Shift2Rail Joint Undertaking

3\textsuperscript{rd} meeting of the User Requirements/Implementation and Deployment Working Group
## Agenda

1. **INTRODUCTION**
   - Adoption of the Agenda and the MoM from previous meeting

2. **SHIFT2RAIL JU – STATE OF PLAY**

3. **PRESENTATION OF PART A OF THE S2R MAAP**

4. **UPDATE ON S2R JU ACTIVITIES ON STANDARDISATION AND REGULATION**

6. **AOB, NEXT STEPS, CLOSING**
#Shift2Rail

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Introduction

- Adoption of the Agenda

- Approval of the minutes of the previous meeting (15/12/2016)
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| **1. INTRODUCTION**  
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• **4 Lighthouse Projects**
  - Satisfactory results and good progress achieved

• **27 Projects (Call 2015-2016)**
  - Satisfactory ramp-up – day-to-day monitoring

• **Call 2017**
  - 17 projects retained for funding
  - Preparation of Grant Agreement on-going
  - Expected start: 01 September 2017

• **Other ongoing activities**
  - Preparation of Annual Work Plan 2018
  - Identification of Quick-wins for TRA and InnoTrans 2018
  - Collaboration with other initiatives/JUs (fuel cells, cyber-security dedicated research)
  - KPIs
62 Proposals worth EUR 180.3 million

EUR 177.7 million Funding Request

53 Open Call Proposals

509 Participants

25.7% SMEs

10 S2R Staff, 25 independent experts, 1 independent observer, 2 ethics reviewers, GSA and IP Coordinators’ as observers
AWP 2017
- 7 topics
- budget available 41.3 M€

Call results
- all topics covered
- budget requested 40.6 M€
- 9 submissions, 7 eligible and proposed for award
**AWP 2017**
- 10 topics
- budget available 19.5 M€

**Call results**
- all topics covered
- budget requested 19.5 M€
- 53 submissions, 48 eligible and 10 proposed for award
<table>
<thead>
<tr>
<th>ELIGIBLE PROPOSALS</th>
<th>Retained for funding</th>
<th>SMEs percentage</th>
<th>success rate</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total participants:</td>
<td>472</td>
<td></td>
<td>42%</td>
<td></td>
</tr>
<tr>
<td>- total SME:</td>
<td>120</td>
<td>25%</td>
<td>42%</td>
<td></td>
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<tr>
<td>total participants in OC:</td>
<td>379</td>
<td></td>
<td>28%</td>
<td></td>
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<tr>
<td>- total SMEs in OC:</td>
<td>108</td>
<td>36%</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td>Total funds available (Million Euros) :</td>
<td>60.80</td>
<td></td>
<td></td>
<td>0.68</td>
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<tr>
<td>- total SME grants requests (Million Euros):</td>
<td>27.89</td>
<td>18%</td>
<td>39%</td>
<td></td>
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<tr>
<td>total funds available for CFM (Million Euros):</td>
<td>41.30</td>
<td></td>
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<td>0.67</td>
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<tr>
<td>total funds available for OC (Million Euros):</td>
<td>19.50</td>
<td></td>
<td></td>
<td>0.09</td>
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<tr>
<td>- total SME grants requests in OC (Million Euros):</td>
<td>23.56</td>
<td>34%</td>
<td>28%</td>
<td></td>
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<tr>
<td>Total Countries:</td>
<td>33</td>
<td></td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>
Beneficiary/Country proposed for award

- Germany 32
- Italy 28
- United Kingdom 19
- Sweden 12
- Portugal 10
- Spain 31
- France 23
- Belgium 15
- Austria 8
- Switzerland 5
- Czech Republic 4
- Turkey 2
- Slovenia 2
- Finland 1
- Poland 1
- Slovakia 1

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Beneficiary/Country Non-Members only

- Italy 22
- Spain 15
- Belgium 15
- United Kingdom 12
- Germany 9
- France 8
- Greece 5
- Austria 3
- Czech Republic 3
- Turk... 1
- Switzerl... 3
- Slov... 1
- Slov... 1
Invitation to the Shift2Rail Associated Members to submit an answer in view of the realignment of their activities and additional commitment to the S2R Programme

- The S2R Associated Members’ net contribution to S2R activities amounts to EUR 144.1 million against the minimum requirement of Article 4(2)a of the S2R Regulation of EUR 150 million.

- A similar gap appears in terms of the co-funding to be allocated by the S2R JU to the Associated Members. In accordance with Article 17(1)b of the S2R Statutes, “up to 30 % [of the Union contribution] shall be allocated to associated members and their affiliated entities”. Out of EUR 131.0 million, a remaining amount of EUR 5.6 million remains to be allocated.

- On 7 June 2017, the Governing Board has mandated the Executive Director to establish the necessary process to allocate the aforementioned amount of EUR 5.6 million, ensuring transparency and equal treatment. The Executive Director shall submit to the Governing Board for adoption his proposal for the allocation of the aforementioned resources, at the latest by 31 December 2017.

- In accordance with the Decision of the Governing Board of 7 June, the Executive Director requested the Associated Members of S2R JU to answer the Invitation in view of their additional commitment to the S2R Programme R&I activities. The S2R JU shall co-fund the additional activities up to EUR 5.6 million in accordance with the provisions contained in the Membership Agreements approved by GB Decision 23/2015 of 11 December 2015. The answer shall also cover the contribution to the administrative costs of the S2R JU.

- In addition, the S2R JU will promote this Invitation so as to create the business opportunities for associating additional entities to the existing Associated Members, whilst giving due consideration to the limited amount of resources available.
GB Decision 7 June

• **Aim**: To fill a vacant position within the SC and establish a reserve list

• Expertise in the fields of telecommunication, information technology, artificial intelligence and/or digital sciences. A reserve list will be established.

• Recommendations from SRG, ERRAC and ERA

• Deadline for application (CV and supporting documents) 01 October 2017, 23:59 Brussels Time.

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MAAP Part A: structure

- Executive Summary
- Introduction
  - General policy context
- Challenges and opportunities
  - Key challenges for the European Rail Sector
  - Key opportunities for the European Rail Sector
- The S2R vision
  - Addressing key societal trends
  - The need for radical transformation
  - Customer-focused mobility
- A catalogue of railway innovation capabilities
- S2R roadmap to deliver the innovation capabilities
  - The S2R R&I structure
  - How S2R will achieve its vision
  - Programme timelines
- Deployment
  - The business view
  - Standards and regulatory needs
  - Risk management
  - Collaboration strategy with other organisations
MAAP Part A: the vision

“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 centred transport mode for Europe”.

1. It is available seven days a week and is reliable, resilient, safe and sustainable.

2. A whole-system approach across the industry fosters innovation and attracts the best talent. Entrepreneurs and innovators have the right conditions to develop new products and services.

3. Network capacity is optimised to meet all requirements for passengers and freight. Intelligent maintenance increases train and track availability and reduces perturbations and delays. World-class asset management is aligned across the industry to improve performance, lower costs and reduce business risks.

4. Flexible, real-time intelligent traffic management and in-cab signalling reduces headways and decreases traction energy consumption. Control centres know the precise location, speed, braking and load of every train on the network to optimise operational performance and keep passengers informed.

5. Carbon emissions are minimised by widespread electrification of the network and sustainable, energy-efficient solutions for the remaining non-electrified routes. Energy recovery systems in rolling stock and alternative fuels allow trains to lower costs and run on and off the electrified network. Sustainable Development Principles are embedded in the design, construction and operation of infrastructure and rolling stock assets and the railway is resilient to climate change.

6. The industry is increasingly cost-effective as more efficiencies are introduced. Unplanned maintenance and damage to track and train are minimised through enhanced industry-wide condition monitoring. Generic designs for buildings and rolling stock interfaces are used instead of costly bespoke solutions to simplify expansion, upgrades and replacements.

7. Operational and customer communications are supported by equipment that can be updated with plug-and-play fitments. Rail services are integrated with other transport modes so that passengers have seamless door-to-door journeys.

8. Station information systems and personalised messaging offer passengers all the relevant information to travel easily and reliably to their destinations. Passenger-friendly stations eliminate the need for queues or physical barriers. Revenue collection and security are based on electronic systems.

9. An extensive high-capability strategic freight network with increased route availability provides freight customers with flexible and timely responses to their operational and planning requests.
12 Innovation Capabilities

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
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&D delivery

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12 Innovation Capabilities

**Capability 1** - Automated train operation

1A. Automated (passengers and freight) trains run closer together with increased flexibility

1B. Passenger and freight train preparation processes are automated

1C. Vehicles split and join on the move. New operational approaches (e.g. virtual coupling, convoying, reduced headway, communication connections between trains/units) are employed

1D. Self-propelled automated / autonomous single units guide themselves through the system
Capability 2 - Mobility as a Service

2A_ Tailored guidance to the best use of available transport services is provided so that each customer appreciates a personalised service

2B_ Every journey is provided intelligently and seamlessly, with rail physically integrated with the other modes

2C_ Continuous flow of information eases the journey, making connections between the different modes seamless

2D_ Electronic ticketing and payment are the norm

2E_ Superior passenger experience and comfort as a key value compared to other transport modes
12 Innovation Capabilities

**Capability 3 - Logistics on demand**

3A_ Planning and scheduling are synchronised in real-time to customer demand

3B_ Flexible, interchangeable, multipurpose and smart freight transport units increase handling flexibility and unit utilisation

3C_ Shipments are moved effectively, efficiently, safely and securely throughout the “physical internet” logistic chain

3D_ Freight trains are able to integrate within high-intensity passenger operations

3E_ Automated yards, intermodal hubs, ports and cross-modal interchange locations connect the rail system into the multimodal logistic chain
12 Innovation Capabilities

**Capability 4** - More value from data

4A. Secure, robust, scalable and resilient open architecture and protocols allow full interoperability

4B. The Internet of Things (IoT) and Artificial Intelligent (AI) provide efficient capture, storage, management and interpretation of data

4C. The customer and the rail system communicate intelligently with each other

4D. Railway businesses exploit new data-driven revenue streams

4E. Big Data analytics enables a range of new and improved services to be developed. State of the art cybersecurity ensures reliable and secure ICT services, protection of the rail system and business continuity in case of an incident.
**12 Innovation Capabilities**

**Capability 5 - Optimum energy use**

5A. Alternative propulsion concepts such as fuel cells are introduced. Hybrid powertrains allow running over non-electrified track sections. Discontinuous electrification at stations and on branch lines dramatically reduces the capital costs of extending electrification.

5B. Automated Train Operations (ATO) improves energy efficiency

5C. Optimised on-board and line-side energy storage and charging technologies (e.g. dynamic wireless power transfer) allow the railway to redistribute energy throughout the system according to supply and demand.

5D. A high proportion of energy is recovered through regenerative braking, and small scale energy generation and harvesting technologies feed energy efficient trackside systems.

5E. A fully integrated system approach to intelligent energy supply maximises renewable energy generation and the use of smart grids, including those outside the railway system, through links with the wider energy supply sector.
Capability 6 - Service timed to the second

6A_ Automated vehicle identification and monitoring is the basis of precise service operation

6B_ Smart traffic management ensures every train is in the right place and travelling at the right speed

6C_ Automated dynamic timetables are facilitated. Automated recovery from perturbation (a “self-healing” process) quickly restores normal service
12 Innovation Capabilities

Capability 7 - Low cost railway

7A_ A low-cost, affordable rail system supports the rural economy. This is supported by the application of tailored standards.

7B_ Simplified control-command system appropriate for low-intensity operation is used, allowing various degrees of autonomy.

7C_ The use of lightweight materials for rolling stock reduces maintenance costs and energy consumption.

7D_ A whole life operating cost approach balances the use of low-cost technical assets and good value service.

7E_ European simplified train certification processes and validation techniques reduce time and cost of product deliveries and subsequent modifications.
12 Innovation Capabilities

**Capability 8** - Guaranteed asset health and availability

8A_ The Internet of Things (IoT) enables real-time monitoring through connected sensors (ground/air/embedded)

8B_ Artificial Intelligence (AI) supports predictive maintenance decision-making to reduce manual interventions on infrastructure and rolling stock

8C_ Greater use of robotics, modularity and automation simplifies maintenance and reduces the number of components

8D_ Remote maintenance of trains and infrastructure allows operations to continue uninterrupted

8E_ Performance based service specifications encourages a diverse supply chain
**12 Innovation Capabilities**

**Capability 9 - Intelligent trains**

9A_ Autonomous trains can monitor and regulate themselves

9B_ Communications is possible between trains, between train and infrastructure and between train and passenger/freight customers

9C_ Trains feature advanced mechatronics, reducing dependence on wheel conicity and permitting simplified running gear design.

9D_ In-train signalling capability is used to resolve conflicts at junctions and stations.
12 Innovation Capabilities

**Capability 10** - Stations and “smart” city mobility

**10A** Railways are a core part of smart city mobility management systems and city fulfilment and delivery services. Stations are key to smart city governance structure and development plans

**10B** Railways are connected to smart city mobility platforms for a seamless end to end journey within and beyond the city

**10C** New designs of infrastructure and rail vehicles provide easy access and interchange between transport modes

**10D** Flow management systems guide customers safely and efficiently through stations and to/from adjacent transport hub and city infrastructure, using dynamic way finding, barrier free access and multi-sensory information systems

**10E** Platform management systems help passengers position themselves for their train and facilitate efficient boarding

**10F** Security and revenue protection at stations and interchanges are based on electronic gates using smart wireless technologies, ticket detection systems and biometrics
Capability 11 - Environmental and social sustainability

11A_ Adoption of ‘circular economy’ principles enable the railway to move towards ‘zero-waste’ operation

11B_ Sustainable and ethical procurement and production reduces the carbon footprint, with a whole life approach and focus on inputs to the system, recycling, transport of materials, renewable energy, operations and disposals.

11C_ A climate change adaptive approach mitigates the impact of climate change on the railway

11D_ Green technologies enable the railway to operate exhaust emissions free and with low noise and vibration levels

11E_ Information and accessible facilities put railways within the reach of citizens as an inclusive, affordable and accessible transport system

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12 Innovation Capabilities

**Capability 12** - Rapid and reliable R&I delivery

12A_ An R&I ecosystem with centres of excellence fosters a high participation in knowledge networks, opening new forms of collaboration, technology transfer from other industry sectors and keeping railway skill sets fresh.

12B_ The sector has a strong commercial focus and awareness of the maturity levels of new technologies. There is a well-coordinated and fast decision-making process, reducing time to market.

12C_ Virtual testing and efficient implementation processes speed up production and deployment of new products. There is close cooperation within the sector for standardisation and testing. Component-driven development, modularised products are key elements of a rapid deployment of innovation to the market. Railways have a permanent focus on disruptive technologies, using their challenges to increase their innovation capabilities and speed.

12D_ Agile development approaches, Labs, Hackathons, early involvement of customers are the elements of customer centric innovations. Open-labs invite end-users/customers to be part of the innovation process.
The contribution of each IP/CCA to achieving the necessary capabilities is being assessed through the completion of **building blocks (BB)**.

A building block is understood as a **complete and distinct enabler of one or more capabilities** which is formed by TDs outcome(s).
# Shift2Rail

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Shift2Rail – Cross Cutting Activities

Development of a global standardisation roadmap (update 1)
4-step approach  Preliminary work on 1st, 2nd and 3rd

Screening of project deliverables and cross-checking with existing standards and ongoing standardisation activities

Analysis and assessment of the standardisation potential of expected results

Identification of best standardisation target: level, nature, liaisons with appropriate standardisation bodies

Support to the standardisation process
Joint identification of standardisation trajectories with JPCR and RASCOP

- Development of industrial standards
- Adaptation of standard framework
- International railway solutions and standards
- Etc.

Screening of project expected outcomes
Evaluation of their standardisation potential

Regulatory impact
Products and services
Operation and system-related processes

Closure of TSI open point
Improvement of TSI
Preliminary work towards a global roadmap

Overview of Shift2Rail deliverables and their standardisation potential
- Structured list of deliverables by TD
- Exploratory assessment grid for standardisation potential

Definition of the main dimensions of the roadmap template
- Initial roadmap architecture

Finalisation of the template and pre-population of the standardisation roadmap
- Refined roadmap to support the rolling monitoring of standardisation development throughout the Shift2Rail initiative

Status: ongoing
Status: advanced
Status: not started yet
Cooperation with ERA (1/2) overall principles

• The role and responsibilities of each organisation is set in the respective Regulations

• ERA attends as observer the following meetings, amongst others:
  – S2R Governing Board;
  – IP and CCA Steering Committees;

• ERA is also requested to provide inputs to the S2R JU Annual Work Plans. In this regard, ERA can also propose the S2R JU to undertake “research and development activities leading to technical standards with a view to guaranteeing the interoperability and safety of results”.

• The S2R JU will be attending relevant ERA Committees and working groups.
Cooperation with ERA (2/2) at project level

• To ensure that the results from the S2R projects do not encounter a regulatory blocking point because of their novelty (e.g. integration in TSIs), the S2R JU has defined with ERA and DG MOVE a process for collaboration at project level.

• Different desired “levels” of involvement have been defined:

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>ERA has <strong>minimal direct interest/competence</strong> and does not attend any meeting, conference, seminar, workshop or any other event organised and managed by the S2R research project management.</td>
</tr>
<tr>
<td>1</td>
<td>ERA <strong>attends at least one of the major events</strong> organised and managed by the S2R research project, e.g. kick-off, final conference, mid-term meeting or workshop.</td>
</tr>
<tr>
<td>2</td>
<td>ERA <strong>follows on a regular basis open meetings</strong> organised and managed by the S2R research project. The Agency follows the discussion and has knowledge of the research project management activities.</td>
</tr>
<tr>
<td>3</td>
<td>ERA <strong>shows particular interest in the research project due to the specific match with its competence</strong>. In particular it follow the development of results by attending meetings and may act in a particular role, e.g. member of an advisory board.</td>
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</table>
Cooperation with CEN-CENELEC

- **First coordination meeting** held between CEN/CENELEC and the S2R JU in April 2017
- **Objective**: how to best approach cooperation between the S2R projects and CEN/CENELEC Technical committees:
  - How to best manage the information flow coming from projects;
  - How to best handle the input coming from these projects and how to guide the **drafting of deliverables to ensure a smooth transposition to draft standards**.

- **Cooperation will continue in the coming months to establish a sound and efficient process (input from S2R standardization roadmap)**
Memorandum of Understanding with ETSI

• Discussions have started for the signature of a possible “MoU” between ETSI and the S2R JU.

• Specific objectives:
  – Identify and agree on key work areas (e.g. IP2’s Adaptable radio communication systems)
  – Exchange on information in areas of mutual interest;
  – to take part in and/or organise jointly meetings, conferences and workshops promoting issues of mutual interest and their partnership.

• Identification of specific areas is on-going

• Target: finalisation after Summer 2017
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AGENDA ITEM 6
AOB, NEXT STEPS