High speed rail infrastructure as a platform for digitalisation and innovation: Recommendations for Rail Baltica

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UNIFE represents the European rail supply industry (rolling stock, signalling and infrastructure equipment suppliers)

90 member companies from all over Europe and of all sizes (1/3 of SMEs) and 14 National Associations

Provider of 400,000 jobs in Europe and 46% of the worldwide rail production
The whole European rail sector wants to remain the backbone of transport in Europe and Rail Baltica will play a crucial role in this.
Rail (including high speed rail) faces huge challenges

- **Competitive** modes of transport (e.g. low cost airlines or buses)
- Increasing success of **new business models** (e.g. Uber, BlablaCar)
- **Changes in citizens needs**, with commuting mobile apps and increasing needs of real-time information

Digital trends, such as “3Vs” (data volume/variety/velocity) offer both great opportunities and significant challenges for the railway sector

However, there are still some **barriers to digitalise the rail sector**:

- Long life cycle (not a fast moving sector), so new greenfield projects like Rail Baltica can bring a significant breakthrough in the use of the newest technologies
- Interoperability and backward compatibility needs
- Safety aspects which are an entry barrier for GAFA types of actors
The key role of the European Rail Supply industry

The existing digital technologies that improve performance:

- Signalling solutions (ERTMS/ETCS); Traffic management systems
- Energy management solutions which is a high political priority
- Digital based maintenance, with monitoring and diagnosing tools
- Cyber-security, physical security
- Communication solutions
- Internet of Things and Big data applications
The key role of the European Rail Supply industry (2)

- The existing digital technologies improving the end customer’s satisfaction:
  - Infotainment (internet on board)
  - (Real time) passenger information solutions, new apps, new HMI
  - Seamless access to all travel services
  - e-ticketing and/or various rights to travel
  - Digital tracking/tracing applications (for freight and passengers).
The European rail supply industry will continue to develop digital innovations in the framework of Shift2Rail.

Shift2Rail: the 920 m € PPP for rail Research & Innovation under Horizon 2020.

Digital aspects in all 5 Innovation Programmes:
- Cost Efficient and Reliable Trains (IP1)
- Advanced Traffic Management and Control Systems (IP2)
- Cost Efficient and Reliable Infrastructure (IP3)
- IT Solutions for Attractive Railway Services (IP4)
- Technologies for Sustainable and Attractive European Rail Freight (IP5)
UNIFE is currently coordinating two Shift2Rail Lighthouse Projects that started in May 2015.

- **Roll2Rail** is mainly contributing to Shift2Rail Innovation Programme 1 “Cost-efficient and reliable trains, including high-capacity trains and high-speed trains”

- **IT2Rail** is a first step towards the long-term Shift2Rail Innovation Programme 4 “IT Solutions for Attractive Railway Services”
The Roll2Rail project aims to develop key technologies and to remove already identified blocking points for radical innovation in the field of railway vehicles, as part of a longer term strategy to revolutionise the rolling stock for the future.
Roll2Rail Project Partners

Coordinator

Railway Manufacturers:
- ALSTOM
- AnsaldoBreda
- BOMBARDIER
- CAF
- Siemens
- Faiveley
- Stadler
- Talgo
- Knorr-Bremse
- Thales
- UniControls

Operators and Infrastructure Managers:
- DB
- TRENITALIA
- KTH
- Fraunhofer
- University of Southampton
- IK4 Ikerlan
- SET
- Trafikverket
- Virtual Vehicle
- Rail NIM
- Politecnico di Milano
- DLR

Consultancies:
- Network Rail
- Cefi
- Universitat Salzburg
- IFSTTAR

Universities and Research Centers:
### Roll2Rail objectives

- Increase the capacity of the railway system and bring flexibility to adapt capacity to demand

- Increase availability, operational reliability and therefore punctuality of the vehicles

- Reduce life cycle costs of the vehicle and the track

- Increase the energy efficiency of the system

- Improve passenger comfort and the attractiveness of the rail transport

- Reduce the environmental impact of railways
**IT2Rail: Facts & Figures**

- Horizon 2020 research and innovation program under grant agreement No: 636078
- Total Budget: €12 million
- Partners: 27
- Project Start Date: 1 May 2015
- Project End Date: 31 October 2017
- Duration: 30 months
- [http://www.it2rail.eu/](http://www.it2rail.eu/)
- New seamless travel experience
- Complete multimodal travel offer connecting the first and last mile to long distance journeys
- Traveller at the heart of innovative solutions, accessing all multimodal travel services (shopping, ticketing, and tracking) through its travel-companion
- Build an open published framework providing full interoperability whilst limiting impacts on existing systems, without prerequisites for centralised standardisation.
IT2Rail: Scope & organisation

- Travel Shopping
- Booking & Ticketing
- Trip Tracker
- Travel Companion
- Interoperability Framework
- Business Analytics
IT2Rail: Expected Outcomes

Jane is provided with a personalized, customizable and secure digital “Travel Companion” (TC) environment.

Jane plans her trip to attend her fashion show.

Jane builds her multimodal travel solutions, manages her booking and shopping through her preferred one-stop shop.

Jane uses TC’s wallet to validate entitlements.

Assistance to navigate at interchanges, taking into account Jane’s mobility constraints (luggage, reduced mobility).

Business Analytics provide relevant feedback of traveler data to operators and service providers, to ensure more robust and responsive operations.

Jane receives notification of significant event affecting her itinerary. She is offered some options for re-routing and re-accommodation.
ERTMS: most advanced signalling system
UNIFE activities on railway signalling

Political and strategic platform for the ERTMS suppliers

Communications activities (ERTMS website, logo) & lobbying

Work on the ETCS Specifications jointly with EUAR & railways

technical platform for the ETCS suppliers (e.g. standardisation of interfaces)
ERTMS / ETCS (European Train Control System) in a nutshell:

- ETCS is a train control system, developed to replace more than 20 existing systems in Europe.
- ETCS provides the driver with signalling information, such as how fast he is allowed to drive and until where.
- ETCS supervises the movement of the train and prevents the driver to exceed the indicated limits.
- ETCS complies with highest safety standards, permitting operation at very high speeds and traffic density, and without traditional optical lineside signals.
- Compatible ETCS equipment is available from multiple suppliers.
Benefits of ERTMS

- ERTMS is a unique standard
  - Multi-sourcing opportunities
  - Future **safe investments**
  - Technical and operational **interoperability**
  - **Improved safety**
  - Increase of traffic capacity
  - Higher speeds

- ERTMS provides **high flexibility** for all kinds of rail traffic

- ERTMS as a **base for innovation and future proof solutions**
ERTMS, a global standard

Total track km: **88,885**

48 Countries are using ETCS trackside

Total No vehicles: **11,687**

45 Countries are using ERTMS vehicles
Key principles:

- Stability of the ERTMS/ETCS specifications based on Baseline 3 Release 2
- Compliance with the TSI and no national “add-ons”
- Ensure interoperability across the network
- Improved change and software management
- Synchronised deployment
- Monitoring by the ERTMS Stakeholders Platform

Sector committing to work jointly to achieve these key objectives in the coming years
How to ensure that Rail Baltica uses the best and most innovative products and technological solutions?
Why life cycle cost approach ensures the best value for money?

- What should be chosen:
  - a product which has a cheaper catalogue price yet turns out to be more expensive in the maintenance, or
  - a more expensive product which costs less in the long run (CAPEX and OPEX integrated approach)?

- European rail supply industry innovation strategy is based on the life cycle cost approach → Added value for the Operators and Infrastructure Managers and for the end-users!

- Cost efficiency is a key priority for Shift2Rail: Target - 50% reduction of LCC of the railway transport system! S2R Innovation based on LCC approach:
  - Rolling Stock: New Traction Systems using Silicon Carbide Converters…
  - Infrastructure: Next Generation of Switch & Crossing systems and Track system…
  - Freight - Increase Energy Efficiency: recuperation of braking energy, last mile propulsion capabilities for freight locomotives…

- European companies are also developing innovative tools for measuring life-cycle cost for infrastructure and rolling stock
Procurement – a key instrument to promote innovative and qualitative products

- The 2014 EU public procurement framework contains a specification that “contracting entities shall base the award of contracts on the most economically advantageous tender” (MEAT principle)

- Award criteria “shall be identified on the basis of the price or cost, using a cost-effectiveness approach, such as life-cycle costing”

- More qualitative, social and environmental criteria should become determining factors in the choice of a contractor, and the procurement should stimulate innovation uptake

- Need to switch from ‘Lowest Price’ to the ‘Best Price-Quality Ratio’ in the public procurement
The 2014 EU public procurement framework also makes it possible to reject bids if more than 50% of the value is added outside the EU (Article 85 and 86 of Directive 2014/25/EU).

It is important that Rail Baltica project uses the European taxpayers’ money as a lever to stimulate growth and jobs for EU companies and thereby maximise local economic benefits.
Thank you for your attention!
Annex
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<tr>
<th>Roll2Rail expected outcomes</th>
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<td>New traction technology based on emerging electronic components and motor-wheel high-speed equipment</td>
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<td>New wireless technologies applied to train control functionalities</td>
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<td>Carbody solutions based on lightweight composite materials</td>
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<td>Quantifying the LCC impact of existing and new technologies</td>
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<td>Gaining knowledge of the variety of requirements in Europe</td>
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<td>Standardised methodologies for assessing attractiveness and comfort from the passenger’s point of view</td>
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<td>Development of methodologies for noise source separation techniques</td>
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<td>Development of an Energy calculation methodology</td>
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Roll2Rail main achievements

- Two field measurement campaigns were completed:
  - Different measurement methodologies to separate wheel and track noise
  - Characterisation of the railway environment for radio transmission

- Development of silicon carbide technology for traction

- Simulation of Car-body prototypes made with lightweight materials

- Universal cost model for quantifying the whole life cycle cost