Why digitalisation and innovation should be on the agenda of any new transportation infrastructure project?

Tallinn, 11 April 2018
Key challenges of the European rail sector

- Innovation
- Quality of service
- Skills
- Cost
- Competitiveness
- Integrating the European rail market
- Infrastructure

Strngthening the role of rail in the European transport system and the global competitiveness of European Industry
To deliver through railway research and innovation the capabilities to bring about the most sustainable, cost-efficient, high-performing, time driven, digital and competitive customer-driven transport mode for Europe.
A PUBLIC-PRIVATE PARTNERSHIP R&I PLATFORM FOR RAILWAY
WORKING TOGETHER TO
DRIVE INNOVATION
DELIVER BY 2024
Capability 1: Automated train operation

Capability 2: Mobility as a service

Capability 3: Logistics on demand

Capability 4: More value from data

Capability 5: Optimum use of energy

Capability 6: Service timed to the second

Capability 7: Low cost railway

Capability 8: Guaranteed asset health and availability

Capability 9: Intelligent trains

Capability 10: Stations and "smart" city mobility

Capability 11: Environmental and social sustainability

Capability 12: Rapid and reliable R&I delivery
R&I for Innovation Capabilities

IP1: Cost effective and reliable trains, including high capacity trains and high-speed trains.
IP2: Advanced traffic management and control systems.
IP3: Cost efficient, sustainable and reliable high capacity infrastructure.
IP4: IT solutions for attractive railway services.
IP5: Technologies for sustainable and attractive European freight.

S2R Programme: Integrated consistent delivery oriented
What’s ongoing

- Around 50 ongoing Projects
- EUR 487 Mio R&I activities, 63% total budget committed
- Projects’ Reviews
- MAAP PART B
- CALL 2018
- Co-funding EUR 81.3 Mio, 18 topics
- AWP 2019
- R&I BEYOND 2020
- S2R 2
Participation per MS
excluding Lighthouse Projects, at award

Total Research & Innovation Activities per Member State (TPC, Mio EUR)

Number of entities per Member State

Shift2Rail
IP1 Cost-efficient and Reliable Trains, including high-capacity and high speed
**IP1** Cost-efficient and Reliable Trains, including high-capacity and high speed

- **Traction system**: use of silicon carbide for higher energy efficiency, passive Cooling Equipment and Noise Reduction

- **TCMS**: standardised interfacing for coupling different trains, use of wireless communication within vehicle/consist, drive-by-data technology and function distribution architectures – lower weight, increased services and control possibilities, virtual coupling

- **Running Gear**: Low-noise, lightweight, track friendly and sensors embedded

- **Brakes**: fully electric brakes, reduction of failures and noise levels; new gen eddy current brakes

- **Carbody shell**: hybrid use of composite materials, new designs and reduced maintenance

- **Doors**: next gen doors, PRM access, noise attenuation and increased accessibility

- **Interiors**: new modularity concepts, easier upgrades
IP2 Advanced Traffic Management and Control System

✓ **Moving Block** based on ERTMS/ETCS specifications and opportunity to remove trackside fixed signalling systems

✓ **GNSS/positioning systems** applied to rail to remove physical balises and facilitating the application of moving block

✓ **Advanced ATO for railway lines**; GoA4 will reduce human error and increase service availability

✓ **New and dynamic control of train management** – based on Virtual Coupling and On-board intelligence
IP3 Cost Efficient and Reliable High Capacity Infrastructure
IP3 Cost Efficient and Reliable High Capacity Infrastructure

✓ **Intelligent asset management**: from reactive and/or preventive maintenance to condition based and/or predictive maintenance, based on intelligent monitoring/analysis of the assets. IT decision supporting tools and new processes/procedures. Lower costs and down-time

✓ **Enhanced energy management**: smart metering of the energy consumption for optimised use and power supply equipment able to optimise energy use and link to smart-grid

✓ **Enhanced track system**: new solutions to improve the life-cycle of tracks and S&C. Continuous monitoring techniques for better design solutions and automated maintenance. Noise & vibration reduction

✓ **Next gen track system**: disruptive technology applicable to both track and S&C. possible tonnage increase, maintenance increased automation. Noise & vibration reduction

✓ **Station**: design taking into account new IT techniques, crows flow and new management strategies
IP4 IT Solutions for Attractive Railways Services

User

IP4 / IT-Rail

Shopping
Ticketing
Trip Tracker

Interoperability framework

Social Networks

Business Analytics

IP2/TD9 - Traffic Management

IP3/TD6 to 8 Maintenance 2.0

Supervision layer / I2M
IP4 IT Solutions for Attractive Railways Services

✓ **Interoperable framework:** semantic based IT solution capable of making interoperable different databases using different standards, without the need of changing the legacy systems → creating a multimodal framework

✓ **Business analytics:** providing to the operating companies the means to understand and adapt their offer to a real time multi-modal demand

✓ **Multimodal travel services:** providing to the passenger the easy interface, masking the complexity of technical and financial interaction among the several services provider, for shopping, booking and retrieving their right to travel

✓ **Customer experience applications:** providing to the user the engine to search its travel accordingly to his/her specific needs/preferences + providing an useful companions guiding the user across the right platform or across a service disruption through an automatic re-routing, etc.
Maximizing service quality, productivity, resource utilization and network capacity

Pan-European rail freight as key enabler for automated driving systems

Boosting productivity/punctuality
Competitive cost structures
Stimulating sustainable rail freight growth in Europe

LCC cost and customers benefit
Cost-efficiency in maintenance and operations
Based on smart freight assets
Maximizing reliability

Automated train composition and operation

Asset Control tower & customer communication

Logistics capable Future wagon

Longer coupled trains with distributed power

Smart eco-efficient propulsion technologies

Condition monitoring for predictive maintenance

Driver assistance, hybridization and advanced propulsion technologies
Significantly reducing energy consumption and emissions
IP5 Technologies for Sustainable & Attractive European Rail Freight

- Electrification & Telematics
- Access and Operations
- Wagon design
- New freight propulsion systems
- Terminal, hubs, marshalling yards, sidings
- Automated train operation
- Strategic choices
S2R R&I results and process leading to standards and regulation

**Shift2Rail internal process**

S2R R&I results → S2R CCA WA 3.2

Develop

Maintain

**Assisting the S2R projects/TDs:**
- Overview of standardisation activities, ongoing and planned
- Monitoring of progress
- Assistance in the timely development of appropriate standards
- Close cooperation with relevant partners and organisations

S2R CCA WA 3.2 → S2R Rolling Innovation Plan

**Bring its input into the regulatory framework and standardization plan**

- Detailed Guidance
- Feed into

**R&I to reg / stds formal process**

- Recommendation for TSI
- Requests for TSI
- Request for standards

**European Commission**

- Mandate

**Stakeholders e.g. ERRAC**

Advisory task proposing guidelines for R&D leading to technical standards for interoperability and safety, after stakeholders consultation

RASCOP Platform (chaired by EC)

- CEN/CLC/ETSI
- ISO/IEC/ITU
- JPC-R, Others, SSO

**Shifting2Rail**

S2R R&I results and process leading to standards and regulation.
S2R 2 Research and Innovation beyond 2020

FUNDAMENTAL RESEARCH
TRL: 0 -> 2
Rail « Blue Sky »
ad-hoc governance open to all

APPLIED RESEARCH
TRL: 3 -> 7
R&I
PPP membership with third parties

DEPLOYMENT COORDINATION
S2R solutions with S2R JU supervision open to all

START-UPS BLUE-SKY APPS

Funding type: FP9 rules
Flat rate on entity accounting rules

Funding type: CEF/EIB/etc.