

# 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)

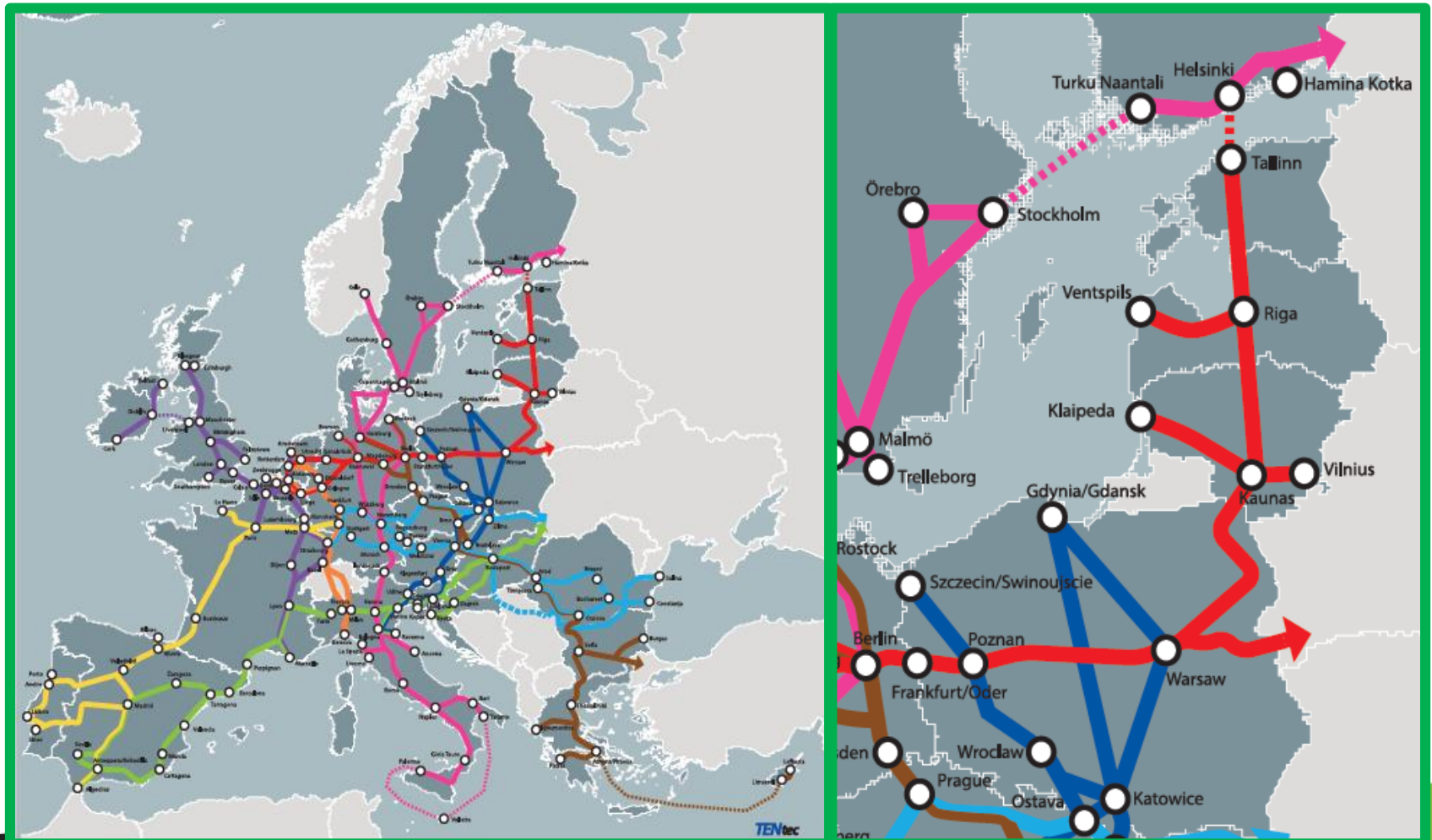


■ 90 member companies from all over Europe and of all sizes (1/3 of SMEs) and 14 National Associations



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 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 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**



**IT2Rail**

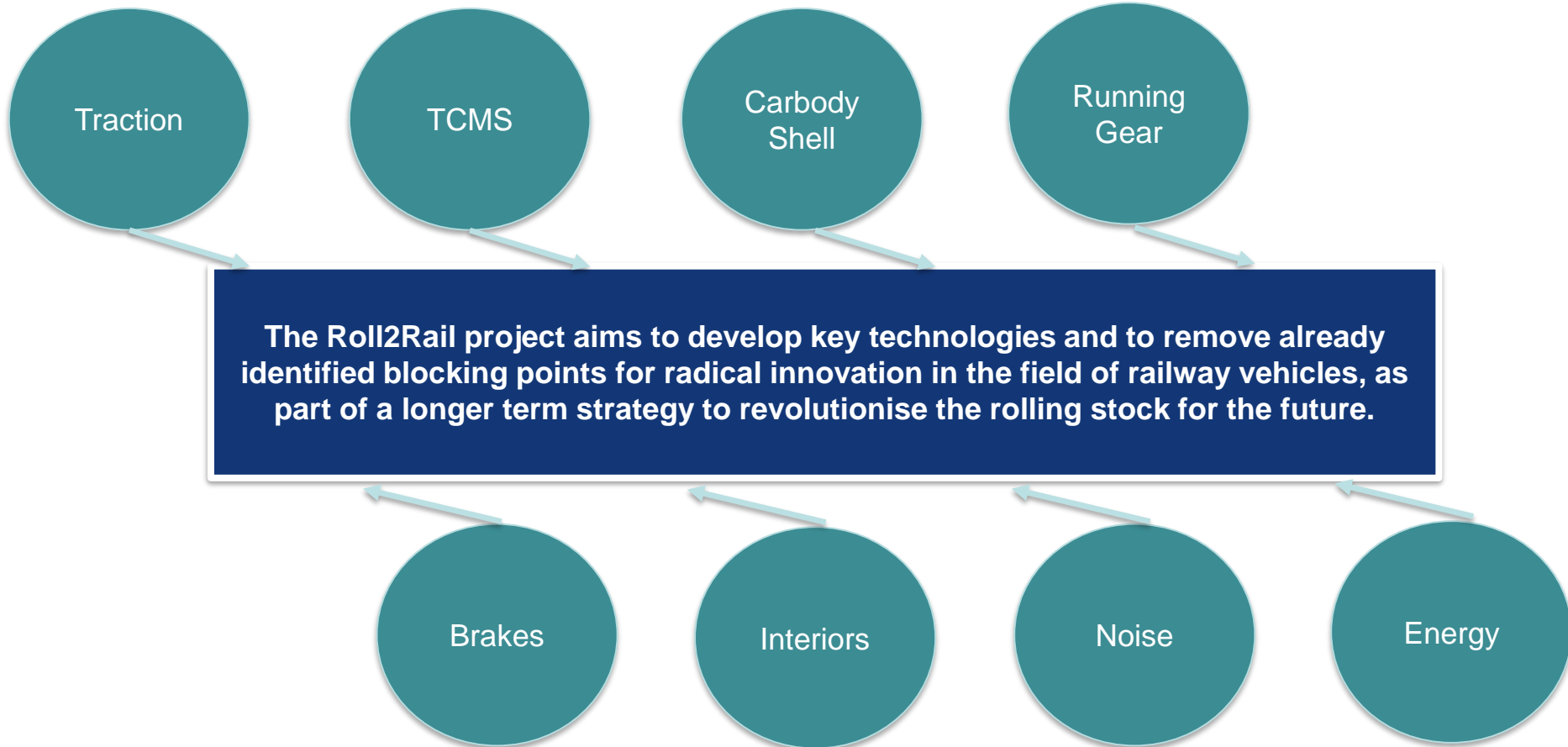
- Roll2Rail is mainly contributing to Shift2Rail Innovation Programme 1 “Cost-efficient and reliable trains, including high-capacity trains and high-speed trains”
- IT2Rail is a first step towards the long-term Shift2Rail Innovation Programme 4 “IT Solutions for Attractive Railway Services”



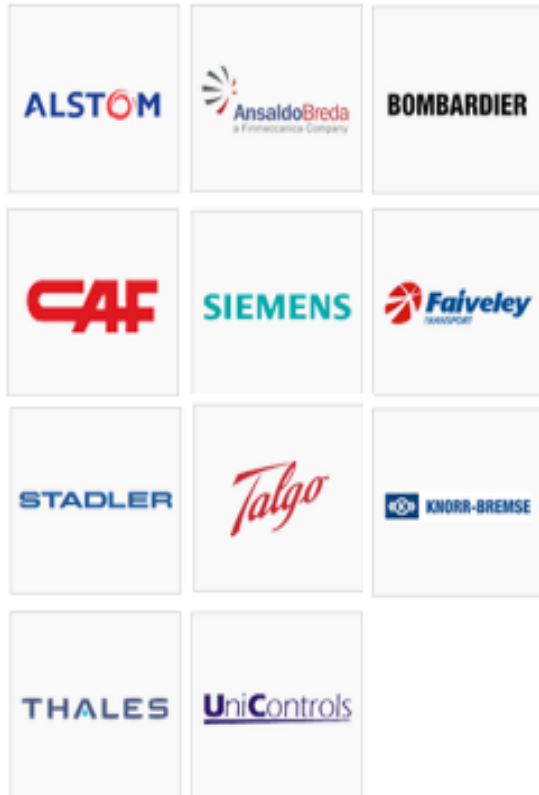


# Roll2Rail

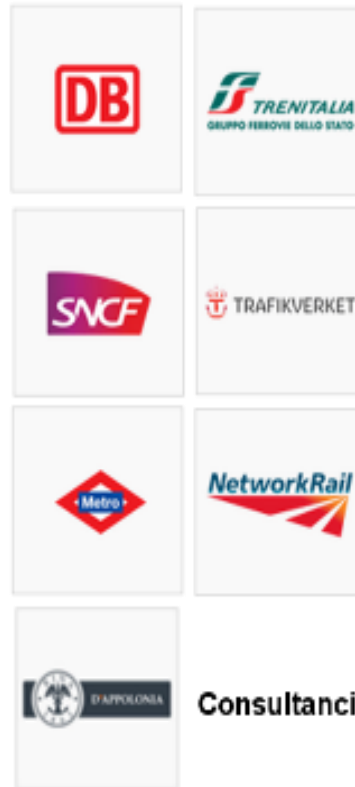




Coordinator



Railway Manufacturers



Operators and Infrastructure Managers

Consultancies



Universities and Research Centers

**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





- 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/>

# IT2Rail Project Partners



## Coordinator



## Mainline Operators



## Urban Operators



## ICT specialists



## Universities and Research Centres



## SMEs & other



## Associations



## Consultants



- **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.**

**Across Europe**

**Across Modes**

**Door-to-Door**

**Across Services**





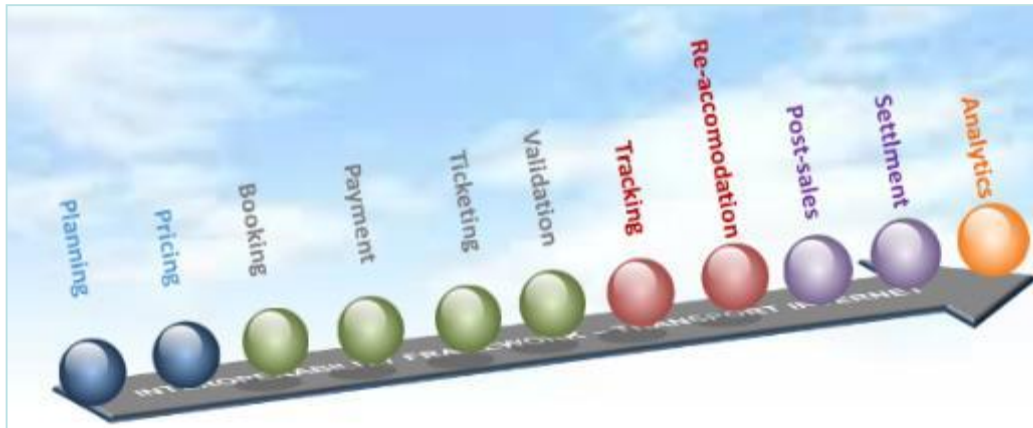
Travel Shopping

Booking & Ticketing

Trip Tracker

Travel Companion

Interoperability Framework



Business Analytics

**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)



**Jane** receives notification of significant event affecting her itinerary. She is offered some options for re-routing and re-accommodation



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

# ERTMS: most advanced signalling system



**Political and strategic platform  
for the ERTMS suppliers**



**Communications activities  
(ERTMS website, logo) &  
lobbying**



**Work on the ETCS  
Specifications jointly with  
EUAR & railways**

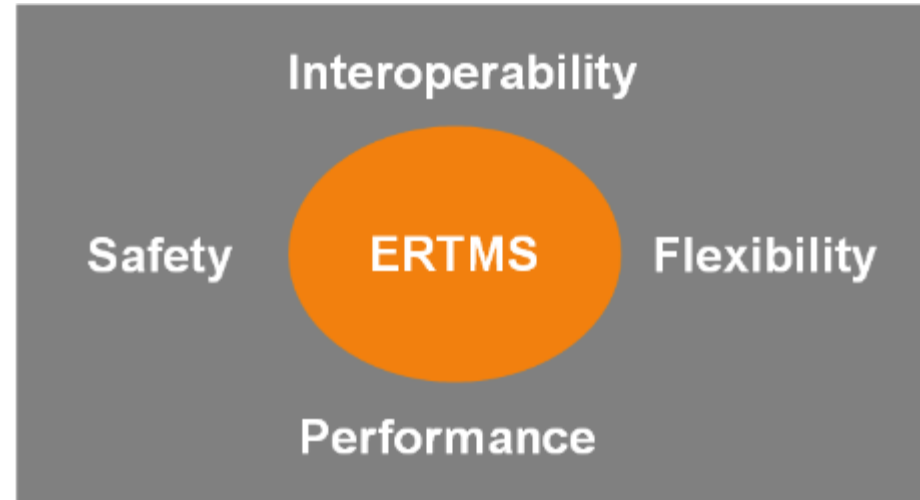


**technical platform for the  
ETCS suppliers  
(e.g. standardisation of  
interfaces)**

- **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



- 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**

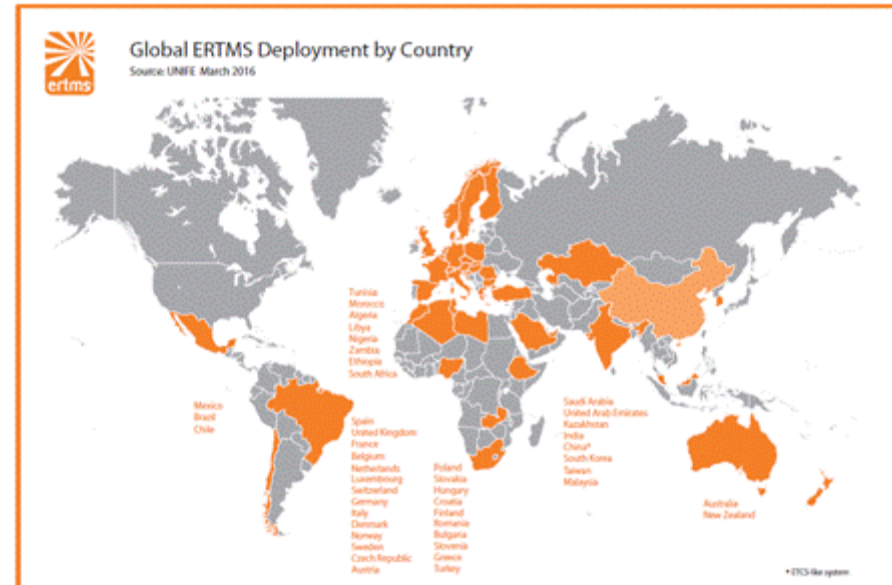


▶ **Total track km: 88,885**

▶ **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*

**New traction technology based on emerging electronic components and motor-wheel high-speed equipment**

**New wireless technologies applied to train control functionalities**

**Carbody solutions based on lightweight composite materials**

**Quantifying the LCC impact of existing and new technologies**

**Gaining knowledge of the variety of requirements in Europe**

**Standardised methodologies for assessing attractiveness and comfort from the passenger's point of view**

**Development of methodologies for noise source separation techniques**

**Development of an Energy calculation methodology**

- **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**

