AICQ
Energy & Digitalisation: the Shift2Rail research programme

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About UNIFE

- UNIFE represents the European Rail Supply Industry (rolling stock, infrastructure, sub-systems and signalling)

- UNIFE is a trusted partner of European and international institutions in all matters related to rail transport and industrial competitiveness

- Over 85 full members of the largest and small and medium-sized companies in the rail supply sector and 16 associated members including 14 National Associations (such as ASSIFER), representing almost 1000 suppliers of railway equipment

World leaders:

UNIFE Members have a 84% market share in Europe and supply 46% of the worldwide rail production
A strategic industry for the European economy

400 000 JOBS IN EUROPE!

INNOVATIVE

WORLD LEADER & EXPORTER
Improving the European transport system – EU Trends

- Increased demand for mobility and safety
- Need to reduce transport emissions
- Increasing urbanisation = increasing congestion
- Need of an efficient multimodal transport system

Rail is the backbone of a future efficient digitalised multi-modal transport system.
Rail— a key answer to global challenges

- Rail uses considerably less land and carries higher numbers of passengers
- Rail has the least CO2 emissions of all modes of transport
- Rail consumes dramatically less energy than other modes of transport
- Wider economic and social impacts
Digitalisation
Today’s challenges of the European Rail sector
Digital trends & railway environment

- The whole European rail sector wants to remain the backbone of transport in Europe

- However, it 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

- All industrial sectors are already or will be soon impacted

- However, there are still some barriers to digitalise the rail sector:
  - Long life cycle (not a fast moving sector)
  - Interoperability and backward compatibility needs
  - Safety aspects
In order to better respond to these challenges, UNIFE created a Digitalisation Platform and adopted a Position Paper on Digitalisation of Railways, which proposes priorities for the European railway industry in the field of digitalisation.
The key role of the European Rail Supply industry in digitalisation (1/2)

The existing use of the digital technologies is already covering many aspects:

- **Contribution to the Railway performance**
  - Signaling solutions, with ERTMS/ETCS, and CBTC for urban rail; Traffic management systems;
  - **Energy management solutions which is a high political priority**;
  - Digital based maintenance, with monitoring and diagnosing tools;
  - Cyber-security; Physical security, and specifically Video system;
  - Communication solutions
  - Internet of Things and Big data applications

- **Improvement of 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).

- **Internal digital transformation of the Railway manufacturing industry**
  - Industry 4.0 with automation of production, of the supply chain and collaborative workplaces;
  - Digital based design and/or production (Simulation, Collaborative design), virtualization.
Further developments will come from all SHIFT2RAIL 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)

Additionally, the rail supply industry is committed to extend this effort, aiming to develop technological and organisational arrangements maximising capacity and reliability, and leading to a major culture change to better operate and maintain the railway.

The digital transformation will benefit the end-users and the complete sector and will make railways more attractive and competitive: the rail supply industry is keen to contribute to achieve common objectives for the railway sector as whole.
Research and Innovation
Rail Transport Challenge

How to get a better railway transport system?

Need of new and advanced technologies
→ Research and Innovation are key

- To cut the life-cycle cost of railway transport by as much as 50 %;
- To double railway capacity;
- To increase reliability and punctuality by as much as 50 %. 
Research and Innovation in the rail sector are of paramount importance to answer the **societal challenges** (Climate change adaptation, decarbonisation, digitalisation…)

Need to **increase the capacity, the reliability and reduce cost of the railway system**.

**Shift2Rail**, the new and ambitious European Research & Innovation Programme, will deliver **Technology Demonstrators** aiming at improving the performance of the railway system.

**Shift2Rail - A whole industry solution**: Supply industry, IMs and RUs will work together with the support of academia.
Shift2Rail is based on a work programme composed of five Innovation Programmes (IPs) and six Cross-Cutting Work Areas aiming at increasing the railway capacity and reliability and reducing the life-cycle cost of the system.

Digital transformation is not identified as such as an objective within Shift2Rail.

However, several Shift2Rail Technology Demonstrators will contribute to the Digitalisation of the railway, notably Technology Demonstrators of the Innovation Programmes 2, 3 and 4.

The Energy topic is addressed in almost all the Innovation Programmes particularly in IP 1, IP3 and the Cross-Cutting Work Areas.
Shift2Rail contribution to digitalisation and energy efficiency: innovative technologies, systems and applications in different fields:

- **Cost Efficient and Reliable Trains - IP1:**
  - Digitalisation of train subsystems and equipment, to improve several aspects of performance (energy, maintenance, operation...). Extended communications capabilities, by using new technologies (wireless). Safety critical functions will be transferred to digital platforms;

- **Advanced Traffic Management and Control Systems - IP2:**
  - Telecommunication, train separation, supervision, engineering, automation and security (including ERTMS)

- **Cost Efficient and Reliable Infrastructure IP3**
  - Infrastructure and energy: new solutions and technologies aiming at improving track performance, management of maintenance activities (e.g. predictive maintenance) and energy efficiency (e.g. Smart Metering for railway distributed energy resource management system...)

- **IT Solutions for Attractive Railway Services - IP4**
  - more innovative, attractive and end-users oriented rail services and a general framework for multimodal transport.

- **Technologies for Sustainable and Attractive European Rail Freight - IP5:**
  - New digital features to boost productivity and punctuality of freight transport, to automate the trains coupling and to propose more resilient time-table planning. Improvement of condition monitoring for predictive maintenance.
Highlight on the Shift2Rail lighthouse projects

- UNIFE is the coordinator of two Shift2Rail lighthouse projects (Roll2Rail and IT2Rail) and involved as partner in another Shift2Rail lighthouse project (In2Rail).

- These projects are setting-up the foundations of several Shift2Rail Innovation Programmes and are contributing to the setting up of a **digitalized and energy efficient railway system**:
  - **Roll2Rail**: To develop key technologies that will overcome hurdles to innovation in rolling stock development and forms part of a longer term strategy towards revolutionising the rolling stock of today. (S2R IP1)
  - **IT2Rail**: To transform the European citizen’s global travel interactions into a fully integrated and customised experience, to offer a user door to door (D2D) multi modal travel experience to passengers (through services distributed by multiple providers) and to contribute to Shift2Rail IP4
  - **In2Rail**: To set the foundations for a resilient, consistent, cost-efficient, high capacity European network by delivering outputs that will feed into Shift2Rail IP2 and IP3.
UNIFE Messages
Commitment of the rail supply industry to maximise capacity and reliability:

- More real-time resilient, adaptive and available railway system components, leading to a highly performant system which is a prerequisite for the development of track capacity and network performances; business continuity, optimised by IT based real-time traffic management, maximising capacity, conserving energy and minimising inconvenience to the passenger and the freight user; optimised recovery solutions and reduction of in-service failure;

- IT innovations foster highly adaptive and (semi)automated railway operation and technical support, including vehicle and infrastructure, as for operation that for condition monitoring and maintenance, thereby enhancing system resilience, including facing cyber-attacks from different origins, reliability and cost efficiency and improving customer service;

- Digitalisation and IT innovation technologies will lead for the railways, IM’s, RU’s and suppliers to a major culture change in order to operate the railway, to maintain a safe, secure and available traffic, to promote continued improvement of every aspect of the passenger’s trip and of the freight shipper’s experience along the supply chain.

- UNIFE strongly believes that the digital transformation will benefit the end-users and the complete sector and will make railways more attractive and competitive: the rail supply industry is keen to contribute to achieve common objectives for the railway sector as whole.
The UNIFE Digital Platform has identified the following priorities:

- Better use of existing infrastructure mainly through ERTMS deployment and predictive maintenance
  - the “ERTMS Long Term Strategy” adopted by the Member States in February 2016, aims at detailing the different additional features in order to boost capacity, reduce maintenance cost, reduce energy consumption and further optimise traffic management.

- Better accessing and using data

- Enhancing the security of the rail system, and maintain high reliability/safety and operational continuity standards

- Improving end-user’s experience, by implementing TAP/TAF TSI and fostering multi-modal real time information and services for door to door journey
A cooperative approach by all stakeholders is essential to reach the digitalisation of the railway sector in Europe

A permanent dialogue between sector stakeholders and decision makers is needed
- This includes the other sector associations such as EIM, CER, UIC, UITP, etc. and the European institutions

EU institution should strongly support the digitalisation of the railways:
- Legislation and regulation at the EU level should be supporting the digital transformation of the transport sector, while also providing the necessary safeguards and funding for its achievement
R&I
• Shift2Rail is a first important milestone to improve the rail transport system and tackle the global trends.
• However a stronger support for rail R&I is expected within H2020 (outside of Shift2Rail) and after Shift2Rail (Shift2Rail n°2).

Digitalisation
• The Rail Industry calls on the European Institutions to set-up a rail digital platform.
• This platform shall cooperate with others modes of transports and sectors on key topics like cyber-security

Key for the competitiveness of the European Rail Industry!
Thank you for your attention!