

# Schienenfahrzeugtagung

43. Tagung Moderne Schienenfahrzeuge



**Shift2Rail - The first and only European  
rail joint technology initiative**

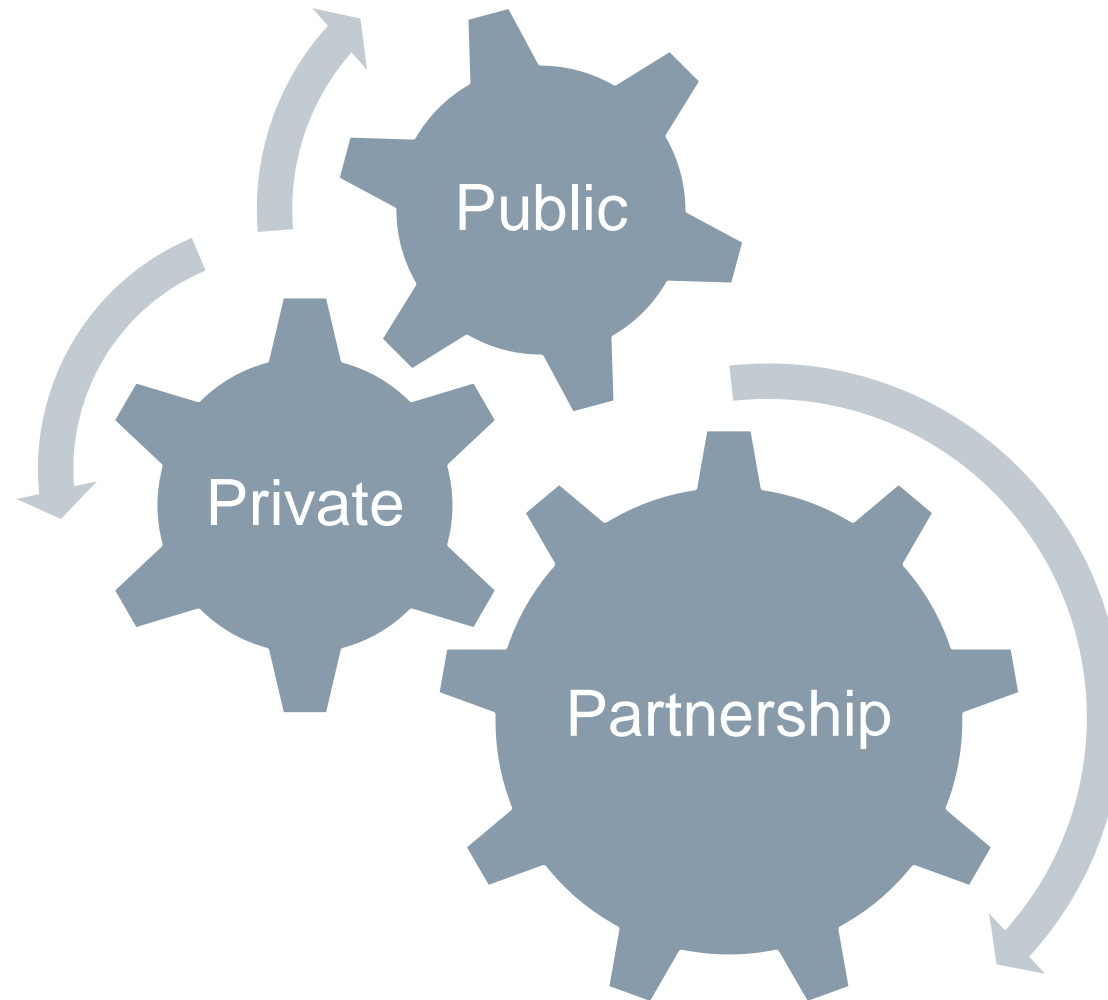
**Version 6. March**

presented by:



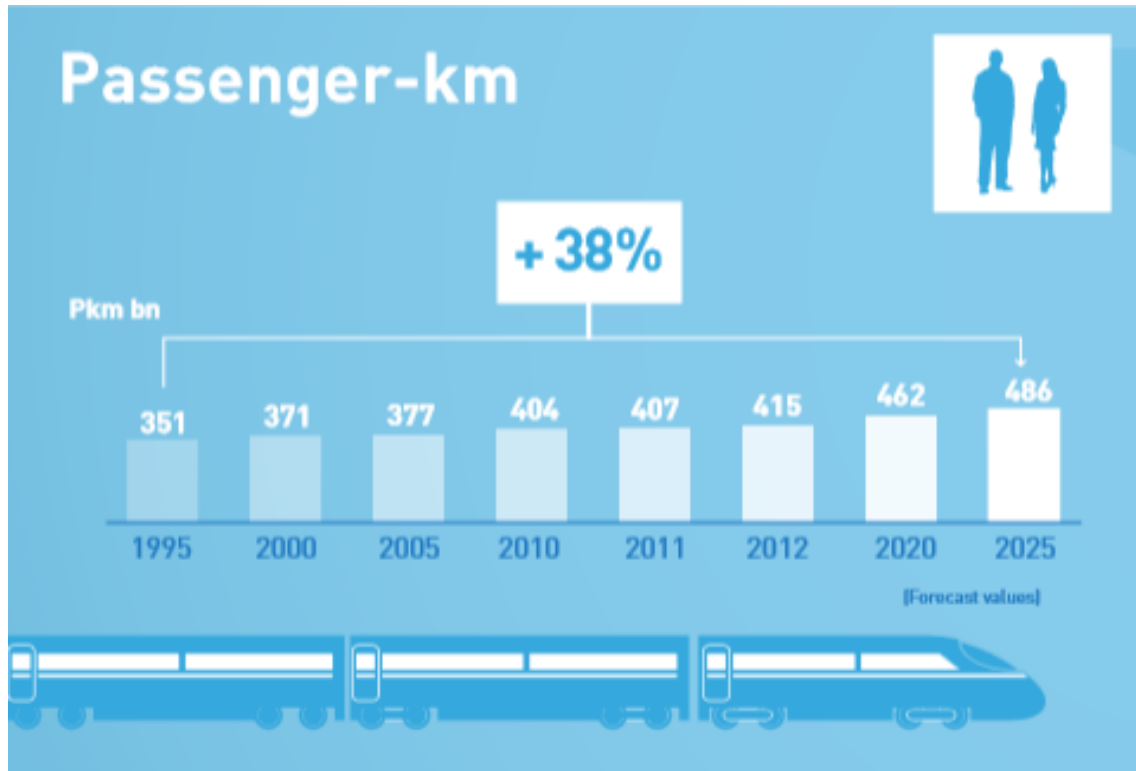
**SIEMENS**



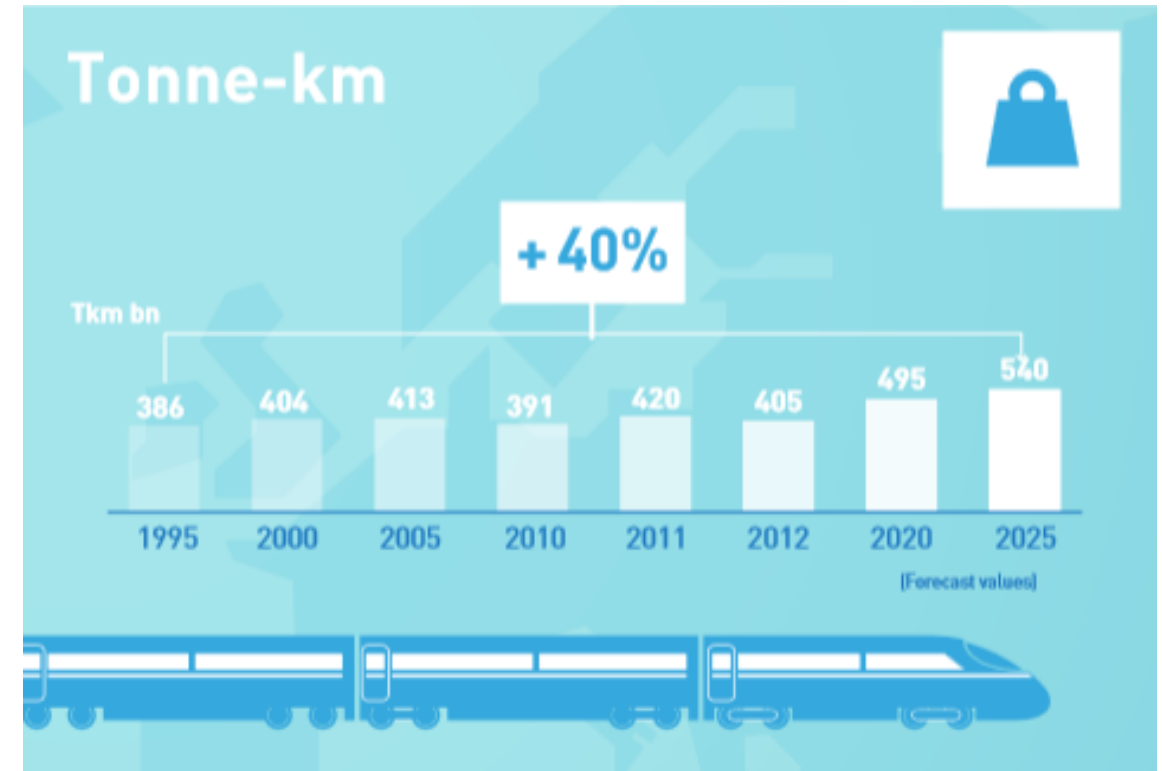


Shift2Rail is the first Public Private Partnership (Joint Undertaking) focusing on Research and Innovation established by the European Commission and the European Rail Industry.

# Why Shift2Rail?

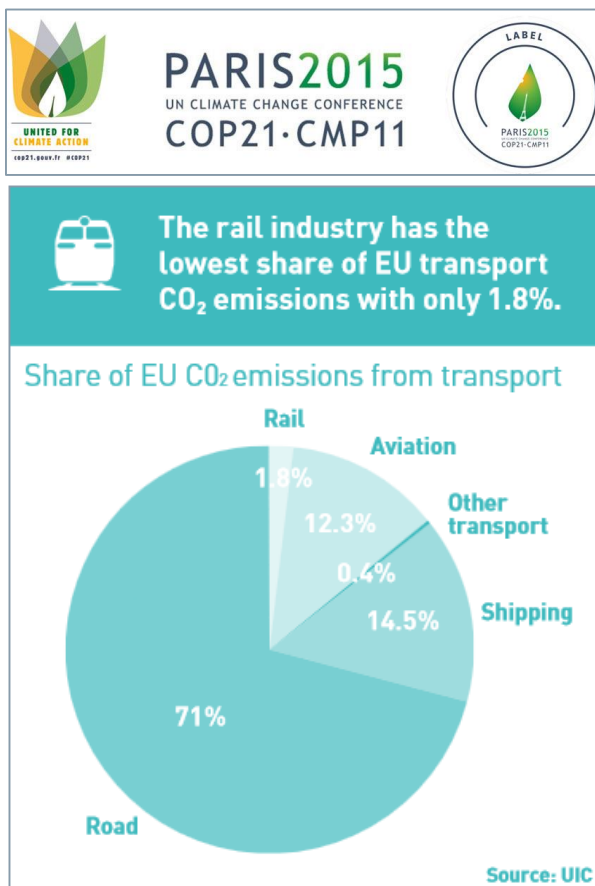


Source: UNIFE pocket guide



Source: UNIFE pocket guide

# Why Shift2Rail?



Source: UNIFE pocket guide



Source: European Commission SERA



Source: [http://ec.europa.eu/transport/themes/strategies/2011\\_white\\_paper\\_en.htm](http://ec.europa.eu/transport/themes/strategies/2011_white_paper_en.htm)

Joint Undertakings, like Shift2Rail, are specially designed within Horizon 2020 to overcome the issues of R&I fragmentation and to support market uptake and the implementation of innovative solutions.





# Why Shift2Rail?



The Competitiveness  
of the  
European Railway  
Industry

## Targets of the European Union

White Paper on Transport

Shift to **less Carbon** emission transport

"Smart, green integrated transport"

**Fragmentation** of R&I efforts

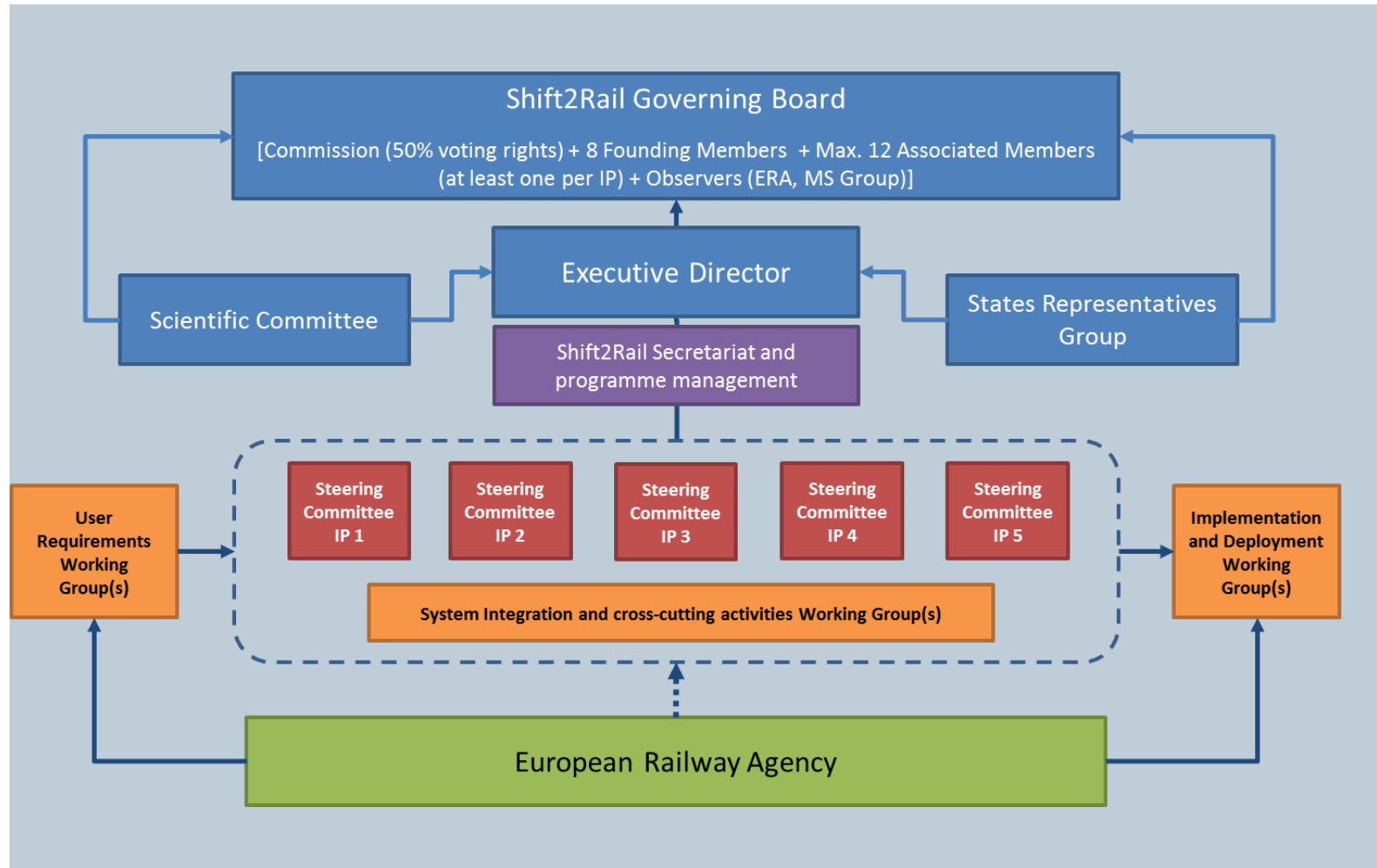
**Low leverage** of EU rail R&D



**SERA**

Single European Railway Area

**Competitiveness** and Global  
leadership for the European  
transport industry



## Governing Board Members from Industry, Research and Railway Undertakings



## 50% cost reduction

50 % reduction of the life-cycle cost of the railway transport system, through a reduction of the costs of developing, maintaining, operating and renewing infrastructure and rolling stock, as well as through increased energy efficiency;

## 100% capacity increase

100 % increase in the capacity of the railway transport system, to meet increased demand for passenger and freight railway services;

## 50% reliability increase

50 % increase in the reliability and punctuality of rail services (measured as a 50 % decrease in unreliability and late arrivals);

- Reduction of negative impacts: noise, vibrations, emissions
- Remove of technical obstacles for interoperability (through TSI) and efficiency
- Contribute to the overall EU targets, as Smart, Green and Integrated Transport Challenge etc.
- Contribute to SERA (Single European Railway Area)

# Shift2Rail is clustered in 5 Innovation Programmes



Innovation Programmes		Objectives
<b>IP1</b>	Cost-efficient & Reliable Trains, including high capacity trains & high speed trains	<ul style="list-style-type: none"> <li>▪ Reduce weight of trains</li> <li>▪ Increase energy efficiency of trains</li> <li>▪ Reduce travel times, track damage and environmental impact</li> <li>▪ Reduce life-cycle costs of trains</li> </ul>
<b>IP2</b>	Advanced Traffic Management & Control Systems	<ul style="list-style-type: none"> <li>▪ New generation of signaling &amp; control systems based on ERTMS</li> <li>▪ Enable intelligent traffic mgmt &amp; automatically driven trains</li> <li>▪ Optimize network capacity and reliability</li> <li>▪ Reduce life-cycle costs</li> </ul>
<b>IP3</b>	Cost-efficient, Sustainable & Reliable High Capacity Infrastructure	<ul style="list-style-type: none"> <li>▪ Focus on infrastructure and energy subsystems</li> <li>▪ Deliver a new railway infrastructure system</li> <li>▪ Increase network capacity and performance</li> <li>▪ Reduce life-cycle costs of infrastructure</li> </ul>
<b>IP4</b>	IT Solutions for Attractive Railway Services	<ul style="list-style-type: none"> <li>▪ Develop a framework for a European multimodal transport information, management and payment system</li> <li>▪ Develop innovative solutions and services</li> <li>▪ Encourage travelers to public transport</li> </ul>
<b>IP5</b>	Technologies for Sustainable & Attractive European Freight	<ul style="list-style-type: none"> <li>▪ Optimize the overall transport time</li> <li>▪ Improve the performance of wagonload services</li> <li>▪ Optimize coupling and decoupling processes</li> <li>▪ Integrated production of wagonload and intermodal services</li> </ul>
<b>CCA</b>	Cross-Cutting Activities: Noise & Vibration, Energy, Integrated Mobility Mgmt., Integrated Assessment	<ul style="list-style-type: none"> <li>▪ Harmonization of cross-IP objectives, methods and procedures</li> <li>▪ Ensure alignment of cross-IP interfaces</li> <li>▪ Provide measure to evaluate KPI of IPs</li> </ul>

# Budget of Shift2Rail



## Rail Sector

€ 470m

€ 270m Founding Member

€ 200m Associated Member

## European Commission

€ 450m

€ 52m Light House Projects included

**max 40% (max. € 180m)** for Founding Members

**max 30% (max. € 135m)** for Associated Members

**min 30% (min. € 135m)** Open Calls for non Members

## € 920m Overall Budget

€ 120m In-Kind Contribution

€ 27m Admin cots Shift2Rail

€ 221m for IP1

€ 191m for IP2

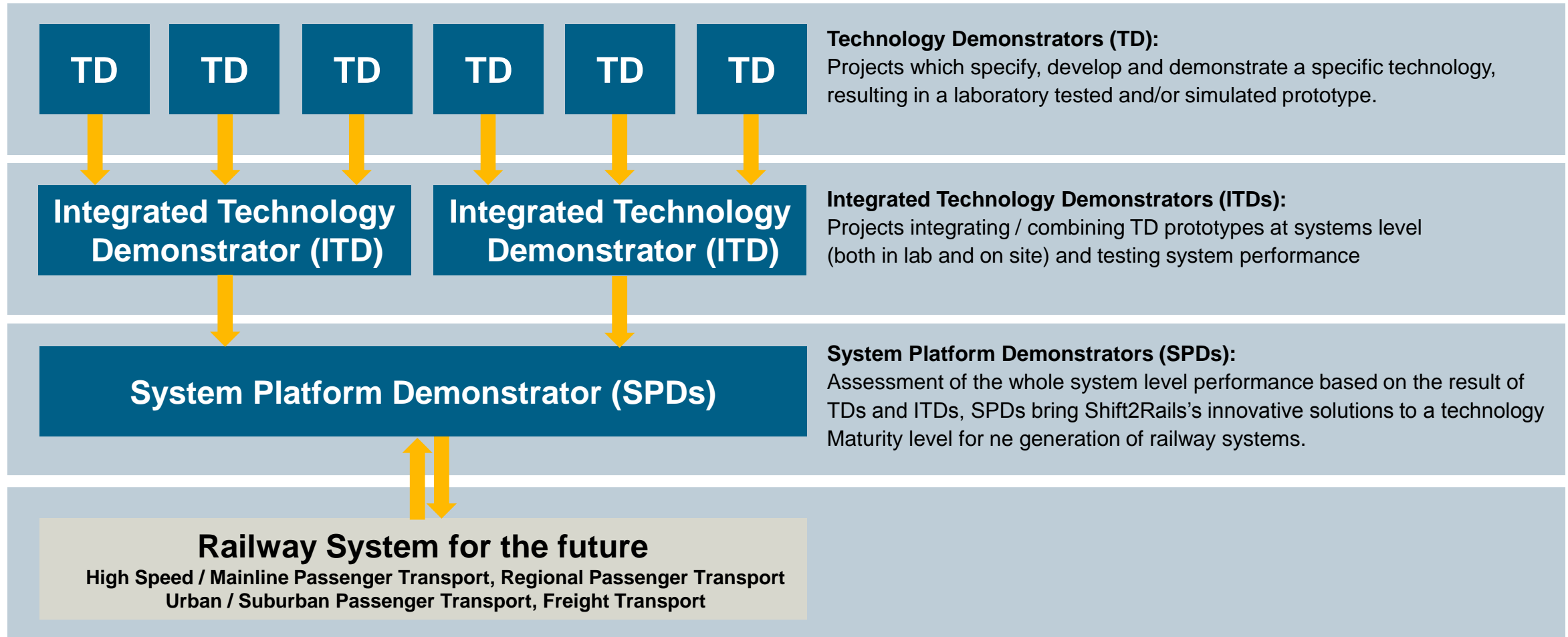
€ 153m for IP3

€ 85m for IP4

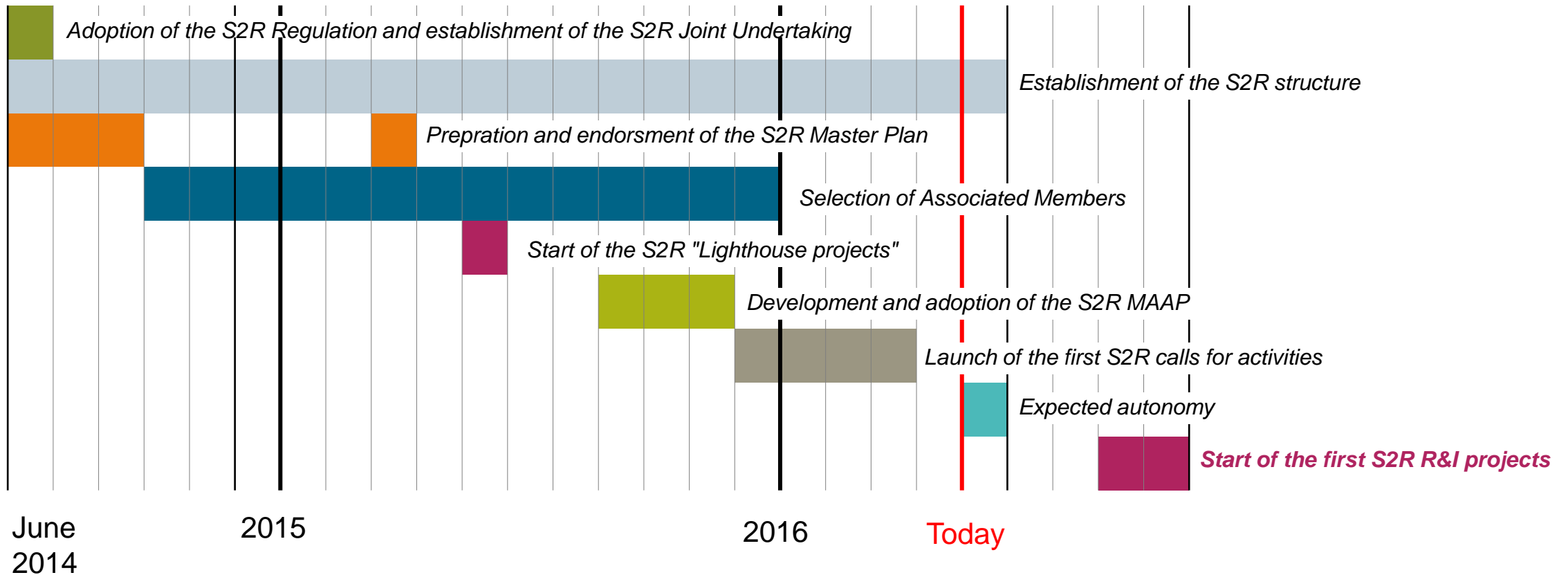
€ 82m for IP5

€ 34m for CCA

# What is Different in Shift2Rail

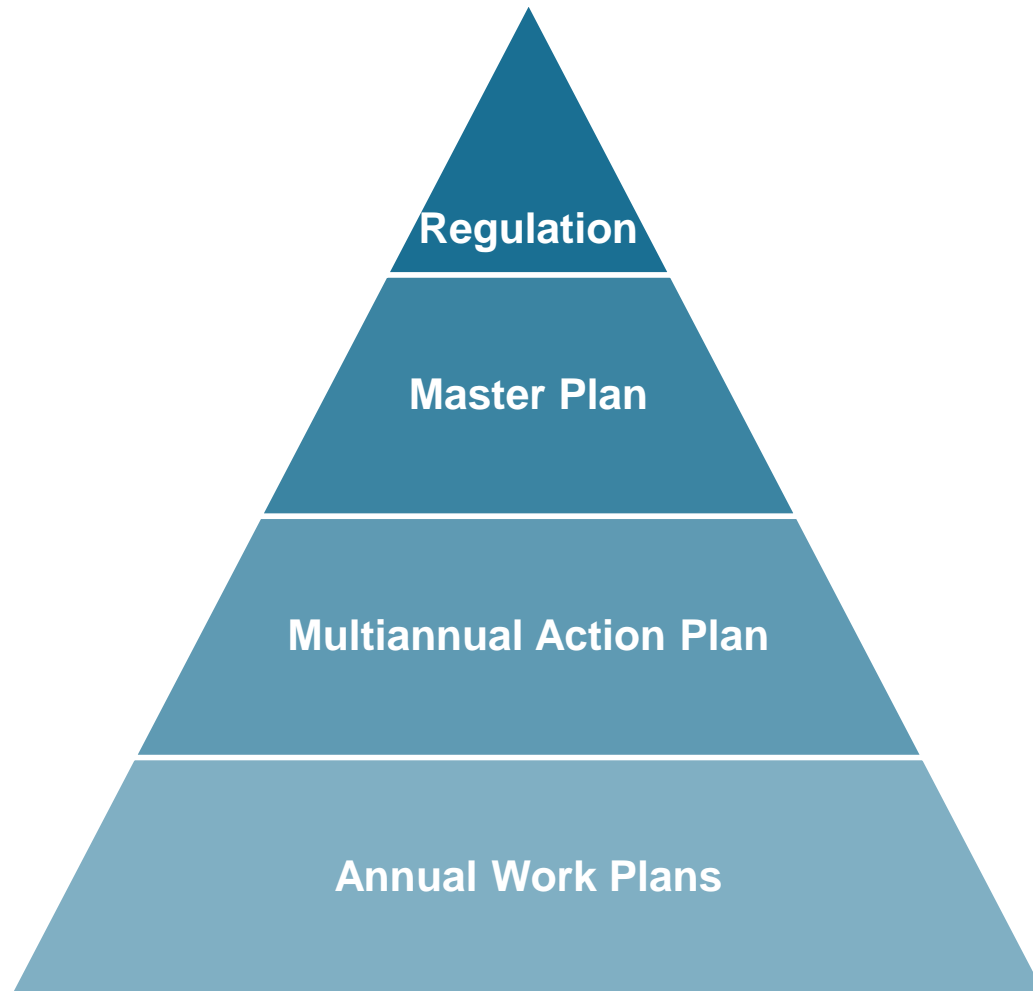


# Key Milestones



As of the end of 2016, the Shift2Rail Joint Undertaking is planning to enter a standardized budgetary cycle and to **organize regular call for activities** to implement its R&I activities. The last S2R call for activities is expected to be launched by the end of 2020 or 2021 (in duly justified cases).





1

The general objectives of the Shift2Rail Joint Undertaking are described in the Shift2Rail **Regulation**, adopted on 16 June 2014

2

The S2R **Master Plan**, adopted on 30 March 2015, following the Council's endorsement, translates the general objectives into specific objectives, providing a high-level strategic vision to achieve them and identifying key priority research areas

3

The S2R **Multiannual Action Plan** (MAAP), adopted by the S2R JU on 27 November 2015, provides a detailed, long-term investment plan that identifies the projects, milestones and deliverables.

4

The **Annual Work Plans** translate the S2R MAAP into detailed, result-oriented activity plans and serve as the basis for identifying the JU calls

# Railway undertakings in Europe are facing various challenges that burden their economic prosperity

## DIGITALIZATION as an enabler

### Intermodal competition

- Low Cost Airlines
- Liberalization
- Autonomous cars
- Ridesharing
- Autonomous trucks
- Gigaliner



### Customer needs

- Declining mobility purchasing power
- Connected transports
- Smart simplicity



### Rigid framework

- High percentage of technical related costs
- Intensive level of fixed assets
- High amount of energy consumption



### Regulation and restriction

- Noise
- Laws & political restrictions
- Train path price
- Safety
- Accessibility



High demand and pressure to act and be innovative for rail undertakings as well as rail industry

# To create a Single European Railway Area many fields of action need to be taken into account

## SERA



## Fields of Action



**Rolling Stock Intelligence**



**Technical Interoperability**



**Technical Staff**



**Climate Change & weather resilience**



**Life-Cycle-Cost**



**Vehicle comfort**



**Energy- CO2-Efficiency**



**Noise & emission reduction**



**Automated train operations**

# Automatic train operation (ATO) creates a roadmap for future cooperation in the rail sector

## Technical framework



**Auto Control**



**Obstacle detection**



**Self-diagnosis**

## Automatic train operation (ATO)



Thameslink Class 700

## Stakeholder framework

**Shift2Rail member**

**Manufacturer**

**Private stakeholders**

**Research institutes**

**Public Authorities**

**RUs & IMs**

**Capacity**



**Safety**



**Noise**



**Quality**



**Costs**



**Energy consumption**





## S2R JU Composition

balanced participation

- of SMEs,
- of the research community
- and of actors from the entire rail value chain,
- including from outside the traditional rail sector

## Research Community

- to support the industry to achieve the S2R objectives
- involved as associate members in consortia
- via open calls

## virtual vehicle austria consortium<sup>+</sup>



**IP1  
Trains**



**IP3  
Infrastructure**



**IP5  
Freight**



→ comprehensive technology-oriented whole-rail-system approach

→ emphasis on vehicle-track-environment interfaces and complex interactions



## Asset Management & Maintenance

- Maintenance costs:  
→ 20% - 30% of Rail Systems LCC
- Periodic preventive maintenance is state-of-the-art

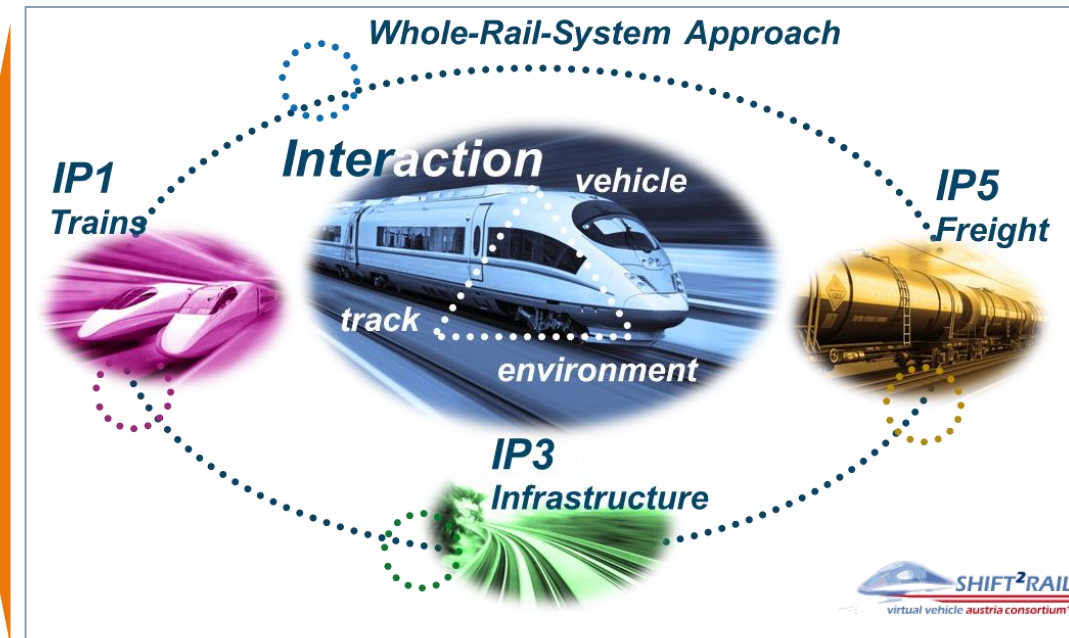
risk based, prescriptive and holistic asset management  
→ to reduce costs  
→ to increase availability, reliability



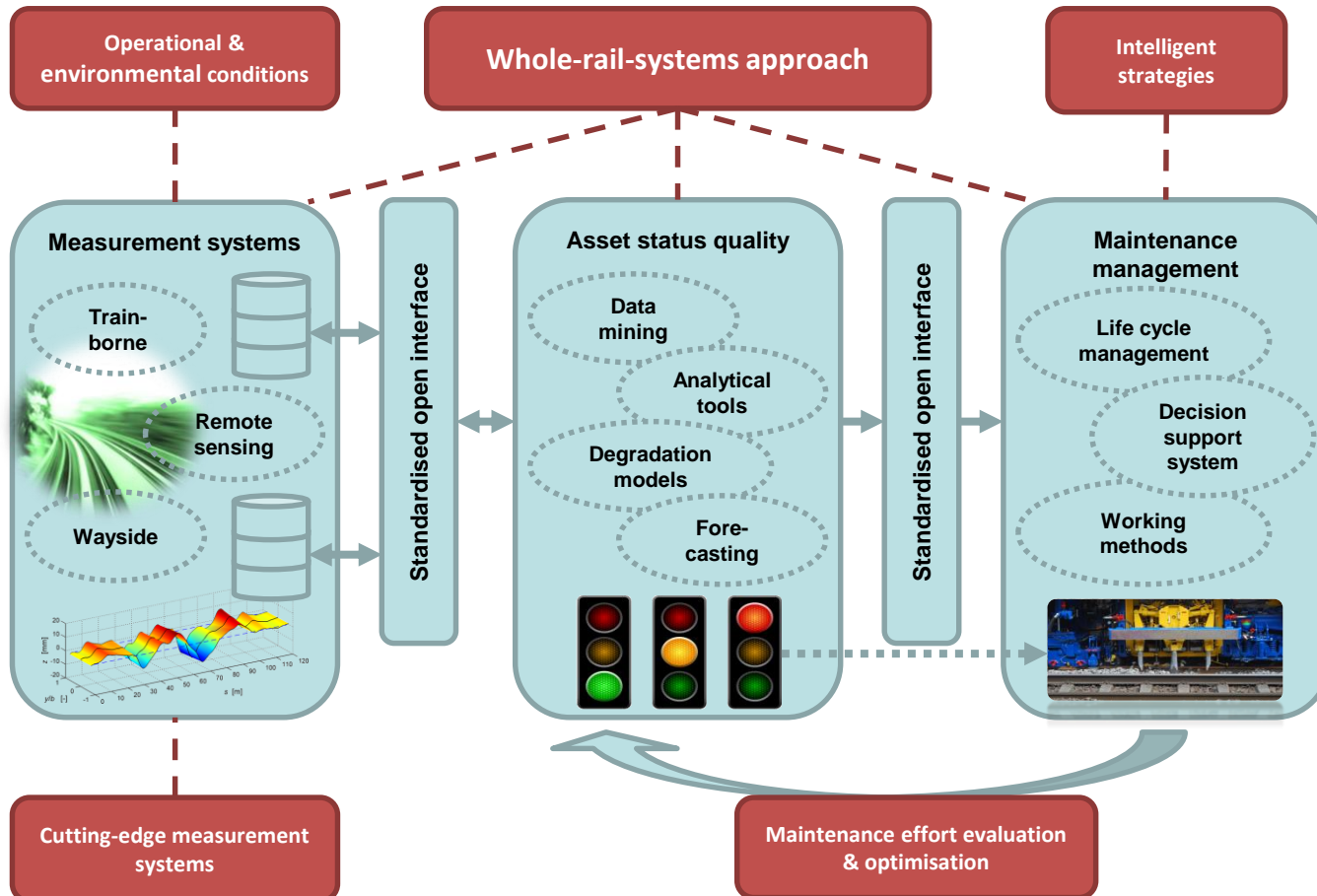
Life-Cycle-Cost



Asset Intelligence



## Asset Management & Maintenance



### Risk based, prescriptive and holistic asset management

- **Descriptive** → “What has happened?”
- **Predictive** → “What could happen?”
- **Prescriptive** → “What should we do?”
- **Standardised asset status criteria & interfaces**  
→ enhanced interoperability
- **Forecasting & intelligent strategies**  
→ reduction of failure maintenance costs
- **Reduction in downtime**  
→ capacity increase

Shift2Rail can be a very powerful instrument to support the sector and meet the broad European policy objectives of modal shift, decarbonisation and competitiveness. In order to be success, the Joint Undertaking will have to ensure:

an **effective cooperation** among the different actors of the rail sector, guaranteeing that the user needs are properly reflected in the development of innovative solutions and that the broader research community can contribute to the excellence of the programme;

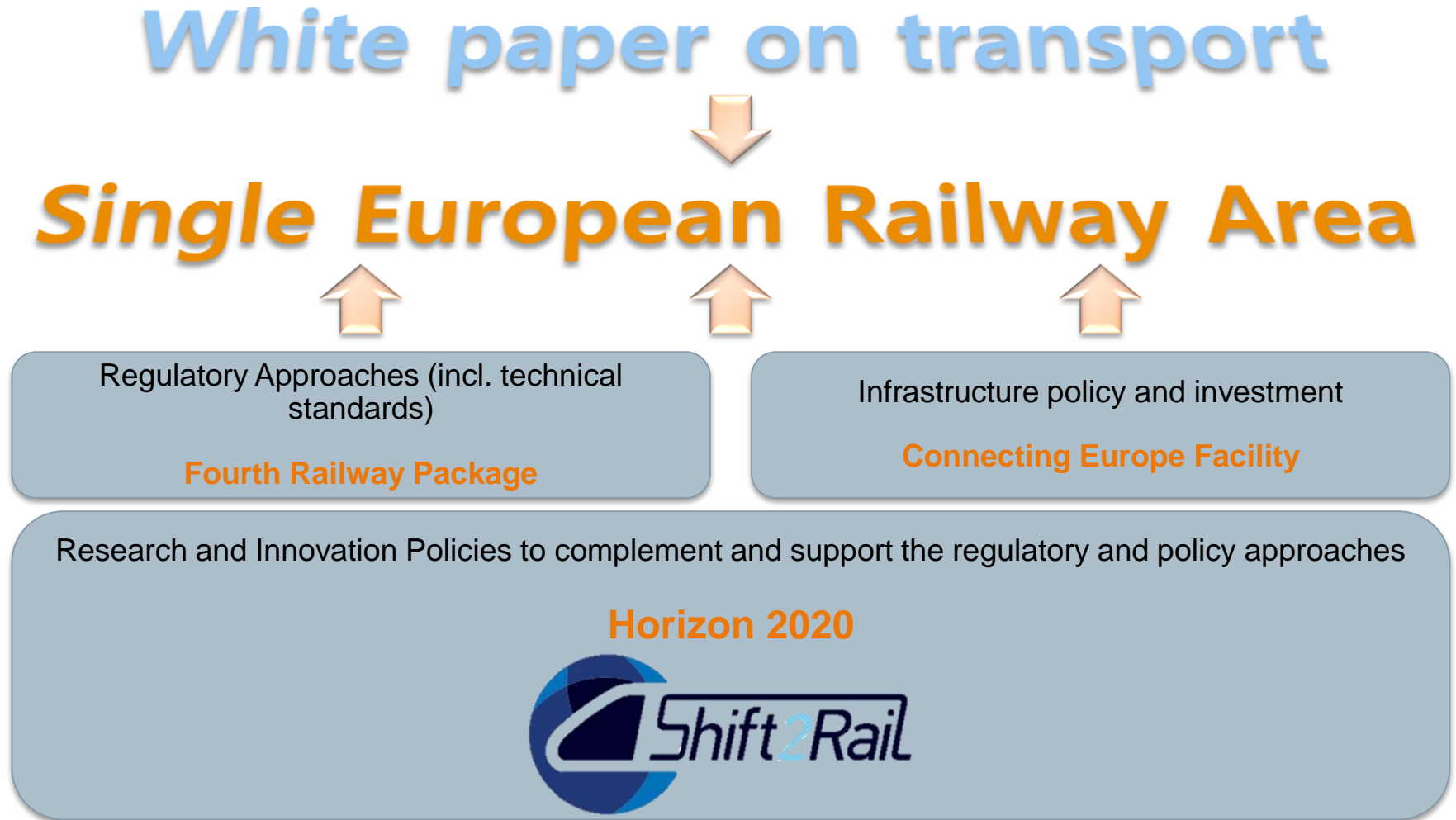
a properly functioning system approach to allow sufficient coordination of the different R&I activities and deliver solutions responding to the sector's needs;

it addresses the critical challenges faced by the rail sector, taking into account the diversity of networks / businesses / operations across Europe;

real added-value in its R&I activities and a long term contribution to a joint vision delivering the objectives of the S2R Regulation and of the S2R Master Plan.

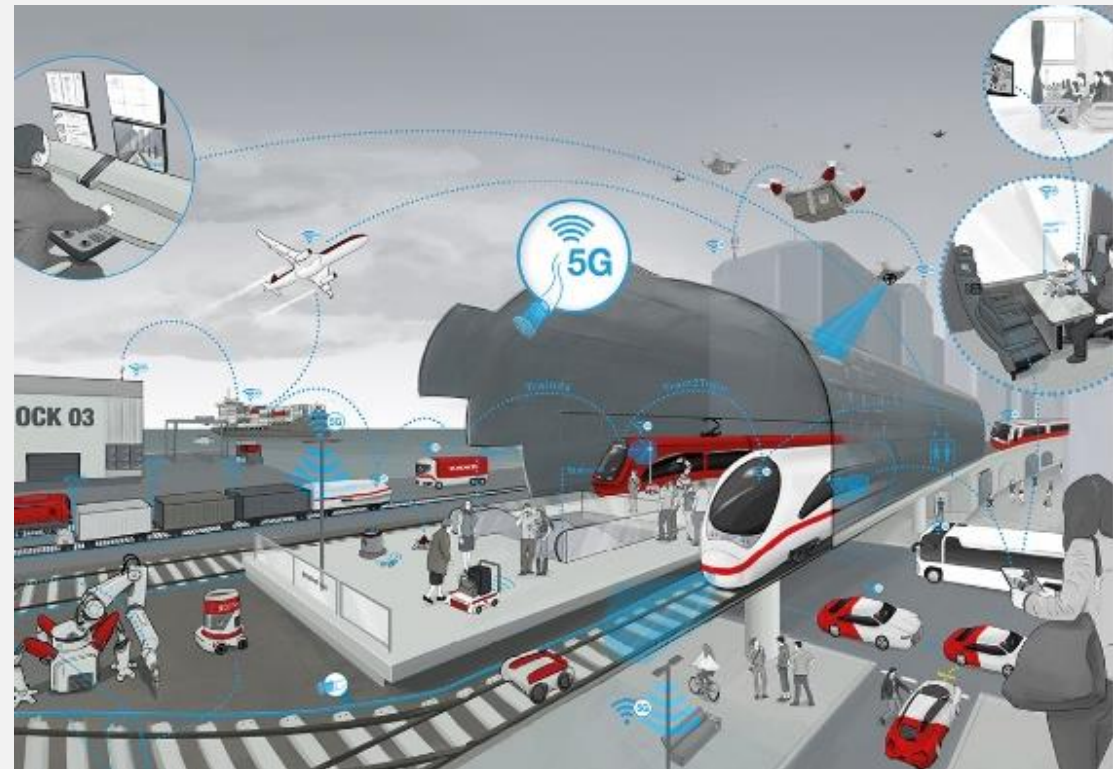
real added-value in its R&I activities and a long term contribution to a joint vision delivering the objectives of the S2R Regulation and of the S2R Master Plan.

In complement to the development of the regulatory framework and the support of infrastructure policy, Shift2Rail can complement and support the establishment of the Single European Railway Area and contribute to meeting the ambitious objectives of the EU transport policy.



## Advantages of S2R for European rail sector

- Increase Industry Competitiveness
- Coverage of all technology and action fields
- Sector-wide cooperation
- Trans-European network
- Thematic synergies
- Interim and short-term goals
- Path for migration and implementation
- Development of demonstrators





# Thanks for your attention



## **Keir Fitch**

Interim Executive Director  
Shift2Rail Joint Undertaking

2nd Floor, Office TO56 02/01  
B-1060 Brussels / Belgium

Tel: +32(0) 2 541 83 60

Keir.Fitch@ec.europa.eu

## **Matthias H. Koch**

Vice President  
Siemens Mobility, Technology and Innovation

Hartmannstraße 65  
91052 Erlangen / Germany

Mobile: +49 172 1099904

matthias.koch@siemens.com

## **Ralf Marxen**

Project Manager Shift2Rail  
Deutsche Bahn AG

Gallusanlage 8  
60329 Frankfurt / Germany

Tel: +49 69 265 32999

Ralf.Marxen@deutschebahn.com

## **Martin Rosenberger**

Head of Rail Systems Research  
VIRTUAL VEHICLE

Inffeldgasse 21/  
A, 8010 Graz / Austria

Tel: +43 316 873 9028

martin.rosenberger@v2c2.at