Next stops for European Rail

Delivering the future of asset Management: Update on Europe Rail’s focus on asset management innovation

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
Our biggest opportunity

- Rail is a network
- Rail is a system
- Rail is supervised
- Rail is predictive
- Rail is GREEN

→ *delivering* coordinated EU system transformation for the rail of the future through R&I and digital integration.
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

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-emission, 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

EXPLORATORY AND FUNDAMENTAL R&I

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

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
Founding Members
Flagship Project FP3 – IAM4RAIL

Holistic and Integrated Asset Management for Europe’s RAIL System

# 106.9 M€ Total Project Cost (77.04 M€ Eligible Costs (inc. 46.22 M€ max. Grant amount)+ 29.9 M€ IKAA)

93 contributors: 29 partners+64 Affiliated Entities

Duration: 4 years (Dec 2022-Nov 2026)

7 Integrated Demonstrations, 8 Groups of Technical Enablers, 56 Use Cases)
FP3-IAM4RAIL: 29 Partners

- 9 Major Operators
- 17 Railway integrators & suppliers
- Plus 65 Affiliated Entities
- and 3 research centers

An Advisory Board will bring more representation from other members' states/countries and SMEs.
Infrastructure Assets
Digital Twins
Asset Management
Rolling Stock Assets
Interventions
Traffic Management System (TMS)
Design & Manufacturing
What is Flagship Project FP3 – IAM4RAIL about? (2)

A Holistic and Integrated Approach

**Usually expected TRL 6/7 in 2025 for UCs / Integrated Demos**

- **Uses Cases as Business Case**
  - Reducing costs & making objective access charges
  - Increasing automation level in M&O subsystem
  - Harmonised EU frame added value projects
  - EU common standards and tech specs

**Objectives**
- Cost-effective asset management for the railway system
- Increase reliability and capacity of the overall system
- Increase level and technology for automation and robots in construction & maintenance
- Sustainable production of resilient assets with new techniques
What is Flagship Project FP3 – IAM4RAIL about? (3)

IAM4RAIL Concept

Data capture & sharing

Data to information

Information to action

INFRASTRUCTURE ASSETS (INF, ENE, CCS)

Operation generated data [INF]

Staff generated data [INF]

DATA COMMUNICATION (interfaces and toolsets)

Re-design

VEHICLE ASSETS (RST, ENE, CCS)

Operation generated data [RST]

Staff generated data [RST]

DATA COMMUNICATION (interfaces and toolsets)

Re-design

Maintenance decision support system

Condition status and predictive algorithms

Degradation Models

Data Platform

Infra maintenance operational work planning and execution

Infra maintenance and renewal strategic planning and execution

Signalling, power supply and catenary maintenance and strategic planning

Infra, Energy and CCS maintenance process and equipment treatment

Traffic Management Systems (e.g. disturbances information)

Business analytics

Rolling Stock, Energy and CCS maintenance operational work planning and execution

Rolling Stock, Energy and CCS maintenance and renewal strategic planning and execution

Rolling Stock, Energy and CCS maintenance process and equipment treatment

Design & construction characteristics

On-board generated data

Wayside generated data

Weather forecast data

Digital Models

Degradation Models

Condition status and predictive algorithms

Data Platform

Rolling Stock, Energy and CCS maintenance process and equipment treatment

Data Platform

Condition status and predictive algorithms

Data Platform

Weather forecast data

Rolling Stock, Energy and CCS maintenance process and equipment treatment
## Impact and KPI

<table>
<thead>
<tr>
<th>#</th>
<th>Demonstrator Name</th>
<th>High level theme and result</th>
<th>KPI’s</th>
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<tbody>
<tr>
<td>1</td>
<td>Asset Management &amp; TMS</td>
<td>Integration of Intelligent Asset Management System (IAMS) &amp; TMS</td>
<td>I. Qualitative and prompt integration of information, including reducing time to transfer asset condition status to TMS by 50 %, in specific use cases</td>
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<td>2</td>
<td>Asset Management &amp; Rolling Stock</td>
<td>Asset Management of Rolling Stock Operation, including specific solutions for freight</td>
<td>II. Reduction of maintenance costs up to 10% in specific use case, and/or</td>
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<td>III. 25% reduction of in-service failures</td>
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<td>IV. Increasing rolling stock availability respective reducing workshop downtime targeting 10% in specific use cases</td>
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<td>3</td>
<td>Long Term Asset Management</td>
<td>Infrastructure &amp; Rolling Stock long-term Asset Management</td>
<td>V. Tools which provide at least 3 possible strategies of long term management with an accuracy (as defined by ISD) improvement of 10%</td>
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<td>4</td>
<td>Asset Management &amp; Infrastructure</td>
<td>Asset Management of Infrastructure Operation</td>
<td>VI. Reduction of maintenance costs targeting 10% in specific use case, and/or</td>
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<td>VII. 25% reduction of in-service failures</td>
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<td>5</td>
<td>Asset Management &amp; Digital Twins</td>
<td>Digital Twin Asset Management, addressing both Rolling Stock &amp; Infrastructure</td>
<td>VIII. The number of assets managed and monitored by Digital Twins is increased by 25 %</td>
</tr>
<tr>
<td>6</td>
<td>Design &amp; Manufacturing</td>
<td>Advanced and Holistic Design</td>
<td>IX. For repair: Extension of remaining life 25%</td>
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<td></td>
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<td>X. 20% time reduction (from design to manufacturing)</td>
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<td>XI. 20% cost reduction</td>
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<tr>
<td>7</td>
<td>Robotics &amp; Interventions</td>
<td>Remotely controlled and unmanned interventions</td>
<td>XII. Increased accuracy of inspections of 25% with respect to conventional interventions and/or</td>
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<td>XIII. Reproducibility of inspections of 25% with respect to conventional interventions</td>
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<td>XIV. Cost reduction of the interventions by at least 10%</td>
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You can apply to the EU-Rail call 2023-01


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


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
<table>
<thead>
<tr>
<th>DESTINATION Topics</th>
<th>Type of Action</th>
<th>Expected TRL</th>
<th>Expected EU contribution per project (EUR million)</th>
<th>Number of projects expected to be funded</th>
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<tr>
<td>HORIZON-ER-JU-2023-FA1-SESAR: EU-RAIL – SESAR SYNERGY: INTEGRATED AIR AND RAIL NETWORK BACKBONE FOR A SUSTAINABLE AND ENERGY EFFICIENT MULTIMODAL TRANSPORT SYSTEM</td>
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<td>HORIZON-ER-JU-2023-EXPLR-02: FUTURE METRO SYSTEMS</td>
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<td>HORIZON-ER-JU-2023-EXPLR-03: BIODIVERSITY</td>
<td>CSA</td>
<td>-</td>
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<tr>
<td>HORIZON-ER-JU-2023-EXPLR-04: DISRUPTIVE ASSETS MANAGEMENT SOLUTIONS, INCLUDING URBAN USE CASES</td>
<td>RIA</td>
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<td>2.7</td>
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<td>HORIZON-ER-JU-2023-EXPLR-05: EXTENDING THE RAIL NETWORK OF PHDS</td>
<td>RIA</td>
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<td>2.0</td>
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<tr>
<td>HORIZON-ER-JU-2023-EXPLR-06: DAC FLEET RETROFITTING AND RETROFIT CAPACITY PLAN</td>
<td>CSA</td>
<td>-</td>
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</table>
HORIZON-ER-JU-2023-EXPLR-04: DISRUPTIVE ASSETS MANAGEMENT SOLUTIONS, INCLUDING URBAN USE CASES

Research and Innovation Action – TRL4/5
Budget: 2.7M€

Expected outcome:
Three innovative demonstrators of innovative
- assets monitoring solutions and/or
- inspections solutions and/or
- remotely controlled interventions solutions.

Among the proposed demonstrators, at least two urban specific use cases (metro/tramway/…) shall be addressed.
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B1060, Brussels - Belgium

www.rail-research.europa.eu