Europe's Rail Joint Undertaking

The role of EU-Rail in delivering transformation in Freight

RAIL LIVE 2023, Madrid
30 November 2023

What is EU-Rail about?

VISION

To deliver, via an integrated system approach, a high capacity, flexible, multi-modal, sustainable and reliable integrated European railway network by eliminating barriers to interoperability and providing solutions for full integration, for European citizens and cargo

MISSION

Rail Research and Innovation to make Rail the everyday mobility
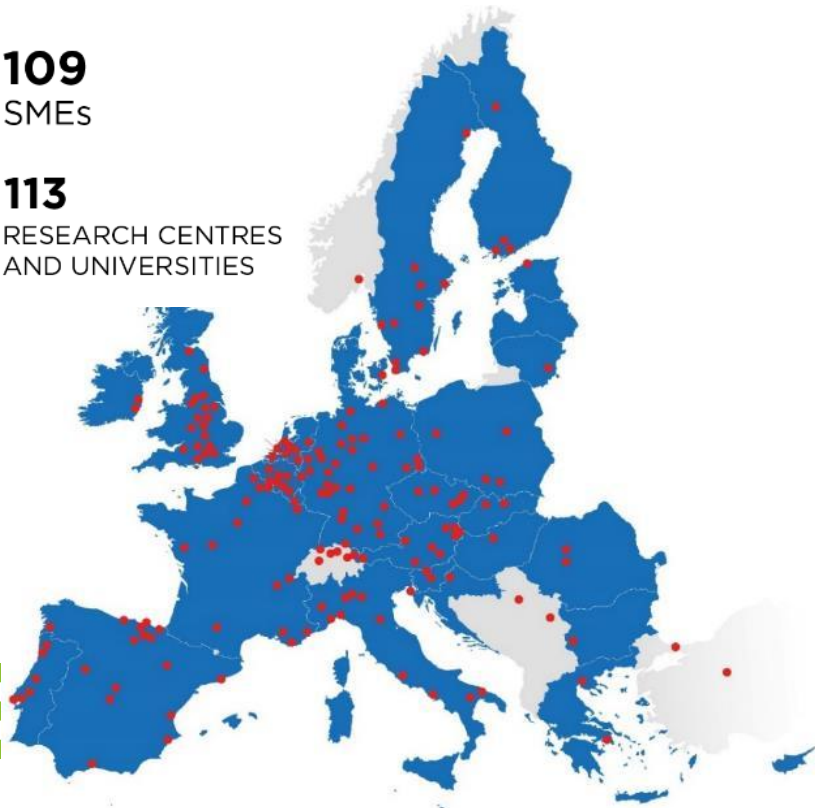
What is EU-Rail built on?

Shift2Rail R&I programme

28 MEMBERS

412 PARTICIPANTS

29 COUNTRIES

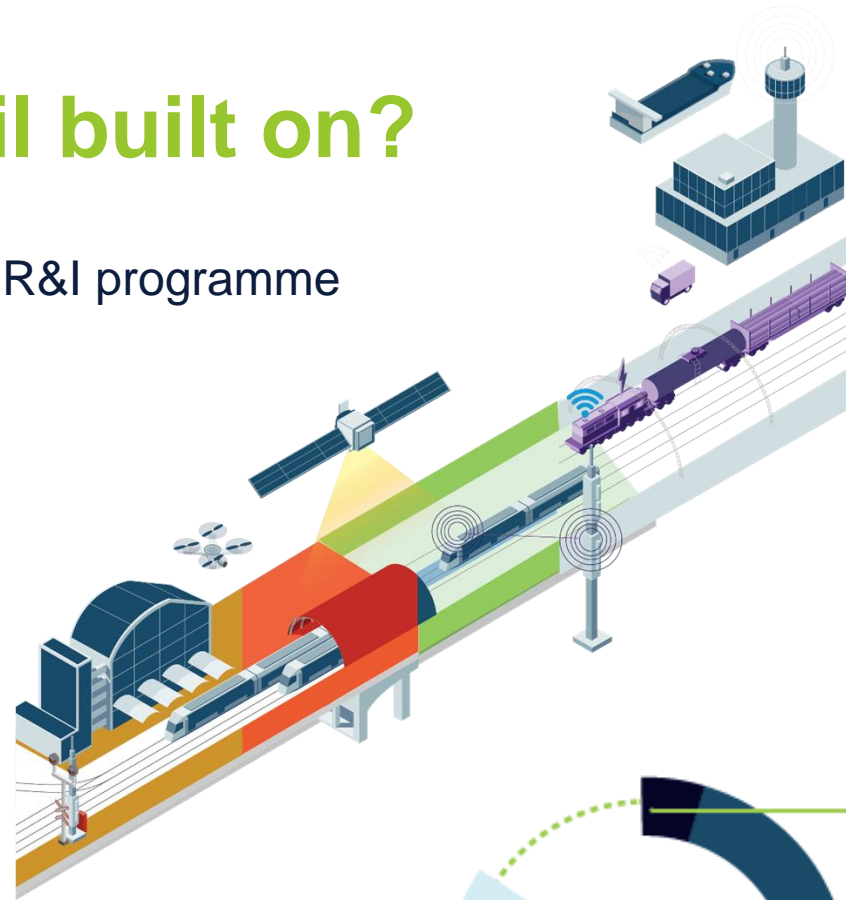**109** SMEs

113 RESEARCH CENTRES AND UNIVERSITIES

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

€ 920 MILLION

2015 - € 52 M SHIFT2RAIL INITIATIVE LIGHTHOUSE PROJECTS
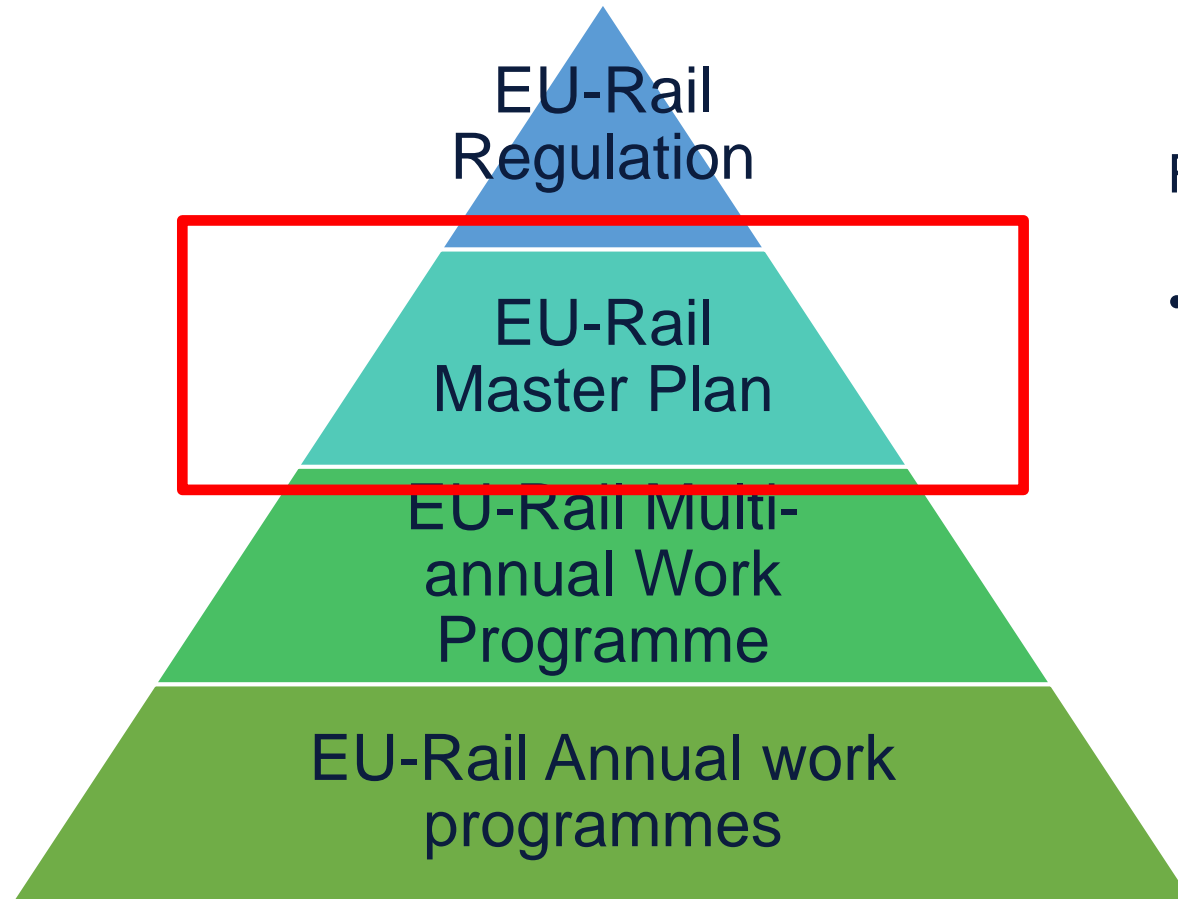
2016 – € 168 M 27 PROJECTS

2017 – € 112 M 17 PROJECTS

2018 - € 153 M 19 PROJECTS & 3 TENDERS

2019 - € 150 M 17 PROJECTS & 4 TENDERS

2020 - € 152 M (yet to be awarded) 19 TOPICS, 3 TENDERS & 1 PRIZE

EU-Rail Programme approach

EU-Rail
Regulation

EU-Rail
Master Plan

EU-Rail Multi-
annual Work
Programme

EU-Rail Annual work
programmes

Focus on the

- **MP:** A common, forward-looking roadmap based on a system view, presenting the areas of intervention within the scope of the Joint undertaking; Give guidance on how to invest the €1,2 billion (EU funding 50%); Based on two integrated pillars, System and Innovation Pillars, complemented by the Deployment Group

Expected system impacts from the EU-Rail Programme

- Meeting evolving customer requirements

- Improved performance and capacity

- Reduced costs

- More sustainable and resilient transport

- Harmonised approach to evolution and greater adaptability

- Reinforced role for rail in European transport and mobility

- Improved EU rail supply industry competitiveness

DELIVER AN INTEGRATED EUROPEAN RAILWAY NETWORK BY DESIGN

DEVELOP A UNIFIED OPERATIONAL CONCEPT AND A FUNCTIONAL SYSTEM ARCHITECTURE FOR INTEGRATED EUROPEAN RAIL TRAFFIC AND CCS/AUTOMATION

DELIVER A SUSTAINABLE AND RESILIENT RAIL SYSTEM

DELIVER A COMPETITIVE, GREEN RAIL FREIGHT FULLY INTEGRATED INTO THE LOGISTICS VALUE CHAIN

DEVELOP A STRONG AND GLOBALLY COMPETITIVE EUROPEAN RAIL INDUSTRY

EUROPE'S RAIL:
ONE INTEGRATED R&I PROGRAMME

SYSTEM PILLAR

OPERATIONAL CONCEPTS

FUNCTIONAL SYSTEM ARCHITECTURE

A SINGLE COORDINATING BODY FOR THE WHOLE SECTOR EVOLUTION

OPEN INTERFACES TO OTHER TRANSPORT MODES AND BUSINESSES

SYSTEM REQUIREMENT SPECIFICATIONS

INNOVATION PILLAR

TECHNOLOGICAL AND OPERATIONAL SOLUTIONS FOR SERVICES OF FUTURE

FLAGSHIP PROJECTS

LARGE-SCALE DEMONSTRATIONS

EXPLORATORY AND FUNDAMENTAL R&I

1 EUROPEAN RAIL TRAFFIC AND MOBILITY MANAGEMENT
- Manage and improve rail traffic at EU level
- Adjust rail traffic management in function of the mobility demand

2 DIGITALISATION & AUTOMATION IN TRAIN OPERATIONS
- ATO implementation
- Digital train operations

3 SUSTAINABLE AND DIGITAL ASSETS
- Integrated assets testing & life-cycle framework
- Zero-emmission, silent rail system

4 COMPETITIVE, DIGITAL, GREEN RAIL FREIGHT
- New digital customer interaction & innovative rail freight services
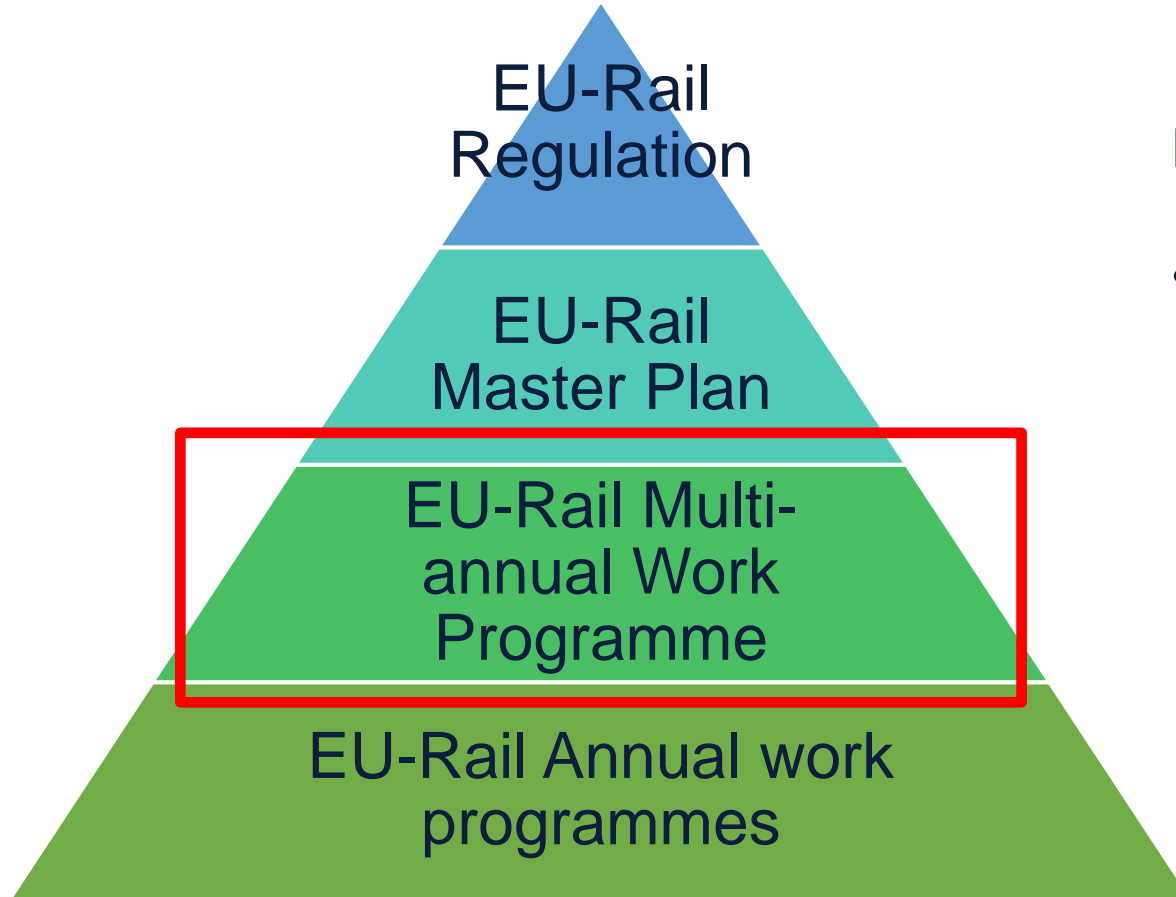- Multimodal and rail freight innovation integration

5 REGIONAL RAIL SERVICES IN LOW DENSITY AREAS
- New system approach to regional rail services in low density areas

DEPLOYMENT GROUP

FUTURE SOLUTIONS DEPLOYED IN A COORDINATED AND CONSISTENT WAY AT EUROPEAN LEVEL, TAKING INTO ACCOUNT ALTERNATIVE ROLLOUT SCENARIOS, BEHAVIOURAL AND ORGANISATIONAL CHANGES, SYNERGIES WITH OTHER MODES OF TRANSPORT

Navigating the EU-Rail key documents of a Programme approach

EU-Rail Regulation

EU-Rail Master Plan

EU-Rail Multi-annual Work Programme

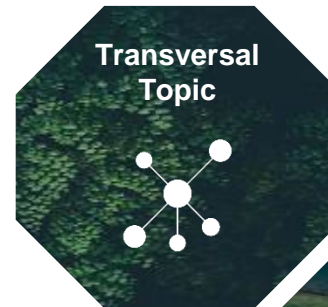EU-Rail Annual work programmes

Focus on the

- **MAWP:** It defines how the EU-Rail JU has designed its R&I activities to achieve the general and specific objectives set out in the SBA through an Integrated Programme:
  - *System Pillar (tasks)*
  - *Innovation Pillar*
    - *7 Flagship Areas + TT*
    - *Exploratory and Other activities*
  - *Deployment group*

EU-Rail Multi-Annual Work Programme

Network management planning and control & Mobility Management in a multimodal environment

Network management planning and control (new processes and automation for decision support) & rail management in a multimodal environment (real-time demand-driven operations, including demand from other transport modes)

Digital & Automated up to Autonomous Train Operations

Digital "Automated & Autonomous" Train Operations building upon the next gen Automatic Train Control based on ERTMS + enhancements on TCMS for integration at the on-board level

Intelligent & Integrated asset management

Knowledge from the digital transformation will feed back into the design, construction, manufacturing as well as into operation and maintenance processes.

A sustainable and green rail system

Innovative solutions and services based on leading edge technologies to minimize the overall energy consumption and environmental impact of the railway system

Digital Enablers

Provide Digital Twins Design toolbox for design as well as for validation, verification and test + a Federated dataspace where all digital elements of the system can play together in a coherent and interoperable way

Innovation on new approaches for guided transport modes

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

Regional rail services / Innovative rail services to revitalise capillary lines

Decreasing cost while offering a high quality of service and operational safety + increase customer satisfaction and attractiveness

Sustainable Competitive Digital Green Rail Freight Services

Digitalization and automation of operational functions (e.g. DAC) and processes as well as increasing the efficiency of the immaterial (information/data) layer of transport in logistic

FA1 - TMS+

Transversal Topic

FA2 - ATO+

FA7- new approaches

FA3 - Assets Mngt

FA6 - Regional services

+ Exploratory Research and other activities

FA4 - Green Solutions

FA5 - Freight

EU-Rail Call 2022-1

DESTINATION Topics	Type of Action	Expected TRL	Expected EU contribution per Project (EUR million)	Number of projects expected to be funded
			Opening: 10 March 2022; Deadline: 23 June 2022	
HORIZON-ER-JU-2022-FA1-TT-01	IA	5 to 7	38.0	1
HORIZON-ER-JU-2022-FA2-01	IA	5 to 7	54.3	1
HORIZON-ER-JU-2022-FA3-01	IA	5 to 8	46.3	1
HORIZON-ER-JU-2022-FA4-01	IA	5 to 7	38.3	1
HORIZON-ER-JU-2022-FA5-01	IA	5 to 8/9	40.6	1
HORIZON-ER-JU-2022-FA6-01	IA	5 to 7	16.5	1

Call structure (see also annex VII of the EU-Rail Work Programme 2022 2024):

❖ **Destination:** indicates the objectives as well as clear and quantified targets in term of KPIs to be reach with the R&I activities.

❖ **Expected outcome**: describes the expected demonstrations, the expected preparatory works to be launched for the future set of demonstration foreseen in the MAWP and the input/output expected with the linked actions from other Destinations.

❖ **Scope:** identifies the expected capabilities/enablers that should be developed through R&I activities for achieving the expected demonstrators. It also highlight other requirements, as the need to measure and monitor KPI, contribute to standards and interact with the System Pillar activities.

Programme overview
Innovation Pillar

EU-Rail Call 2022-1

Flagship Area Projects

FP1 – MOTIONAL:

92M € Total Project Cost; 87 total partners; Duration: 46 months

FP2 - R2DATO:

160M € Total Project Cost; 72 total partners; Duration: 42 months

FP3 – IAM4RAIL:

104M € Total Project Cost; 94 total partners; Duration: 48 months

FP4 – RAIL4EARTH:

96M € Total Project Cost; 71 total partners; Duration: 48 months

FP6 – FUTURE:

35M € Total Project Cost; 21 total partners; Duration: 48 months

Flagship Area 5: Sustainable Competitive Digital Green Rail Freight Services

FP5- TRANS4M-R

100M € Total Project Cost
71 total partners
Duration: 45 months (July 2022 - March 2026)

FP5-TRANS4M-R divided into two work streams with focus on DAC development and deployment preparation

Competitive Digital Rail Freight Services: Transforming Rail Freight in Europe

Full Digital Freight Train Operation

- **Demonstration of Digital Freight Trains** in **2025** with DAC Type 4 & 5 incl. Energy and Data Supply, Hybrid Coupler and automated brake test **(TRL 8)**
- Preparing further development of **Full Digital Freight Train** incl. Distributed Power, EP-Brake for further **Demonstrators** in 2027 and 2030 **(TRL 7-8)**
- Development of systems and solutions for **automated shunting operations (TRL 7)**

Seamless Freight

- **Real-time data management and processing** to improve cross-border timetable planning, timetable management and train path ordering **(TRL 6-8)**
- Development of **standardised railway checkpoints** to automate handover controls using e.g. sensors, videogates and handhelds **(TRL 8)**
- Development of **dynamic yard/terminal management** systems **(TRL 6)**

Total Work-Stream Costs 2022 to 2026: EUR 80m
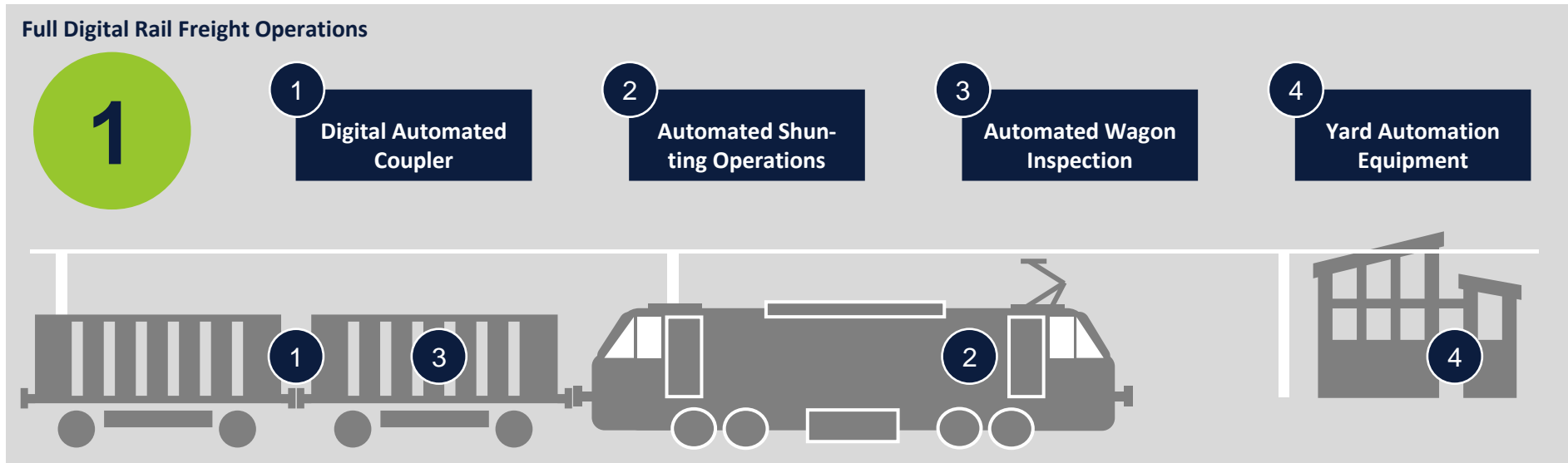
Total Work-Stream Costs 2022 to 2026: EUR 20m

FP5 brings together in total 71 partners from across Europe to transform rail freight in the next 4 years
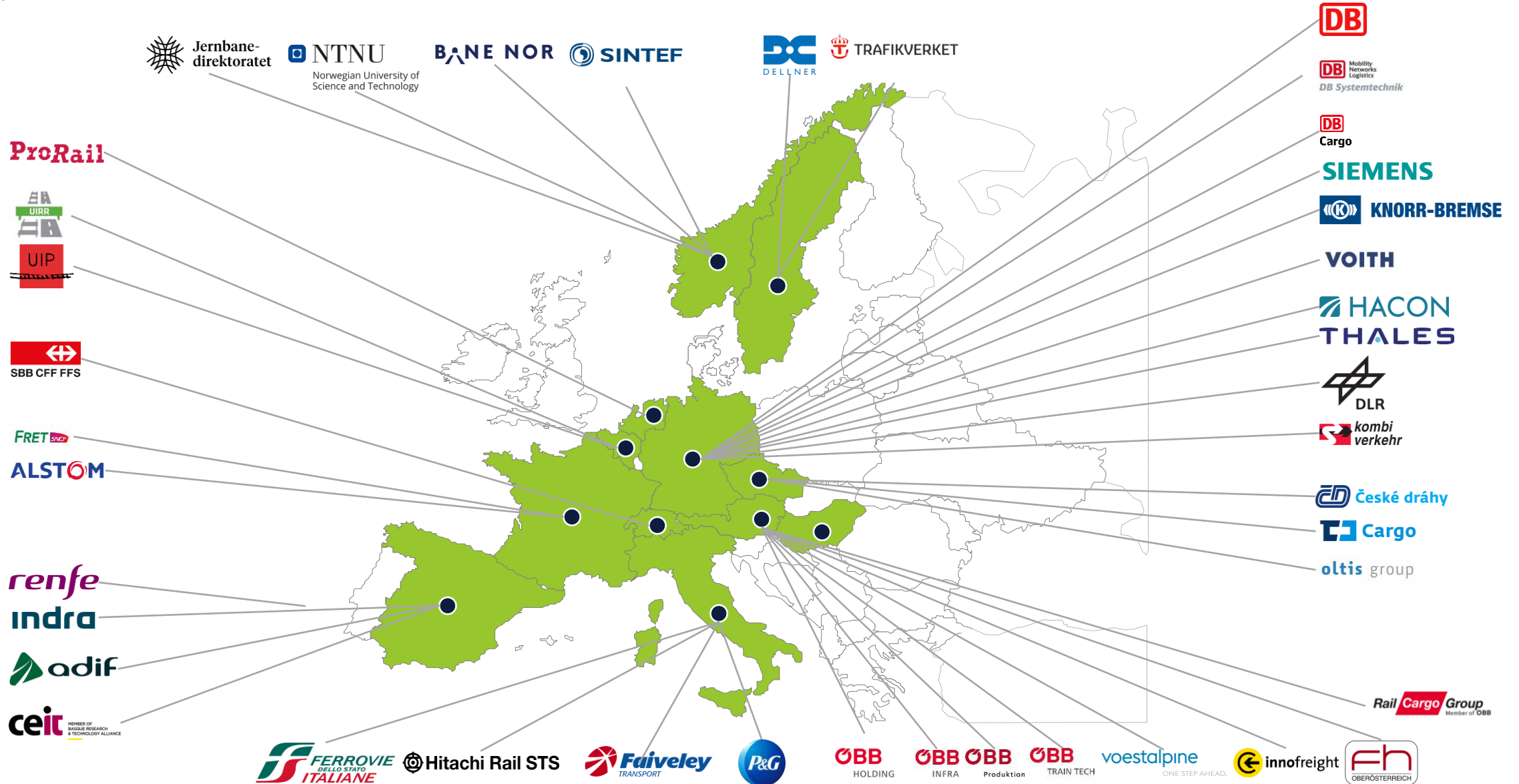
The DAC enables European rail freight to develop a multimodal, seamless logistics and transport chain

Seamless Rail Freight

2

Multimodal logistics and transport chain

Customer A — Port — Border — Terminal — Customer B

Seamless planning and dispatching

Intermodal integration and prediction
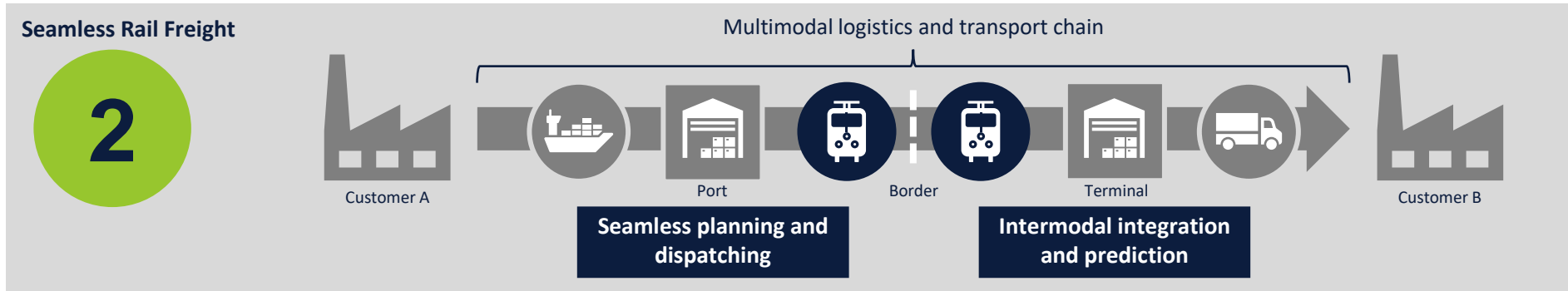
Cluster 1 enables Cluster 2

Full Digital Rail Freight Operations

1

1. **Digital Automated Coupler**
2. **Automated Shunting Operations**
3. **Automated Wagon Inspection**
4. **Yard Automation Equipment**

FP5-TRANS4M-R, EDDP, System Pillar and Sounding Boards

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

FP 5 FDFTO sounding boards

DAC migration roadmap   **11 actions**

DAC/"Full Digital Freight Train Operations"

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

Technology (mirroring & sector feedback)

Operational Procedures (mirroring & sector feedback)

Fleet Analyses & rtf Engineering (rtf readiness)

Retrofitting capacity plan (workshops, work-force, components)

Funding & Financing plan

CBA (updates)

Infrastructural & IT adaptations

Placing into service plan (safety, workforce training, rulebooks etc.)

Retrofitting plan (traffic & customer sidings analysis, operational plan)

Investment plan & procurement framework plan

Other regulatory & legal framework plans

EUROPEAN UNION AGENCY FOR RAILWAYS

development of efficient & suitable authorisation process & 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

EU-Rail Call 2022-2

DESTINATION Topics	Type of Action	Expected TRL	Expected EU contribution per Project (EUR million)	Number of projects expected to be funded
			Opening: 13 September 2022; Deadline: 14 December 2022	
HORIZON-ER-JU-2022-FA7-01	RIA	3 to 4	3.0	1
HORIZON-ER-JU-2022-FA7-02	RIA	2 to 3	1.5	1
HORIZON-ER-JU-2022-FA7-03	IA	6	2.3	1
HORIZON-ER-JU-2022-ExplR-01	RIA	-	0.7	1
HORIZON-ER-JU-2022-ExplR-02	IA	6 to 7	1.0	1
■ HORIZON-ER-JU-2022-ExplR-03	RIA	5	1.3	1
HORIZON-ER-JU-2022-ExplR-04	RIA	1 to 2	2.0	1
HORIZON-ER-JU-2022-ExplR-05	RIA	1 to 3	0.7	1
HORIZON-ER-JU-2022-ExplR-06	RIA	1 to 3	0.7	1
■ HORIZON-ER-JU-2022-ExplR-07	IA	-	1.5	1

Call structure (see also annex VIII of the EU-Rail Work Programme 2022 2024)
- ❖ **Destination:** indicates the objectives to be reached with the R&I activities
- ❖ **Expected outcome**: describes the expected developments within the destination topic and the input/output expected with the linked actions from other Destinations.
- ❖ **Scope:** identifies the expected capabilities/enablers that should be developed through R&I activities

ExplRes - DACcord

Coordination and Support Action - DACcord (Migration roadmap towards deployment and related activities) is intended to boost shift to rail in freight transport

Project started in April 2023 (6 partners from 4 countries) and will support EU-Rail in the continuation of the professional management of [European DAC Delivery Programme (EDDP)](#) activities, in which European Rail Freight Sector and manufacturers are united to strive for the introduction of a Europe-wide DAC. DACcord will:

- Describe in detail the required migration planning activities, leading to an industrial migration roadmap, since the EDDP's scope concerns the preparation of DAC migration and deployment.

- Collect and report the positions in the European stakeholder landscape, which will support in providing recommended measures to the EDDP stakeholder management team

- Contribute to the alignment amongst the activities shaping the architectural and procedural DAC-related European Railway System, particularly the FP5-TRANS4RM-R

ExplRes - ESEP4Freight

New European research project ESEP4Freight (European Shift Enabler Portal for Freight) is intended to boost shift to rail in freight transport

Project started in September 2023 (9 partners from 5 countries) and will focus on providing open high-quality and friendly-user static information to all the actors of the supply chain and on testing innovative new tools.

- Create, integrate and validate web-based services integrated in an open-access Web Platform.

- Provide interactive map of the existing European rail freight infrastructure with routes and schedules viewers as well as a CO_2 calculator

- Propose recommendations to adapt the current contractual and legal framework in intermodal transport to the needs of the different actors involved in the supply chain

- Bring together a large number of actors of the European logistics system to identify their information needs and to test and disseminate the ESEP4Freight results.

EU-Rail Call 2023

DESTINATION Topics	Type of Action	Expected TRL	Expected EU contribution per project (EUR million)	Number of projects expected to be funded
			<mark>Opening: 4 October 2023; Deadline: 7 February 2024</mark>	
HORIZON-ER-JU-2023-FA1	IA	6	5.0	1
HORIZON-ER-JU-2023-ExplR-01	RIA	5 to 6	4.1	1
HORIZON-ER-JU-2023-ExplR-02	RIA	3 to 4	3.1	1
HORIZON-ER-JU-2023-ExplR-03	CSA	-	2.8	1
HORIZON-ER-JU-2023-ExplR-04	RIA	4 to 5	2.7	1
HORIZON-ER-JU-2023-ExplR-05	RIA	1 to 2	2.0	1
🟩 HORIZON-ER-JU-2023-ExplR-06	CSA	-	1.5	1

Call structure (see also annex VIII of the EU-Rail Work Programme 2023 2024)

❖ **Expected outcome**: describes the expected developments within the destination topic and the links with other Destinations.

❖ **Scope:** identifies the expected capabilities/enablers that should be developed through R&I activities

🟩 **DAC Fleet retrofitting and retrofit capacity plan**

Thanks!

https://rail-research.europa.eu