Improve freight competitiveness between Europe and Asia: European Union Rail R&I

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Shift2Rail Executive Director

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SUSTAINABLE DEVELOPMENT GOALS

A • Aging
C • Climate Change
T • Technology

RAILWAY

People, Infrastructure, Assets, Staff, ...
Game changer
Opportunity & risk
INNOVATION CAPABILITIES

USER FIRST

INTEGRATED PERSONALISED EASY

Shift2Rail

1. Automated train Operation
2. Mobility as a Service
3. Logistics on demand
4. More value from data
5. Optimum energy use
6. Service timed to the second
7. Low cost railway solutions
8. Guaranteed asset health and availability
9. Intelligent trains
10. Stations and "smart" city mobility
11. Environmental and social sustainability
12. Rapid and reliable R&I delivery
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.
Railway - System of Systems

- **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
Railway System Architecture: Linx4Rail Project

- **Innovation**: evolutionary, by steps or disruptive
- **Time to market**: moving from R&I to deployment => system approach to decrease fragmentation
- “Do not reinvent the wheel”: Open System Interface (or interconnection) model
- **Innovation Skills and Competences**: still the same needs in the Digital Railway?

THE FUTURE RAIL SYSTEM: TRAINS MAXIMIZING THE SYSTEM PERFORMANCE BY A COMBINATION OF DISTRIBUTED INTELLIGENCE AND SUPERVISION

- **Enablers**: digital technologies, automation, artificial intelligence, data, cloud and supercomputing, connectivity, satellite, but also new regulatory concepts and framework, traction, braking systems, etc..

- **Deployment**: from zero on site testing through integrated testing to revenue services testing, large real time demos, transition models
Technologies for Sustainable & Attractive European Rail Freight
EUR 83 Mio

- 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
- High load efficiency
- Low energy consumption
- Low noise emissions
- Fully integrated logistical chain
- Increased intermodal competitiveness
- New services for new markets

Automated train composition and operation
Asset Control tower & customer communication
Logistics capable Future wagon
Longer coupled trains with distributed power
Condition monitoring for predictive maintenance
Smart eco-efficient propulsion technologies

Driver assistance, hybridization and advanced propulsion technologies
Significantly reducing energy consumption and emissions

Boosting productivity/punctuality
Competitive cost structures
Stimulating sustainable rail freight growth in Europe
IP5 better focused approach

**TD 5.1**
Fleet Digitization and Automation
- TD 5.1.1: Condition based maintenance
- TD 5.1.2: Automatic coupling
- TD 5.1.3: Freight ATO / DAS

**TD 5.2**
Digital Transport Management
- TD 5.2.1: Imp. meth. for timetable planning
- TD 5.2.2: Real time yard mgmt & SWL syst.
- TD 5.2.3: Real-time Network Management
- TD 5.2.4: Intelligent Video Gate Terminals

**TD 5.3**
Smart Freight Wagon Concepts
- TD 5.3.1: Running gear
- TD 5.3.2: Core market wagon
- TD 5.3.3: Extended market wagon
- TD 5.3.4: Telematics and electrification

**TD 5.4**
New Freight Propulsion Concepts
- TD 5.4.1: Last Mile propulsion Systems
- TD 5.4.2: Long Trains up to 1500m
- TD 5.4.3: Freight Loco of the future
- TD 5.4.4: Hybridization of legacy shunters

**TD 5.5**
Business analytics & implementation strategies
- TD 5.5.1: Identification of market segments
- TD 5.5.2: Development of Specs and KPIs
- TD 5.5.3: Migration Plan
- TD 5.5.4: \(\text{IP5}\) better focused approach
**IP5** interaction between TDs

**Simplified digital value chain**

**Building Block**
- Asset Digitization
- Asset Intelligence Center
- Condition-based Maintenance
- Condition-based Operations
- Rail Freight Automation

**Central Elements**
- Smart Freight Assets
- Sensors and Telematics
- Automatic Coupling
- Self-Diagnosis
- Electronic Status Notifications
- Scalable Big Data Architecture
- IoT Cloud
- Smart Data Analytics Tools
- Machine Learning
- Customized Dashboards
- Continuous data analytics
- Thresholds and measurement value analysis
- RAM-LCC Reports
- Condition-based maintenance regime
- Data-driven Fleet Steering
- Empty wagons management
- Workflow optimization
- Transport prioritization
- Facilitated Order-to-Cash

**IP5 coverage**
- TD 5.1/5.2/5.3
- TD 5.1/5.2/5.3
- TD 5.1
- TD 5.2
- TD 5.1

**Shift2Rail**
## TD 5.1 Fleet Digitalisation and Automation

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- **milestone**
- **quick win**
- **ongoing activities**
- **planned activities**
S2R JU Catalogue of solutions

• What R&I investments generate as innovative solutions for market uptake

• To explain successful results in term of possible products/solutions with a clear timetable

• To show Benefits for “customers”: final users, operators, infrastructure managers and/or suppliers

• To highlight the advantages of integrating the demonstrators into market solutions

• To deliver the Innovation Capabilities

• 28 October publication
No participation barriers between R&I&D areas
TRL 7 Demos included in Applied Research, Live Large Scale Demos in Deployment Coordination

Funding type: HE rules

“Flat rate on entity accounting” rules

Funding type: to be complemented in implementation by CEF/EIB/etc.

Research and Innovation beyond 2020
Shared Vision

Top down needs

Bottom up needs

Risks/Opportunities & new business models

Challenges

Solutions

Standards/regulatory framework

System Engineering (Architecture)

COLLABORATE

COMPETE

Products / Operational Improvements

MARKET UPTAKE
### Founding Members

- ALSTOM
- BOMBARDIER
- CAF
- Hitachi Rail STS
- NetworkRail
- SIEMENS
- THALES
- Trafikverket

### Associated Members

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<th>Virtual Vehicle Austria consortium+ (VVAC+)</th>
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