

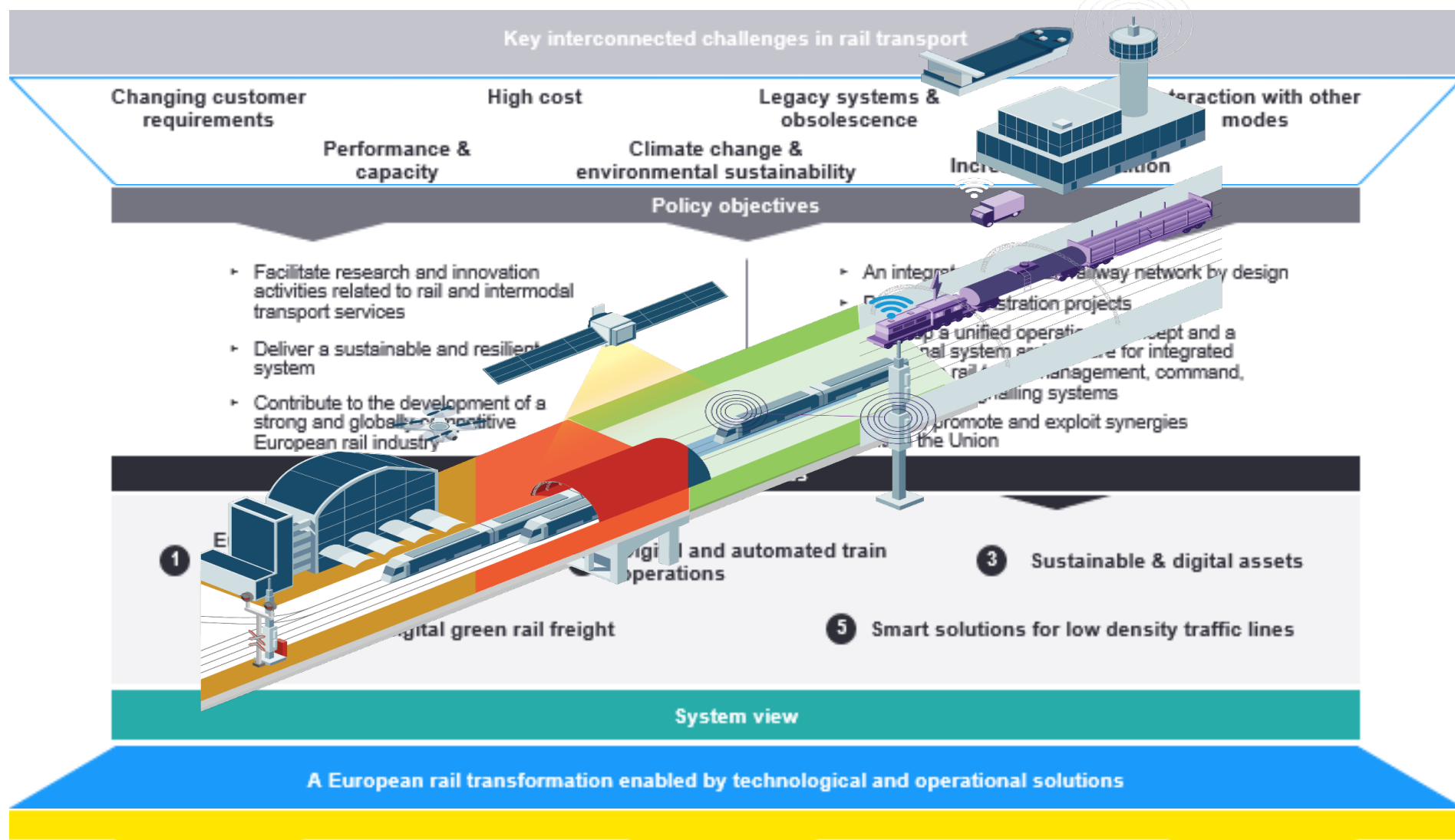
# Railway research and innovation to make the railway an everyday mobility

7 October 2022

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Head of Programme

Europe's Rail JU



- 

Meeting evolving customer requirements



Reduced costs



Harmonised approach to evolution and greater adaptability



Improved EU rail supply industry competitiveness



Improved performance and capacity



More sustainable and resilient transport



Reinforced role for rail in European transport and mobility



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**

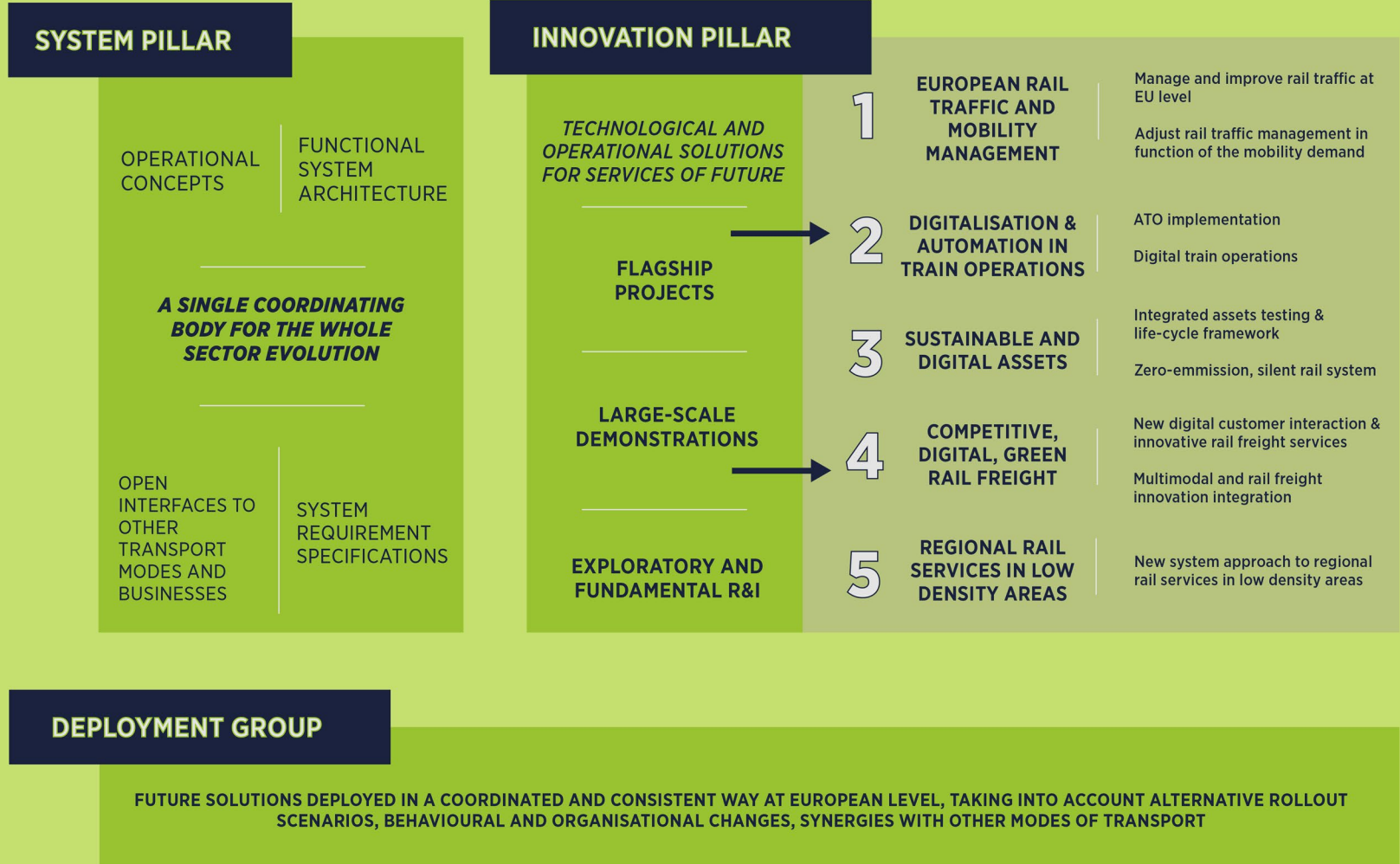


DELIVER A **COMPETITIVE, GREEN RAIL FREIGHT FULLY INTEGRATED INTO THE LOGISTICS VALUE CHAIN**



DEVELOP A **STRONG AND GLOBALLY COMPETITIVE EUROPEAN RAIL INDUSTRY**

# EUROPE'S RAIL: ONE INTEGRATED R&I PROGRAMME



# Founding Members



 **28**  
MEMBERS

 **412**  
PARTICIPANTS

 **29**  
COUNTRIES

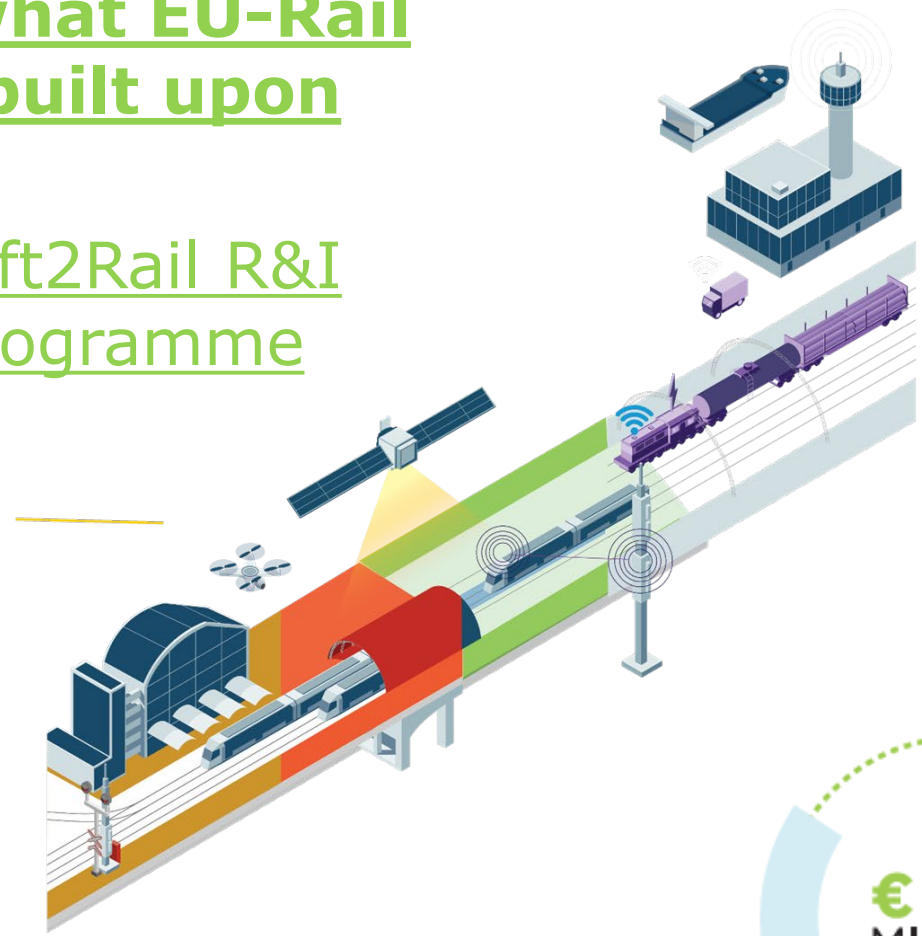
 **109**  
SMEs

 **113**  
RESEARCH CENTRES  
AND UNIVERSITIES



# On what EU-Rail is built upon

## Shift2Rail R&I programme



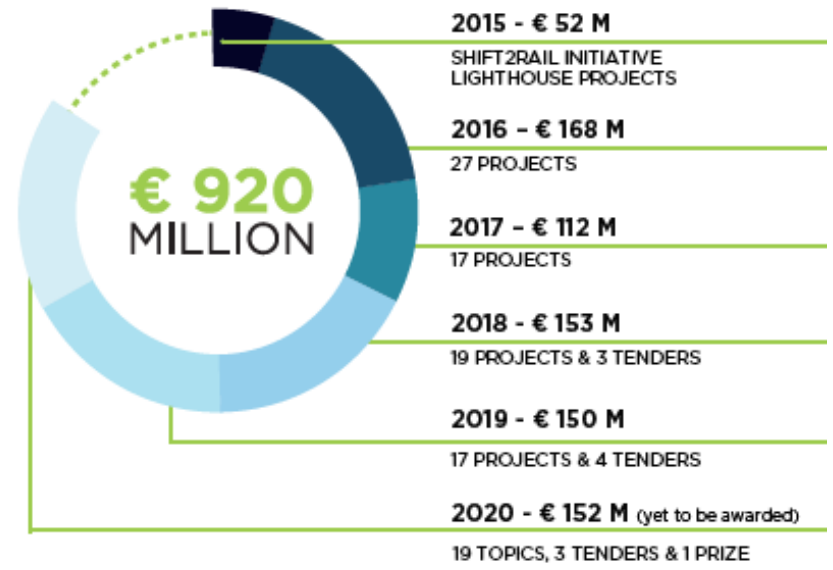
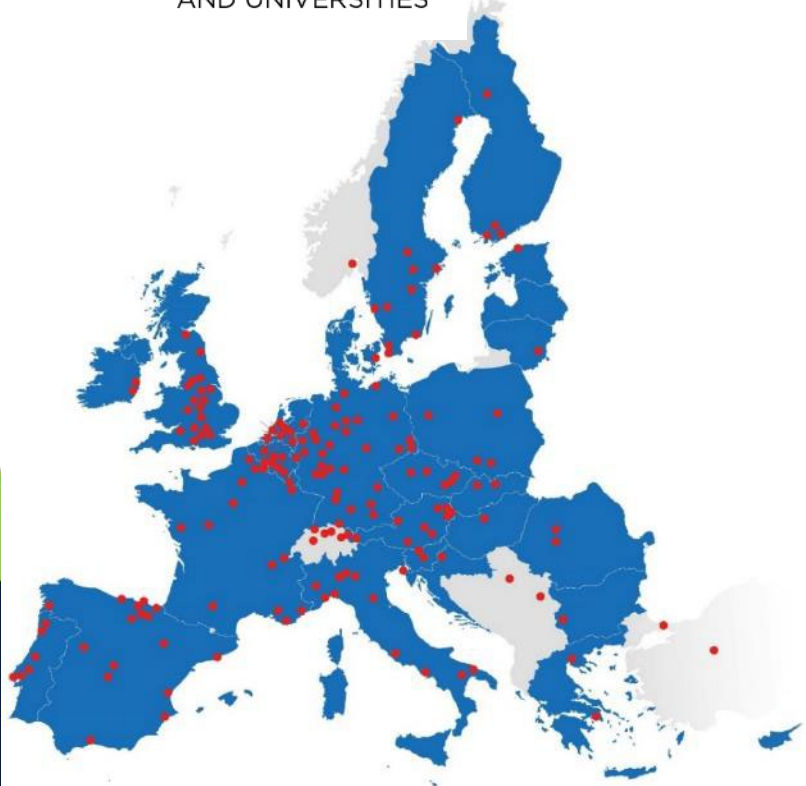
**IP1** Cost-efficient and Reliable Trains, including high-capacity trains and high speed trains

**IP2** Advanced Traffic Management and Control System

**IP3** Cost-efficient, Sustainable and Reliable High Capacity Infrastructure

**IP4** IT Solutions for Attractive Railways Services

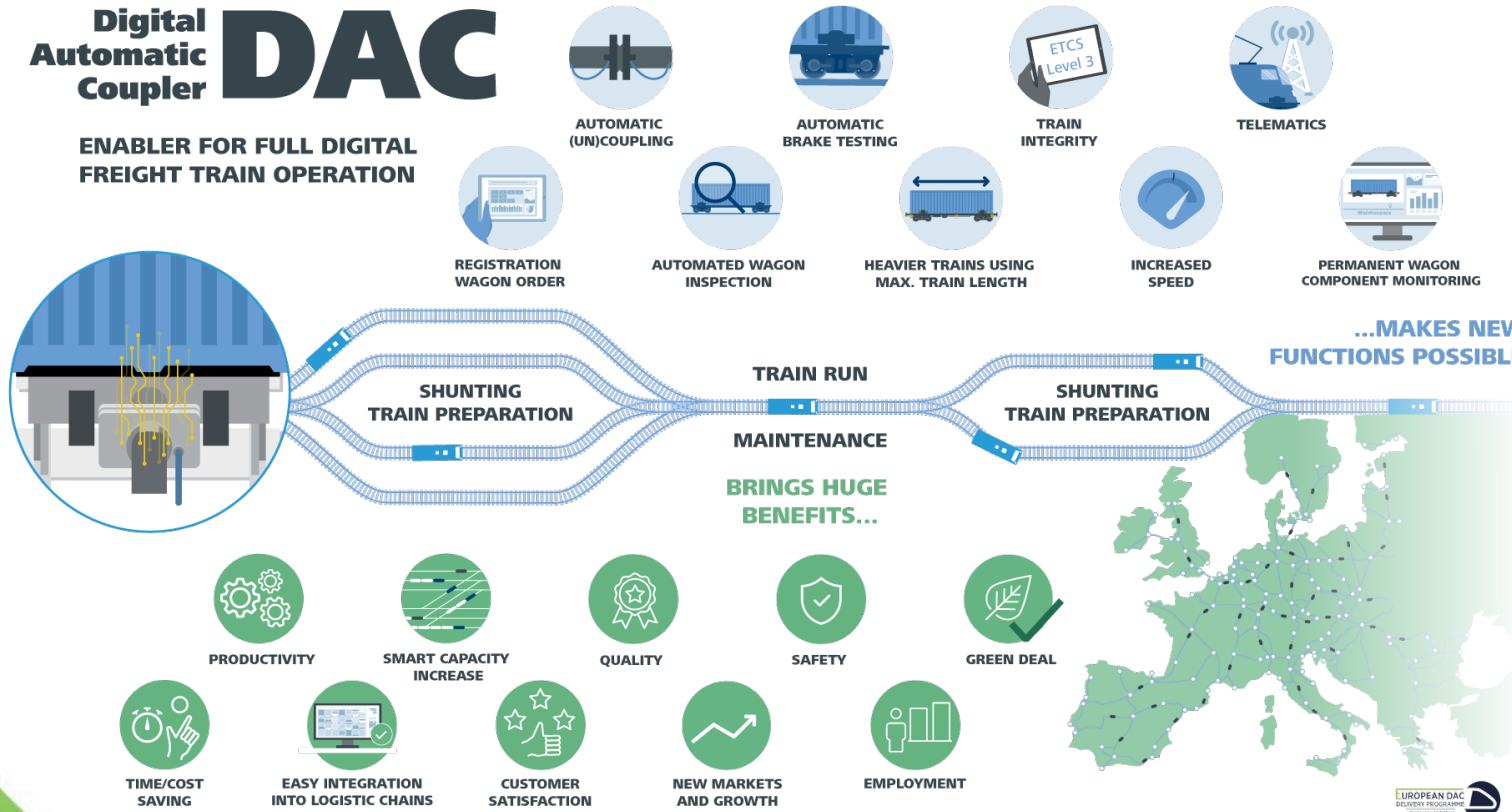
**CCA** Cross Cutting Activities



# European DAC delivery programme: An open platform for Full Digital Freight Train Operations

## Digital Automatic Coupler DAC

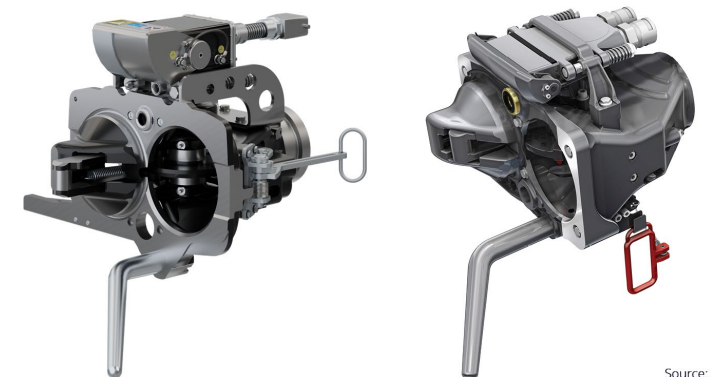
ENABLER FOR FULL DIGITAL FREIGHT TRAIN OPERATION



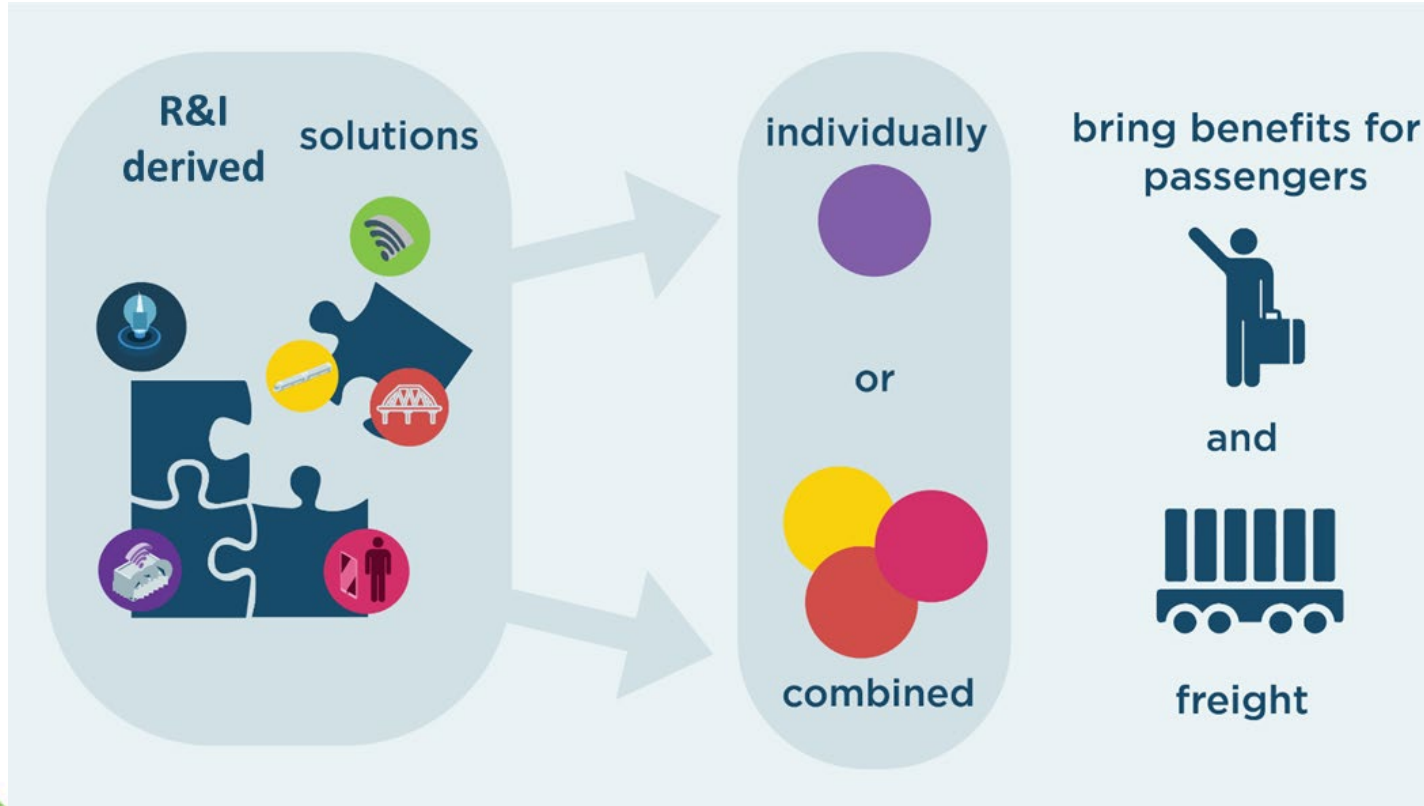
- › DAC is more than just a coupler
- › DAC is a key and unique enabler for numerous applications
- › DAC is not a stand-alone technology but the backbone for “full digital freight train operations” to achieve the ambitious transformation in European rail freight
- › This will allow the DAC to enable even more use cases and to generate a max. possible benefit

EUROPEAN DAC DELIVERY PROGRAMME  
Enabled by Shift2Rail

‘Scharfenberg’ latch-type design selected for future Europe-wide Digital Automatic Coupling (DAC) standard coupler head



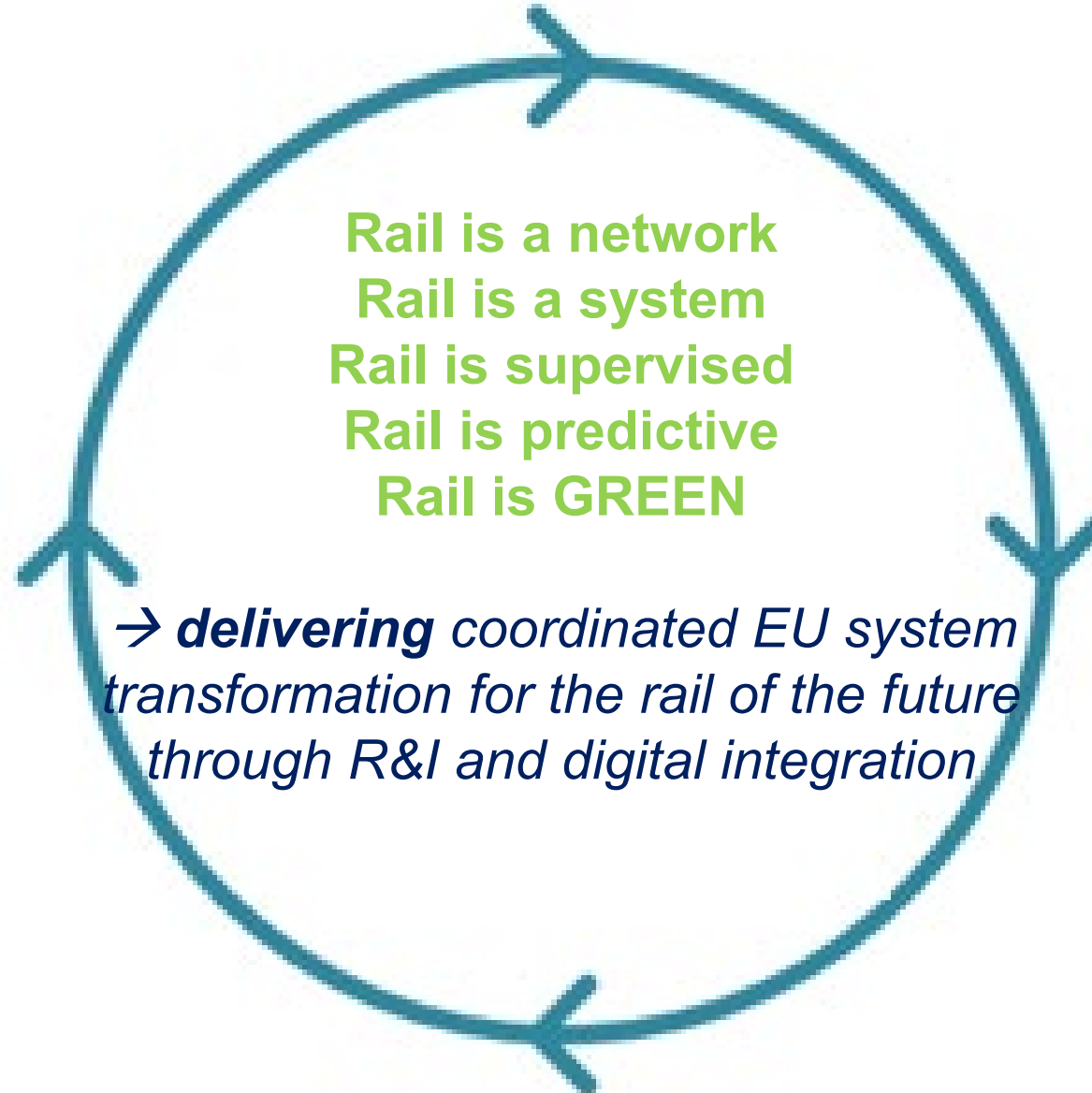
# To make railway an everyday mobility R&I should be USER FIRST



# Our biggest opportunity

*digital twin*

*autonomous  
decisions*



*data driven  
processes*

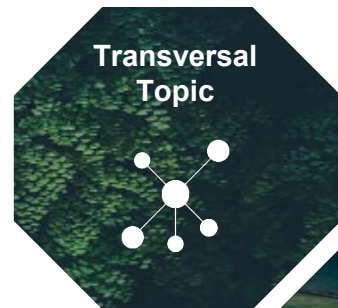
*system  
management and  
interoperability*



# 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 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

## 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



## 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

## 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.



## + Exploratory Research and other activities



## 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

## 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



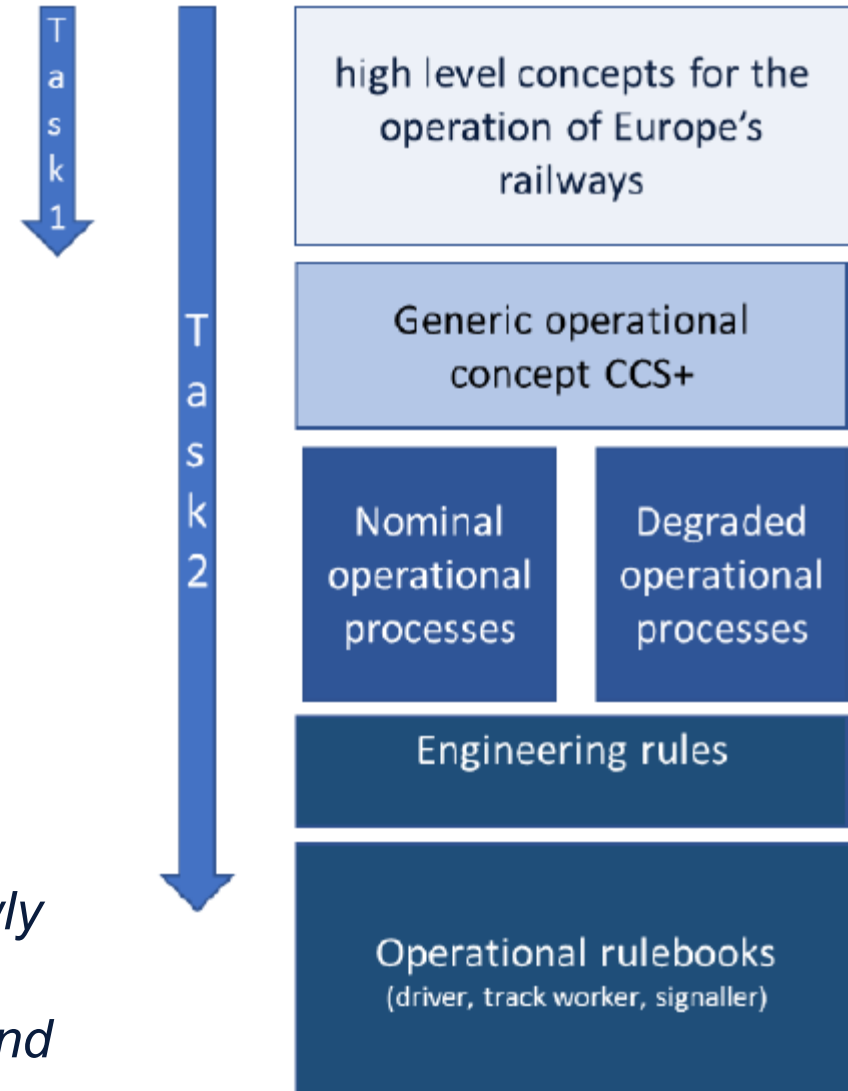
## Sustainable Competitive Digital Green Rail Freight Services

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

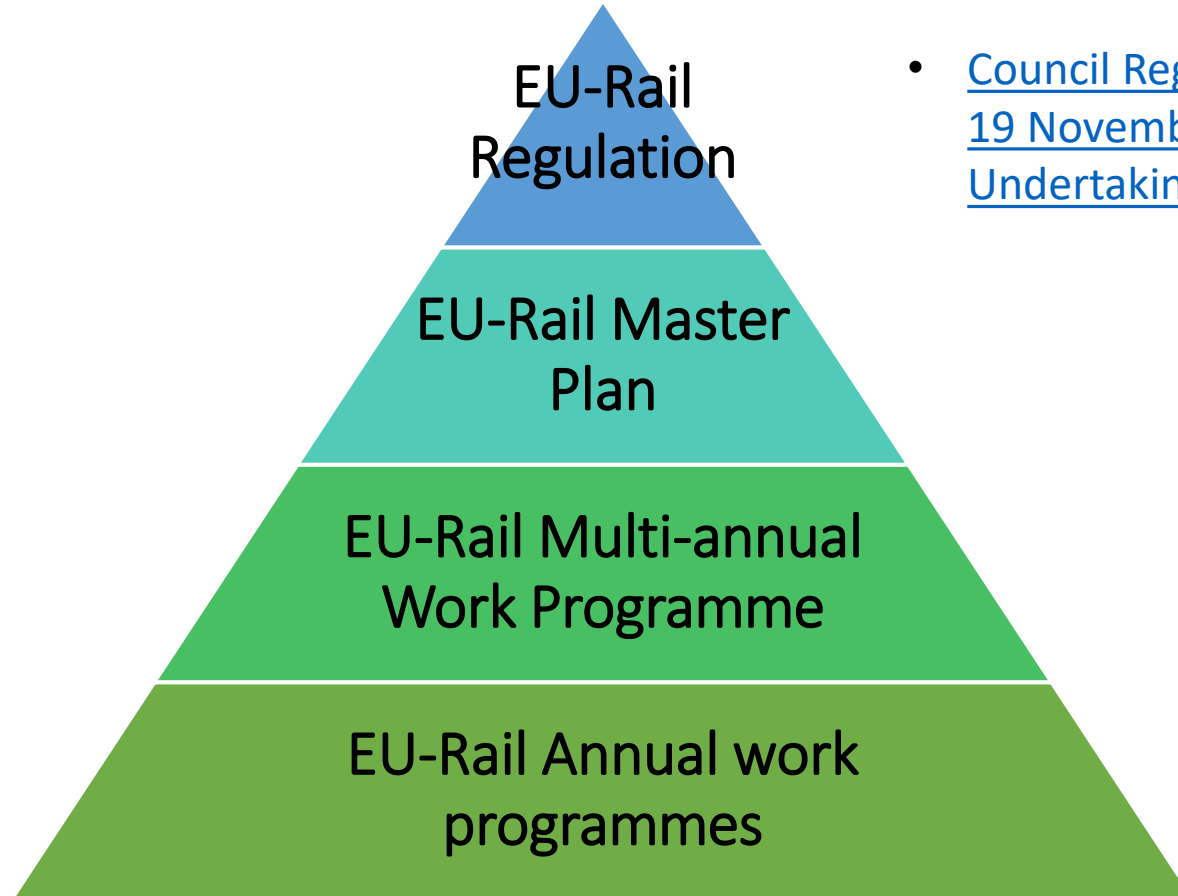
# EU-Rail Multi-Annual Work Programme

## *The System Pillar activities:*

- develop a EU-Rail system architecture for a rail system which is
    - Open access to SERA
    - Performant and competitive;
    - Synchronised deployment
    - Full alignment with the future system
  - develop a harmonised functional and technical architecture (TMS, CCS, DAC), managing the complexity of interaction between the different sub-systems and with appropriate separation of safety-related and non-safety-related layers.
- 
- *Guide the migration strategy in Europe implanting newly defined operational concepts*
  - *Inputs to Technical Specifications for Interoperability and harmonised standards*



# EU-Rail key documents of a Programme approach



- [Council Regulation \(EU\) 2021/2085 of 19 November 2021 establishing the Joint Undertakings under Horizon Europe](#)

# Multi-Annual Programme Implementation

- **System Pillar activities:** the implementation via framework contract (procurement). The first call for tenders launched the end of the first quarter 2022.
- **Innovation Pillar activities:** This constitutes the core of the Programme, where the private Members are expected to provide their contribution up to EUR 576 million.
  1. **Published and closed for submission, under evaluation: Call 2022-1**, to cover up to 50% of the research and innovation activities value of 6 Flagship Areas
  2. Call 2025/2026, expected to cover around 30% of the research and innovation activities of 6 Flagship Areas+TT
  3. Call 2027 expected to cover the remaining part of 6 Flagship Areas activities to be performed until 2031
    - In addition, EU-Rail will launch on a regular basis calls for proposals to explore new areas of rail research and innovation or perform studies and any other relevant activities that would contribute to the achievement of its Programme → **next call 2022-2 published in Sept this year, deadline 14/12/22**
- **Deployment Group activities:** to bridge research and innovation to the future coordinated deployment and they will be defined in line with the evolution of the Programme.

# Synergies

- **Batt4EU:**

- S2R /Europe's Rail JU contributed, through its project PINTA3, to the KPIs/needs related to the energy traction in rail (published by the European Commission in the document "Roadmap on Mobile application of batteries).
- The European Commission has launched (deadline was in September) the BATT4EU call 2022 in which, among others, there is a specific topic in which the rail needs in term of next-generation battery can be addressed (HORIZON-CL5-20222-D2-01-05), TRL5 expected by the end of the project.
  - See section 4 and appendixes, [https://energy.ec.europa.eu/roadmap-application-and-integration-mobile\\_en](https://energy.ec.europa.eu/roadmap-application-and-integration-mobile_en)
  - [Next generation technologies for High-performance and safe-by-design battery systems for transport and mobile applications](#)

# Synergies

- Collaboration with the Space and aviation sector:
  - IP2 which contains a Technological Demonstrator on Safe Train Positioning (TD 2.4), with the EU Agency for the Space Programme (EUSPA) as regards the introduction of GNSS for train positioning.
  - The EUSPA-financed CLUG project (Certifiable Localisation Unit with GNSS in the Railway Environment) is also expected to provide a key building block to the overall work to be achieved within the S2R programme TD2.4 (and to be completed in the EU-RAIL programme under Flagship Area 2 “Digital and Automated up to Autonomous train operations”).
    - <http://www.clugproject.eu/en>
  - A close cooperation with the sector has also been launched to work on relevant standardization topics, such as Digital Maps and GNSS Augmentation, both key component for the localization function. On this specific point, collaboration with the European Space Agency (ESA) has also been launched.
  - SESAR JU on matters related to multimodal mobility passenger solutions (as MaaS) through its projects related to the S2R innovation Programme 4, as well as related to traffic management and functional system architecture, inviting the experts to present their approaches in the S2R projects Linx4Rail 1 and 2 which aim to create an innovative rail functional system architecture. This output will feed the new EU-Rail Programme and in particular the System Pillar works.

# Synergies

- **Collaboration on Cybersecurity for rail:**
  - with the European collaboration in the field of Cyber Security for Railways (ER-ISAC) . Cooperation is covering aspects related to sharing best practices (e.g. product security verification, penetration testing, system verification and validation requirements in IEC standards) or also regarding the early analysis of the feasibility to establish a railway CSIRT (Computer Security Incident Response Team) at European level.
    - <https://er.isacs.eu/>
- **Other Collaborations:**
  - initial talks were initiated in 2021 with EuroHPC JU in order to look for possible services offered when in the course of the new programme significant computing capabilities would be needed (e.g. for traffic management prediction at European scale, something that could be foreseen with the activities stemming from the EU-Rail call topic Destination 1 “Network management, planning and control & mobility management in a multimodal environment and digital enablers”).
  - The JU also became an official member to the Digital PRIME working group, promoted by the European Commission together with rail infrastructure managers around traffic management improvements mainly.

# Upcoming events

- TRA 2022, 14-17 November, Lisbon
  - stand in the European Village showcasing some of the latest innovations coming from the R&I programme
  - Participation to panel discussions and events
- Rail Live 2022, 29 November – 1 December, Malaga
  - stand with key information about Europe's Rail
  - Participation to panel discussions, presentations and keynote speeches
- Call 2022-2 Info Day, Online
- Europe's Rail Innovation Days, December (exact dates to be confirmed), Online
  - Expert led technical sessions across several days
  - Latest results and progress of the Shift2Rail projects

Full list of events available here: <https://rail-research.europa.eu/events/>





<https://rail-research.europa.eu>