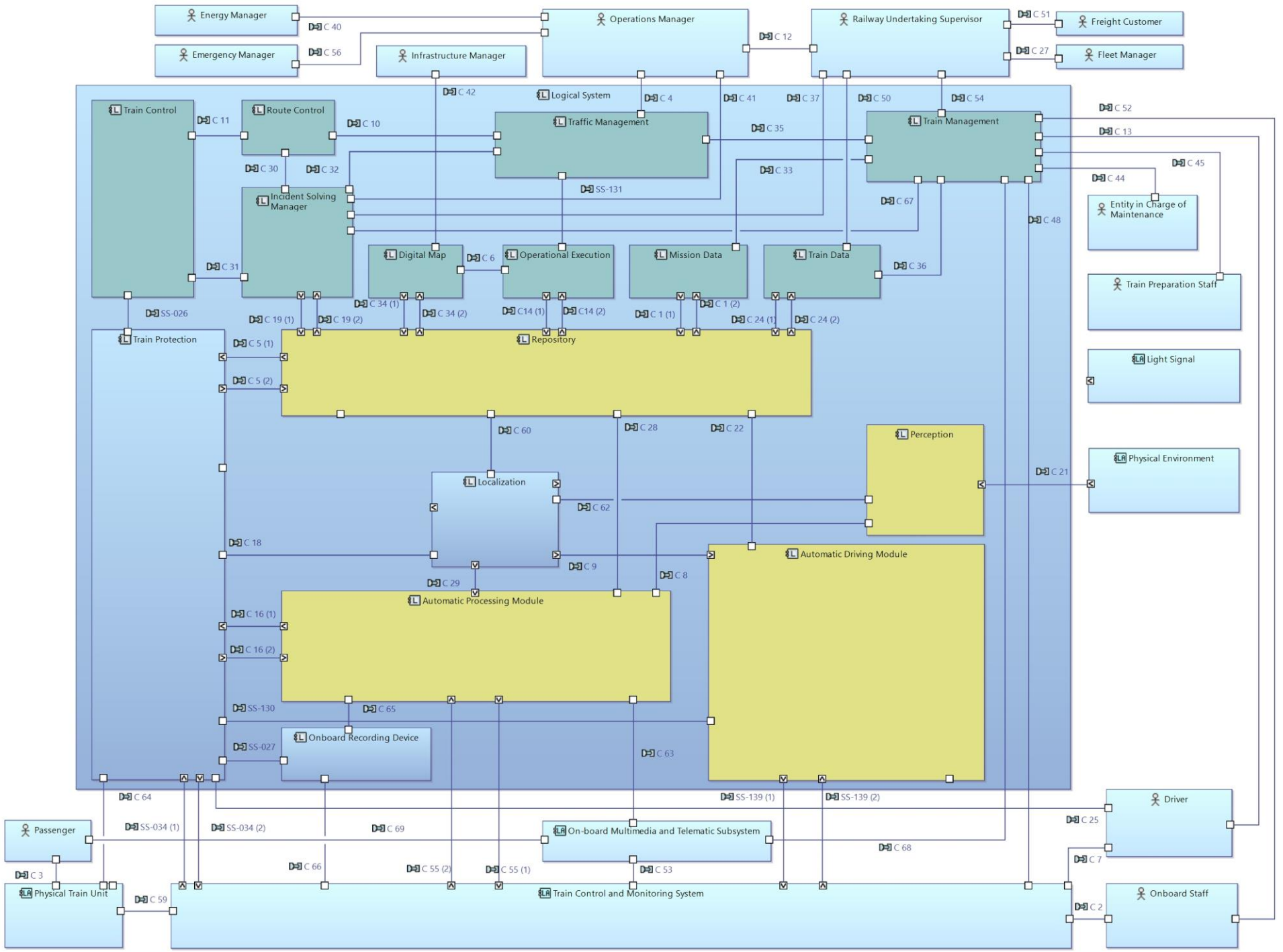
GoA1 Logical Architecture with DAS



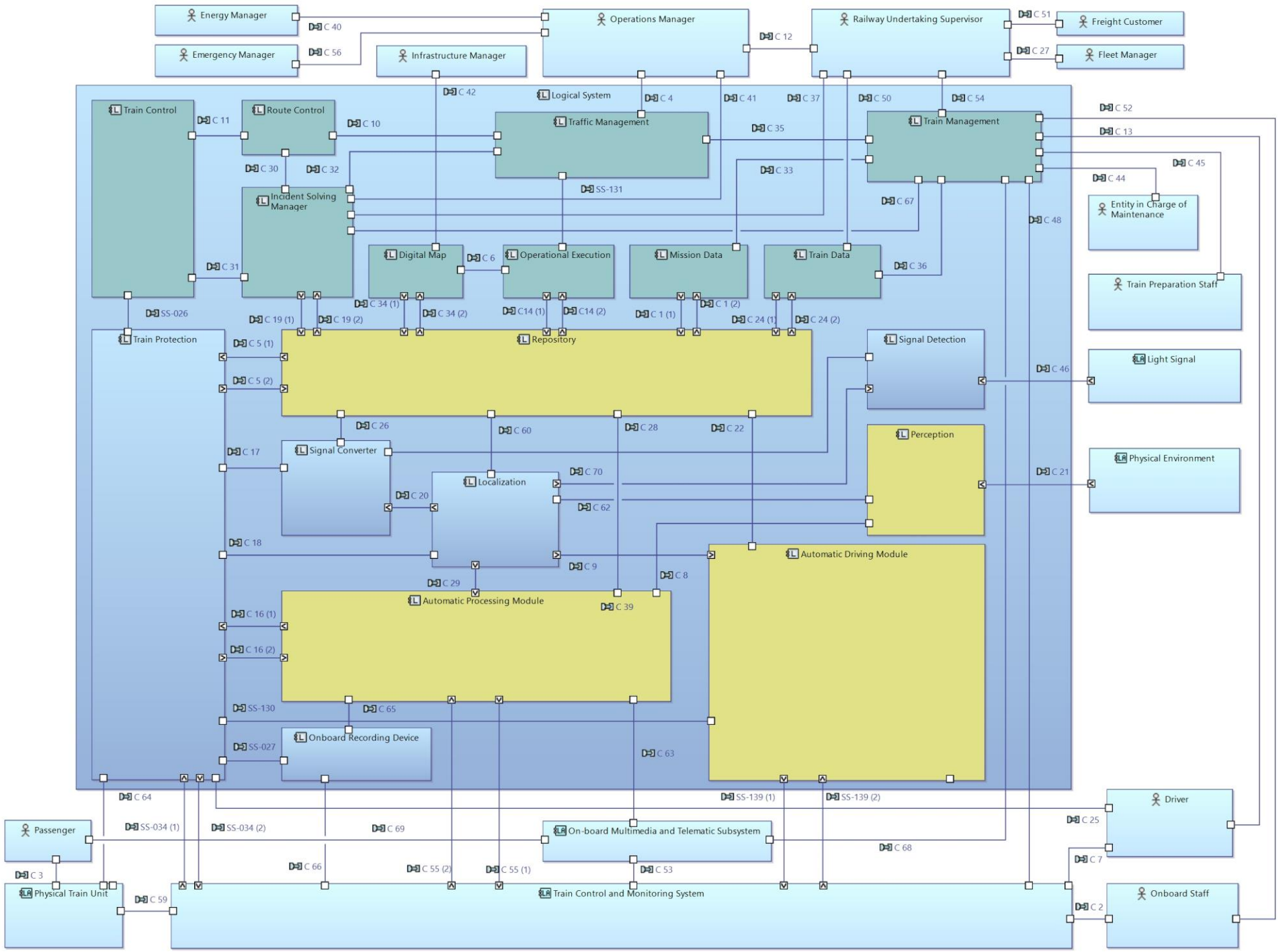
GoA2 Logical Architecture



ATO (up to GoA4)
Logical Architecture



ATO (up to GoA4) with signal interpretation



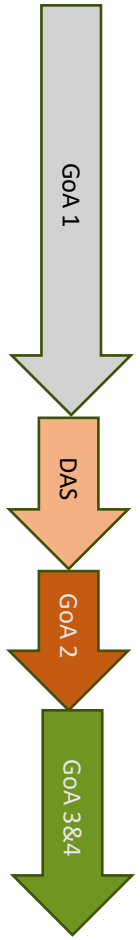
Main assumptions on system architecture

Design criteria

- Interchangeability
  - The Logical Blocks shall be interchangeable
  - Only the interfaces between the Logical Blocks will be standardised
- Flexibility
  - The Logical Blocks may not be split.
  - There are several Physical Architecture Candidates
  - The Logical Blocks may be implemented on separate cubicles (FFFIS interfaces).
  - Several Logical Blocks may be implemented on the same cubicle (FIS interfaces)
- Incrementability
  - The Logical Blocks are defined to permit a smooth migration across the different GoAs (from GoA1 to GoA4)
- Extensibility
  - New Logical Blocks supporting other functions than ATO may be added without jeopardising the architecture nor the track/train communication interoperability principles
  - Common Logical Blocks will remain (LOC, REP, PER)
  - New layers may be added if additional Digital Map data are needed

Logical Blocks

- Repository
  - Manages the interoperable track/train communication
  - Determine the appropriate track side server (transactors) in all situations (wake-up, border crossing, RU change, …)
  - Acquire all the data required for the train operation (Mission, Train composition data, Time table information, foreseen routes, track plan data, etc…)
  - Check the operation data consistency
  - Disclose the relevant data to the other on-board Logical Blocks according to their subscription
- Localisation
  - Determine the train location based on GPS coordinates and base on the distance from the beginning of the occupied Segment Profile
- Train Protection
  - ETCS-OB mandatory Logical Block
- Driver Advisory System (SFERA)
  - Gives advisory speed profile to the driver
- Automatic Driving Module
  - Driving according an optimum speed profile
  - Supporting traction/brake based on the SS-139 interface
  - Recovered from GoA2 (TSI 2023)
- Perception for obstacles and environment detection
  - Replace the eyes and other sensors of the driver
- Automatic Processing Module
  - Replace the brain of the driver
  - Inform the ETCS-OB about obstacles not detected by the track circuit s or axle counter.
- Signal Aspect Perception and Signal Converter (optional)
  - To be used when the ETCS is not yet installed trackside



Agenda

1. Grades of automation and migration (incremental logical architecture)
2. Focus on ATO (up to GoA2)
3. GoA2 Pilot tests
4. ATO (up to GoA4) Pilot tests
5. Conclusion

Main dates related to GoA2 standard

Shift2Rail

ATO GoA2

Findings

GoA2 Specification available

3/2018

9/2014

CR 1238

GoA2 Specification Reviewed by ERA and Frozen

1/2019

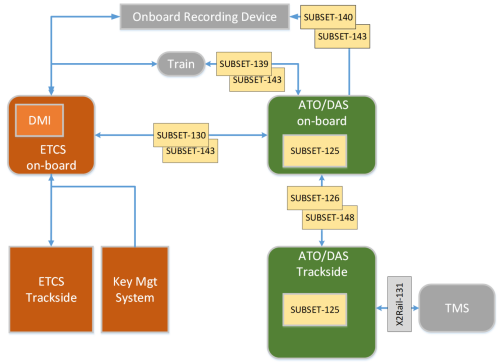
Factory IOP tests Completed

Pilot test on site completed

12/2020

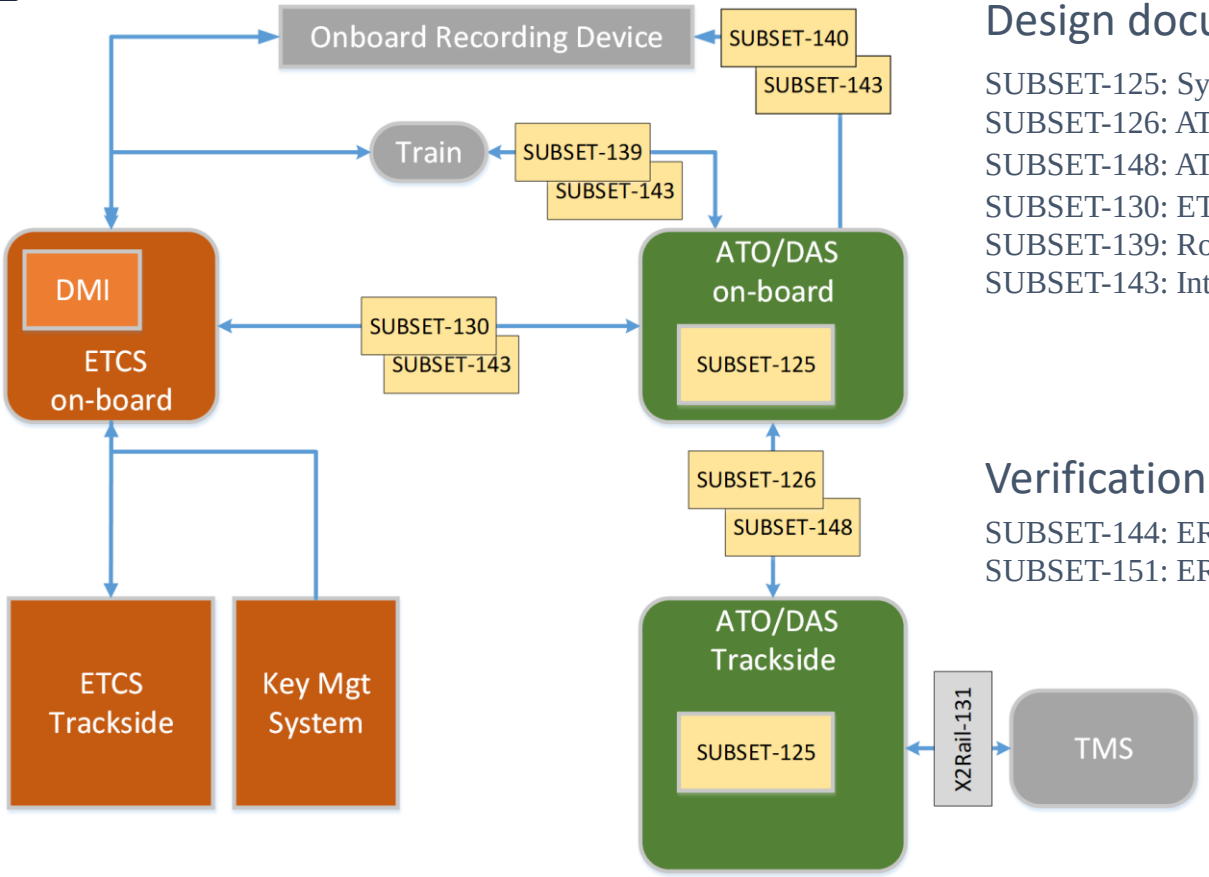
GoA2 Specification Reviewed by ERA and frozen

3/2022



TSI 2023

GoA2 Standard specification



Design documents

SUBSET-125: System Requirement Specification;
SUBSET-126: ATO-OB/ATO-TS interface specification (FFFIS application level);
SUBSET-148: ATO-OB / ATO-TS Interface Specification Transport and Security Layers
SUBSET-130: ETCS-OB/ATO-OB interface specification (FFFIS application level);
SUBSET-139: Rolling stock/ATO-OB interface specification (FFFIS application level);
SUBSET-143: Interface Specification Communication Layers for On-board Communication (FFFIS lower layers).

Verification documents

SUBSET-144: ERTMS/ATO (GoA 1+2) FMEA and functional analysis
SUBSET-151: ERTMS/ATO Test specification

Agenda

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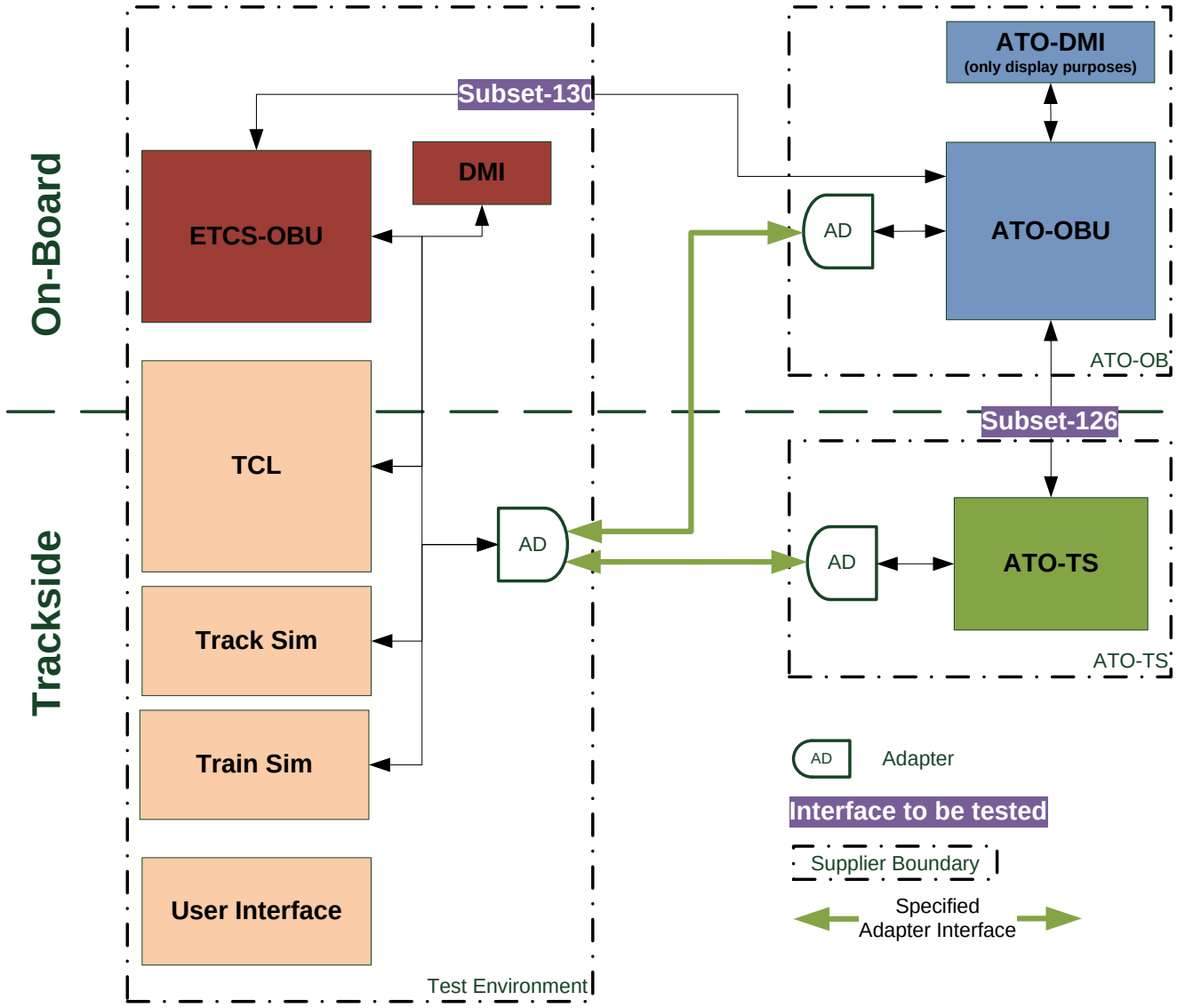
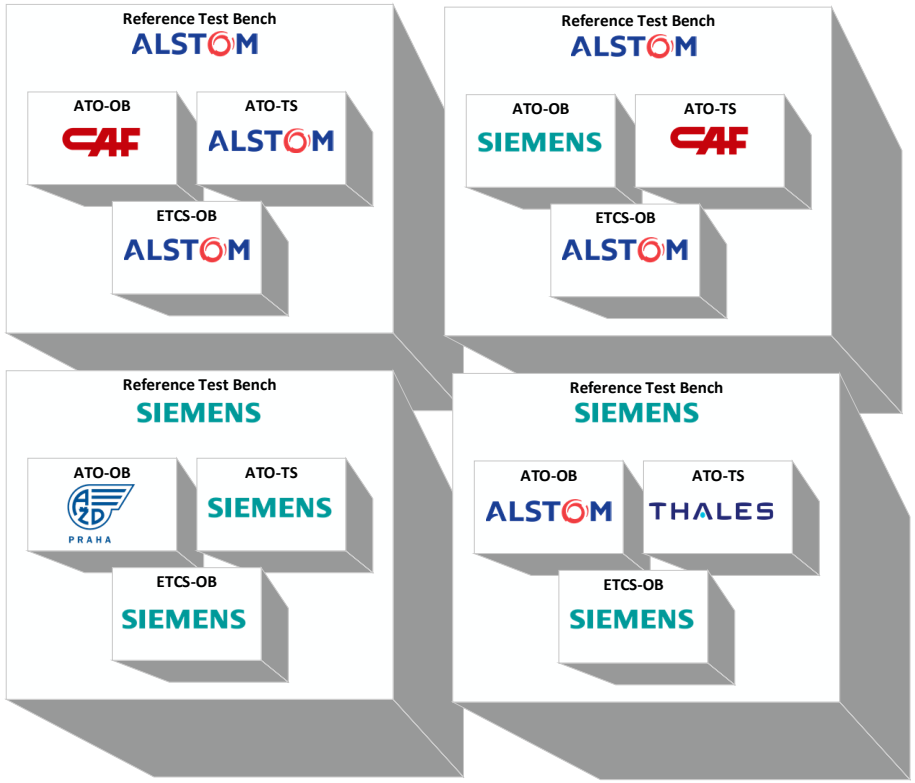
5. Conclusion

GoA2 Reference Test Bench



GoA2 Factory IOP tests



- Two Reference Test Benches (Belgium – Germany)
- Four different configurations
- Frozen Subset versions
- Tests performed in 12/18 and 1/19

- TEST SCENARIOS (21):
  - GoA1 to GoA2 transition on the move
  - Train stops at a stopping point
  - Train departs from a stopping point on time
  - Rerouting the train with JP Updates
  - Stopping Point Skip driver / TS

Pilot tests on site

- The test activites have been performed in 2020 in two different pilot sites

S2R UK
- 1 Pilot train (Class 313; 3 cars 60m)
- 1 Pilot line (ENIF)
- ETCS-OB: ALSTOM
- ATO-OB: ALSTOM, AZD
- ATO-TS: SIEMENS, THALES
- ETCS Level 2
- Track train comm.: GSM-R GPRS

S2R Switzerland
- 1 Pilot train (loco Traxx AC1+14 freight cars)
- 1 Pilot line (Sion-Sierre)
- ETCS-OB: SIEMENS
- ATO-OB: ALSTOM, HITACHI, AZD, SIEMENS
- ATO-TS: SBB
- ETCS Level 2
- Baseline 2.3.0d
- Track train comm.: LTE public network

TARGETS:

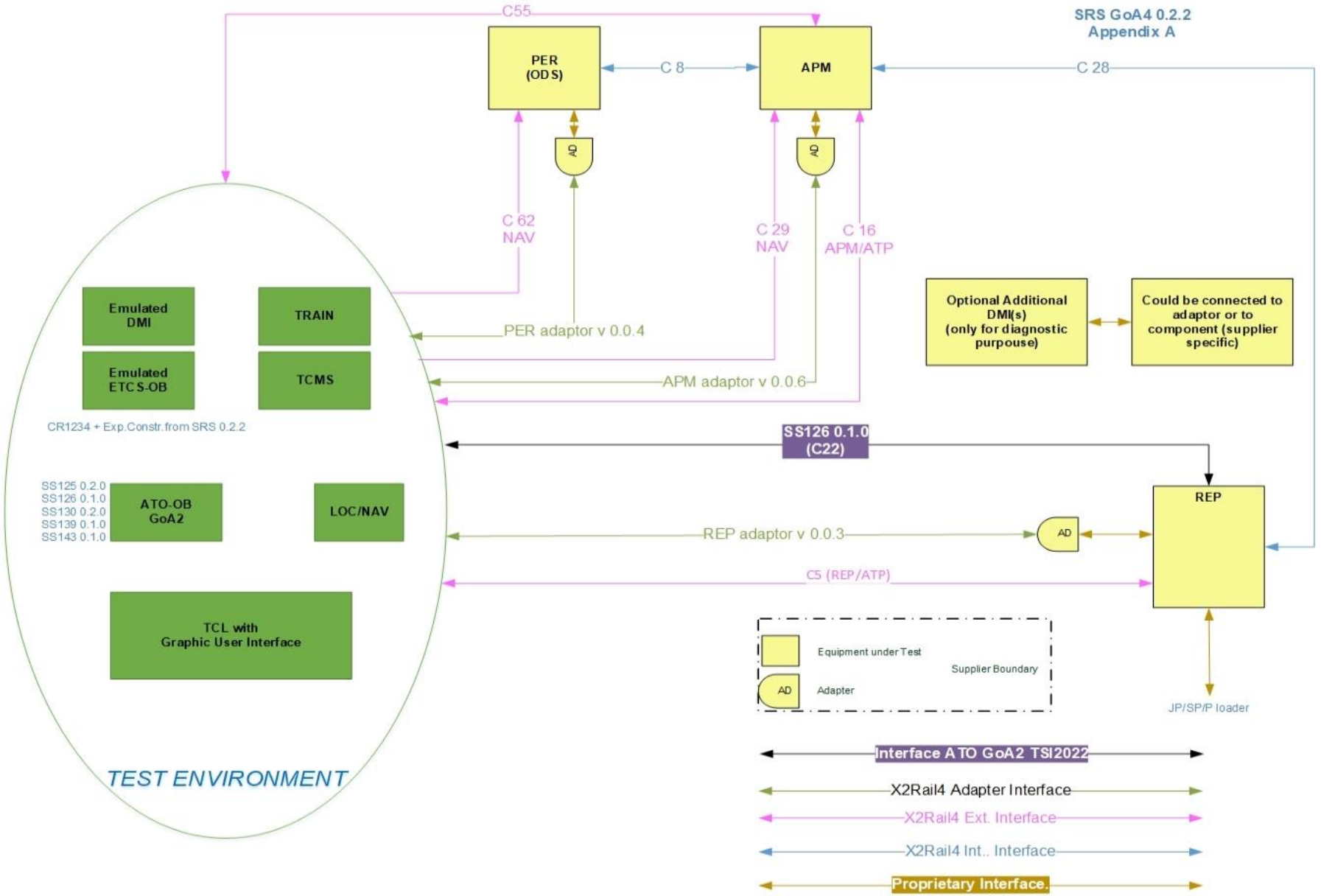
- Interoperability
- EMU Operations
- Passenger Application
- Stopping point
- Rerouting

- Interoperability
- Loco Operations
- Freight Application
- Commercial operation impacts
- Signalling stop

Agenda

1. Grades of automation and migration (incremental logical architecture)
2. Focus on ATO (up to GoA2)
3. GoA2 Pilot tests
4. ATO (up to GoA4) Pilot tests
5. Conclusion

ATO (up to GoA4) Reference Test Bench



ATO (up to GoA4) Pilot tests on site

- The test activities have been performed in 2023 on czechian line

TARGETS

- Transitions from GoA2 to GoA4
- Stopping in front of an obstacle and automatic restart after removing the obstacle
- Passing an unprotected level crossing.

Agenda

1. Grades of automation and migration (incremental logical architecture)
2. Focus on ATO (up to GoA2)
3. GoA2 Pilot tests
4. ATO (up to GoA4) Pilot tests
5. Conclusion

Conclusions

GoA2

- ATO over ETCS is a reality for GoA2
- Mature solution
- Full interoperability has been demonstrated
- Pilot tests have demonstrated the deployment of GoA2 on existing trains
- Interoperable specification for ATO over ETCS in GoA2 is part of TSI 2023

up to GoA4

- ATO (up to GoA4) interchangeable architecture defined
- Pilot tests have been performed in factory and on site
- Demonstrator’s findings are being recorded
- ATO (up to GoA4) System Requirement Specification to be continued in EURail

The ATO specifications prepared in the frame of Shift2Rail X2Rail-1 and XRail-4 projects are used for product development by several suppliers and applied in current and future revenue service projects.

INNOVATIONS FROM SHIFT2RAIL R&I RESULTS

Commercialisation of Ticket Vending Machine (TVM)

Zbigniew Jancewicz

WP 10 : Commercialization of TVM as a result of Extensive IP4 development

Tasks:

Subtasks 9.1.4, 9.1.5, 10.1.4 and 10.1.5, concentrated on railway station multimedia communication and development of text description and screen reader

Original assumptions and changes in the project:

- bulk of infrastructure should come from IP3 In2Stempo project,
- due to delay with modernization of Jurata train station project had to be redirected to Pomiechowek,
- Pomiechówek station was not equipped with TVM,
- PKP started search for TVM which might fulfill requirements but technological limitations forced to start process from scratch.

WP 10 : Commercialization of TVM as a result of Extensive IP4 development

Action undertaken:

- the existing available solutions – negative communication results with TVM and effective VAM performance,
- searching for new solutions,
- new device tested and adopted to role of TVM,
- PKP software BILKOM adjusted and installed on new TVM to help Travel Companion to use TVM,
- new format of train ticket according to UIC standard developed in TVM for printing (QR code developed and used in IP4 MaaSive project),
- positive tests of new TVM at Pomiechówek train station, which allowed Travel Companion to print ticket purchased via TC and which would allow future complete communication between TVM and TC,
- presentation of the TVM prototype at the TRAKO Fair in Gdańsk (September 2023).

Next steps:

- new VAM software for TVM will be developed by producer soon,
- PKP introduces new TVM and plans to install it at train stations in Poland,
- new TVM will provide service to all interested TSPs to avoid duplication of hardware,
- new services like train schedules and travel planners will be made available.

The current state of use of ticket machines in Poland

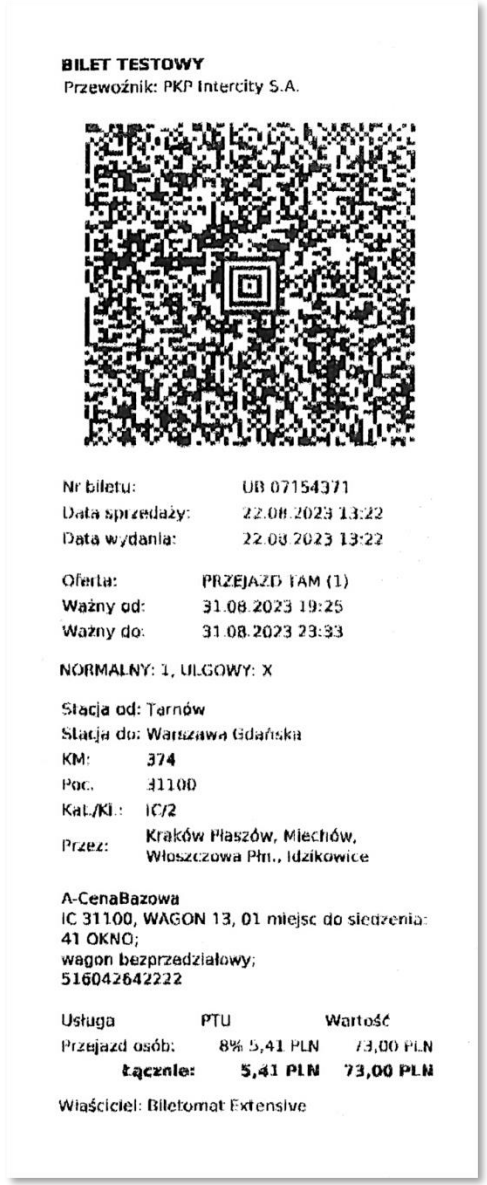
- Ticket machines owned by TSPs providing tickets from several carriers,
- Each carrier and operator provides service, maintenance, payment processing and complaint handling,
- Ticket machines have a specific method of operation, so passengers cannot operate intuitively when using ticket machines,
- Ticket machines do not have the functionality of access to current timetable information,
- Ticket machines do not provide information about delays or other disruptions,
- Many railway stations lack of cash register or ticket machine, which makes purchasing a ticket significantly more difficult,
- The costs of personnel operating cash registers are increasing, which results with liquidation or reduction of working hours.

Main assumptions of the implementation of a universal ticket machine

- creation of a universal ticket machine for selling tickets of all TSPs operating in Poland,
- possibility of adding the offer of any TSP based on transparent access rules,
- uniform connection search mechanisms that do not favor any carrier,
- enabling the purchase of the so-called "Common Ticket", which allows client to buy one ticket for a journey operated by several carriers, and the price is calculated according to a regressive rate (the further you go, the less you pay per 1 km),
- ensuring a uniform service interface throughout the country,
- unification of the appearance of the interface and the course of the ticket purchase process in the ticket machine with the application prepared in the mobile channel,
- easy inclusion of ticket sales from carriers offering other types of transport than rail.

WP10 : Ticket machine tests at the railway station in Pomiechówek

- An interface for the ticket sales process was prepared, adapted to the requirements of Travel Companion, which was used and expanded in the further process of preparing the prototype by PKP,
- The ticket printed at the ticket machine contains a QR code developed in accordance with the standard developed by UIC – direct result of work performed in IP4 MaaSive,
- For the needs of the ExtenSive project, the ticket machine hardware was integrated with the ticket sales system,
- The interface has been expanded to a prototype version used in the test environment and was presented at the TRAKO fair in September 2023.



BILET TESTOWY
Przewoźnik: PKP Intercity S.A.

Nr biletu: UB 07154371
Data sprzedaży: 22.08.2023 13:22
Data wydania: 22.08.2023 13:22

Oferta: PRZEJAZD TAM (1)
Ważny od: 31.08.2023 19:25
Ważny do: 31.08.2023 23:33

NORMALNY: 1, ULGOWY: X

Stacja od: Tarnów
Stacja do: Warszawa Gdańska
KM: 374
Poc.: 31100
Kat./Kl.: IC/2
Przez: Kraków Płaszów, Miechów, Włoszczowa Płn., Idzikowice

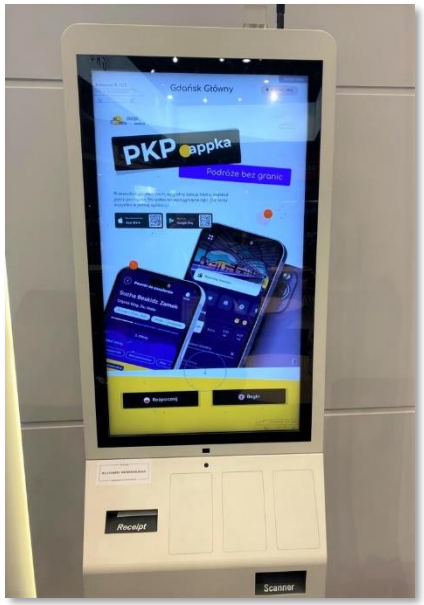
A-CenaBazowa
IC 31100, WAGON 13, 01 miejsc do siedzenia: 41 OKNO;
wagon bezprzedziałowy;
516042642222

Usługa	PTU	Wartość
Przejazd osób:	8% 5,41 PLN	73,00 PLN
Łącznie:	**5,41 PLN**	**73,00 PLN**

Właściciel: Biletomat Extensive

New PKP TVM presentation at TRAKO fairs in Gdansk 18-21 September 2023, EU-Rail presented as a partner

- The ticket machine prototype was presented at the TRAKO fair in Gdansk on September 18-21, 2023.
- The ticket machine was connected to the test environment, but allowed full ticket purchase process,
- TVM users took part in the survey and submitted suggestions for improvements.



Ticket machine commercialization plan

#	Action Point	Deadline
1	Software development based on survey results at the TRAKO fair	January 2024
2	1 stage – pilot implementation	1-2Q2024
3	2 stage – pilot development	3-4Q2024
4	Readiness for full commercial implementation	January 2025

INNOVATIONS FROM SHIFT2RAIL R&I RESULTS

Silicon Carbide (SiC) Traction Systems

Laurent Nicod

General description

Prototypes tested

SiC Traction system demos on Tramway (Siemens), Metro (CAF) and Alstom (Regional trains)

Objectives of the demonstrator

Demonstrate that these SiC based Traction systems are fully operational with nominal performances…

KPIs measured

…and confirm Project Traction KPIs progress on LCC, reliability, weight ,volume and noise reduction of traction components

Participants

Siemens, CAF and Alstom	Train manufacturers, head of each demos

Implementation and practical realisation

Prototype implementation: ALSTOM

Traction transformer, traction cases, motor, gearbox

Regional SiC Traction on train intermediate Test Report

- Aerolic, electrical noise, vibration tests
- Shock & vibration
- Traction brake performances
- Thermal cooling
- EMC
- Energy efficiency

Regional SiC Traction on train Test Report

- Energy
- Acoustic noise
- Aerolic/cooling on train

Train / Laboratory

- Regional train on test ring (Velim / Czech Republic)
- Regional Test : Q4 2021 & Q1 2022

Implementation and practical realisation

Prototype implementation: SIEMENS

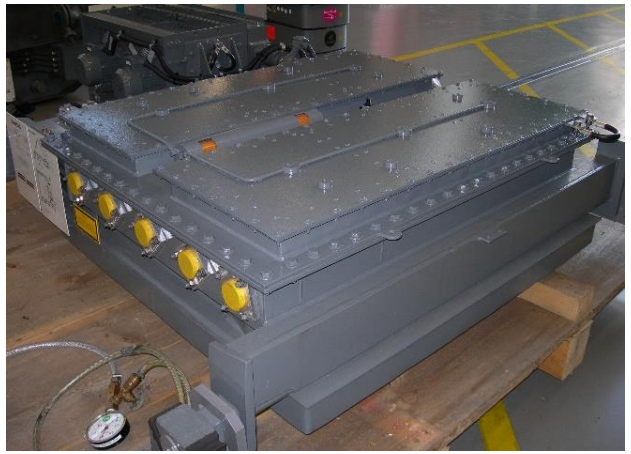
Transformer, traction cases

System architecture and system evaluation for an optimized AC-Traction-System used on dual system tramways

- Energy consumption
- Line harmonics check

Test bench results of the Tramway prototype system test of the AC-Traction-System

- Energy Consumption
- Electrical Stresses
- EMI/EMC Behaviour
- Acoustic Noise



Traction Transformer

Train / Laboratory

- Tramway in commercial service (Munich)
- Tramway Test: 2021

Implementation and practical realisation

Prototype implementation: CAF

Transformer, traction cases, motor

Analysis and influence of the SiC technology in the Metro traction system

- EMI/EMC Behaviour
- Energy efficiency
- Thermal cooling

Final report of full SiC converter tested on a Metro

- EMC
- Energy efficiency

Traction case

Train / Laboratory

- Metro train on a commercial line (Basque country / Spain)
- Metro Test: Q2 2021 to Q2 2023

Results

		LCC reduction						Reliability		Train Capacity				Line Capacity	
Train/application	Development partner	Cost		Energy Cost		Mainte-nance Cost		Reliability		Weight Reduction		Volume Reduction		Noise reduction	
Tramway	Siemens	0%	3	-10%	4	-5%	3	5%	2	-10%	2	-10%	2	Reduction of noise tonality	4
Metro	CAF	2%	4	-7%	4	-7%	4	6%	4	-25%	4	-25%	4	-3%	3
Sub-urban	BT	0%	3	-5%	3	-21%	2	31%	2	-10%	3	-20%	3	-10%	3
Regional	Alstom	2%	3	-13%	4	-14%	2	11%	2	-17%	4	-5%	4	-1%	4

- **Partnership benefits:**
  - **Public funding:** financial risk reduction on technological risky developments.
  - **Partnership:** real time iterations and feedback from two operators (DB and SNCF)

- **Exploitation:** SiC power semi conductors are now used in **series commercial products**
  - Auxiliary converters
  - DC/DC converters on Battery trains (BEMUs)
  - In some cases SiC technology is offered/sold on traction power modules by several European manufacturers depending on customer LCC/business model (Alstom, Siemens, etc…)

Conclusions

Main conclusions

Fully successful demonstrations, technology developed over 8 years (Rail2Rail project started in 2015), European train manufacturers still in the race vs Japanese & Chinese competitors

- **Japanese** sell SiC Traction on VHST (Shinkansen N700S) since 2020
- **Chinese** CRRC sells SiC Traction on metro and tramway since 2021. Chinese cities equipped with SiC Traction
- May 2023: Hitachi and Toshiba win order worth 124 billion Japanese Yen (780M€) to build high speed (SiC Traction) trains for Taiwan
- **European MEDCOM** proposes SiC Traction system. **Mitsubishi Electric Corporation owns 49% of MEDCOM**

European train manufacturers still dependant on Asian SiC Power electronic suppliers (mainly Japan)

EU-Rail - FP4-Rail4Earth will re-use and extend the benefits of SiC technology especially in WP5 targeting to extend the range of BEMU as minimizing the train energy consumption is key to achieve the 200 km targeted autonomy

Lessons learnt

- Technology mastered by the European train manufacturers
- Commercial take off linked to energy price for the customer payback (the entity purchasing the train)
- Accelerating the innovation process will help European Industry to compete against non Europeans

References

- Shift2Rail Joint Undertaking - Projects

INNOVATIONS FROM SHIFT2RAIL R&I RESULTS

Intelligent Asset Management System equipped with decision support methodologies and algorithms for anomaly detection

Marco Borinato

The Shift2Rail context

IN2SMART2 WP4-WP5
Italian Urban Metro System IAMS

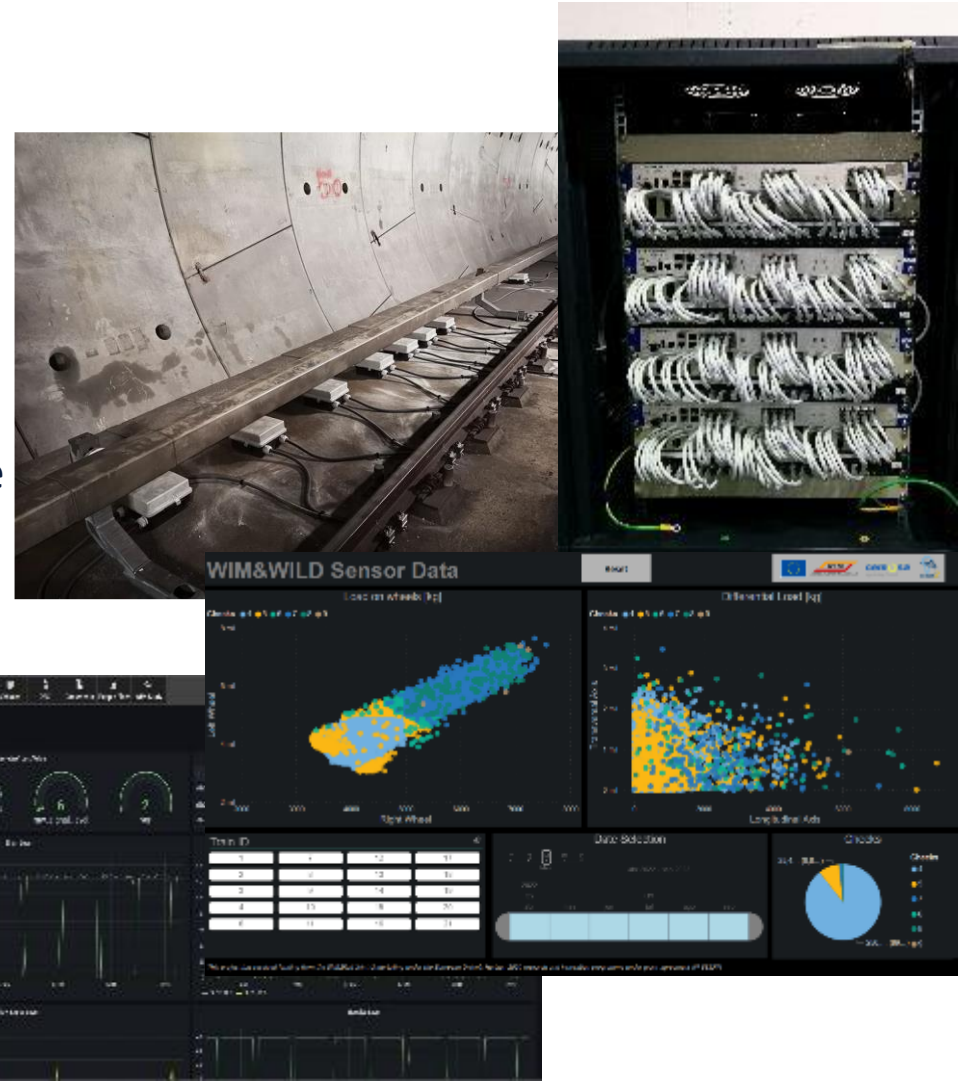
The goal of the use case was to:

- Implement a Cloud IAMS environment for the Metro Milan Line 5;
- Design and field installation of monitoring systems for the collection of wayside and onboard data;
- Deployment of data analytic methodologies focused on nowcasting, anomaly detection and prediction of asset status.
- Development of a Decision Support System to allow maintenance scheduling optimisation, multimodal transportation and dynamic HMIs adaptable to user needs.

IAMS application in an operational environment

Main Achievements:

- Deployment of non-intrusive monitoring solutions.
- Exploitation of existing systems to use as data sources.
- Monitoring of both wayside and on-board assets.
- Track circuits trend monitoring to identify anomalies that can bring to false occupancies events.
- Anomaly detection models to forecast degradation of wheels.
- ATS statistical analysis to identify the most frequent alarms and the most degraded assets
- Development of DSS with creation of alternative maintenance scheduling based on assets 'status
- Development of HMI customize for user's needs



Partners involved:

Hitachi Rail STS

ATM AZIENDA TRASPORTI MILANESI S.p.A.

Fraunhofer IVI

cemosa Ingeniería y Control

The Shift2Rail context

Intelligent Asset Management Strategies

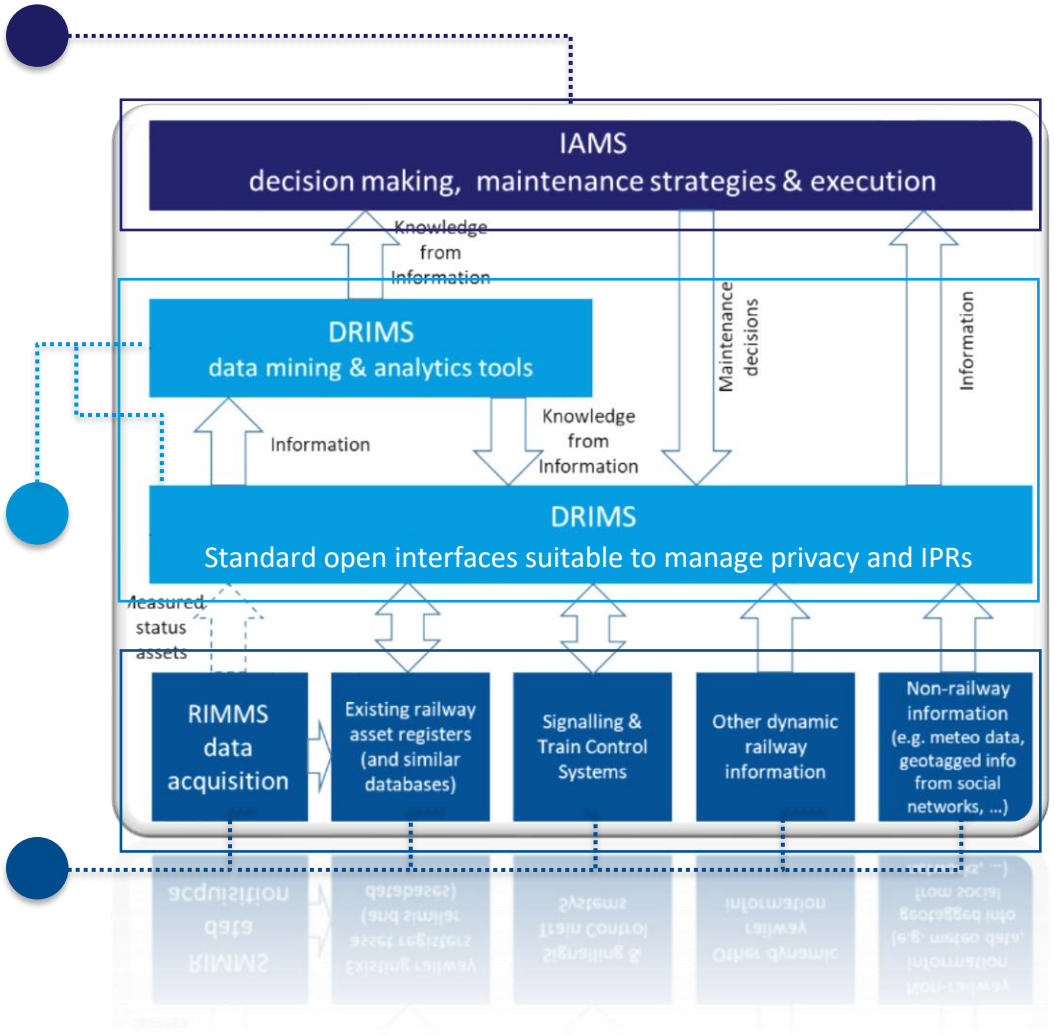
- Modelling methodologies for the formulation of mathematical frameworks
- Design of frameworks for decision support in maintenance and intervention planning
- RAMS & LCC analysis and Risk Assessment
- Indications (or even prescriptions) for Maintenance Execution, Work Methods and Tools

Dynamic Railway Information Management System

- An IT (Big Data) architecture and its interfaces
- A set of algorithms compatible with (running on) the Big Data architecture

Railway Information Measuring and Monitoring System

- A set of heterogeneous monitoring systems

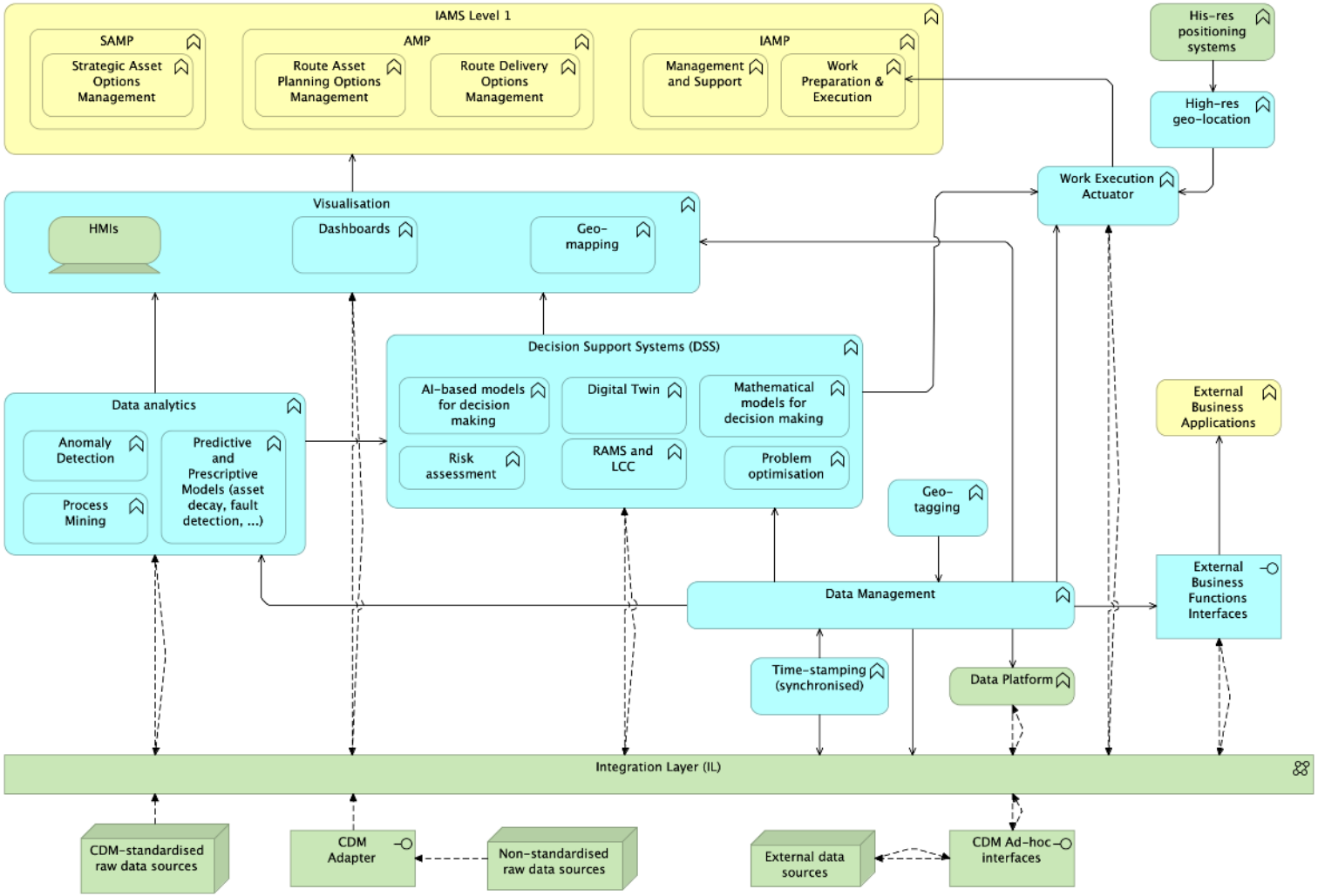


TD3.8

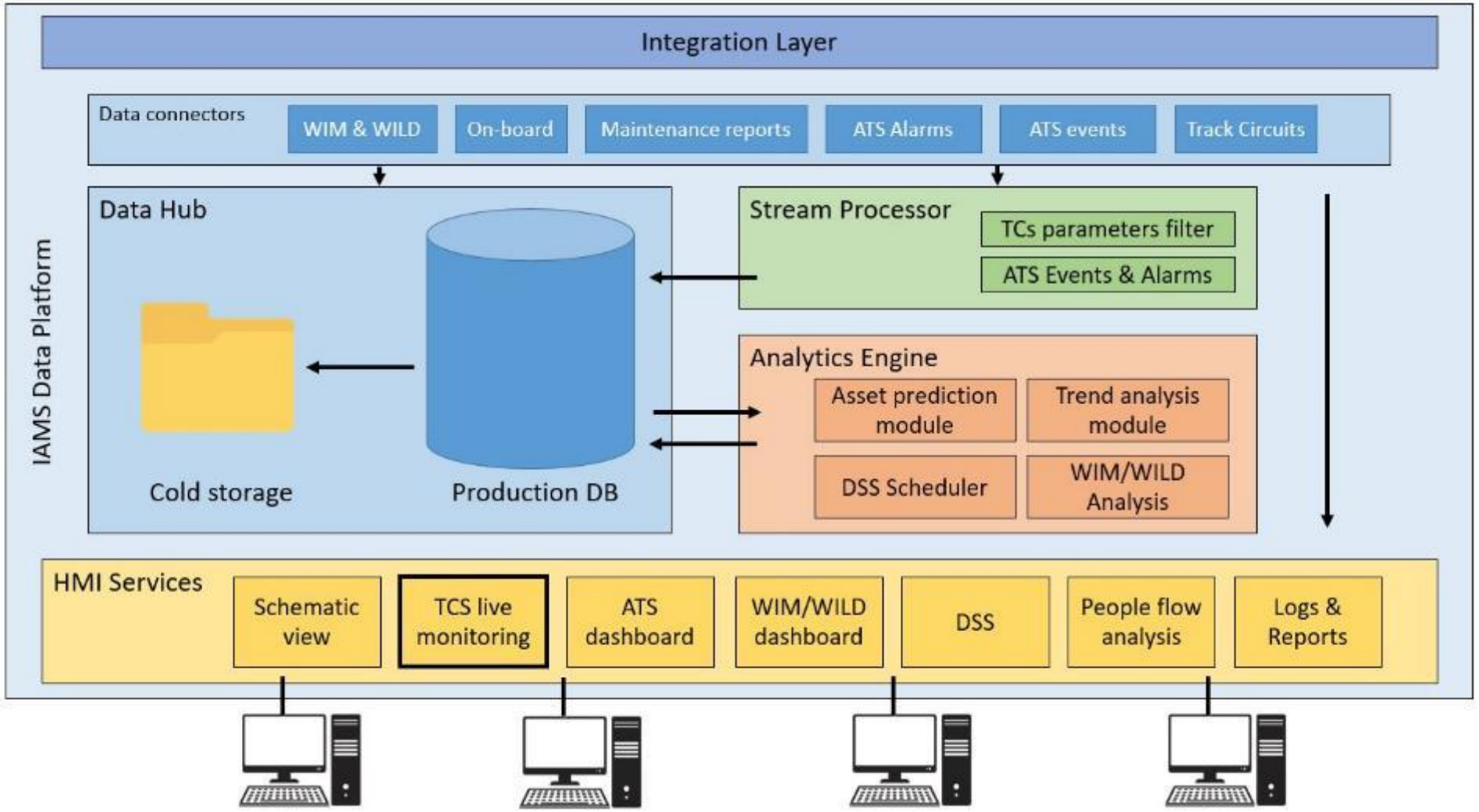
TD3.6

TD3.7

From a common IAMS architecture…



… to the WP5 IAMS Architecture



IAMS application in an operational environment

Track Circuit Monitoring

Exploitation of existing signalling systems to collect operational and diagnostic data.

Implementation and testing of a IAMS environment with algorithms for anomaly detection and decision support methodologies for alternative maintenance scheduling based on assets 'status.

Development of an integrated HMI to allow immediate and customised access to all functionalities from a single operator desk.

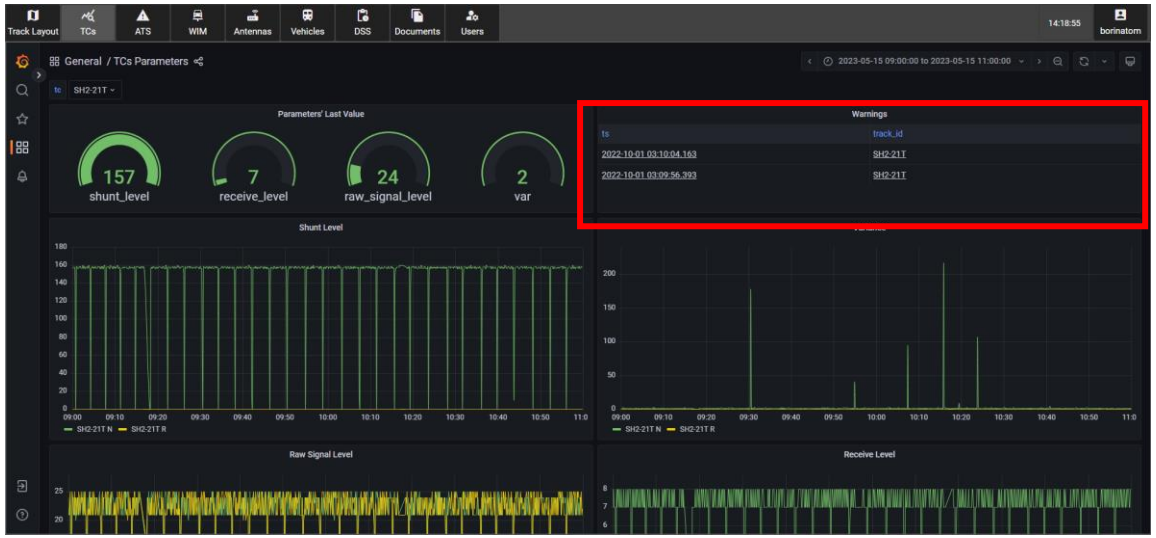
IAMS application in an operational environment

Track Circuit Monitoring

Connection to every TC board for data collection and remote monitoring of functional parameters.

Capability for live filtering of data & drill down analysis.

Application of ML algorithms to correlate functional parameters with maintenance reports.

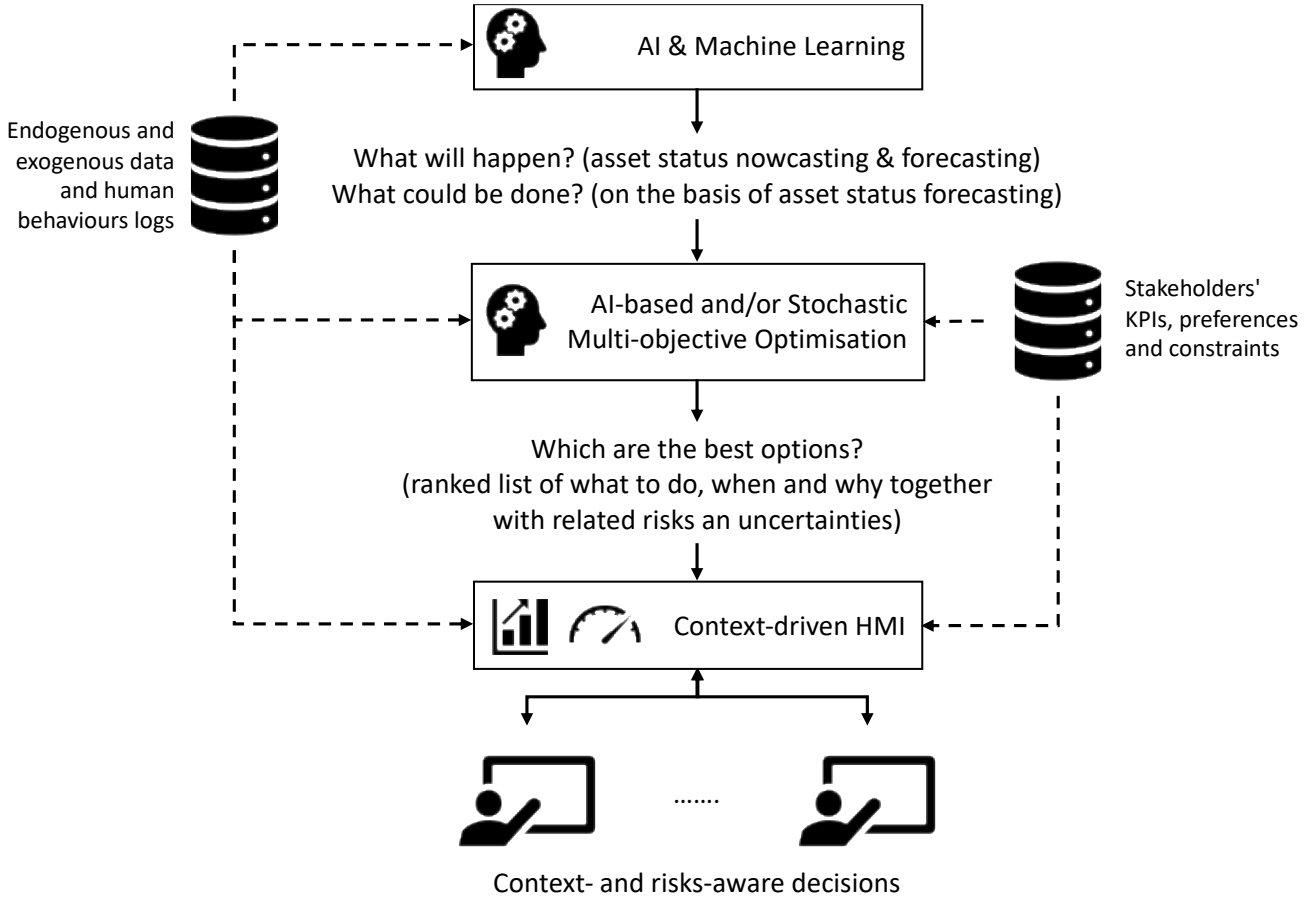


Anomaly detection on live data and alert banner for quick user reaction.

Link to dedicated interface with focus on anomaly highlighted.

IAMS application in an operational environment

Track Circuit Monitoring



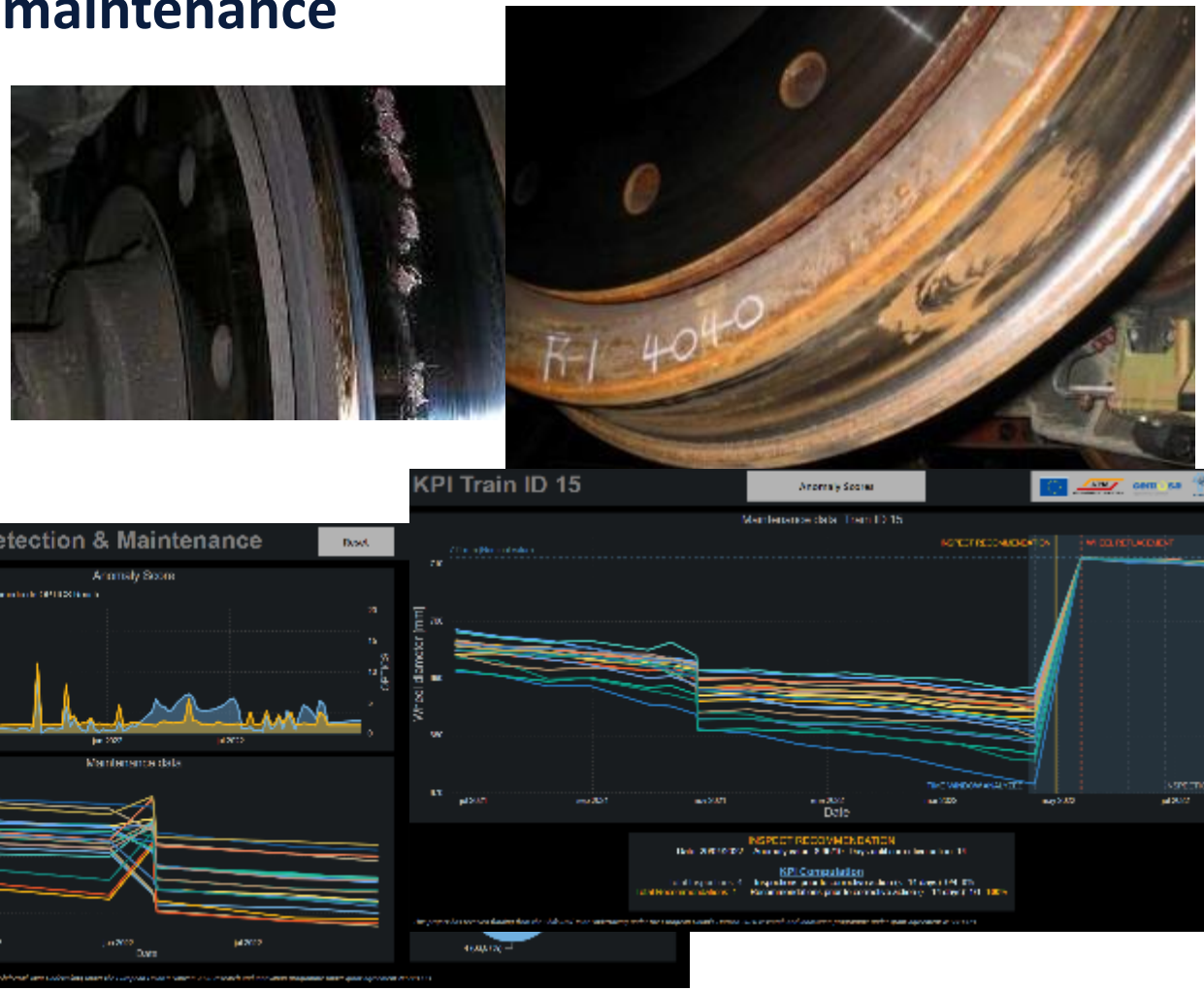
Collaboration with OC “**Daydreams**” to allow the development of prescriptive algorithms to improve the (re)scheduling maintenance process by developing an automated tool able to support the operators during the entire procedure.

IAMS application in an operational environment

Wheels’ status monitoring for preventive maintenance

From the collection of vibration data correlated to the train passage, it was possible to develop ML models to identify wheel anomalies (cracks, flat surfaces, …) that could lead to track damage or passengers' discomfort.

Integration with work-orders data in the loop allowed to implement DSS functionalities to shift the preventive maintenance approach to a predictive one.



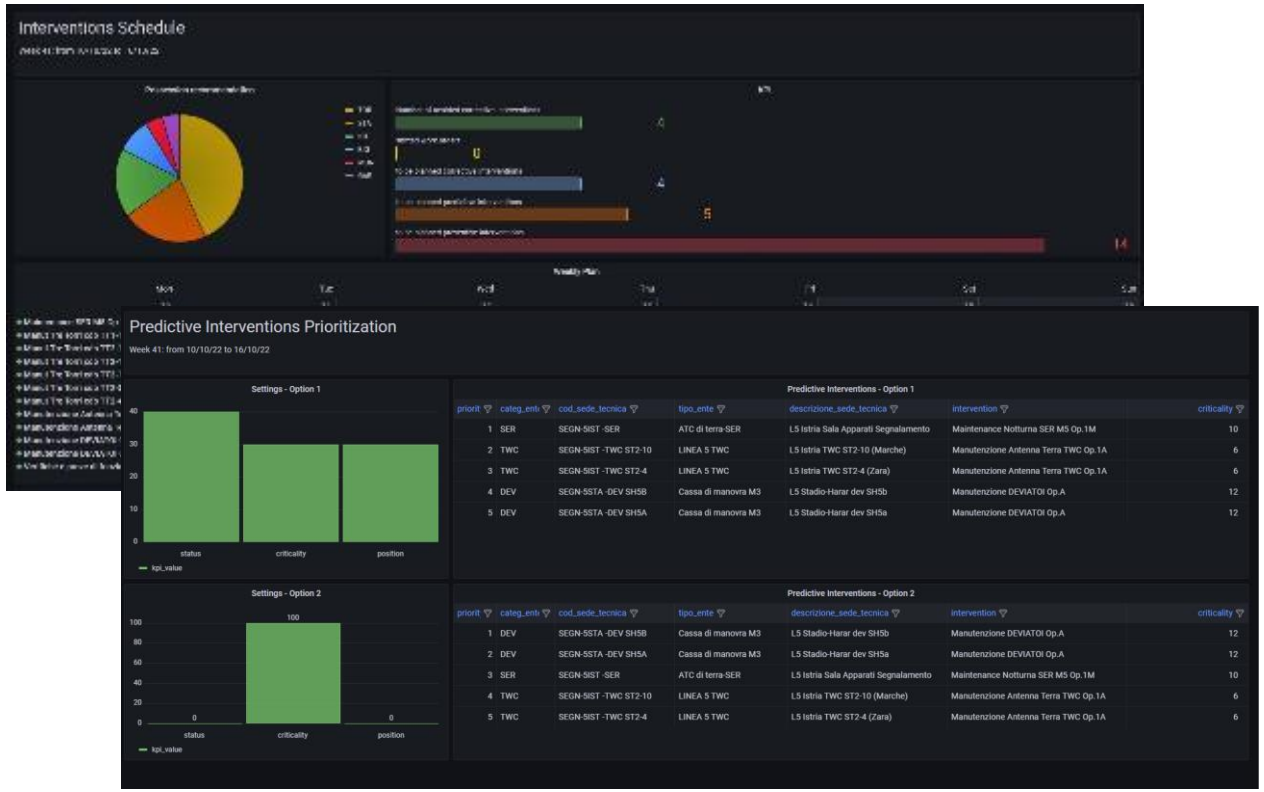
IAMS application in an operational environment

Decision Support System

In accordance with the IM, a new scheduling of maintenance activities has been proposed based on asset criticality and the prediction from the analytics.

The user is able to customize the parameters in order to prioritize different aspects and the algorithms automatically generates a new optimised scheduling.

Comparing the new plan with the fixed preventive one, it was possible to compute that on average 40% of corrective activities could be performed in advance, with a direct benefit in terms of costs.



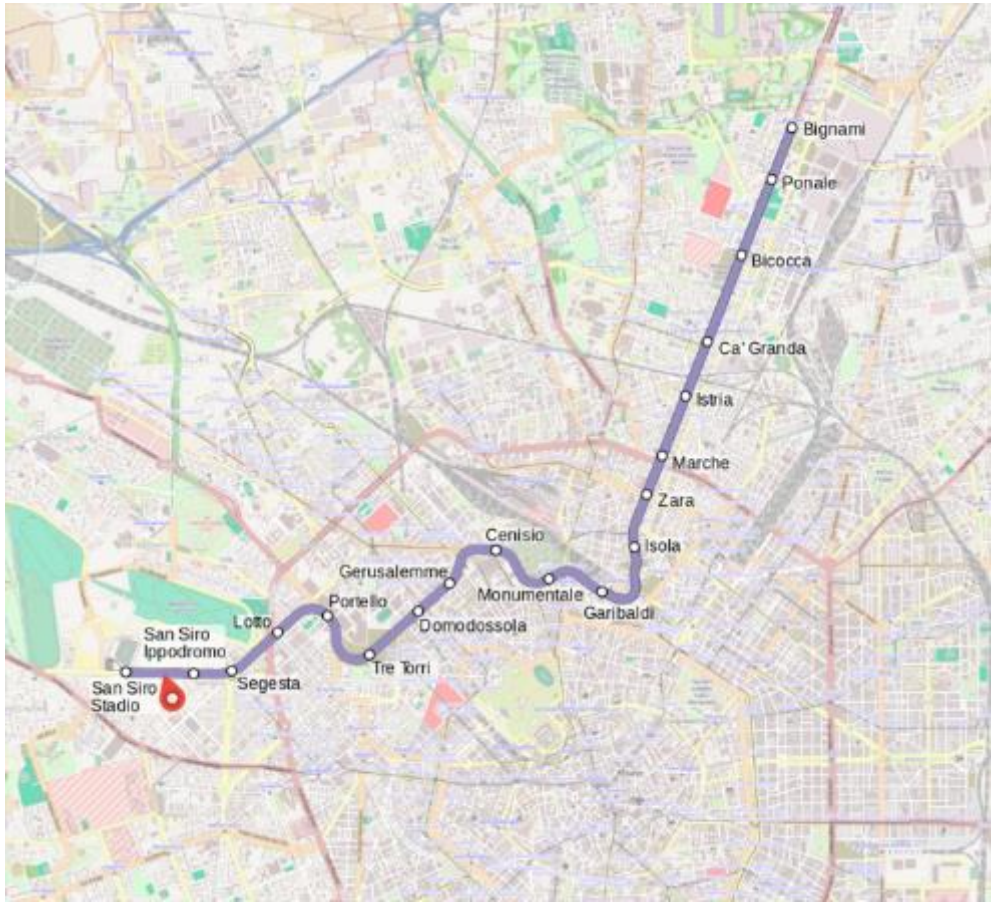
The work beyond IN2SMART2

Exploitation of the results achieved

The functionalities developed during the project have been incorporated in the daily operation of the IM, specifically in the monitoring of the assets and the planning of maintenance activities.

Currently Hitachi and ATM are in the process of extending the services provided and introducing new functionalities to the platform.

The goal is to continue with the current solution and extend the number of assets monitored firstly to the whole M5 line and then to the other section of the Metropolitan Area.



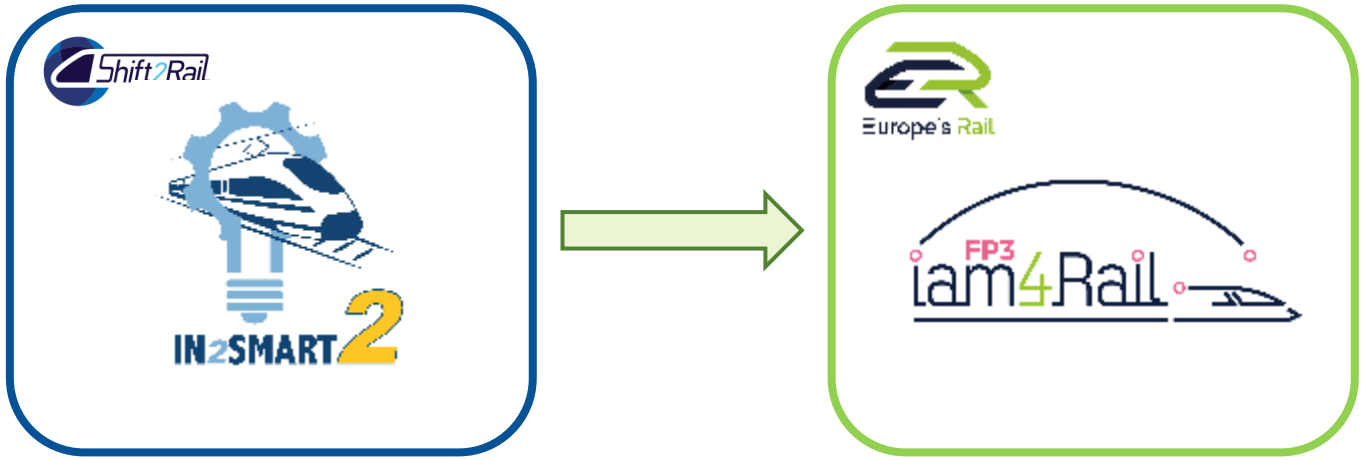
The work beyond IN2SMART2

Exploitation of the results achieved

Hitachi has also consolidated the methodologies developed and the know-how acquired in the development of IAMS application and it's bringing this knowledge into the new generation of European projects.

Hitachi is involved in FP3-IAM4RAIL, specifically in WP3 and WP4 with the goal of developing a IAMS application for the management of railway signalling assets in an important node of the Italian northern line.

The results of the analytics prediction will be fed both to the maintenance operator and the TMS to optimise the scheduling of Train traffic.



IMPLEMENTATION OF THE EU-RAIL PROGRAMME – INNOVATION PILLAR – STATE OF PLAY AND 1ST YEAR RESULTS

Flagship Areas 1 & 2

Léa Paties - Senior Programme Manager, Europe's Rail Joint Undertaking

IMPLEMENTATION OF THE EU-RAIL PROGRAMME – INNOVATION PILLAR – STATE OF PLAY AND 1ST YEAR RESULTS

Flagship Project 1

MOTIONAL

FP1-MOTIONAL – Mobility management multimodal environment and digital enablers

- **Main objective:** improve **flexibility, efficiency, resilience, and capacity adaptation of European rail network** to support development of a Single European Rail Area. Develop functional **requirements, specifications, and solutions for future European Traffic Management**, including common train planning, operations, automation, ticketing, network management and control.
- **Target solution: dynamic network and traffic management at European scale** built upon a harmonized functional system architecture for agile, borderless, and mixed-traffic operations and offering.
- **Benefit:** enables automatic management of cross-border rail traffic, improves service offers, operations, and capacity utilization, and enhances the competitiveness of rail-based mobility chains.
- **Four focus areas:**
  - **SG1**: Railway planning (Capacity Management systems)
  - **SG2**: Railway operations (Traffic Management systems)
  - **SG3**: Integration of Railway services with other modes (B2B)
  - **SG4**: Digital enablers transversal to railway sector

FP1 MOTIONAL
European Rail Network and Mobility Management

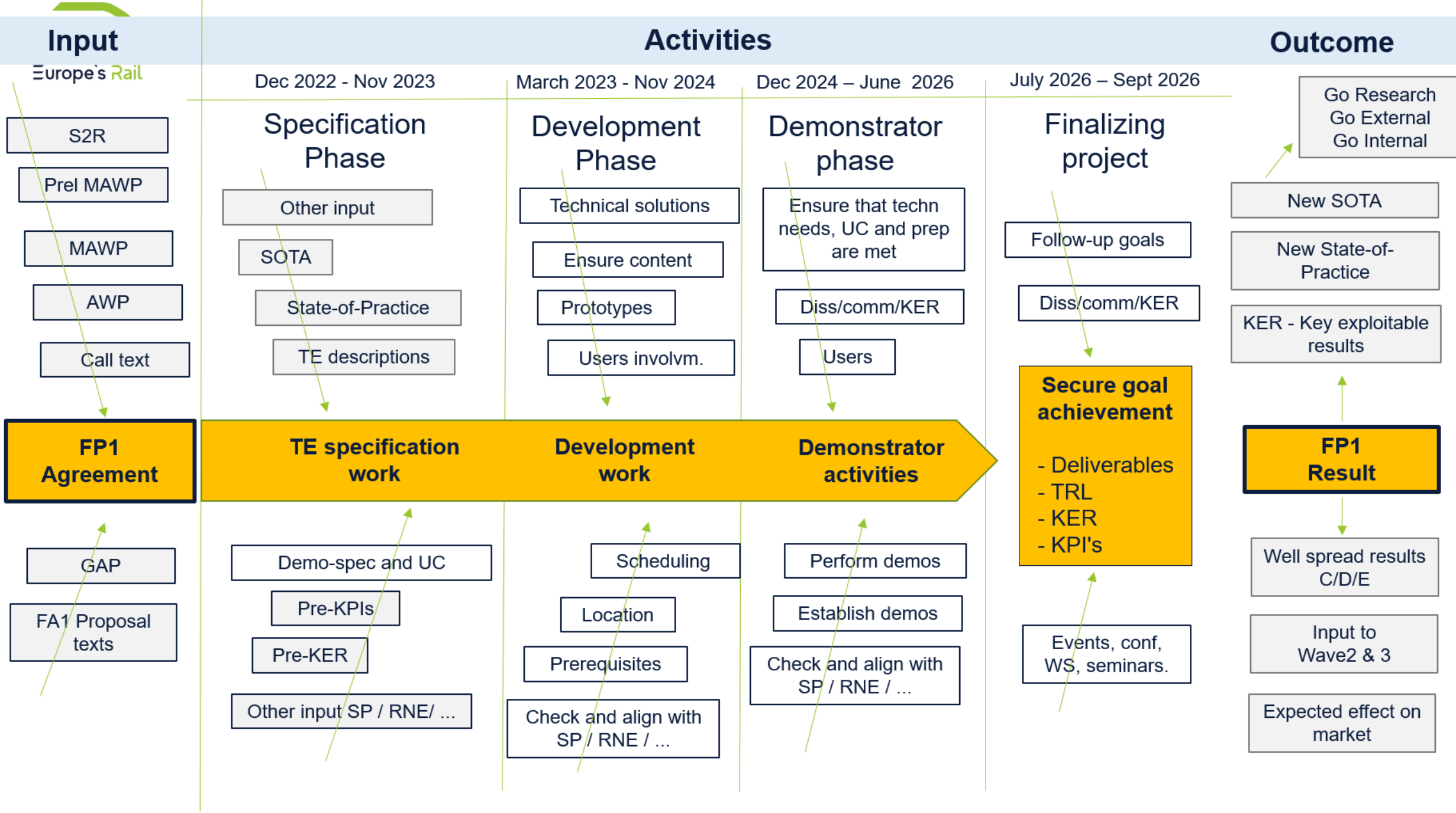
- **Total project cost:** 92.600.000,00 €
- **Project duration:** 46 months
- **Number of partners:** 28 > 89

COORDINATOR

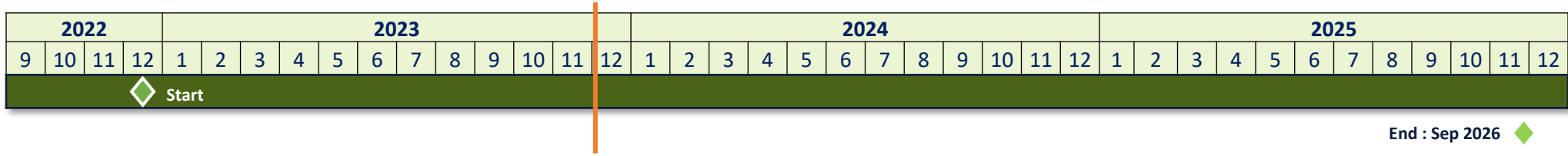
HACON

OTHER PARTNERS

adif, ALSTOM, mermec, CAF, ceit, DB, enyse, etra, Faiveley, Ferrovie dello Stato Italiane, HITACHI, indra, Jernbanedirektoratet, KNORR-BREMSE, ÖBB, PKP, ProRail, SNCF, THALES, TRAFIKVERKET, voestalpine, SJ, FGC


Input
Activities
Outcome
Europe's Rail
Dec 2022 - Nov 2023
March 2023 - Nov 2024
Dec 2024 – June 2026
July 2026 – Sept 2026
S2R
Prel MAWP
MAWP
AWP
Call text
Specification Phase
Other input
SOTA
State-of-Practice
TE descriptions
Development Phase
Technical solutions
Ensure content
Prototypes
Users involvm.
Demonstrator phase
Ensure that techn needs, UC and prep are met
Diss/comm/KER
Users
Finalizing project
Follow-up goals
Diss/comm/KER
Secure goal achievement
- Deliverables
- TRL
- KER
- KPI's
Events, conf, WS, seminars.
Go Research
Go External
Go Internal
New SOTA
New State-of-Practice
KER - Key exploitable results
FP1 Result
Well spread results C/D/E
Input to Wave2 & 3
Expected effect on market
FP1 Agreement
TE specification work
Development work
Demonstrator activities
GAP
FA1 Proposal texts
Demo-spec and UC
Pre-KPIs
Pre-KER
Other input SP / RNE/ ...
Scheduling
Location
Prerequisites
Check and align with SP / RNE / ...
Perform demos
Establish demos
Check and align with SP / RNE / ...

Flagship Project 1 - *MOTIONAL*



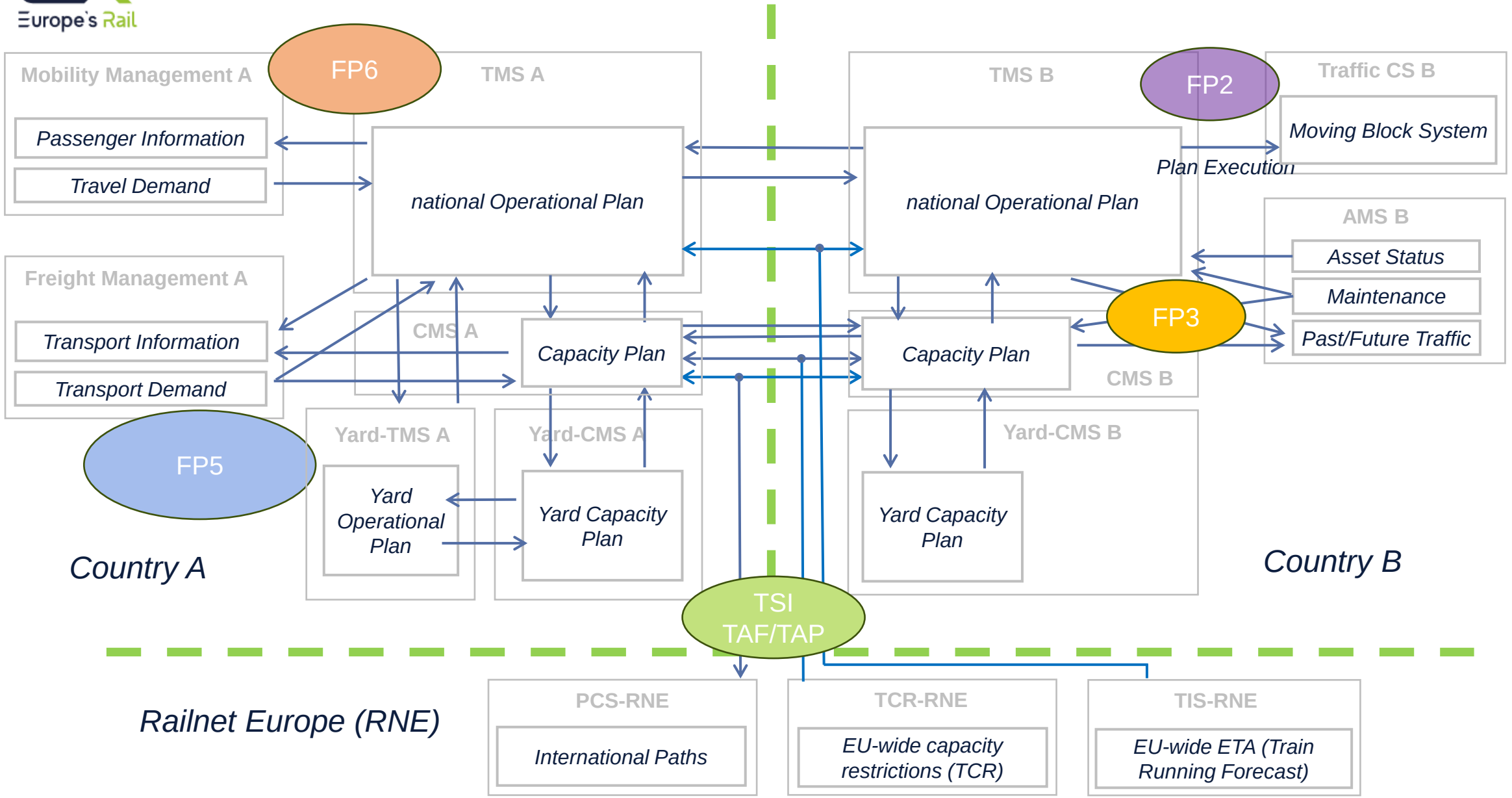
SG1 – Capacity Management

- Finalisation of the specification phase by December 2023 - description, analysis and clustering simulation/ demonstration environment
- Establishment of a close collaboration with SP and RNE
- Further collaboration with FPs about co-operation and interactions (MCP)
- Focus for 2024: start of developments leading to demonstrations in 2025-26

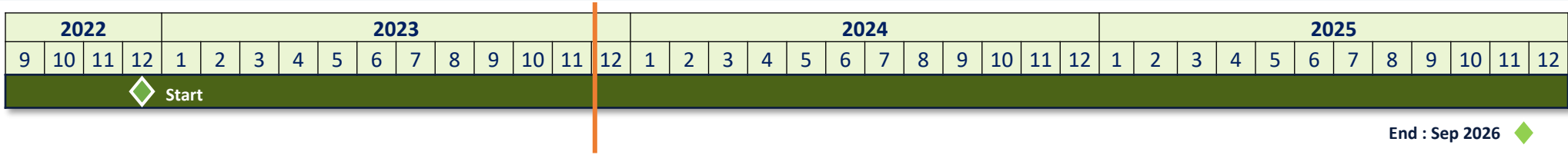
SG2 – Traffic Management

- Specification Deliverables under finalisation
- Ongoing FPx, SP and RNE interactions for requirements clarification and specification alignment.
- Beginning of planning the demo environments including required data sets and system set-ups
- Focus on Developments in 2024 leading to demonstrations in 2025-26

MOTIONAL System Approach (SG1/SG2) – first version



Flagship Project 1 - *MOTIONAL*



SG3 - Integration of Railway services with other modes (B2B)

- Main achievement is the finalization of the specification phase (under review).
- Perspective for 2024 are the development and the preparation of the test phase that will end this period with the delivery of first TRLs.

SG4 – Digital Enablers

- Federated Data space "sandbox" up and running since July 2023
- Dataspace professional services contracted by the JU kicked off September 2023
- Digital Engineering tooling for procurement in 2024
- Input to Glossary collection started, will be fed into System Pillar glossary
- Regular update meetings and/or newsletter on digital enabler status and capabilities will start for other FPs and System Pillar, e.g. Town Hall Meeting in December 2023

IMPLEMENTATION OF THE EU-RAIL PROGRAMME – INNOVATION PILLAR – STATE OF PLAY AND 1ST YEAR RESULTS

Flagship Project 2

R2DATO

FP2- R2DATO – Rail to Digital Automated up to Autonomous Train Operations

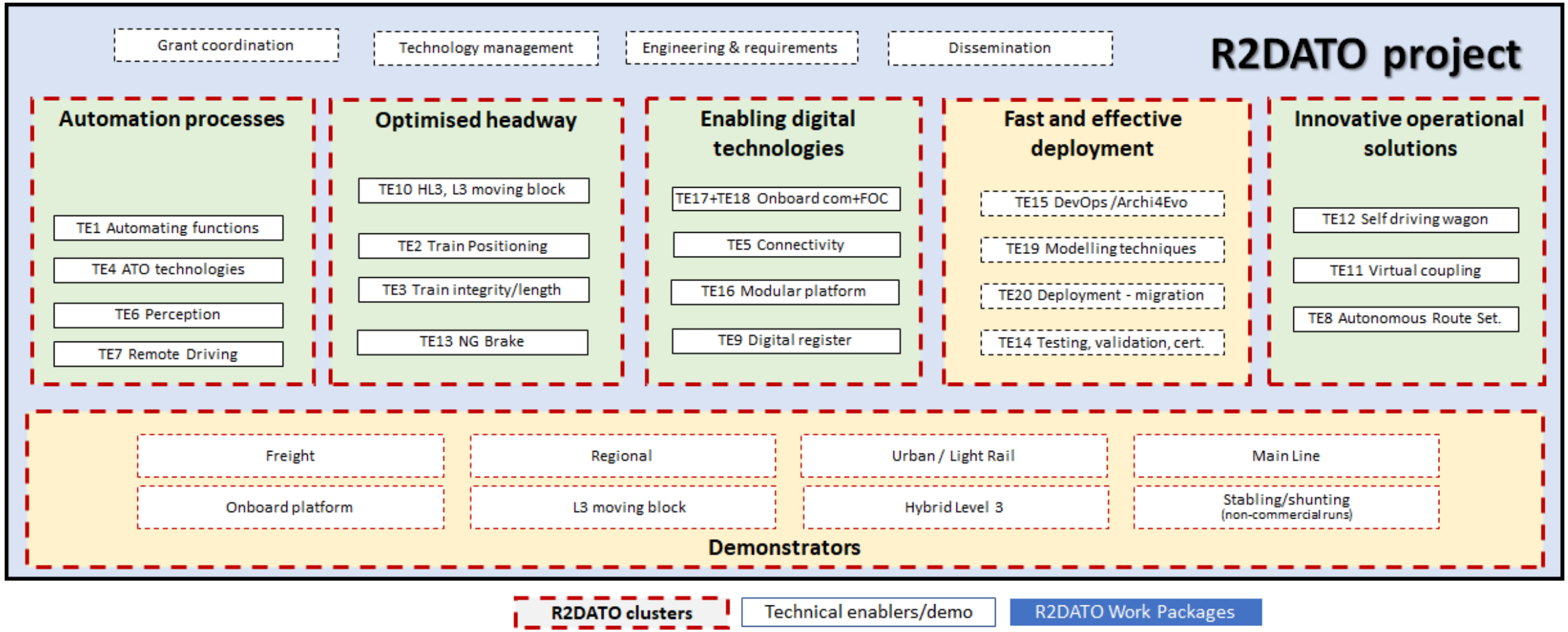
- **Main objective:** take the major opportunity offered by digitalisation and automation of rail operation and to develop the Next Generation ATC and deliver scalable automation in train operations, up to GoA4 for 2030, to enhance infrastructure capacity on the existing rail networks.
- **Target solution:** European solutions fitting requirements from many different use cases across the European network.
- **Benefit:** enables increasing traffic without need for additional investment in physical infrastructure (new railway lines) – enhancing the capacity, maintaining safety levels and operational flexibility.
- **Six focus areas:**
  - **C1**: Automation processes
  - **C2**: Optimised headway
  - **C3**: Enabling digital technologies
  - **C4**: Fast and effective deployment
  - **C5:** Innovative operational solutions
  - **C6:** Demonstrators

- **Total project cost:** 160.800.000,00 €
- **Project duration:** 42 months
- **Number of partners:** 75 (including AE)

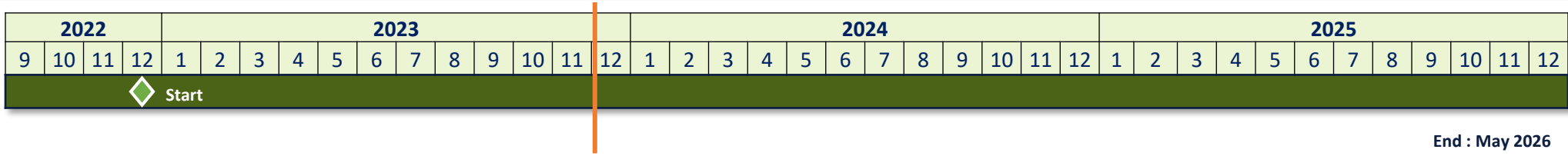
Coordinator

Partners

ASSOCIATED PARTNERS


Grant coordination
Technology management
Engineering & requirements
Dissemination
R2DATO project
Automation processes
TE1 Automating functions
TE4 ATO technologies
TE6 Perception
TE7 Remote Driving
Optimised headway
TE10 HL3, L3 moving block
TE2 Train Positioning
TE3 Train integrity/length
TE13 NG Brake
Enabling digital technologies
TE17+TE18 Onboard com+FOC
TE5 Connectivity
TE16 Modular platform
TE9 Digital register
Fast and effective deployment
TE15 DevOps /Archi4Evo
TE19 Modelling techniques
TE20 Deployment - migration
TE14 Testing, validation, cert.
Innovative operational solutions
TE12 Self driving wagon
TE11 Virtual coupling
TE8 Autonomous Route Set.
Freight
Regional
Urban / Light Rail
Main Line
Onboard platform
L3 moving block
Hybrid Level 3
Stabling/shunting
(non-commercial runs)
Demonstrators
R2DATO clusters
Technical enablers/demo
R2DATO Work Packages

Flagship Project 2 – *R2DATO*



End : May 2026

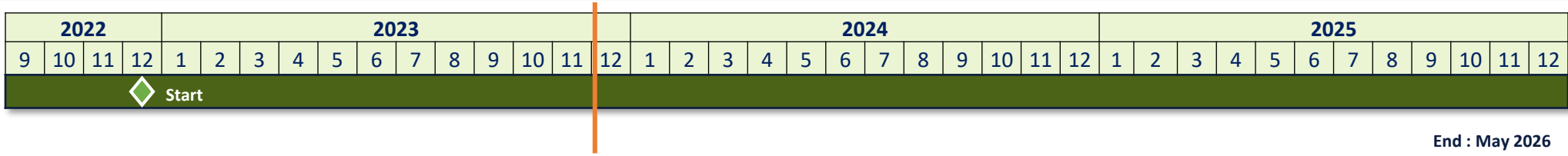
Cluster 1: Automation processes

- Baseline “0” defined and reviewed -> adopt the results of S2R X2Rail-4 in alignment with the System Pillar.
- Successful first MCP (closed)
- Use Cases for the different Technical Enablers and demonstrators defined and send for review and for the preparation of the Maturity Checkpoint MCP#3 (ongoing)

Cluster 2 – Optimised headway

- Moving Block : First version of the specification released (review ongoing)
- Advanced Safe Train Positioning : Specification prepared and first review done, Baseline set up with the SP.
  - EGNOS included into the activities, Kick Off with EUSPA and ESA set up
- Train Integrity: specification under review

Flagship Project 2 –R2DATO



End : May 2026

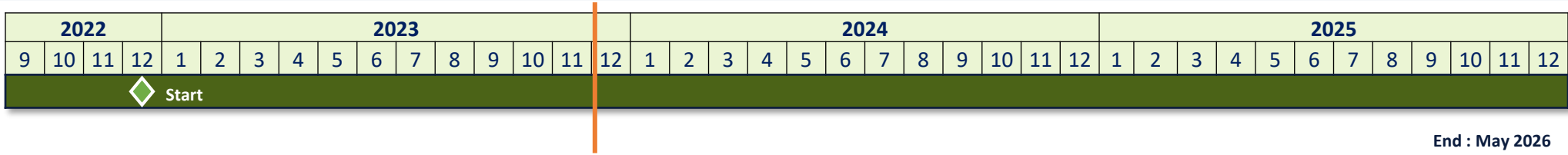
Cluster 3 – Enabling digital technologies

- Onboard Communication: Use Cases & requirements for communication network defined.
- Modular Platforms: Intermediate deliverable finalized, giving first insights into the approach.

Cluster 4 – Fast and effective deployment

- Outline Business case has been delivered.
- Railindustrial DevOps and Architecting4evolution delivered the first set of Specifications (to be detailed)

Flagship Project 2 –R2DATO



End : May 2026

Cluster 5 – Innovative operational solution

- Use cases for the Self Driving Freight wagon have been identified

Cluster 6 – Demonstrators

- **Onboard Platform :** User Stories for Modular Platform, FRMCS and DIA are available
- Releases of the Moving Block Demonstrator have been defined

IMPLEMENTATION OF THE EU-RAIL PROGRAMME – INNOVATION PILLAR – STATE OF PLAY AND 1ST YEAR RESULTS

Flagship Areas 3 & 4 and Exploratory Research

Sébastien Denis - Senior Programme Manager, Europe's Rail Joint Undertaking

IMPLEMENTATION OF THE EU-RAIL PROGRAMME – INNOVATION PILLAR – STATE OF PLAY AND 1ST YEAR RESULTS

Flagship Project 3

IAM4RAIL

FP3-IAM4RAIL – Holistic and Integrated Asset Management for Europe‘s RAIL System

- **Main objective:** provide innovative technical requirements, methods, solutions, and services based on the latest cutting-edge technologies to **minimise asset lifecycle costs** and **extend service life** while meeting safety requirements and **improving the reliability, availability, and capacity of the railroad system.**
- **Target solution: Intelligent Asset Management System** for both **Rolling Stock** and **Infrastructure;** Increased level and technology for **automation and robots** in construction and maintenance/.
- **Benefit: Cost-effective** asset management, increased **RAMS** and **capacity** of the overall railway system. **Sustainable** production of **resilient** assets
- **Five focus areas:**
  - **SP1**: Wayside Monitoring and TMS link
  - **SP2**: Rolling Stock Asset Management
  - **SP3**: Infrastructure Asset Management
  - **SP4**: Railway Digital Twins
  - **SP5**: Environment, User and Worker Friendly Railway Assets

- **Total project cost:** 106.900.000 €
- **Project duration:** 48 months
- **Number of partners:** 29 > 93

COORDINATOR

adif

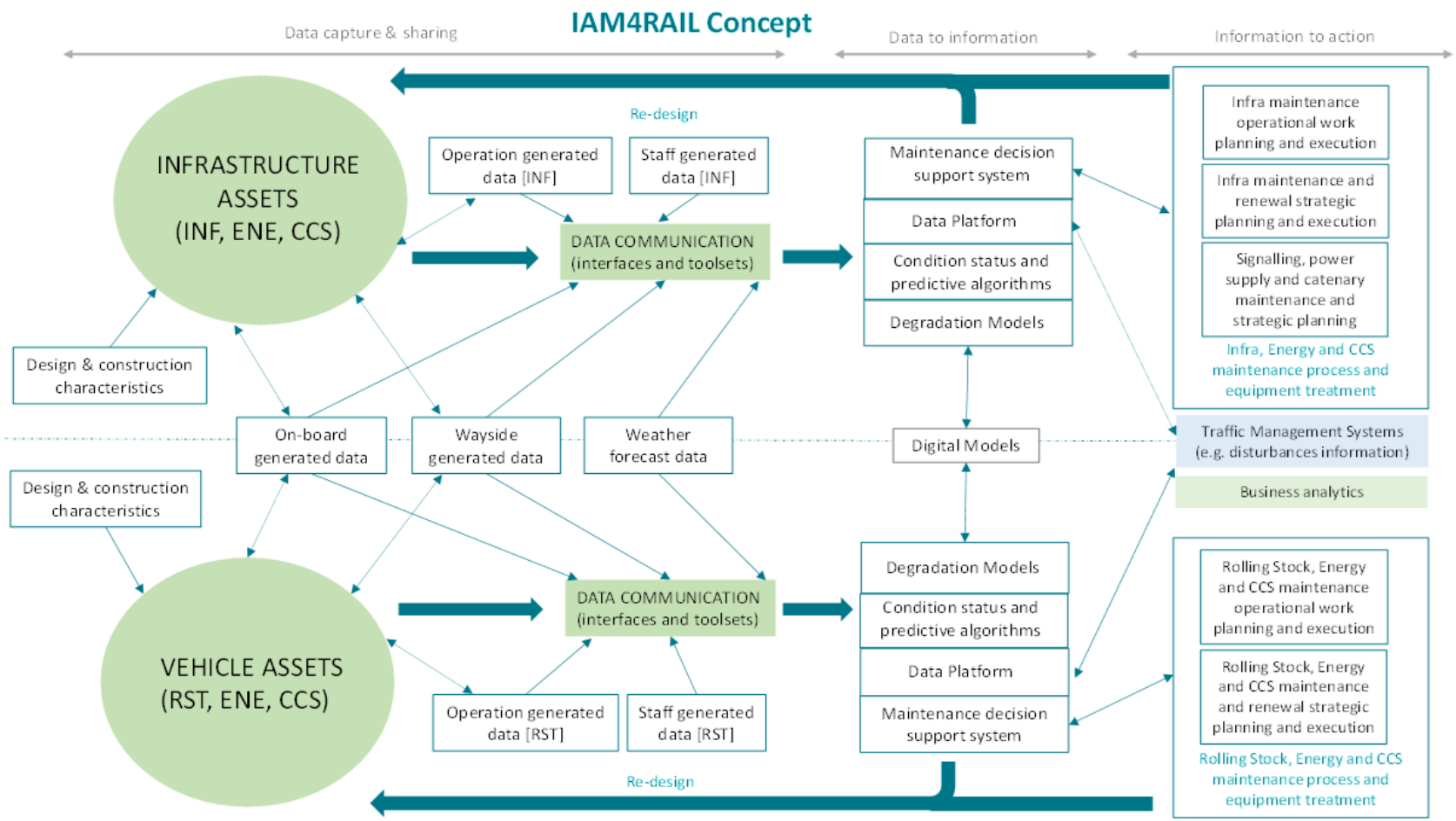
OTHER PARTNERS

ALSTOM, mermec, CAF, ceit, DB BAHN, DLR, cemosa, COMSA, enyse, Tekniker, Faiveley Transport, Ferrovie Italiane, Hitachi Rail STS, indra, Talgo, Jernbane-direktoratet, KNORR-BREMSE, ÖBB, PKP, ProRail, SIEMENS, SNCF, Strukton Rail, THALES, TRAFIKVERKET, voestalpine

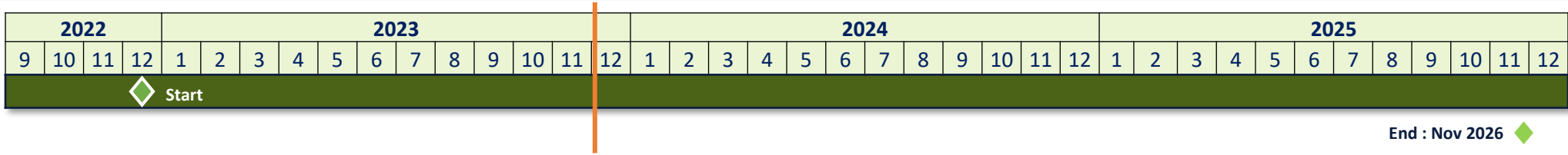
Flagship Project 3 – *IAM4RAIL*

2022				2023												2024												2025											
9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Start																																							

End : Nov 2026



Flagship Project 3 – *IAM4RAIL*



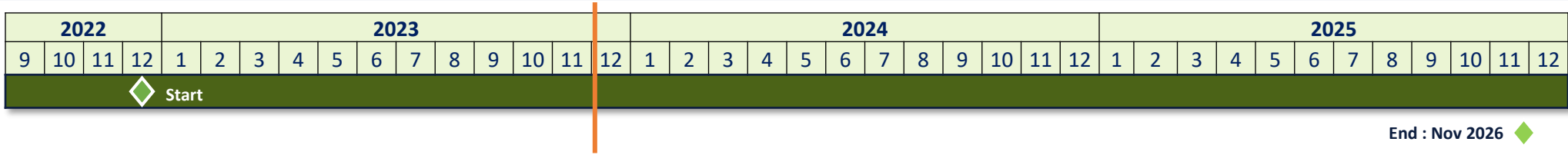
SP1 – Wayside Monitoring and TMS link

- Design and sharing of a general architecture to allow Use Cases start.
- Installation planning on-going with data collection started for a limited set of devices/systems

SP2 – Rolling Stock Asset Management

- Definition of the Use Cases and associated KPIs
- Detailed Demonstrator activites on progress.

Flagship Project 3 – *IAM4RAIL*



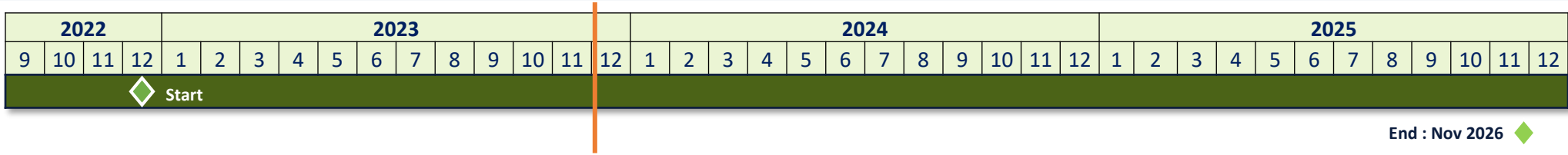
SP3 – Infrastructure Asset Management

- Definition of Use Cases and associated KPIs
- First Version of the Demonstrator Vision & Architecture global for Railway checkpoint. Agreement to install a cross-functional team under the leadership of either HERD or SP Task 4 with FP5 with freight traffic applications
- CBM algorithms output to be reshaped.
- Definition of locations for tests and preliminary systems/assets to be monitored mostly identified and sharing data on going

SP4 – Railway Digital Twins

- Definition of Use Cases and associated KPIs.
- Definition of the BIM Station to test done
- Preliminary work reported done and all UCs in progress

Flagship Project 3 – *IAM4RAIL*



SP5 – Environment, User and Worker Friendly Railway Assets

- Definition of Use Cases and associated KPIs.
- Middleware for Robotics platform selected.
- First Demo of Robot UC for placing balises on tracks
- Specifications and requirements defined for workers needs in terms of ergonomics and task guidance support.
- Scouting and qualification of elastomers and flame-retardant polymers for spare parts on going, as well as the development of a Digital Warehouse

Identified risks for next steps

- No major delay reported for year 1
- No issues on SP/FPs alignment, except for CBM algorithms developments. Collaboration reinforced with FP5 for ECP for freight.

IMPLEMENTATION OF THE EU-RAIL PROGRAMME – INNOVATION PILLAR – STATE OF PLAY AND 1ST YEAR RESULTS

Flagship Project 4

RAIL4EARTH

FP4-RAIL4EARTH – Sustainable and green rail systems

- **Main objective:** provide new innovative products and services based on leading edge technologies to **minimize the overall energy consumption** and **environmental impact** of the railway system, to make this transportation mode **healthier, more attractive** and to provide **resiliency against climate change**
- **Target solution: Enhanced rolling stock, infrastructure, stations, and all their related sub-systems** (traction, bogies, brakes, energy storage systems, HVAC, etc.)
- **Benefit:** improve the existing sustainability performance of railways, more attractive and resilient transport mode.
- **Six focus areas:**
  - **SP1**: Alternative (to Diesel) energy solutions for the rolling stock
  - **SP2**: Energy in rail infrastructure and stations
  - **SP3**: Sustainability and resilience of the rail system
  - **SP4**: Electro-mechanical components and sub-systems for the rolling stock
  - **SP5**: Healthier and safer rail system
  - **SP6**: Trains Attractiveness (Interiors)

- **Total project cost:** 95.100.000 €
- **Project duration:** 48 months
- **Number of partners:** 23 > 71

Flagship Project 4 – *RAIL4EARTH*

2022				2023												2024												2025											
9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12

Start

End : Nov 2026

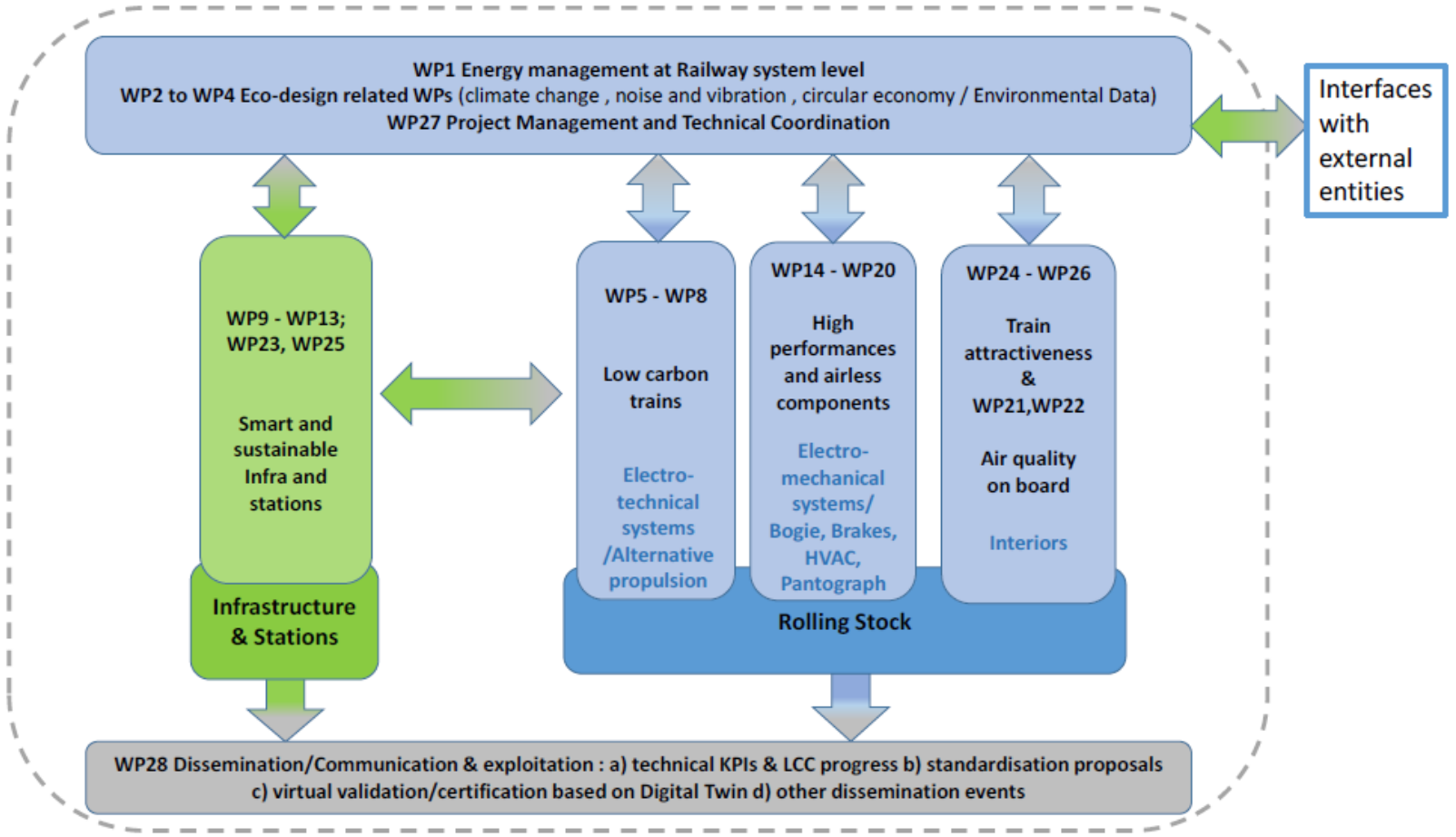
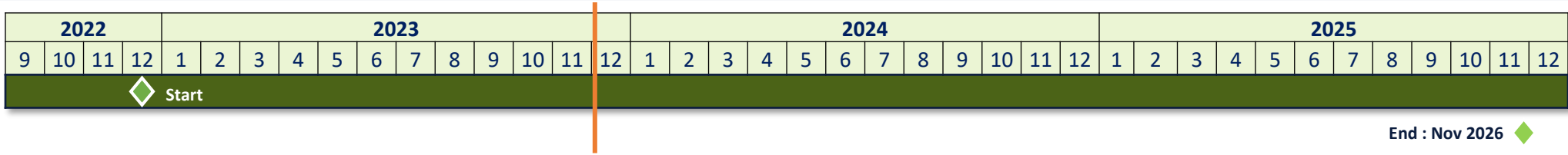


Figure 1: Schematic diagram of Rail4EARTH

Flagship Project 4 – *RAIL4EARTH*



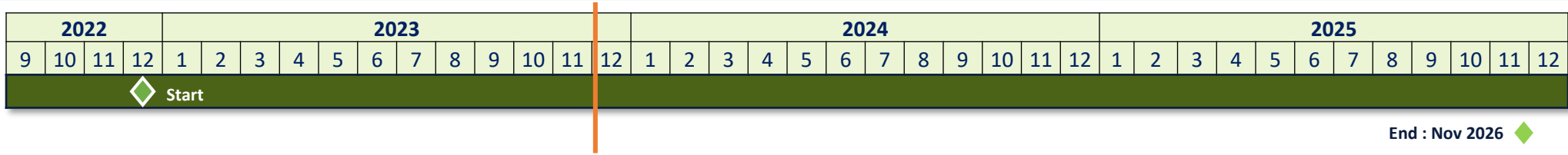
SP1 – Alternative (to Diesel) energy solutions for the rolling stock

- BEMU: Pre-studies on going : 200 km feasible from expert point of view, fast charging system needed.
- H2: Fuel Cell sub-system supplier identified, close collabotation with H2 refueling developments

SP2 – Energy in rail infrastructure and stations

- H2 Safety report on H2 refuling under review
- Start of H2 refueling simulations
- Smart infrastructure power supply : First studies for energy saving and improvement of the energy distributed to the trains.
- Railway Energy Hubs and Smart Green Railway Stations : Studies to improve the energy flexibility and resilience of Electrical Smart Grids as well as the energy management at station level (stations as energy hubs)

Flagship Project 4 – *RAIL4EARTH*



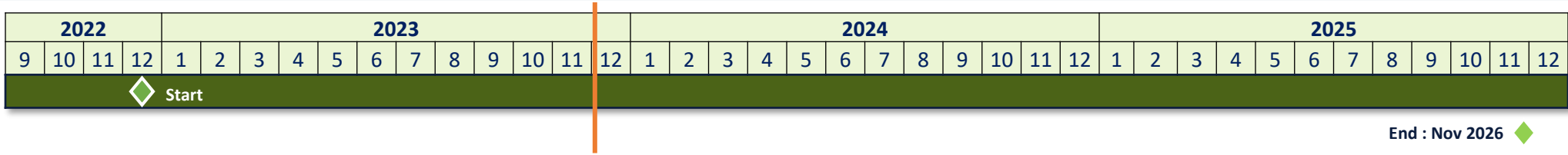
SP3 – Sustainability and resilience of the rail system

- Energy Management & Pre-Standardisation : Alignment on-going on pre-standardisation, including BEMU/Battery; H2 refuelling interfaces standardisation.
- Adaptation to climate change : Bibliography analysis done (121 documents).
- Noise : Noise indicator: methodologies have been defined, both for studying high-train annoyance and tonalities ; Proposition of lab test for Neoballast demonstrator.
- Circular Economy & Environmental Data Management Tools : Active workshops on eco-labeling & marketplace: re-use of spare-parts (totally or partially by component), end of life parts.

SP4 – Electro-mechanical components and sub-systems for the rolling stock

- Airless brake: Prototypes preliminary tests done.
- Airless pantograph: complete simulation of whole pantograph motion done (from roof of train to catenary)
- Bogie : draft of part 1 of the new standard for new materials is ready, included in CEN/TC256/SC2/WG54 “New materials”.
- Running gears architecture: new concept defined (design and dynamic simulation)
- Generic reference model (generic regional train) designed for assessment of aerodynamic performances

Flagship Project 4 – *RAIL4EARTH*



SP5 – Healthier and safer rail system

- Alternative Ventilation concepts for enhanced on board air quality; Computational Fluid Dynamics simulations started and Air quality common protocols developed
- Various field tests carried out in combination with collocating low-cost sensors for enhanced air quality on covered platforms and tunnels

SP6 – Trains Attractiveness (Interiors)

- Sustainable Interiors, Knowledge and Opportunities : Main functions of Interiors developed by biomimicry approach listed (ex: circular flooring or seats)
- Progress on User experience and User Interfaces, Knowledge and pre-concepts with a focus on seats and toilets

Identified risks for next steps

- No major delay reported for year 1
- No issues on SP/FPs alignment
- Operator needed to materialized the KB Electro-Mechanical-Brake demo

IMPLEMENTATION OF THE EU-RAIL PROGRAMME – INNOVATION PILLAR – STATE OF PLAY AND 1ST YEAR RESULTS

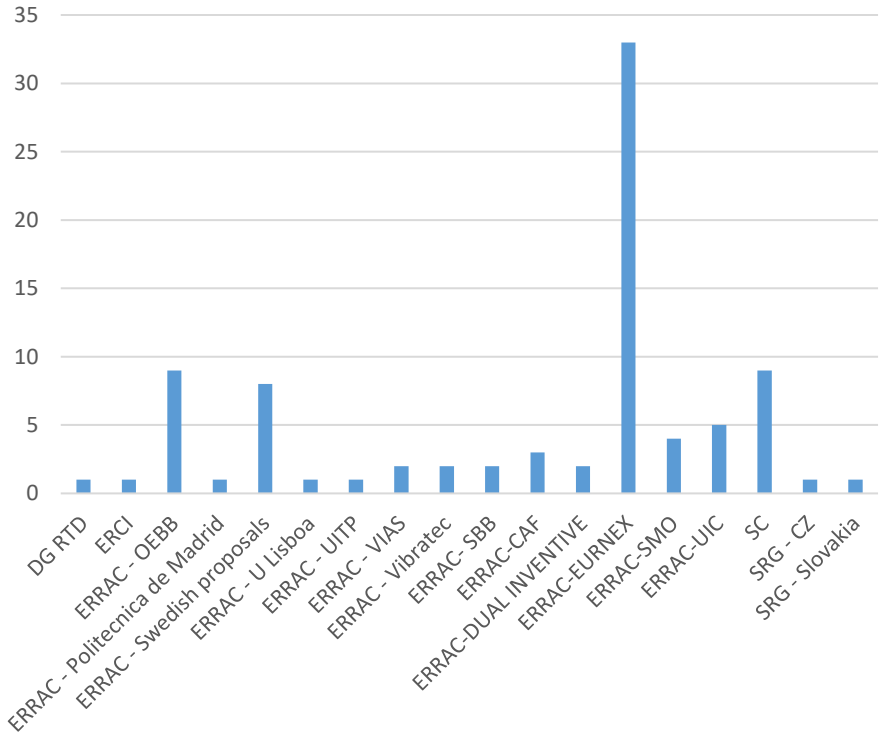
Exploratory Research

Exloratory Research

RAIL4CITIES	RAIL4CITIES	Railway stations for green and socially inclusive cities	HORIZON-ER-JU-2022-ExpIR-01	01/07/2023 – 30/06/2025	€ 697.796,10
InBridge 4EU	InBridge4EU	Enhanced Interfaces and train categories for dynamic compatibility assessment of European railway bridges	HORIZON-ER-JU-2022-ExpIR-02	01/09/2023 – 31/08/2026	€ 928.114,51
ESEP 4 Freight	ESEP4Freight	European Shift Enabler Portal for Freight	HORIZON-ER-JU-2022-ExpIR-03	01/09/2023 – 31/08/2025	€ 1.299.750,00
Academics4Rail	Academics4Rail	Building a community of railway scientific researchers and academia for ERJU and enabling a network of PhDs (academia teaming with industry)	HORIZON-ER-JU-2022-ExpIR-04	01/09/2023 – 28/02/2027	€ 1.807.237,50
LEADER Learnings for European Autonomy to Deliver Europe's Rail in 2030	LEADER 2030	Learnings for European Autonomy to Deliver Europe's Rail in 2030	HORIZON-ER-JU-2022-ExpIR-06	01/07/2023 – 31/12/2025	€ 700.032,12
DACcord	DACcord	DAC migration roadmap towards deployment and related activities	HORIZON-ER-JU-2022-ExpIR-07	01/04/2023 – 31/03/2026	€ 1.499.829,16

Exloratory Research (2)

- From 80+ input of R&I ideas for JU call topics received to the EU-RAIL Call 2023



DESTINATION Topics	Type of Action	Expected TRL	Expected EU contribution per project (EUR million)
HORIZON-ER-JU-2023-FA1-SESAR: EU-RAIL – SESAR SYNERGY: INTEGRATED AIR AND RAIL NETWORK BACKBONE FOR A SUSTAINABLE AND ENERGYEFFICIENT MULTIMODAL TRANSPORT SYSTEM	IA	6	5.0
HORIZON-ER-JU-2023-EXPLR-01: NOISE AND VIBRATIONS	RIA	5 / 6	4.1
HORIZON-ER-JU-2023-EXPLR-02: FUTURE METRO SYSTEMS	RIA	3 / 4	3.1
HORIZON-ER-JU-2023-EXPLR-03: BIODIVERSITY	CSA	-	2.8
HORIZON-ER-JU-2023-EXPLR-04 : DISRUPTIVE ASSETS MANAGEMENT SOLUTIONS, INCLUDING URBAN USE CASES	RIA	4 / 5	2.7
HORIZON-ER-JU-2023-EXPLR-05: EXTENDING THE RAIL NETWORK OF PHDS	RIA	1 / 2	2.0
HORIZON-ER-JU-2023-EXPLR-06: DAC FLEET RETROFITTING AND RETROFIT CAPACITY PLAN	CSA	-	1.5

IMPLEMENTATION OF THE EU-RAIL PROGRAMME – INNOVATION PILLAR – STATE OF PLAY AND 1ST YEAR RESULTS

Flagship Areas 5, 6 & 7

Javier Ibáñez de Yrigoyen - Senior Programme Manager, Europe's Rail Joint Undertaking

IMPLEMENTATION OF THE EU-RAIL PROGRAMME – INNOVATION PILLAR – STATE OF PLAY AND 1ST YEAR RESULTS

Flagship Project 5

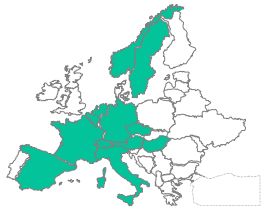
TRANS4M-R

Europe's Rail

95 Mio. € TPC

Workstream Seamless

Facilitating **multimodal and intermodal** logistics across borders



Collaboration of 71 european partners from the whole railway sector

30% by 2030

Increasing the modal split for rail freight

FP5TRANS4M-R
Transforming Europe's Rail Freight

Innovation Project for European Rail Freight funded by the EU

Digitalising and Automating Freight Train Operations

The **Digital Automated Coupler (DAC)** is the central enabler of the project

European Green Deal

Demonstrating new technology up to **TRL 8**

Europe's Rail

Part of Europe's Rail

FP5-TRANS4M-R objectives

Higher throughput and shorter transportation duration

European harmonized, scalable, upgradable DAC systems

Digital Yard Automation and Management Solutions

digital-enabled operational procedures

Mitigating demographic change

minimising physical health exhaustion

automate/digitalise operational processes

maximise the acceptance of the newly developed digital technologies

Maximise flexibility and reliability of rail freight services

Provision of effective intermodal prediction algorithms

Seamless planning covering the complete end-to-end rail service

Gain awareness on EU-Level for the developed technology frameworks

Large-Scale demonstration activities

Provision of resources, inputs and recommendations for standardisation & authorisation

FP5-TRANS4M-R achievement of objectives linked to

Economic Growth

- Increase in capacity, productivity, efficiency and flexibility to secure the economic growth in Europe
- Secure and further develop the world leading position of Europe within the global economy

Demographic Change

- Average age of employees is increasing
- Less people available for physical demanding work especially in yards such as train preparation, coupling, uncoupling and further operational processes

Financial & Political Pressure

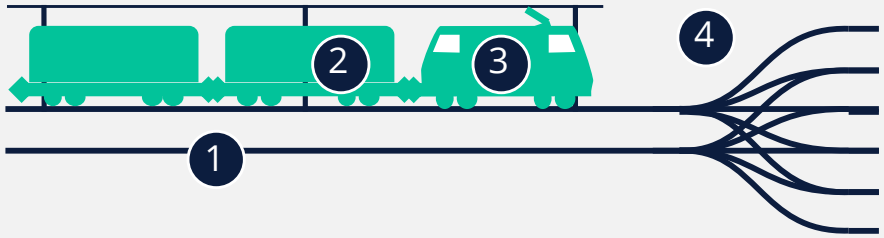
- Factors such as cost and flexibility put rail freight transport structurally under pressure in comparison with road transport
- Willingness for political support has increased
- Respond to customer demands in a timely and flexible manner

Climate Change

- European Commission targets to achieve a 90% reduction in transport-related greenhouse gas emissions by 2050
- Increase rail freight transportation in Europe by 50% by 2030 and double by 2050.

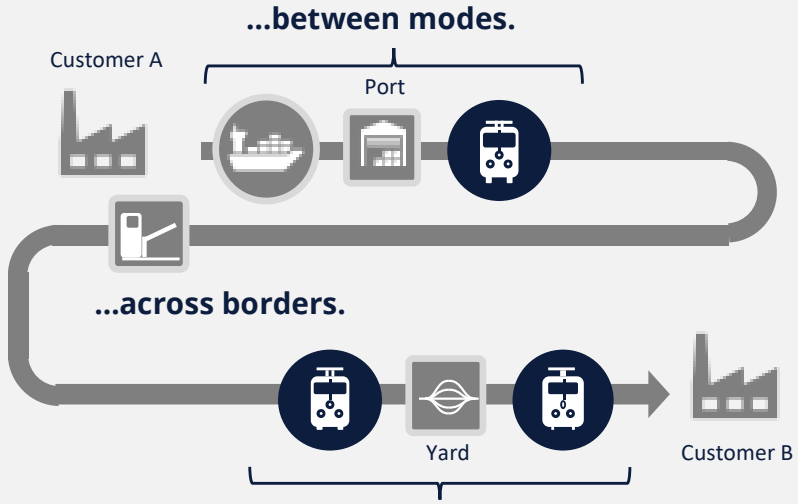
Both clusters enable „Transforming Europe‘s rail freight“

1 Full Digital Rail Freight Operations (FDFTO)



1. **Digital Automated Coupler (Typ 4+5+Hybrid)**
2. **Energy and Communication (400V + Train integrity)**
3. **Train functions (e.g. automated brake test)**
4. **Automated Yard Operations**

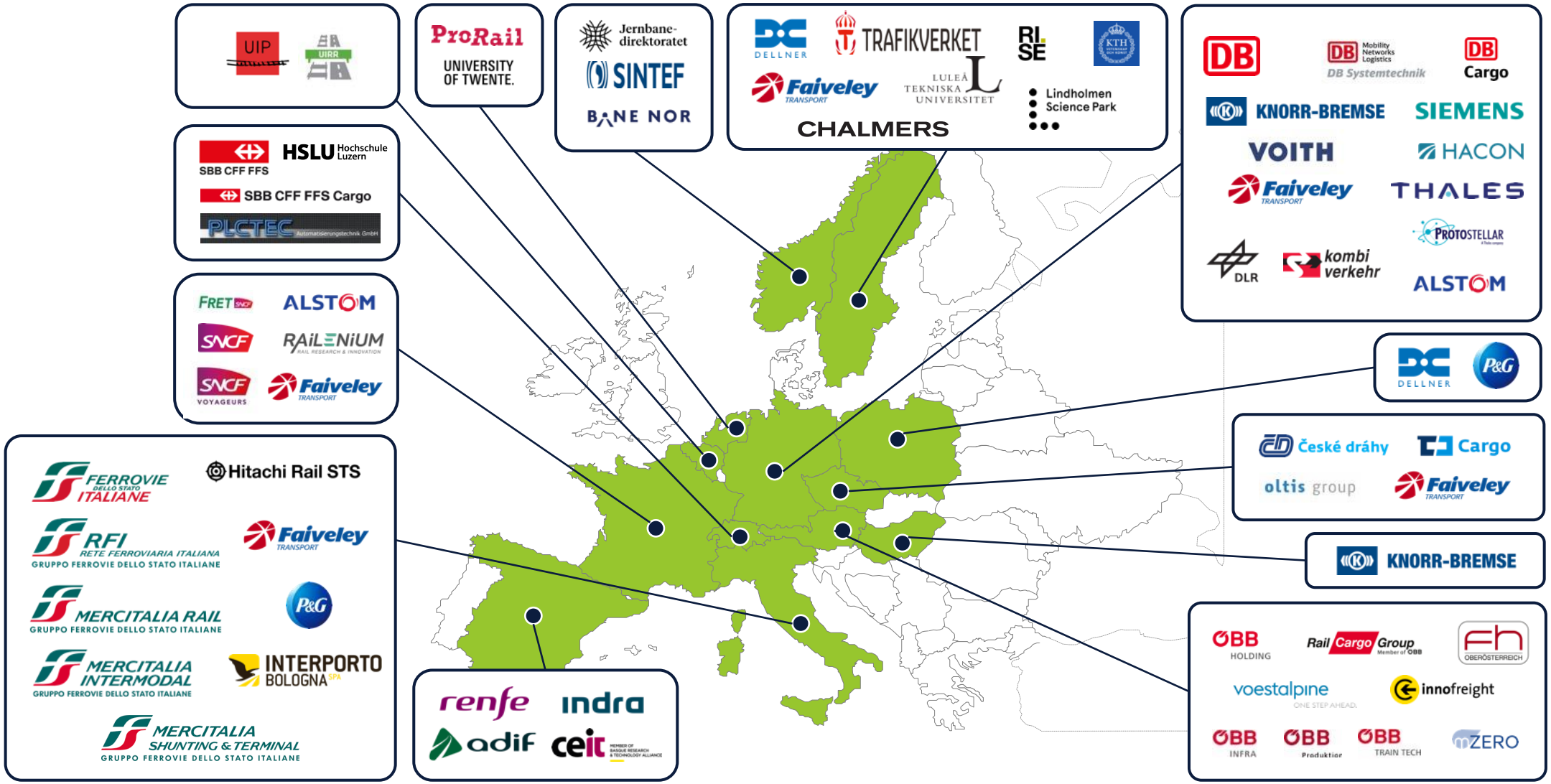
2 Seamless Rail Freight...



- **Seamless planning and dispatching**
- **Intermodal integration and prediction**

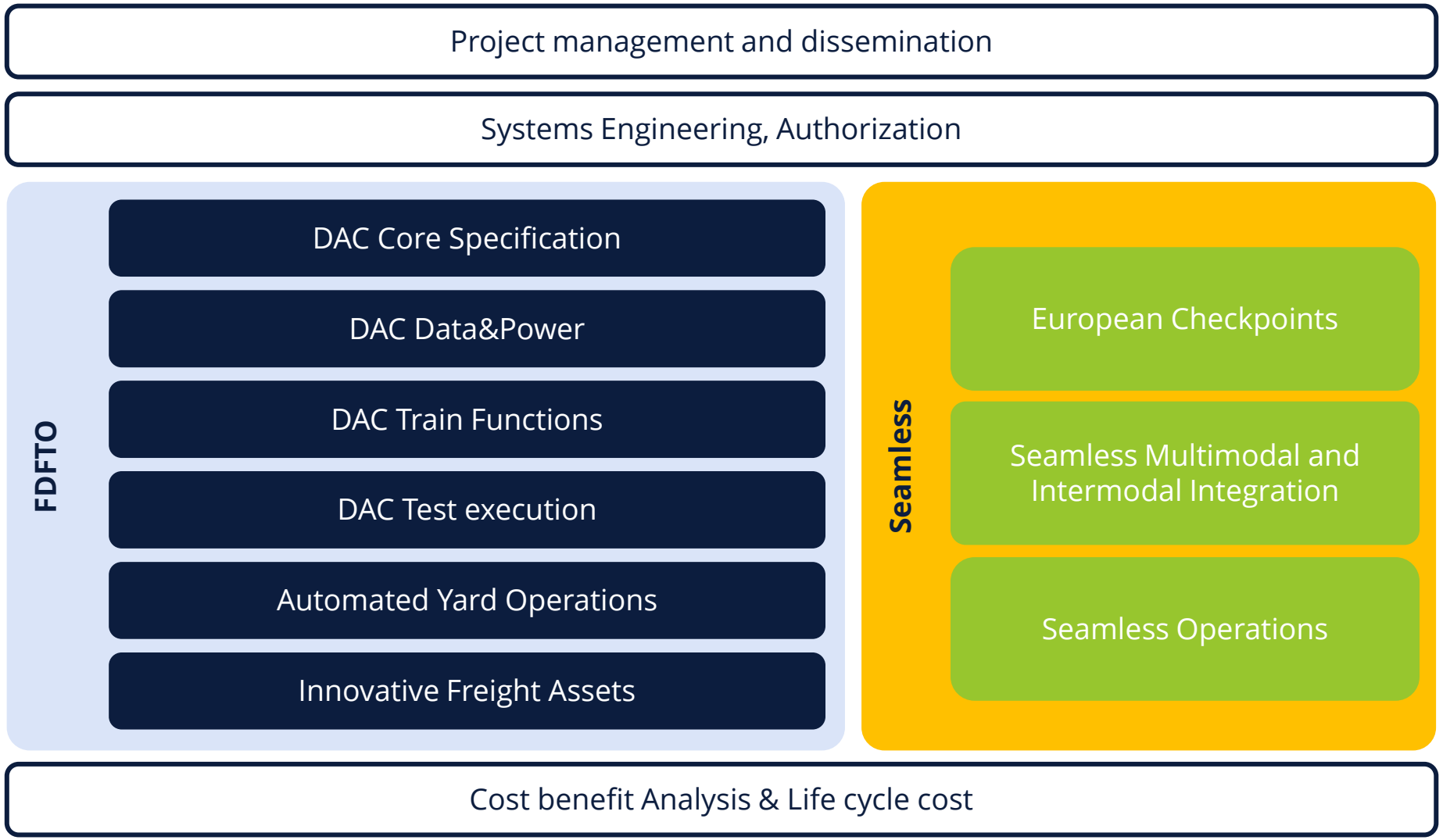
The consortium

71 partners from the whole European railway sector

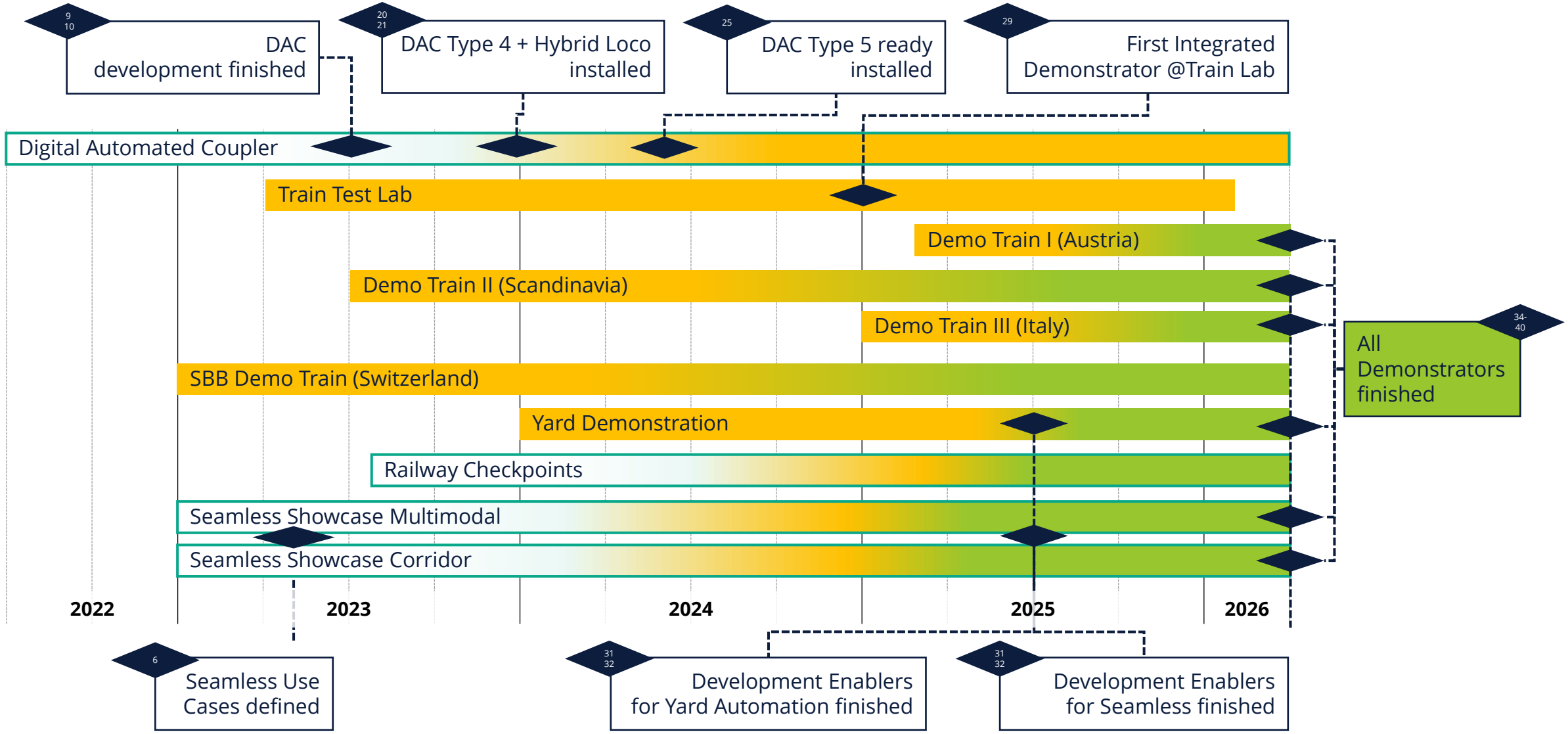


The approach

…in 8 subprojects and a total of 34 work packages



Time plan Technologies



Legend: *Mainly development* | *Mainly testing* | *Mainly demonstrating*

Status 01/2023

Current status

DAC Major Achievements

- DAC Scharfenberg Design selected by the sector
- Major progress on specification activities, electrical coupler designs & solutions for manual uncoupling from vehicle side
- Target operational procedures established and widely discussed (operator, industry, EDDP), sector wide webinar was held
- Standardization of mechanical/pneumatical parts far advanced; Standardization of electrical energy as well as communication system initiated
- Development of solid and feasible migration scenarios first time ever in Europe
- First concept on authorization strategy developed
- Setup of DAC Train Test Lab for early testing

Challenges

- Open topics for standardization addressed in SP Task 4 **Standardisation and TSI Input Plan**
- SP T4 Task „**Development of European Standard for DAC based operations as voluntary standard**“ is currently being assigned to working group as a writing team
- CBA further updates due to vehicle numbers, component prices

Milestones for 2024

- Finalisation of first DAC Specifications incl. Train Functions, power and data communication and e-coupler
- Finalisation of first FDFTO System Architecture & Functional Requirements
- Decision for e-coupler design
- Provision of „DAC5 ready“

WP14 Train Test Lab Opening

14th and 15th of September

Day 01 – Presentations and Workshops
Focus: Testing within TRANS4M-R

Day 01 – Visiting HVLE Sidings
Spandau and Wustermark

Day 02 – Panel discussion

Day 02 – Opening Ceremony

Day 02 – Demonstrations

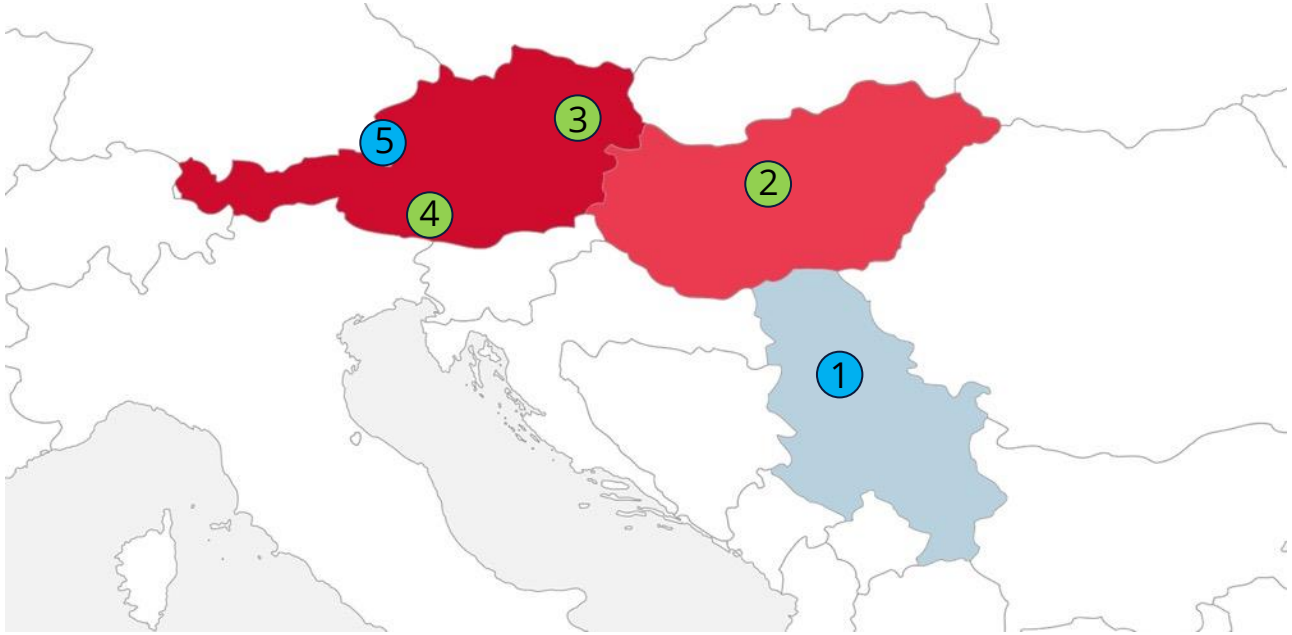
DAC4EU Autumn 2023 Events

Hungary

- 19. – 27. September, Budapest Ferencváros

Austria

- 27. September – 08. Oktober, Vienna & Fürnitz
- Testing & Events



IMPLEMENTATION OF THE EU-RAIL PROGRAMME – INNOVATION PILLAR – STATE OF PLAY AND 1ST YEAR RESULTS

Flagship Project 6

FUTURE

FP6 - FutuRe objectives

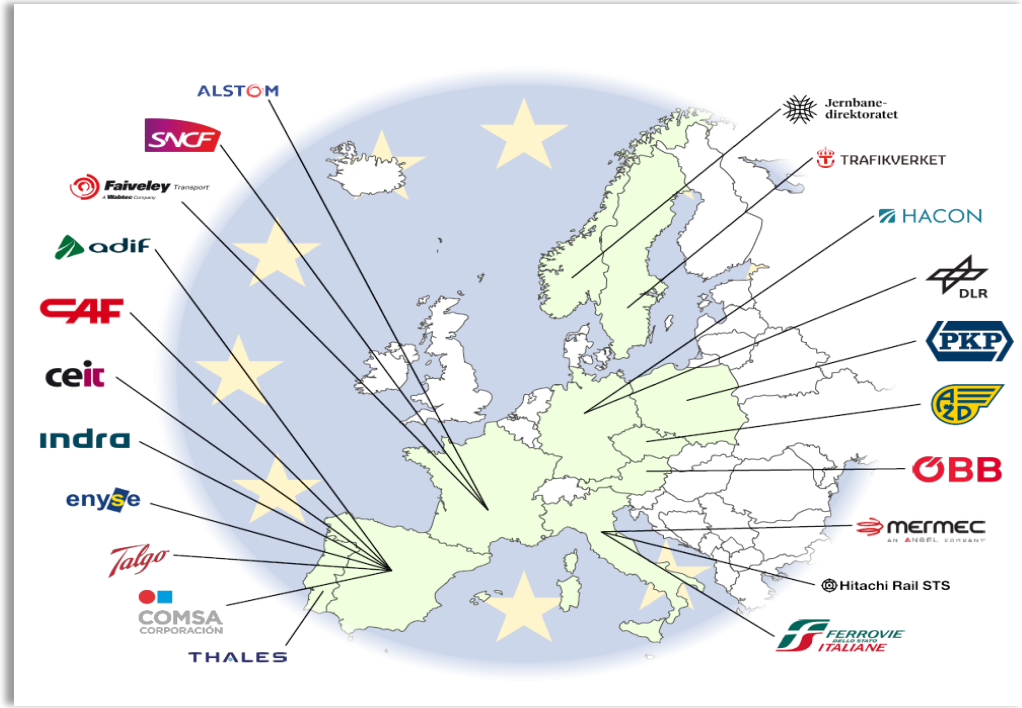
Ensure long-term viability of regional rail by reducing total cost of ownership while ensuring high service quality and operational reliability

FP6-FutuRe
Cost effective regional lines

- **Total project cost:** ~35 MEUR
- **Project duration:** 48 months
- **Number of partners:** 21beneficiaries > 30 Affiliated Entities and Subcontractors

The target is to increase customer satisfaction to become an attractive mode of transport:

- **Lowering CAPEX system costs**
- **Lowering OPEX**
- **Increasing productivity**
- **Improving customer satisfaction**



FP6 - FutuRe objectives

Regional Rail System Solutions/Architecture - Optimised and innovative solutions for the attractiveness and cost-efficient future of regional rail.

Regional Rail CCS & Operations - Covering an integrated control and command system and different technologies applicable to regional lines.

Regional Rail Assets - Developing cost-efficient components and technologies including wireless and energy self-sufficient infrastructure components to decrease operational and overhead costs.

Regional Rail Rolling Stock - Focusing on a conceptual design for a cost-efficient, emission free, light rail vehicle with flexible interior, including the latest innovative technologies.

Regional Rail Customer Services - Focusing on customer service and aiming to develop highly accurate multimodal passenger information on-board and/or at stations for passenger and freight management.

Enable a smooth transition from rail to other modes of transport in regions and vice versa

30/11/2023

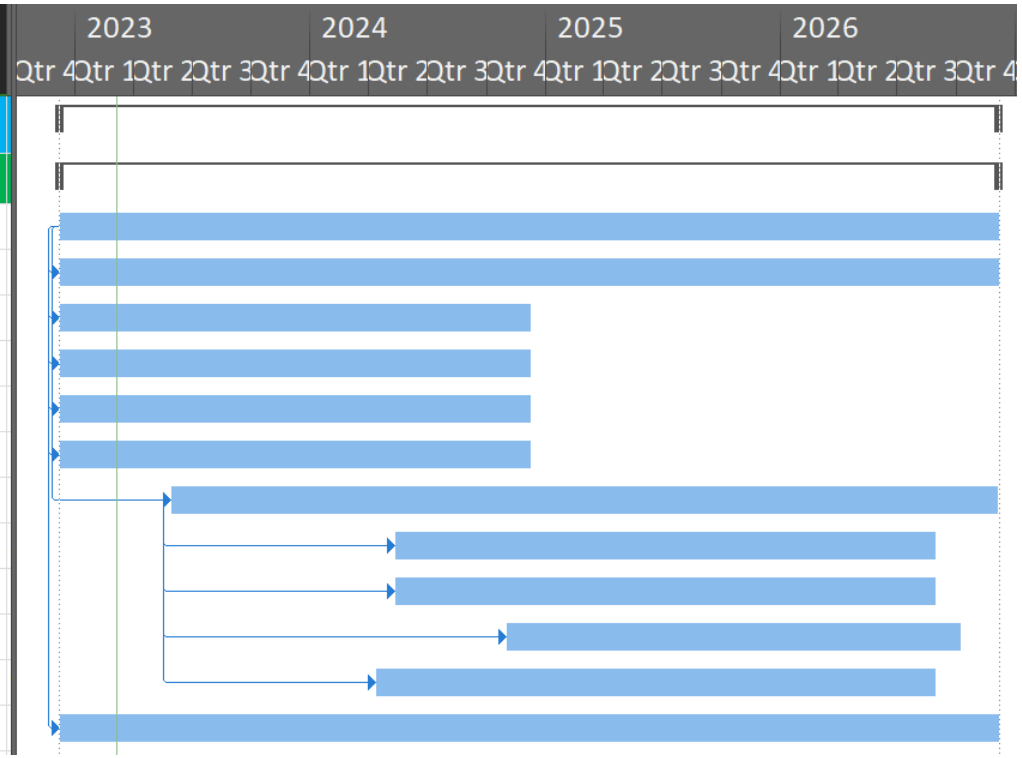
Flagship Project *6*

2022				2023												2024												2025											
9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
◇ Start																◇ (intermediate report each 12 months)												◇ (intermediate report each 12 months)											→ End 12/2026

Overall Status

0

Task Mode	Task Name
	FP6 - FuTuRe
	WPs
	WP1 - Project Coordination
	WP2 - Regional Rail System Solutions/Architecture
	WP3 - Regional Rail CCS & Ope. G1 Lines Req. & Spec.
	WP4 - Regional Rail Assets Req. & Spec.
	WP5 - Regional Rail Rolling Stock Req. & Spec.
	WP6 - Regional Rail Services Req. & Spec.
	WP7 - Preparation for Regional Rail Integrated Demonstrators Preparation Work
	WP8 - Regional Rail CCS & Operations for G1 Lines Demonstrations
	WP9 - Regional Rail Assets Demonstrations
	WP10 - Regional Rail Rolling Stock Demonstrations
	WP11 - Services – Implementation and Demonstration
	WP12 - Communication, Dissemination and Exploitation of Results



Overall time/output plan → Matching the GA baseline

Overall status enablers/WP overview

# Technical Enabler	# WP	WP title	Lead	Technical	Schedule	Dissemination	Resources (PMs availabilities)	FP <> FP	FP <> SP
	WP1	Project Coordination	FT	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0
	WP2	Regional Rail System Solutions/Architecture	MERMEC	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0
	WP3	Regional Rail CCS & Operations for G1 Lines Requirements & Specification	CAF	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0
	WP4	Regional Rail Assets Requirements & Specifications	OBB-Infra	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0
	WP5	Regional Rail Rolling Stock Requirements & Specifications	TRV	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0
	WP6	Regional Rail Services Requirements & Specifications	HACON	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0
	WP7	Preparation for Regional Rail Integrated Demonstrators	TRV	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0
	WP8	Regional Rail CCS & Operations for G1 Lines Demonstrations	CAF	Not started yet					
	WP9	Regional Rail Assets Demonstrations	OBB-Infra	Not started yet					
	WP10	Regional Rail Rolling Stock Demonstrations	TRV	Not started yet					
	WP11	Regional Rail Services Demonstrations	HACON	Not started yet					
	WP12	Communication, Dissemination and Exploitation of Results	FT	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0	(G) 0

No major issues identified for the WPs at current stage

Major achievements in 2023

Project Management and Communication/Dissemination

- ***1st Advisory Board Meeting (March 2023):***
  - *Participated by 31 stakeholders*
  - *Specific interests have been mapped into the project technical enablers and demos*
  - *Follow up for a 2nd meeting within end of 2023*

- ***FP6 in the EU-RAIL context:*** *regular interactions in place with System Pillar, FP1, FP2, FP4*

- ***Communication/Dissemination activities***
  - *Project Website: https://projects.rail-research.europa.eu/eurail-fp6/*
  - *UITP 2023 (Barcelona - Spain, June 2023): FP6 project presentation.*
  - *TRA 2024 (Dublin - Ireland, April 2024): submission of 6 papers as FP6.*
  - *Africa Rail (Johannesburg – SA, June 2023): FP6 project presentation.*
  - *Space for Rail Innovation (Madrid – Spain, June 2023): FP6 as space enablers integrator.*
  - *International Railways Safety Council 2023 (Cape Town – SA, Oct 2023): FP6 project presentation.*

Major achievements in 2023

Technical WPs

WP	Status	Major achievements
WP2 *Regional Rail System Solutions/Architecture*	0	*D2.1 Regional lines architecture (1st rel. @M6) + Use Cases collection.* *D2.2 Regional lines operational and functional Requirements (1st rel. @M6).*
WP3 *Regional Rail CCS & Operations for G1 Lines Requirements & Specifications*	0	*Input to D2.1 and D2.2 content.* *D3.1, D3.2, D3.3, D3.4 M12 intermediate version addressing use cases and scenarios for ATO, ETCS L3, TMS, Fail-safe highly accurate train positioning.*
WP4 *Regional Rail Assets Requirements & Specifications*	0	*Input to D2.1 and D2.2 content.* *D4.1, D4.2, D4.3, D4.4 M12 intermediate version addressing requirements specification for wayside assets and communications*
WP5 *Regional Rail Rolling Stock Requirements & Specifications*	0	*Input to D2.1 and D2.2 content.*
WP6 *Regional Rail Services Requirements & Specifications*	0	*D6.1 Specification of Multimodal Travel Solution (Alpha Release).*

Main issues

- ***Slightly slow setup of the interaction with System Pillar (successfully mitigated)***
- ***Need for harmonisation of schedule with FP2***

No critical neither blocking issues identified at current stage.

Outlook to 2024

- ***Consolidation of requirements and architecture (WP2)***
- ***Final release of technical WPs (3-4-5-6) deliverables***
  - *Regional Rail CCS & Operations for G1 Lines Requirements & Specifications*
  - *Regional Rail Assets Requirements & Specifications*
  - *Regional Rail Rolling Stock Requirements & Specifications*
  - *Regional Rail Services Requirements & Specifications*
- ***Setup demonstrators' concept of project technical enablers (WPs 8 to 11)***
- ***Speed on concept for integrated demonstrators (WP7)***
- ***Follow up Communication/Dissemination activities, including contribution to EU-RAIL at InnoTrans 2024 (WP12).***
- ***Continue assuring full involvement of Advisory Board (WP12)***

IMPLEMENTATION OF THE EU-RAIL PROGRAMME – INNOVATION PILLAR – STATE OF PLAY AND 1ST YEAR RESULTS

Flagship Area 7

Progress in 2023

The objective of FA7 is to explore non-traditional and emerging flexible and/or high-speed guided transport systems, as well as to create opportunities for innovators to bring forward ideas for shaping those future systems via a scientific approach into an existing rail system.

Two projects were launched as an outcome of the call 2022-2:

- **Pods4Rail**
  - Starting date: September 2023;
  - Duration: 30M;
  - Budget: 3M EUR;
  - Objective: to develop a concept for Pods and Pod-Carriers on railway and to identify relevant use cases and business cases.
- **MaDe4Rail**
  - Starting date: July 2023;
  - Duration: 12M;
  - Budget: 1.5M EUR;
  - Objective: to explore non-traditional and emerging maglev-derived systems (MDS) and to assess the technical feasibility and effectiveness to introduce MDS in Europe under safety aspects and technical-economic performance.

- In 2024, EU-Rail is expecting launch a topic in its call for proposals with the aim to strengthen the collaboration of the different hyperloop promoters in the technology convergence of the hyperloop solutions by defining the operational, safety and reliability aspects and assessing the economic viability.

EUROPE'S RAIL GENERAL ASSEMBLY 2023

Coffee Break

Back at 11:25

IMPLEMENTATION OF THE EU-RAIL PROGRAMME – SYSTEM PILLAR – STATE OF PLAY AND 1ST RESULTS

Ian Conlon *- Head of System Pillar, Europe's Rail Joint Undertaking*

Christoph Klose *- System Pillar Core Group Representative*

Paolo Ciucci *- System Pillar Core Group Representative*

Steffen Schmidt *- System Pillar Core Group Representative*

Context

System Pillar

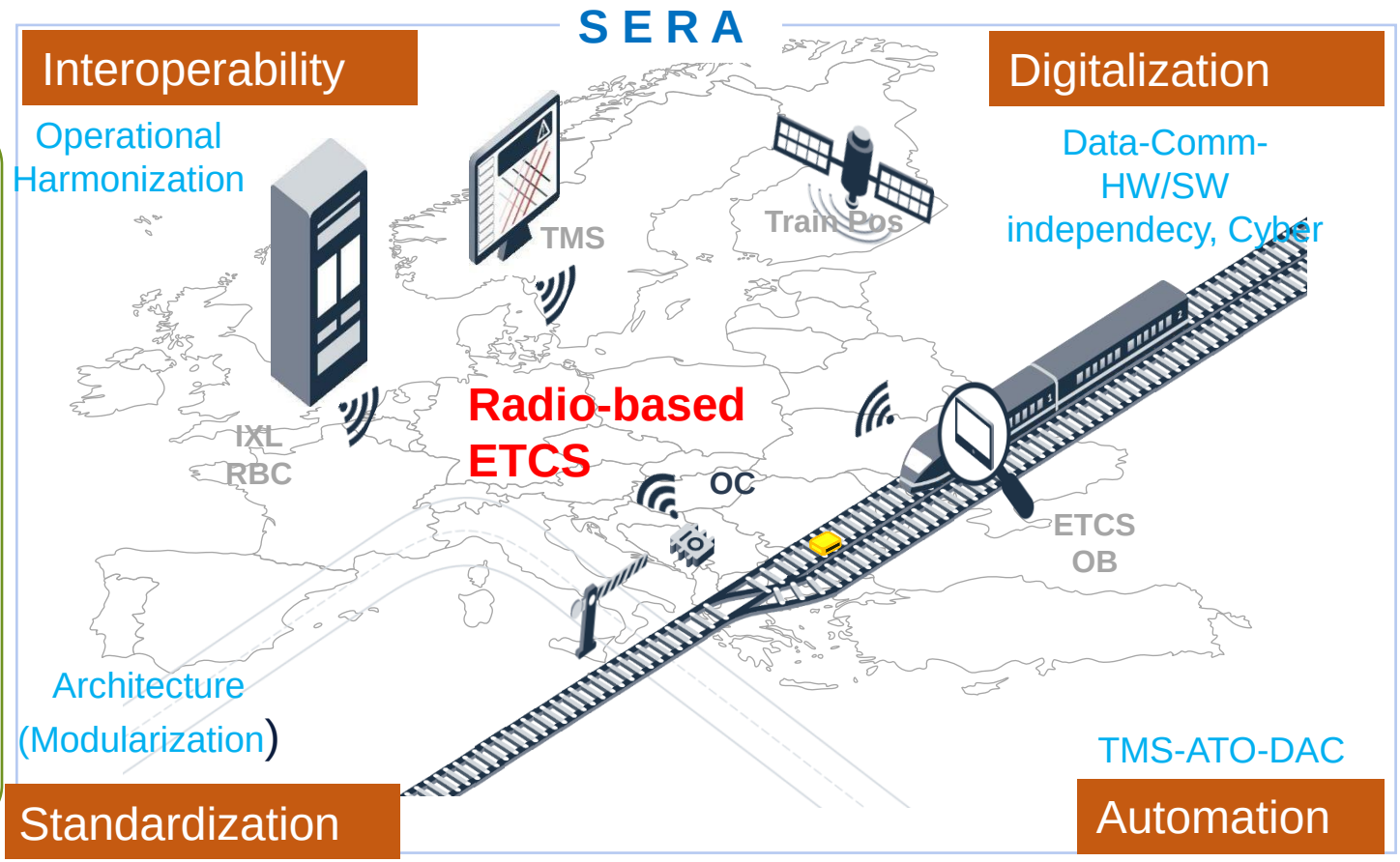
EC, ERA, Member States, and Sector agreed on a dedicated structure - System Pillar - to provide a unique opportunity to allow the Rail sector to converge on a strategic vision for the evolution of the Single European Rail Area (SERA).

System Pillar

MultiYear Program

~ 400 *experts from Sector*

50 *m EU funded*



System Pillar: Basic Concepts / Principles

- CCS/TMS focus (though not restricted to these, also DAC, computing environment, …)

- The target system is based on
  - Advanced traffic management and trackside protection system (radio based ERTMS, FRMCS…)
  - Harmonized standard products with reusable specifications, skills, and systematic modularity, interoperability and upgradeability
  - Harmonized operational rules

- The designed solution need to fulfil the Common Business Objectives

- The architecture is based on modularization standardized principles with an agreed ‘Granularity’

- The single system component (module) has specified standardized interfaces and functions. Each supplier is free to use their own technologies.

System Pillar: General Goals

- Streamline product specification towards uniformity, eliminating 40 national variations.
- Improve product reuse for various European market services, boosting development and competition.
- Reuse expertise to mitigate skilled engineer shortages.
- Introduce modular, upgradable rail components to protect investments and encourage innovation.
- Deploy a simplified, versatile trackside protection system to increase traffic and efficiency while cutting costs.
- Support ATO implementation with remote functionalities and advanced driver support systems.
- Upgrade traffic management with advanced control for precise adjustments.
- Support the advance towards automated digital train coupling.

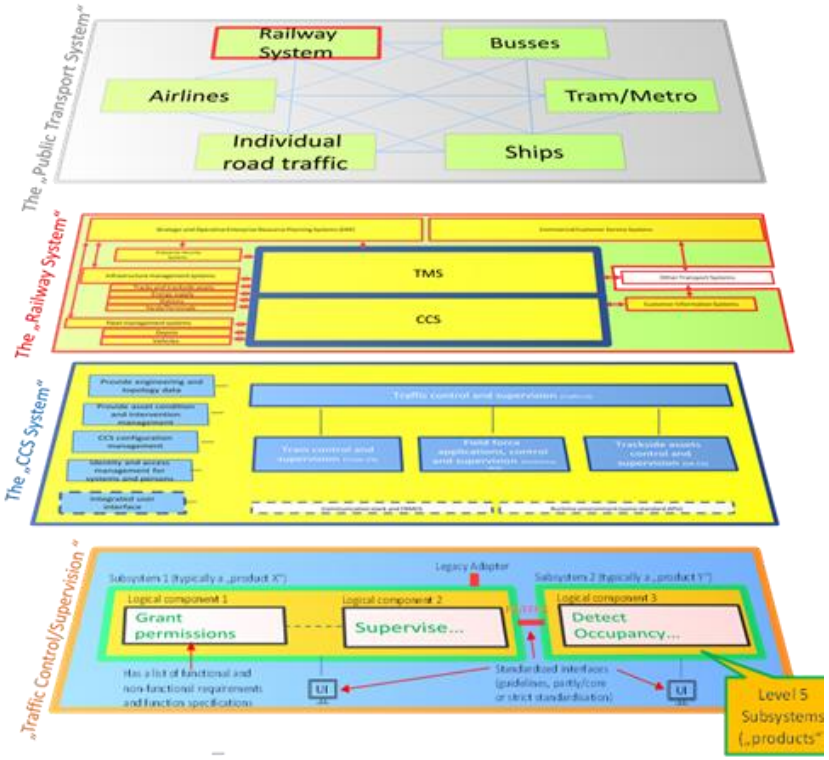
System Pillar: working method

Operational design
- Creating **harmonized operational processes** and define process improvements

Architecture coordination
- Create and maintain **one consistent target architecture** for the whole system

Migration design
- Define migration plateaus that allows **stepwise migration towards European target architecture**

Domain Specification
- Define per System Pillar Task **standardization granularity and related specifications**



The central tasks of the System Pillar are:

1. Define target system architectures and operational concepts.
2. Coordinate and deliver the means for implementation through inputs to Technical Specifications for Interoperability and harmonized standards.

⇒ **The aim is:**

- **Faster processes**
- **Better design**
- **Deeper harmonisation**

System Pillar setup and organization

- Integrated leadership team (*System Pillar Core Group*) with representatives of sector organizations and ERA

- Defined set of standardization areas (*Tasks*). For each area a joint leadership team with one representative from Railways and Suppliers each will work together
  - Task 1 will specify the Business Process Architecture for the Railway System
  - Task 2: Control Command and Signalling
  - Task 3: Traffic Management Systems / Capacity Management Systems
  - Task 4: Digital Automated Coupling/Full Digital Freight Train Operations

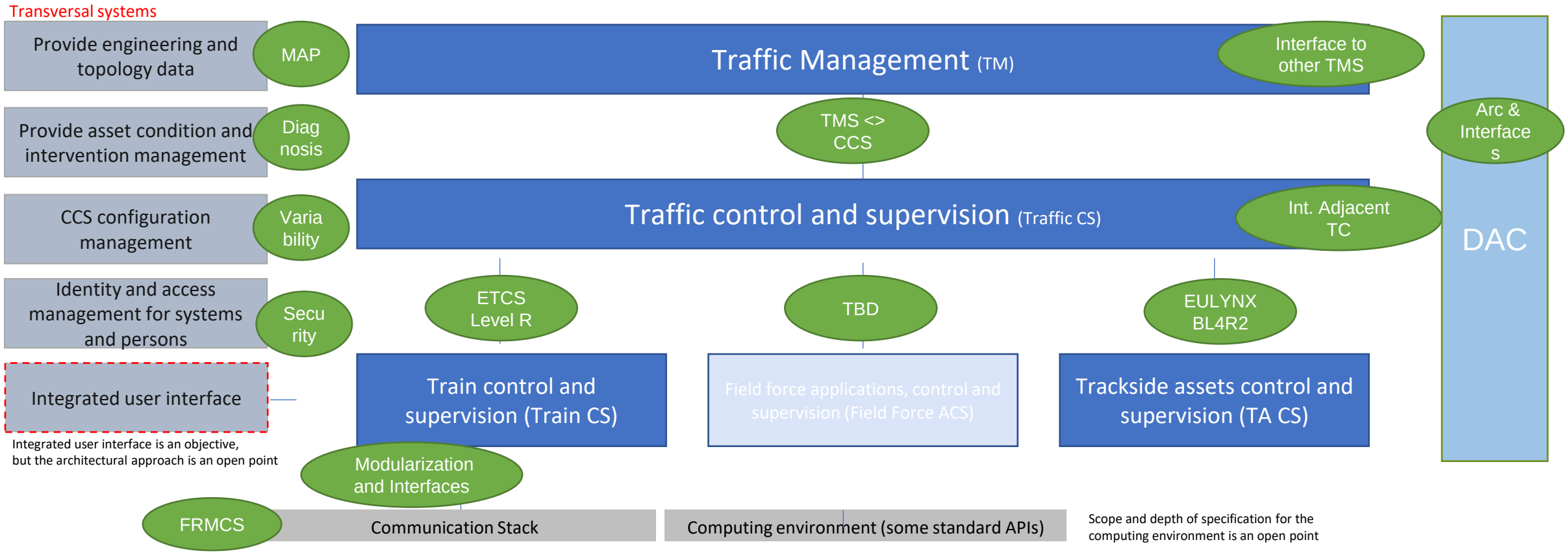
- Integration of sector standardization activities (OCORA, RCA, EULYNX, ERTMS, …)

State of play and first results

Harmonised approach CCS and TMS

'Very High Priority' areas 2023 – 2026

Harmonized operational Concept, Process, Rulebook



System Pillar. Year 1 - *general content*

General, horizontal and Task 1 Railway System

- As-is Rail System Architecture, version 1
- Energy saving in Rail
- System Engineering Management Plan v1 and v2
- Common business objectives
- Operational vision for CCS and TMS
- Safety guidelines for SP work

Task 3. TMS / TCS

- Traffic Management System Concept
- Functional allocation for the major CCS and TMS logical components

Task 4. DAC / FDTFO

- High level requirements for digital coupling concerning integrity and train length
- Analyses for Central Instance
- Alignment with European DAC delivery Programme and FP5

Task 2. CCS

- Operational harmonisation principles and working methods
- Harmonisation concepts for 12 of 31 areas of operational processes
- Principles about the future harmonisation process, e.g., about harmonisation granularity
- Logical architecture and modularity of the vehicle CCS onboard units
- High level requirements and basic logical architecture of the advanced CCS trackside systems
- Interfaces for trackside assets, EULYNX Baseline 4 release 2
- Working hypothesis for the design of the future moving block approach
- Potential harmonized API for decoupling of hardware, operating systems, and software
- First educated draft for a harmonized CCS/TMS data model for interface exchange objects
- Basic rules for secure component specification
- Functional scope of driver assistance systems
- Flexible aggregation of trackside and onboard sensor information for occupation detection
- FRMCS report - Alignment on timing and content of V2 and V3 specifications with UIC, UNITEL, MOVE, ERA and sector

System Pillar. Year 1 - *organisation*

Changing sectoral working practices…..

- Launched a coordinated program for architectural planning, moving from scattered, specialized groups to streamlined efforts.
- Increased resources, involving 250+ participants, to speed up harmonization.
- Railways and suppliers collaborate daily, investing significant resources and knowledge.
- A comprehensive 'systems-of-systems' approach is vital for effective CCS and TMS, beyond just interoperability.
- Implemented a unified work and engineering method, with over 100 participants trained in the system.

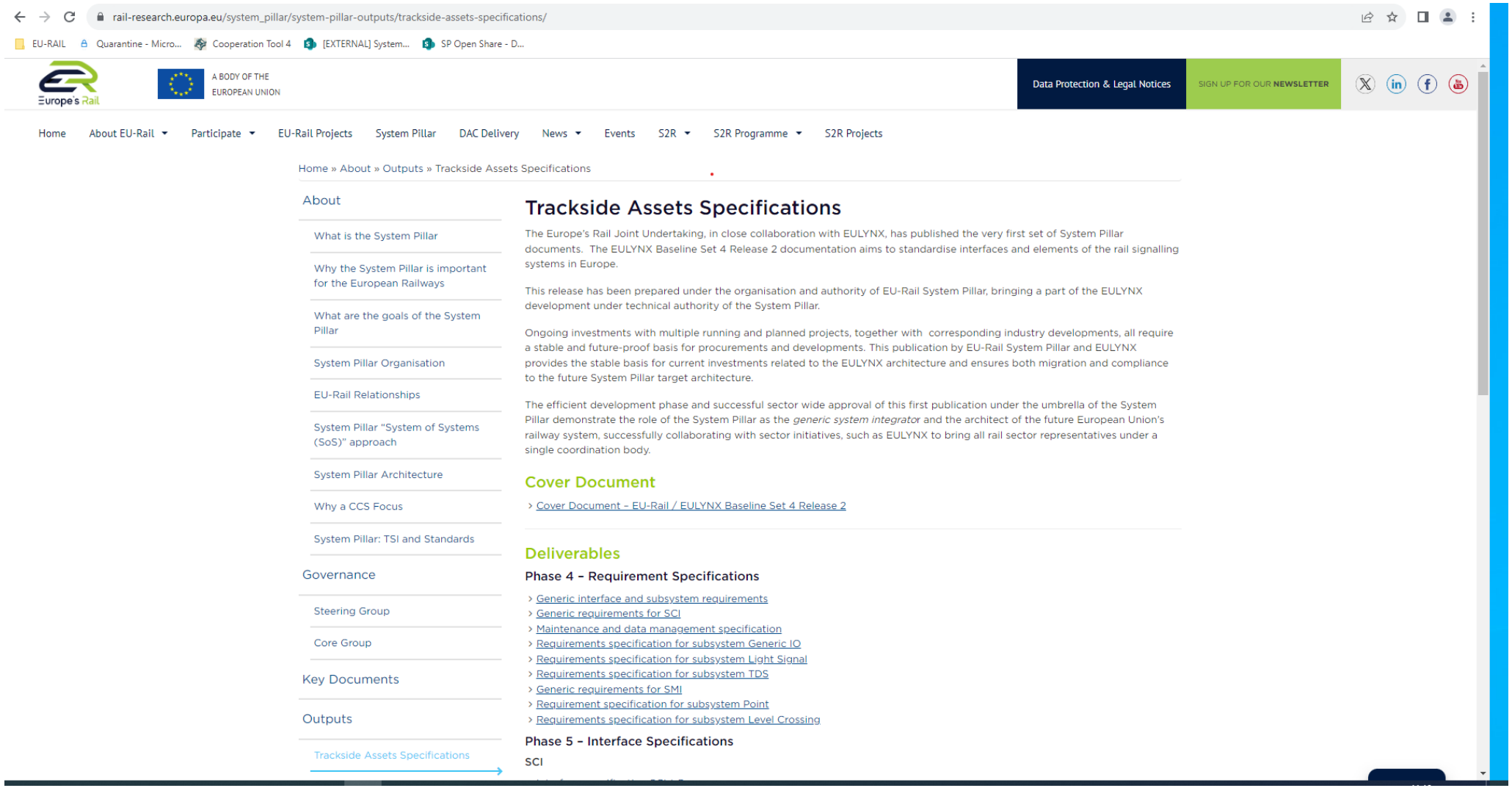
System Pillar. Year 1 - *organisation*

- Governance in place (Core Group, Task and Domain teams, some mirror teams, Steering Group)
- Standardised system of systems approach introduced and adopted
  - System engineering management Plan (SEMP), Version 1 agreed; Version 2 to be adopted at November SP-STG
- Supporting tools introduced (and supported by ERJU)
  - Polarion (platform for Requirements-, Quality-, and Application Lifecycle Management)
  - Capella (model-based system engineering (MBSE) tool)
- EU-rail and harmonisation - document agreed with sector, ERA, MOVE; first Standardisation and TSI Input Plan (STIP) in process
- Process for interaction System Pillar and Innovation Pillar
  - Contributions to Maturity Check Points IP
  - Alignment on DAC: EDDP, SP (task 4) and IP (FP5)
- Inclusion of new subject:
  - Harmonised European Railways Diagnostics (HERD)
- Request for Service (RfS) Lot2, year 2 signed with consortium

Example result: Trackside Assets specifications

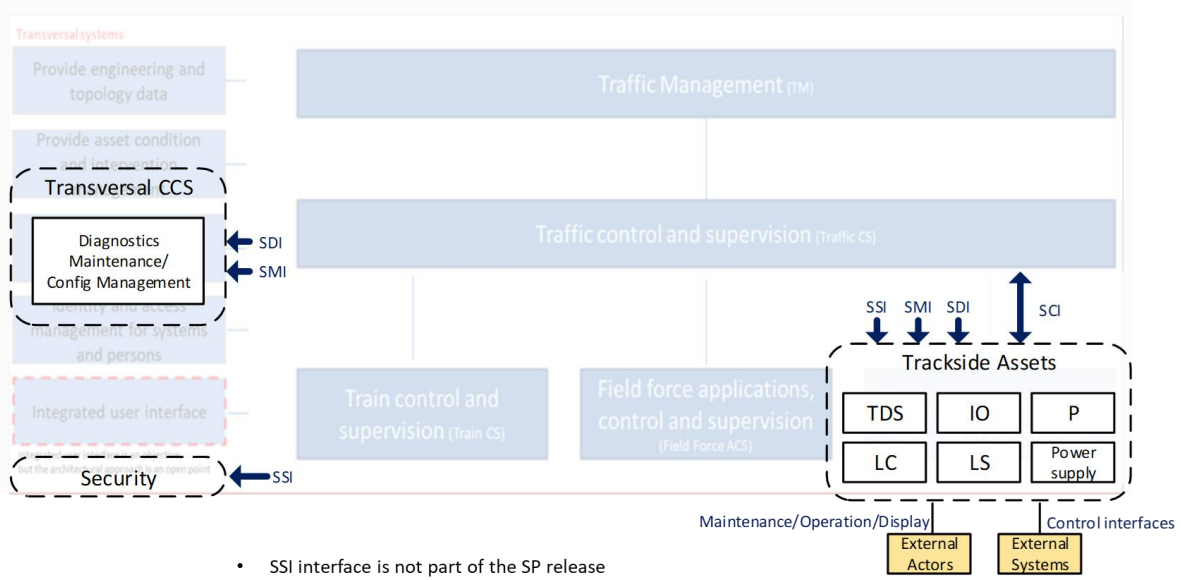
Trackside Assets specification

- Successful publication on 30 June – available on EU-RAIL website



Trackside Assets specification

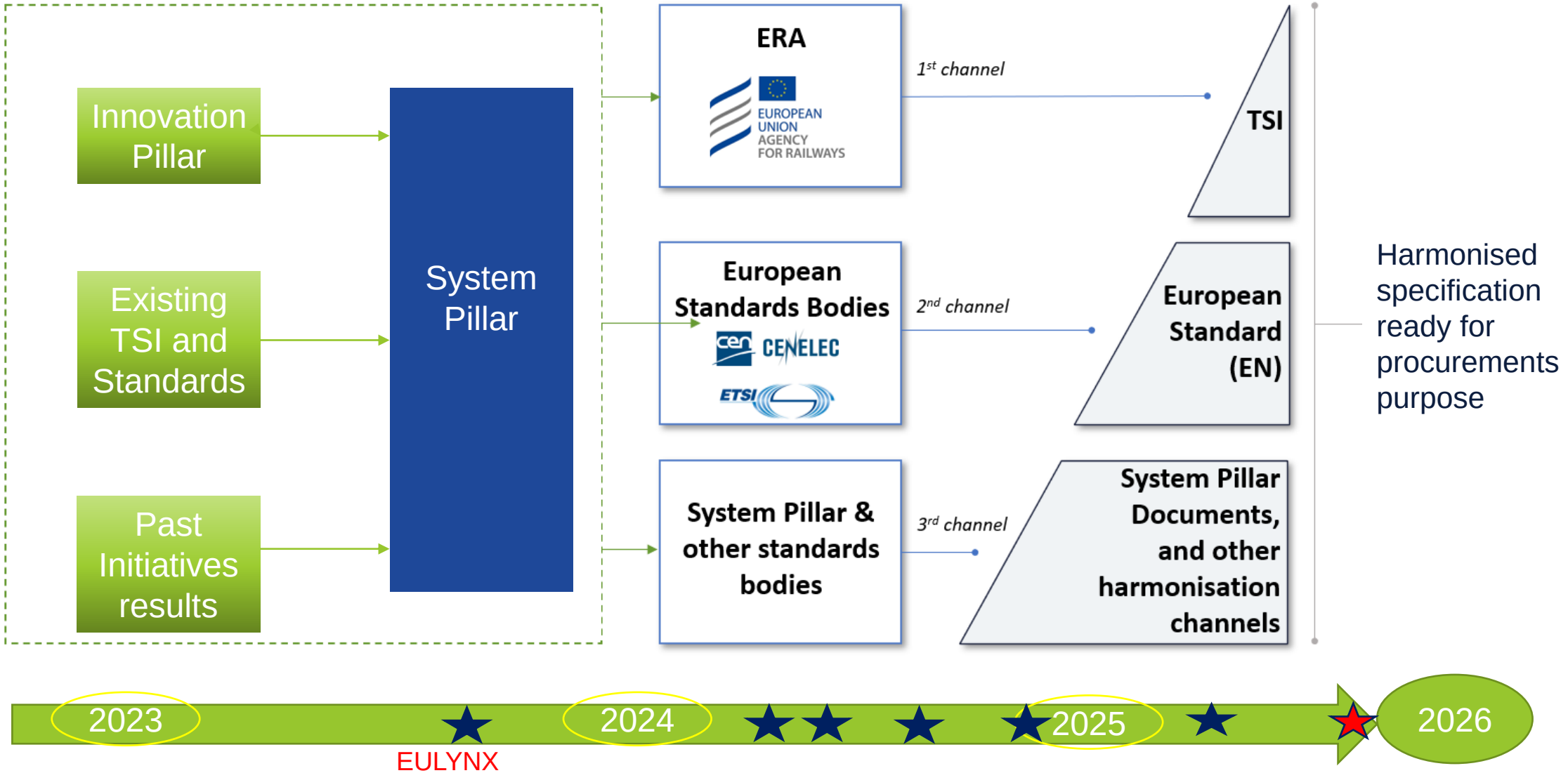
- Trackside Assets Control and Supervision (TACS) domain : Responsible for standardising Trackside Assets, primarily based on the work done by the EULYNX initiative, working in extended working groups based on previous EULYNX clusters.
- The starting point: Sector agreed architecture from the ramp-up phase, EULYNX BL4 Release 1 with pending change requests and outstanding comments, as well as SWOC inputs from S2R
- Result - completion of EULYNX BL4 Release 2 in order to release sector agreed Trackside Assets interface specifications under the technical authority of the System Pillar. Stable and future proof specifications ready for procurement.
- Subsystems and interface specifications: Detailed technical specifications on System Level 5 for defined subsystems and interfaces
  > trackside assets subsystems (object controllers) and interfaces SCI, SDI, SMI
  > transversal functions for diagnostics, maintenance and config. management
- Integrated infrastructure manager change requests
- Resolved and integrated all review comments and resulting change requests from UNIFE issued against
  EULYNX BL4 Release 1 or older baselines
- Delivery of Trackside Assets subsystem requirements
  specifications and interface specifications
  > 24 deliverables



- SSI interface is not part of the SP release
- Power supply standardisation will be evaluated in later phases

Standardisation and TSI Input Plan

System Pillar Standardization & TSI deliverables



STIP objectives

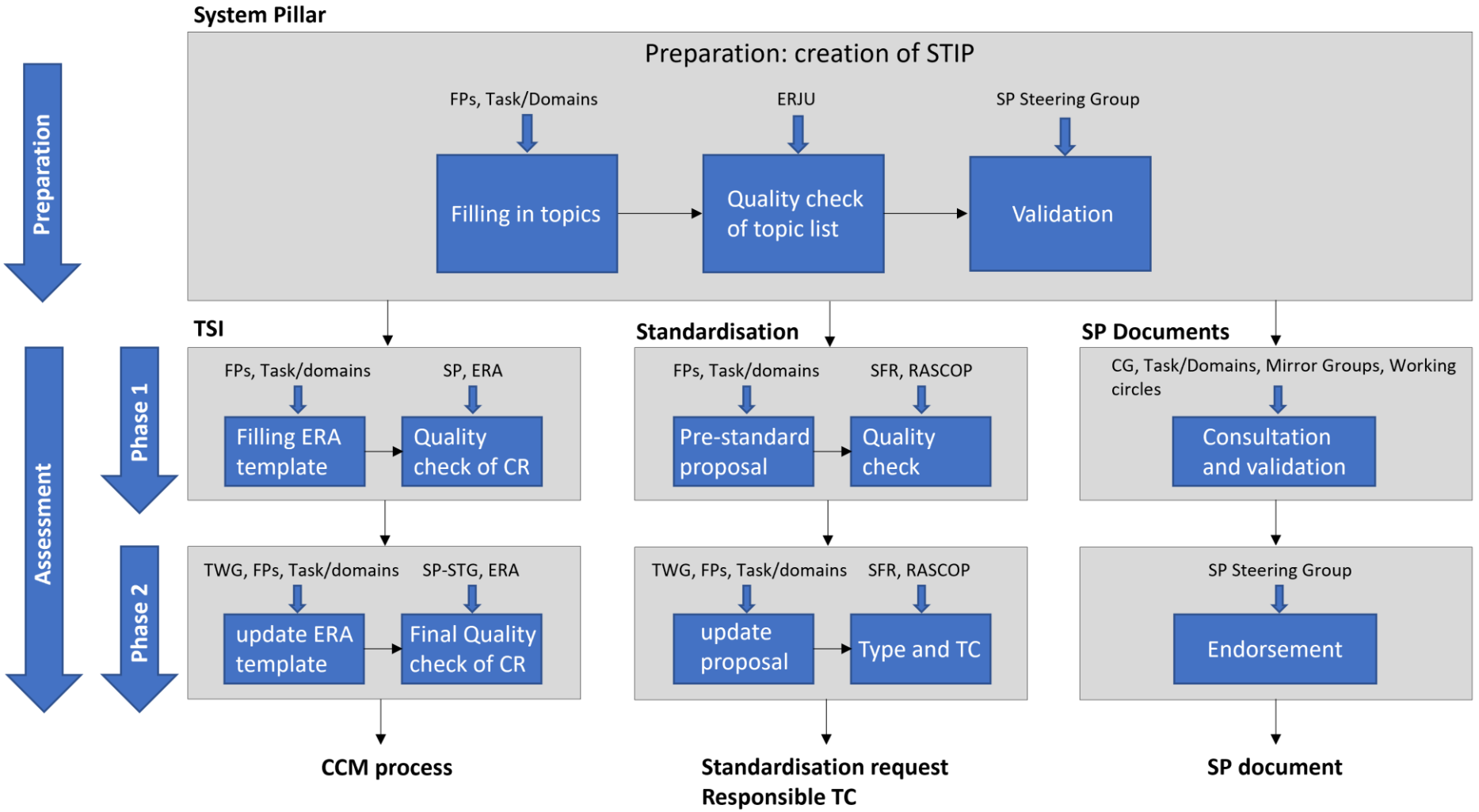
- The System Pillar will coordinate the harmonisation outputs and needs from the EU-RAIL programme in the Standardisation and TSI Input Plan (STIP)

- The aim is to provide a validated and complete view of the harmonisation outputs of EU-RAIL
  - Endorsed by the sector, DG MOVE, ERA, European standardisation bodies
  - To provide a strategic alignment of the EU-RAIL outputs with the TSI and European standardisation revision processes

- The process aims to support the delivery of mature input to harmonisation channels respecting existing processes, their ownership, and legal status.

⇒ Aim is to bridge the gap between R&I activities and harmonisation processes

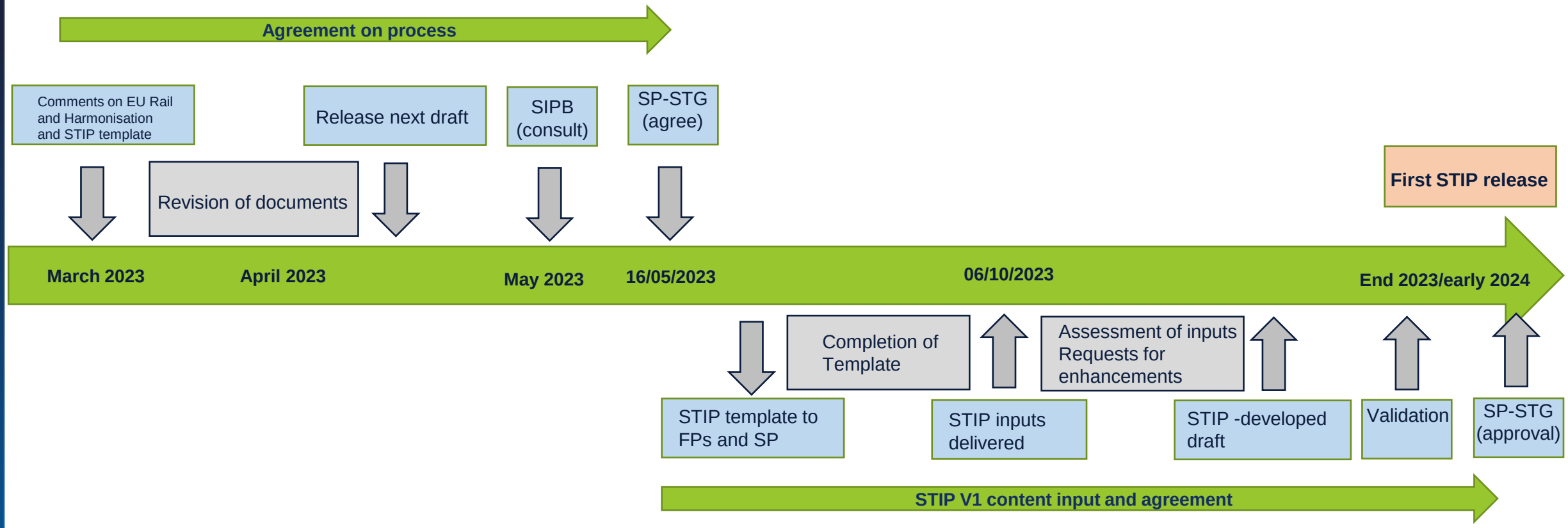
STIP process



- Collection of topics delivered by FPs and task/domains
- Quality check by ERJU (supported by CG, horizontal domain)
- Discussion and validation in Steering Group

- Topic descriptions sent to CCM and SFR/RASCOP
- Assessment of proposals
- Update by FPs and task/domains

Preparation of first STIP release



Ingredients for future success

System Pillar: Ingredients for success 1/2

- Focus on what makes sense to be harmonised at European level
  - Harmonised operational processes and rules
  - Harmonised modular architecture and interfaces

- Close coordination between
  - Railways (RU and IM) and suppliers
  - Sector and ERA / DG MOVE

- Leverage existing deployment and work into solutions applicable at European level

- Interaction with (national) deployment & migration plans and Innovation Pillar.

- Commitment
  - sufficient and experienced resource
  - decisions being made are agreed at company level
  - the outputs being developed to be tested and used

System Pillar: Ingredients for success 2/2

- Clear vision on target architecture and goals

- No surprises:
  - Standardisation and TSI input plan
  - Transparent way of working

- Early use of results
  - Align with national approaches
  - Co operation with industry

- Alignment of big sector changes:
  - Implementation of moving block
  - Introduction of FRMCS
  - Introduction of DAC and FDFTO
  - Specification of ATO GoA 3/4
  - Standard interface between TMS and CCS

IMPLEMENTATION OF THE EU-RAIL PROGRAMME – SYNERGIES BETWEEN FLAGSHIP PROJECTS, EXPLORATORY RESEARCH AND SYSTEM PILLAR

Léa Paties *- Senior Programme Manager, Europe's Rail Joint Undertaking*

Sébastien Denis *- Senior Programme Manager, Europe's Rail Joint Undertaking*

Javier Ibáñez de Yrigoyen *- Senior Programme Manager, Europe's Rail Joint Undertaking*

Alignment between FPs (1/3)

FP1/FP2

- Collaboration (Input/Output) to be mainly focused on ATO and MB

FP1/FP3

- Collaboration (input/output) to be mainly focused on TMS, CDM

FP1/FP5

- FP1 - MCP: Alignment regarding Data Exchange, Planning and Yard Operations ongoing
- Seamless-FP5 Input for FP1 reflected in the D25.1 (Req. for Seamless Freight) and D25.2 (Requirements for planning and operations)
- Next action and processes are clearly defined and follows an agreed structure

FP1/FP6

- FP6 – MCP: 18 September and FP1 - MCP: 28th of November
- Identification of topics and assignment of experts from both FPs per topic
- Timeline re-steering with one deliverable identified – mitigation ongoing

Alignment between FPs (2/3)

FP2/FP6

- FP6 – MCP: 18 September and FP2 – MCP: 09th of November
- Timeline re-steering required for some deliverables – mitigation ongoing
- Planning of Regional demonstrators with FP2 prototypes - joint analysis ongoing

FP3/FP4

- Collaboration (Input/Output) on N&V data collection from FP3 for FP4

FP4/FP6

- FP6 – MCP: 18 September
- Technical interfaces established
- Specific interaction for refuelling station topic in place

Alignment between FPs (3/3)

FP3/FP5

- Alignment is focusing on Intelligent Video Gates / Standardized European Railway Checkpoints in the first phase of Europe´s Rail.
- Seamless-FP5 Input for FP3 like specifications of video gates are reflected in the FP5-D25.3 to feed in FP3-D7.1
- Agreement on implementation on a cross-functional team under the leadership of either HERD or SP Task 4 for freight traffic applications
- Agreement how to handle the interaction on CBM algorithms between FP3/FP5 in the updated MAWP

FP2/FP5

- Topics and time plan for alignment between FP5 – Automatic Shunting Operations and FP2 – Automation Processes Cluster described in FP2 - D4.1 Collaboration Map
- Focus topics for alignment: Use cases, remote control, Interfaces and protocols
- Expert exchange is ongoing on a regular basis

Alignment between FPs and SP (1/2)

SP/FP1

- Quarterly meeting between SP and FP1
- Focus on CMS/TMS and alignment on demonstrations (incl.RNE)
- TT: alignment ongoing on data formats and data exchange

SP/FP2

- Quarterly meeting between SP and FP2 (last workshop on 29/30 November)
- Alignment on ATO architecture (baseline 0 defined)

SP/FP3

- Initial exchanges between SP and FP3. See FP3/FP5 status

SP/FP4

- Quarterly meeting between SP and FP4

Alignment between FPs and SP (2/2)

SP/FP5

- Bi-Weekly exchange between FP5, SP and EDDP
- Focus topics: Development of general target operational procedures, Central Instance Management of data & software (updates), Appropriate storage of vehicle data related to DAC/FDFTO retrofit, standardisation and TSI input plan
- Intensive contribution of FP5 project members to System Pillar Task 4

SP/FP6

- FP6 – MCP: 18 September
- Definition of focus areas and assignment of experts
- Use cases, requirements and architecture concept from FP6 taken as input for technical interaction

COMMUNICATION AND DISSEMINATION PLAN

Catherine Cieczko *- Chief Stakeholder Relations and Dissemination, Europe's Rail Joint Undertaking*

Zanda Litvina *- Communication and Finance, Europe's Rail Joint Undertaking*

Key 2023 Communication and Dissemination Activities

2023 activities

Communication and dissemination

- ✓ **Dissemination of project results**
  - Support to FPs with Communication & Dissemination Strategies, creation of Teams environment
  - Promotion of closing Shift2Rail projects' demo activities across Europe
  - Developing a concept for the legacy of Shift2Rail projects
- ✓ **Campaigns**
  - European Year of Skills videos
  - Article series on new FPs
- ✓ **Website**
  - Section on EU-Rail projects developed
  - Work on analysis of website structure and new landing page launched
- ✓ **Publications**
  - Annual Activity Report, HSR study
- ✓ **Media relations**
  - Articles in BtoB magazine and IRJ on S2R legacy

2023 activities

Main events organised :

- ✓ **Launch of the High-Speed Rail Study** – 23 January
  - In collaboration with ALLRAIL, CER and UNIFE organised a press event dedicated to the launch of the joint high-speed rail study. The event gathered more that 100 online participants and a strong interest from media.
- ✓ **UIC High-Speed Rail Summit** – 7-10 March
  - 9sqm stand and attracted European and international visitors
  - Presentation on the key results of the joint High-Speed Rail Networks study
- ✓ **SIFER** – 28-39 March
  - 12sqm stand near several Founding Members
  - Masterclass on energy efficiency in the rail sector
- ✓ **UITP Public Transport Summit** – 4-7 June
  - 36sqm stand near several Founding Members
  - Four different demos from the Shift2Rail programme relevant to public/urban transport
  - Participation to panels, spotlight sessions and projects' final event
  - Stakeholder relations with representatives from Founding Members, academia, EC, UITP, ITF, journalists, EU Global Gateway

2023 activities

Main events organised :

- ✓ **Space for Innovation in Rail** – 13-14 September
  - Two day event with high-level keynote speeches from the ES Presidency, EC, FMs

- ✓ **Info Day 2023** – 4 October
  - Promotion of Call 2023 topics via a webinar with matchmaking sessions (180 participants)
  - Joint communication campaign (press release, social media) with SESAR 3 JU on the common topic
  - B2Match platform open until Call closure and various advertisements
  - Participation of French and Turkish dedicated info-days

- ✓ **European Startup Prize for Mobility** – 26 October
  - Hosted by the Chair of TRAN Committee, Ms Karima Delli
  - Participated in a high-level roundtable + awarded special prize on Digital and Green Rail Mobility to 'RAILwAI'

- ✓ **Rail Live** – 29 November – 1 December
  - stand in the main exhibition hall, promoting Call 2023 and running EU-Rail projects
  - Participation in 3 presentations/panels

Activities launched in 2023 with impact on 2024

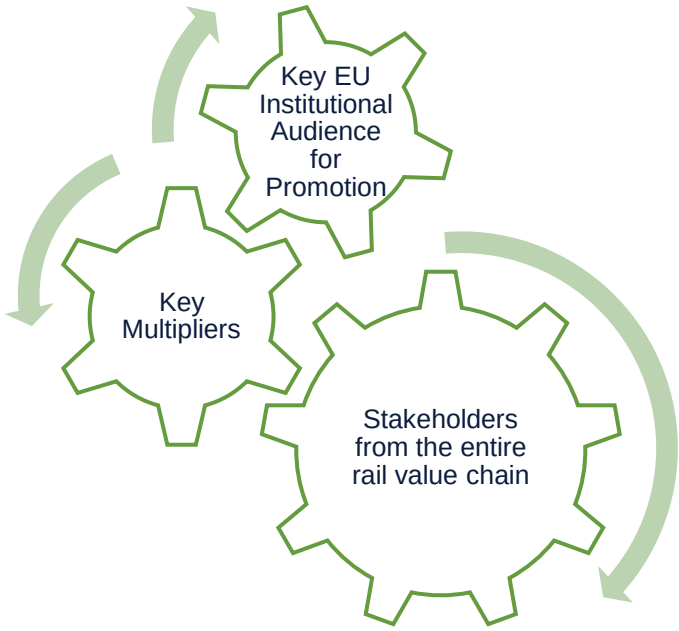
- InnoTrans 2024
  - Joint stand with ERA, DG MOVE – procurement in process
  - Preparation of stand demos and side events
- TRA 2024
  - Joint stand with Clean Hydrogen, Clean Aviation and Sesar JUs – procurement in process
  - Participation in a Strategic Session ‘Connected, Cooperative and Automated Mobility’
  - Supporting the TRA Visions Young Scientists Competition and ERRAC
- Website revamp
  - launching procurement for website analysis in 2023;
  - Implementation of the results of the analysis to take place in 2024. Final website to be done before InnoTrans 2024
- Dissemination – R&I outputs
  - S2R R&I outputs on ‘Energy’ currently in progress
  - Factsheets/articles/social media campaign on the results from clustered S2R R&I results to be prepared in 2024
  - Updated digital Catalogue of Solutions to be presented in InnoTrans 2024

Communication and dissemination plan 2024

Communication

Objectives

- ✓ Raising awareness about the JU among key stakeholders across Europe from the rail sector and beyond
- ✓ Support and promote the recognition of the JU's results at global level
- ✓ Promote stakeholder engagement
- ✓ Promote the JU within the EU Institutional arena
- ✓ Lead a coherent dissemination strategy
- ✓ Pro-actively publish communication material at corporate level and from projects
- ✓ Expand the network of press and media contacts
- ✓ Manage and revamp the EU-Rail website



Harnessing synergies

Dissemination

Objectives

✓ **Disseminate results of projects and activities focusing on:**

- The innovative solutions developed under S2R
- The future solutions coming from EU-Rail

✓ **Lead a coherent communication and dissemination campaign**

✓ Maintaining relationships with and advising existing projects

✓ Building relationships and guiding new projects

Goals

✓ Highlight the added value of R&I activities

✓ Inform on the new Calls for Proposals and the projects resulting from the Calls

✓ Inform stakeholder groups on the progress of EU-Rail projects and their added value for the European rail and broader transport sector

Dissemination channels

✓ Website

✓ Press releases

✓ Newsletters

✓ Mailshots

✓ Presentations at internal and external stakeholders' events

✓ Rail press

✓ Social media

Stakeholder Relations

Goal

✓ Ensure the involvement of stakeholders **from the entire rail value chain**, including actors from outside the traditional rail sector.

EU Institutional Arena Target Audience

- the European Parliament
- the Council (with particular attention to the rotating presidencies)
- policymakers in EU Member States,
- the Committee of the Regions,
- the European Economic and Social Committee
- other EU bodies, such as the European Union Agency for Railways (ERA), the European Environmental Agency (EEA), the European Agency for the Space Programme (EUSPA) and other Joint Undertakings.

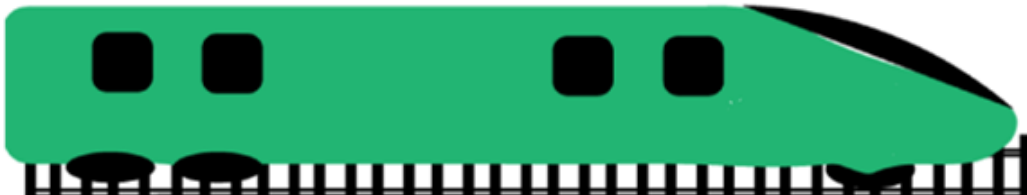
Key Multipliers

- JU Founding Members, including JU project coordinators, corporate communication managers and project participants, who will communicate the success of the JU to various audiences;
- Presidencies of the European Union;
- ERRAC members, including policy makers and decision-makers;
- Members of the Scientific Steering Group (SSG);
- Members of the States' Representatives Group (SRG);
- Wider stakeholders reached through EU-Rail Information days and online channels Global stakeholders present at key events, within and outside the Union;
- European railway associations, including those in relation to passengers and staff;
- Media, including rail and general (Euractiv, Railway Gazette, IRJ, BtoB Rail, Global Railway Review, Horizon Magazine, etc.);
- EU-Rail staff acting as ambassadors.

Activities in 2024 (draft)

- Editorial & Publications
  - AAR 2023
  - Website articles
    - Promoting results coming from S2R and EU-Rail projects
  - Corporate Video
  - Social Media
- Dissemination
  - Digital and Interactive Third Edition of the Catalogue of Solutions
  - Shift2Rail legacy
  - Promotion of success stories through different channels
  - Optimisation of Microsoft Teams Environment
- Website migration and revamp
- Events
  - General Assembly, Info Day 2024, InnoTrans, TRA, Connecting Europe Days, etc.
- Internal Comms

Events 2024



Call 2024 Info Day
Online
January

InnoTrans
Berlin
Sept
24-27

ITF Summit
Leipzig
May

Transport Research Arena (TRA)
Dublin
April
15-18

Connecting Europe Days
Brussels
April
2-5

European Startup Prize
October

UN Climate Change Conference
November

General Assembly Of the JU
December

JUs European Parliament Event
December

CLOSING WORDS

Giorgio Travaini

Executive Director ad interim

Europe’s Rail Joint Undertaking

Founding Members