Next stops for European Rail

# Rail Research and Innovation to Make Rail the Everyday Mobility

Giorgio Travaini

Executive Director a.i., Europe's Rail JU

# EU-Rail, a R&I integrated Programme and a cooperation to deliver

- Adapt to changing customer requirements
- More cost-efficient solutions and services compared to today
- Need for improved performance and capacity
- Addressing workforce shortage
- Climate change adaptation and environmental sustainability
- Increased competitiveness
- Interaction with other modes, make rail central to future mobility
- Addressing legacy systems and obsolesce

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<br>Adjust rail traffic management in function of the mobility demand |
| 2 | **DIGITALISATION & AUTOMATION IN TRAIN OPERATIONS** | ATO implementation<br>Digital train operations |
| 3 | **SUSTAINABLE AND DIGITAL ASSETS** | Integrated assets testing & life-cycle framework<br>Zero-emmission, silent rail system |
| 4 | **COMPETITIVE, DIGITAL, GREEN RAIL FREIGHT** | New digital customer interaction & innovative rail freight services<br>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**

# Founding Members

adif

ALSTOM

mermec
AN ANGEL COMPANY

ŽD

CAF

ceit
IK4 Research Alliance

DB

DLR

eSGR
European Smart Green Rail

Faiveley Transport
A Wabtec Company

FERROVIE DELLO STATO ITALIANE

Hitachi Rail STS

indra
Talgo

Jernbane-direktoratet

KNORR-BREMSE

ÖBB
Immer in Bewegung

PKP
POLSKIE KOLEJE PAŃSTWOWE
Spółka Akcyjna

ProRail

SIEMENS
Ingenuity for life

SNCF

Strukton
Rail

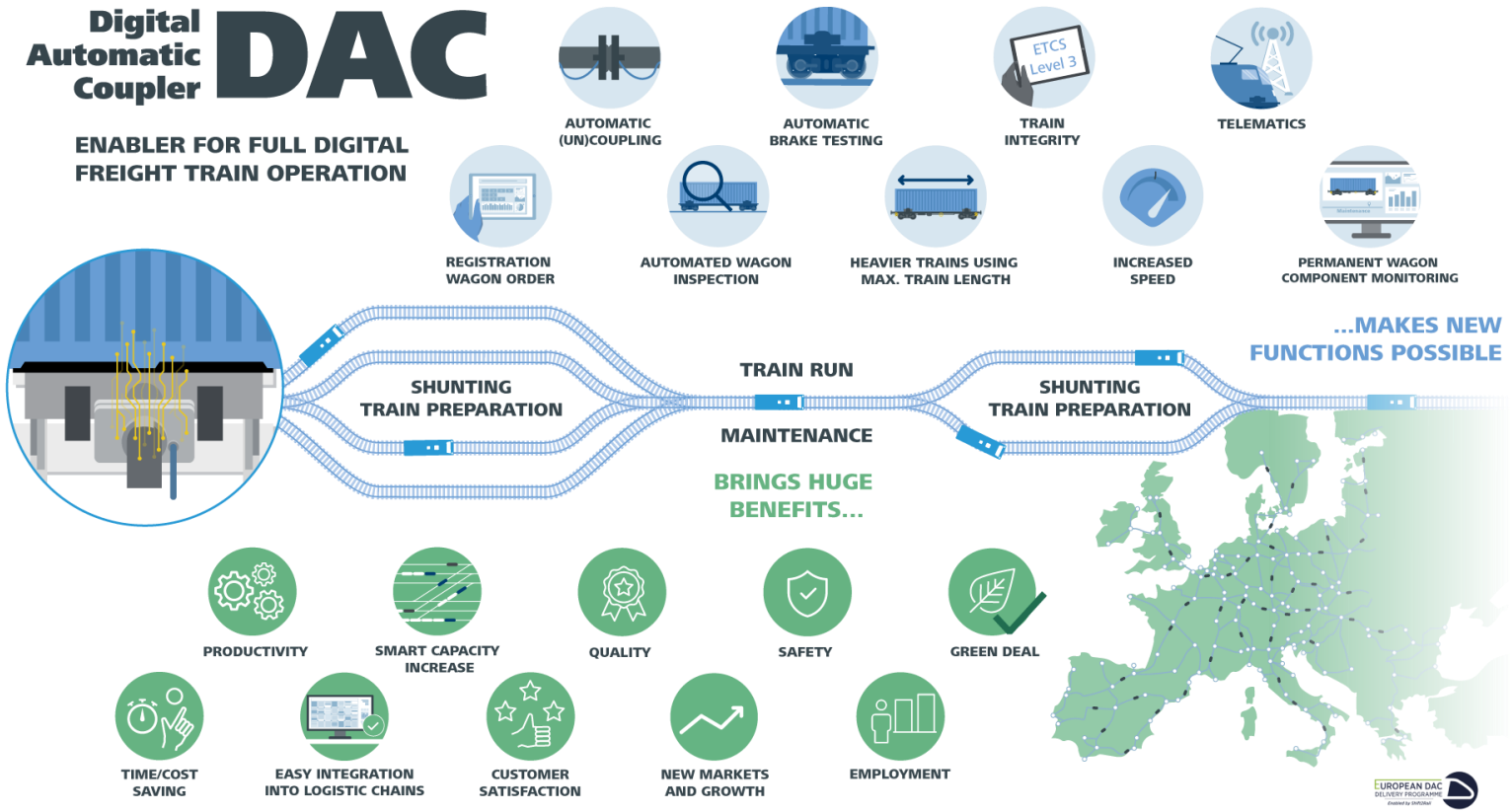
THALES
Together • Safer • Everywhere

TRAFIKVERKET

RAILWAY SYSTEMS
by voestalpine

# European DAC delivery programme:

## An open platform for Full Digital Freight Train Operations




- 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

Source: Dellner & Voith

# Europe's Rail Flagship Projects - Phase 1

*Rail Research and Innovation to make Rail the Everyday Mobility*


**FP1: MOTIONAL**
Mobility management in multimodal environment and digital enablers

**Value:** EUR 92.6 million
**Partners involved:** 88
**Duration:** 46 months

**FP2: R2DATO**
Rail to digital automated up to autonomous train operation

**Value:** EUR 160.8 million
**Partners involved:** 76
**Duration:** 42 months

**FP3: IAM4RAIL**
Holistic and integrated asset management for Europe's rail system

**Value:** EUR 106.9 million
**Partners involved:** 94
**Duration:** 48 months

**FP4: RAIL4EARTH**
Sustainable and green rail system

**Value:** EUR 95.1 million
**Partners involved:** 71
**Duration:** 48 months

**FP5: TRANS4M-R**
Transforming Europe's rail freight

**Value:** EUR 95.1 million
**Partners involved:** 71
**Duration:** 45 months

**FP6: FUTURE**
Innovative rail services to revitalise capillary lines and regional rail services

**Value:** EUR 32.9 million
**Partners involved:** 50
**Duration:** 48 months

# Why the System Pillar is important for the European Railways

European railways have **differences in operations and most technical systems**, leading to:

- Expensive and slow deployment of innovations
- Limited market potential and return on investment
- An undermined performance and competitiveness of the European rail system and the European railway supply industry in global markets

To overcome these shortcomings, the System Pillar provides **governance, resources, and outputs** to allow the sector to converge on the evolution of the future railway system through:

- Defining the fundamental design principles and architecture for future changes – drawing on best practice from other industries
- Harmonising the architecture at European level, including (where necessary) standardization of interfaces, communications and data exchange – supporting the strategic vision of the Single European Rail Area
- Defining any necessary technical specifications to feed into standards or TSI

# System Pillar - Expected Outcomes

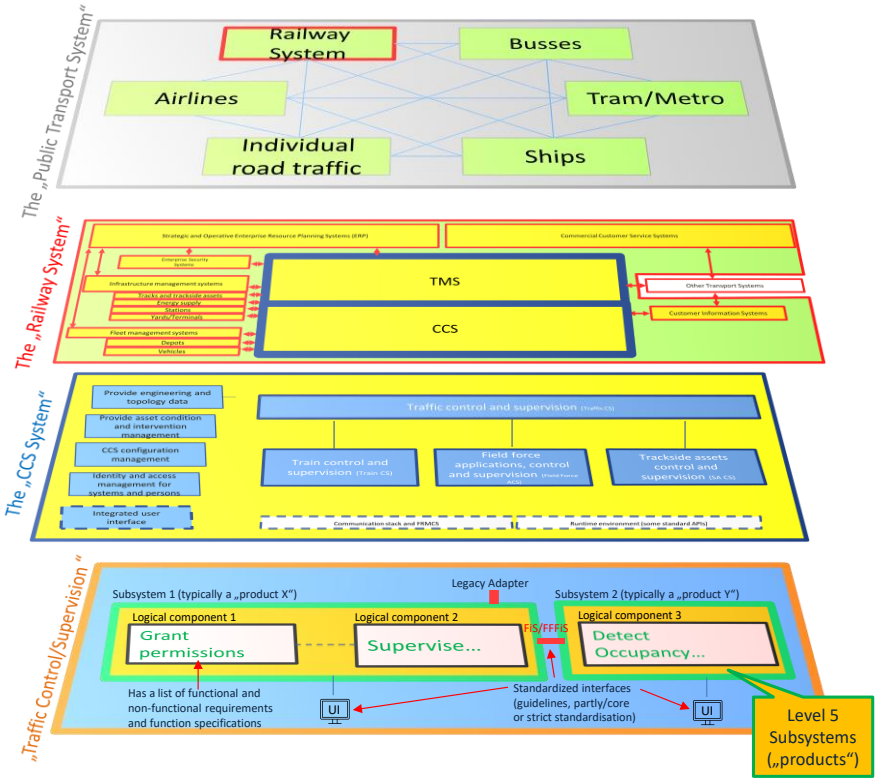
## Technical Specifications for Interoperability and Standards

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**



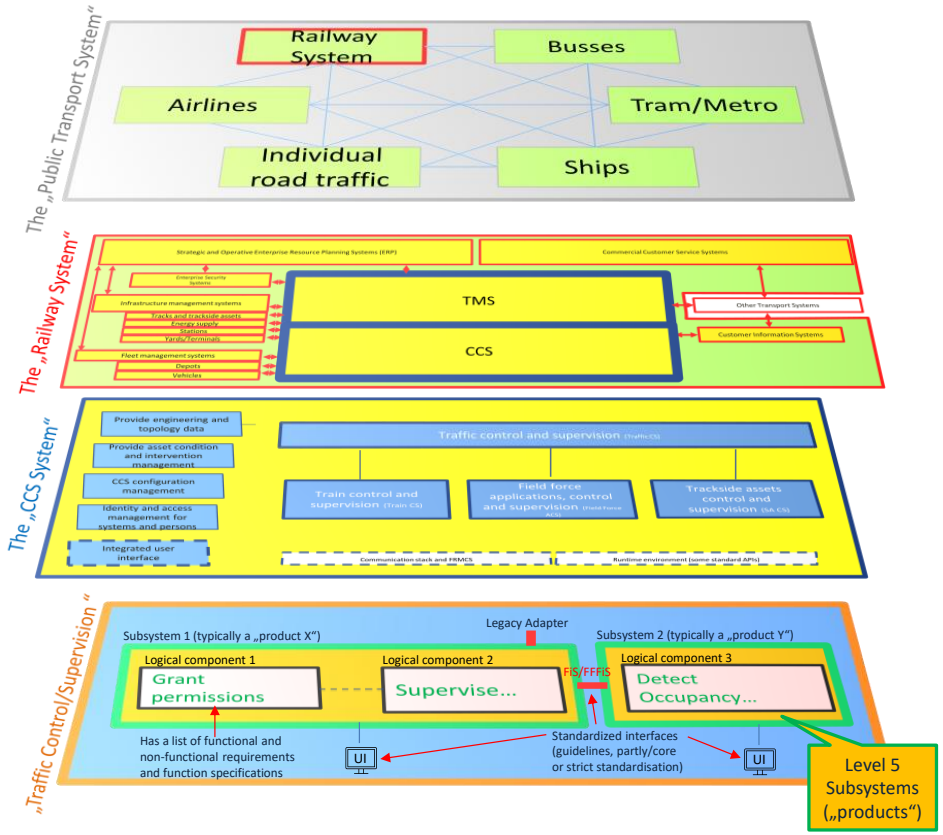
# System Pillar: design levels

**Railway System**

**Task 1**

**Specific sub systems**

**Tasks 2,3,..**




**Operational concept and Basic requirements**

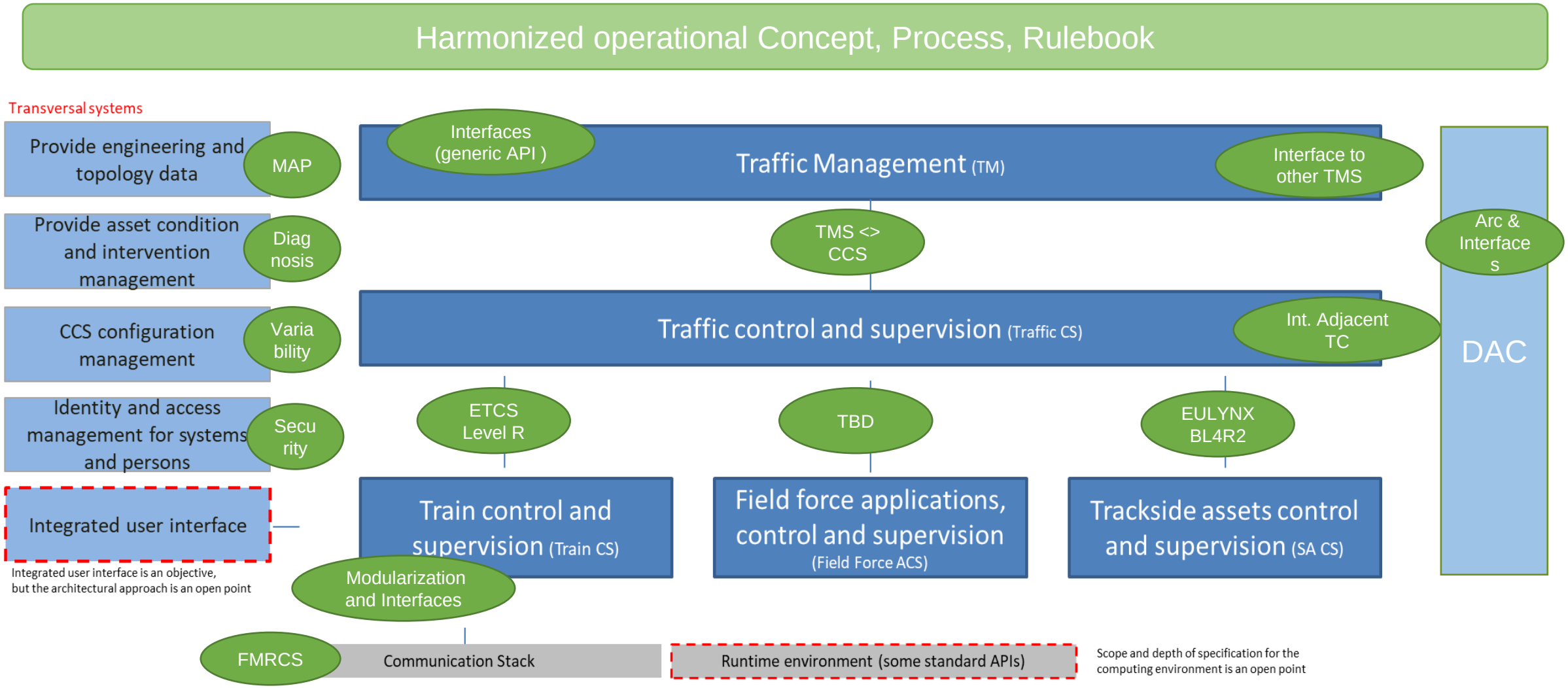
**Basic operational processes and requirements**

**Operational processes and specifications**

## Examples

- ✓ System layer 1: For public transport, how railways and other transport systems shall interact concerning management connections in a station
- ✓ System layer 2: For Railway system, how shall customer information, TMS and CCS interact in general to manage connections for passengers in case of a deviation
- ✓ System layer 3: For CCS, how shall different actors in the production (trains, field forces, ..) be coordinated to execute a changed plan
- ✓ System layer 4: For vehicle control and supervision, what processes shall happen onboard in general when the movement authorisation changes
- ✓ System layer 5: TSI Specification for interface between ETCS onboard and FRMCS gateway

# CCS/TMS/DAC: ‘**High Priority**’ areas 2023 – 2026



# Regulation by TSI

- Significant outputs into the TSIs are expected from EU-RAIL activities, for example linked to DAC, ATO, and advanced train positioning.
- The System Pillar will **coordinate**:

**EU-RAIL proposals for TSI enhancement**

- Collection of all EU-RAIL topics linked to potential change.
- Proposals for TSI input assessed in collaboration with ERA to ensure strategic alignment and common criteria for maturity for development (case-by-case)
- The Standardisation and TSI input plan is approved by the System Pillar Steering Group
- Mature Change Requests developed with ERA as input to the CCM process.

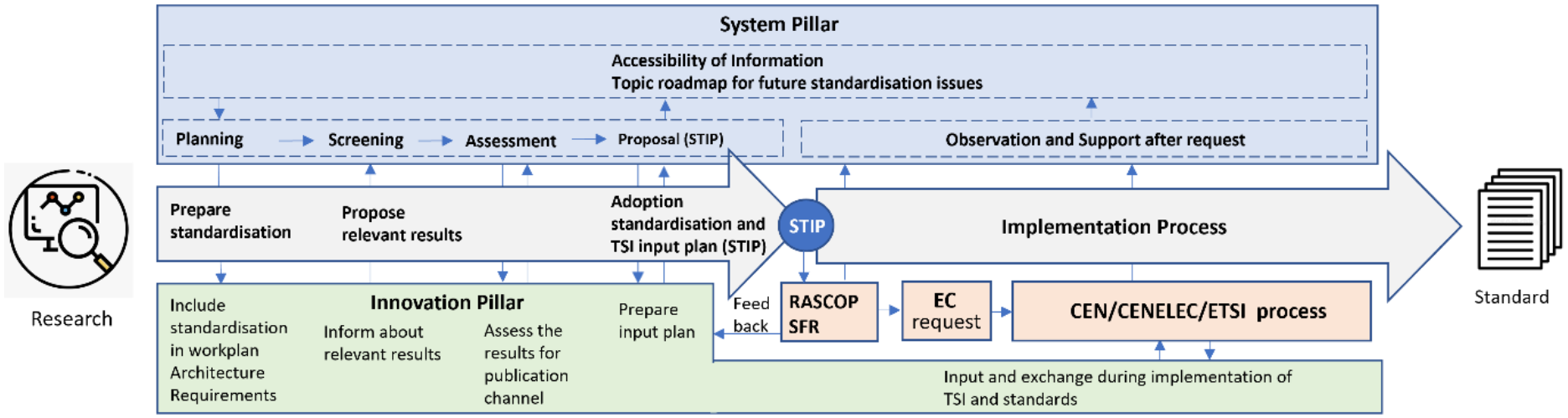
**External Change Requests linked to the CCS TSI**

- External Change Requests (not coming from EU-RAIL)
- Sent by ERA to the SP for assessment

# European Standardisation

**EU-RAIL proposals to the European standardisation process**

- All EU-RAIL inputs are collected by the System Pillar in the standardisation and TSI Input plan template
- Topics are assessed for identifying the adequate harmonisation channel
- Assessment and approval of the Standardisation and TSI input plan by the System Pillar Steering Group in collaboration with SFR and RASCOP
- Standardisation work items are created in CEN, CENELEC and ETSI.



# Synergies

- **Examples:**
  - Space and aviation sector (EUSPA, ESA, SESAR JU)
  - Batt4EU
  - Clean Hydrogen JU
  - Cyber Security for Railways (ER-ISAC)
  - Other as Digital PRIME, etc.

# You can apply to the EU-Rail call 2023-01

https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-search?tenders=false&callIdentifier=HORIZON-JU-ER-2023-01


https://rail-research.europa.eu/calendar/europes-rail-info-day-2023/

**Call opening: 4/10/23**
**Call closure: 7/02/24**
**Overall indicative budget: 21,2M€**

**Call topic text already in Annex VII of the EU-Rail Work Programme 23-24: https://rail-research.europa.eu/wp-content/uploads/2023/07/GB-Decision_08_2023_Annex_WP_23-24.pdf**

**You** Topics ranging from integration of  air and rail networks planning to exploratory research activities, essential pathfinders for future R&I, covering topics such as noise and vibration, future metro systems, biodiversity, disruptive assets management solutions, extending the network of PhDs, and DAC fleet retrofitting and capacity plan

White Atrium Building, 2nd Floor
Avenue de la Toison d’Or 56-60
B1060, Brussels - Belgium

www.rail-research.europa.eu