Shift2Rail - JOINT UNDERTAKING

Shift2Rail (S2R) is a public-private partnership in the rail sector providing a platform for the rail sector as a whole to work together with a view to driving innovation in the years to come. The primary task of the S2R JU is to **establish the priority research and innovation activities** to accelerate the penetration of **integrated, interoperable, and standardised technological innovations** to support the Single European Area and **to achieve operational excellence of the railway system**. In addition to the Union, which is a Founding Member, the S2R JU has eight other Founding Members and nineteen Associated Members.

A call for proposals with an indicative budget of **EUR 151,3 M** has been launched on January 15th 2019: competitive calls for proposals for S2R JU Members with a total foreseen value of the actions of 129,5 M€ (not described in this document); open calls for proposals, where the S2R JU Members are excluded from participation, with a total foreseen value of the actions of 20,8 M.

The call is composed by the following five integrated **Innovation Programmes (IP)**, complemented by a Cross-cutting section:

IP1 - Cost-efficient and reliable trains

IP2 - Advanced traffic management and control systems

IP3 - Cost Efficient and Reliable High Capacity Infrastructure

IP4 - IT Solutions for attractive railway services

IP5 - Technologies for Sustainable and Attractive European rail freight

IPX - Cross-cutting themes and activities

⚠️ **The deadline for applications is June 18th 2019.**

IP1 - Cost-efficient and reliable trains

The design of rolling stock plays a key role for the attractiveness of rail transport. Only trains that are comfortable, reliable, affordable and accessible can convince passengers to use rail transport instead of other modes. At the same time, the train design has to meet the requirements of the railway undertakings and the urban operators, who are the main customers of the rail supply industry, in order to deliver high quality and cost-efficient services to their customers.

*If rail is to integrate more effectively with other modes and attract more passengers to further develop its role as back of multi-modal mobility in the future, it needs a **future generation of passenger trains that will be lighter, automated, more energy and cost-efficient** while at the same time providing a **comfortable, connected, reliable and affordable travel experience** for all passengers at a define level of safety and security.*

Three topics are open in 2019:

Action	Topic
RIA	Advanced Car body shells for railways and light material and innovative doors and train modularity
RIA	Tools, methodologies and technological development of next generation of Running Gear
RIA	Support to the development of technical demonstrators for the next generation of brake

The deadline for applications is June 18th 2019.

IP2 - Advanced traffic management and control systems

*Control, command and communication systems should go beyond being only a contributor to the control and safe separation of trains and become a flexible, real-time, intelligent integrated and fully automated traffic management system. Although European Rail Traffic Management System (ERTMS) has become a worldwide dominant solution for railway signalling and control systems, it has the potential to offer increased functionalities and become even more competitive. **Current systems do not sufficiently take advantage of new technologies and practices**, including use of satellite positioning technologies, high-speed, high-capacity data and voice communications systems (Wi-Fi, 4G/LTE and their future generations), automation, as well as innovative real-time data collection, processing and communication systems, which have the potential to move towards new traffic management concepts (including predictive and adaptive operational control of train movements), thereby delivering improved capacity, decrease traction energy consumption and carbon emissions, reduce operational costs, enhance safety and security, and provide better customer information. Seven priority research and innovation areas in which activities should be undertaken are: **Smart, fail-safe communications and positioning systems; Traffic Management Evolution; Automation; Moving block (MB) and train integrity; Smart procurement and testing; Virtual coupling; Cyber security**.*

Action	Topic
RIA	Demonstrator development for the use of Formal Methods in railway environment and Support to implementation of CSIRT to the railway sector
IA	Support to development of demonstrator platform for Traffic Management

The deadline for applications is June 18th 2019.

RIA: Research and Innovation Action
IA: Innovation Action

IP3 - Cost Efficient and Reliable High Capacity Infrastructure

The **design, construction, operation and maintenance of rail network infrastructure have to be safe, reliable, supportive of customer needs, cost-effective and sustainable**. In order to deliver the benefits of market opening and interoperability and to reduce the life cycle costs of rolling stock and on-board signalling systems, the network diversity needs to be eliminated, notably through a migration towards common high-performing infrastructure system architecture. Activities that can support the reduction of infrastructure maintenance costs, such as simplified procedures or automation, need to be led in priority. Furthermore, the infrastructures have to be managed in a more holistic and intelligent way. Compatibility between different modal infrastructures (including multimodal hubs, changing points and stations) needs to be ensured and based on principles of interoperability and standardisation. Six priority research and innovation areas in which activities should be undertaken are: **New directions in switches and crossings; Innovative track design and materials; Cost effective Tunnel & Bridge solutions; Intelligent system maintenance; Energy efficiency; Improved station concepts**.

Action	Topic
RIA	Future traction power supply for railways and public transport

The deadline for applications is June 18th 2019.

IP4 - IT Solutions for attractive railway services

In order to become more attractive, rail must respond to customer needs to support **seamless door-to-door intermodal journeys** encompassing different modes of transportation. Rail must achieve **interoperability with other transport modes** and mobility services, within different regions, cities and across borders. In order to achieve this, rail needs to take due advantage of the ever growing connectivity of people and objects, the availability of European GNSS based location, the advances in cloud computing, Open Data and Big Data Analytics and the propagation of Internet and social media. The step towards sharing data needs to be considered and progressively developed, using open standards and specifications. To achieve a full seamless multimodal travel experience, the customers must be able to easily plan and purchase door-to-door journeys. Ticketless or multi-application solutions that guarantee interconnectivity should become the norm. The development of truly multimodal infrastructure, providing for simple and seamless interchanges, including among different transport modes should make transfers easy, comfortable and reliable. For this reason, the timetables should be increasingly integrated across transport modes to allow better modal integration and minimise travellers' inconvenience. Three priority research and innovation areas in which activities should be undertaken are: **Technical framework; Customer experience applications; Multimodal travel services**.

Action	Topic
RIA	Complementary Travel Expert Services

The deadline for applications is June 18th 2019.

RIA: Research and Innovation Action
IA: Innovation Action

IP5 - Technologies for Sustainable and Attractive European rail freight

Rail freight must be in a position to offer a **cost-effective, attractive service to shippers that helps to take freight away from the already-congested road network,** *to become the backbone of the Union inland integrated logistic system. Different market segments have to be identified: the first segment is the* **intermodal segment,** *which mainly relies on the use of containers/trailer trains and where continued growth can be expected. Reliability, service characteristics and cost competitiveness in this segment can progress significantly with an increase in train length, better length utilisation, innovative rolling stock features for value-added services, progress in the terminal operations, improved real-time customer information to customers and better data exchange between involved parties in the intermodal transport chain. A second market segment is the* **wagon load activity segment** *(either Single Wagon Load (SWL) or Train Load (TL) services), which relies on the use of specific freight wagon. The single wagonload services have significantly declined in the past years and its significant growth potential can only be fully exploited if a step change is made in terms of service quality and reliability. Solutions such as automated coupling and decoupling, tagging of all wagons with RFID tags automatically readable provide a huge potential to speed up and reduce costs in train formation and to improve the overall performance of wagonload services.*

Eight priority research and innovation areas in which activities should be undertaken are: **Implementation Strategies and Business Analytics; Freight Electrification, Brake and Telematics; Access and Operation; Wagon design; Novel Terminal, Hubs, Marshalling yards, Sidings; New Freight Propulsion Concepts; Sustainable rail transport of dangerous goods; Long-term vision for an autonomous rail freight system**.

Action	Topic
RIA	Condition-based and preventive maintenance for locomotive bogie
IA	Advanced obstacle detection and track intrusion system for autonomous freight train

The deadline for applications is June 18th 2019.

IPX - Cross-cutting themes and activities

These cross-cutting activities will ensure that the R&I activities within the different Innovation Programmes are closely aligned in terms of their objectives and their requirements, as well as the methodologies for evaluation and assessment of impacts. *These activities include elements already taken into account in the different Innovation Programmes that require horizontal coordination (such as energy and noise management) and additional R&I that will be necessary to complement the technical work of S2R JU.*

Five priority research and innovation areas in which activities should be undertaken are: **Long-term needs and socio-economic research; Smart materials and processes; System integration, safety and interoperability; Energy and sustainability; Human capital**.

Action	Topic
RIA	Artificial Intelligence (A.I.) for the railway sector
RIA	Breaking language barriers
RIA	Noise & Vibration

The deadline for applications is June 18th 2019.

RIA: Research and Innovation Action
IA: Innovation Action