FP1 MOTIONAL
European Rail Network and Mobility Management

Europe's Rail

Newsletter 11/2024

Welcome to the latest edition of our newsletter, where we share updates and insights from the Flagship Project 1 (FP1) MOTIONAL. In this edition, we highlight key milestones and provide a closer look at the progress we have made so far.

We hope you enjoy this edition!

Europe's Rail Flagship Project 1 - Mobility management multimodal environment and digital enabler

MOTIONAL Project: Transforming Europe's Rail Network

The FP1 MOTIONAL, a key initiative within Europe's Rail Joint Undertaking (EU-Rail), is an EU-funded collaboration led by Hacon and Trafikverket with 89 partners. FP1 MOTIONAL aims to modernise Europe's rail network through digitalisation, automation, and integration, establishing rail as a vital part of sustainable European transport for both passengers and freight.

One major goal of FP1 MOTIONAL is to improve railway planning and capacity management. By introducing standardised cross-border planning methods and advanced algorithms, the project aims to ensure smoother, more reliable journeys across Europe. New AI-powered tools will help planners optimise schedules and respond to real-time changes, while simulation capabilities allow them to assess the impact of innovative technologies, enhancing decision-making.

FP1 MOTIONAL is also advancing traffic management systems (TMS) by creating a unified, Europe-wide framework. This system will connect regional and national networks, enabling a more efficient, adaptable rail network. Integration with Automatic Train Operation (ATO) systems will

improve capacity, energy efficiency, and schedule consistency, making the rail system more responsive and sustainable.

In addition to improving rail operations, FP1 MOTIONAL emphasises multimodal integration, establishing rail as the central link in a cohesive European transport system. By enhancing collaboration between transport providers, the project supports seamless ticketing and real-time information sharing. Accessibility features such as touchless ticketing and indoor navigation further improve passenger convenience, while demand forecasting tools help transport providers anticipate and manage passenger needs.

Through its focus on shared digital infrastructure, secure data-sharing, and simulation tools, FP1 MOTIONAL is laying the groundwork for a fully integrated European railway network. By investing in these digital enablers, the project is setting a new standard for rail transport across Europe, driving sustainability and connectivity for the future.

Mid-Term Event

On 29th of October, the FP1 MOTIONAL project marked an important milestone with its Mid-Term Event in Madrid, bringing together more than 130 stakeholders from the rail sector. The event provided a platform to showcase the project's advancements in rail operations, multimodal connectivity, and digital technologies. These developments are designed to significantly improve passenger experiences and operational efficiency across Europe. Stakeholders shared insights on how these innovations are helping rail companies and infrastructure managers better address the evolving demands of the transport sector. The event reinforced the project's alignment with EU-Rail's mission of enhancing rail resilience and accessibility.

The ongoing collaboration and exchange of ideas will play a key role in shaping the next stages of the project, which continues to deliver concrete benefits for the rail industry. Through further collaboration and knowledge sharing, the FP1 team remains committed to transforming European rail into a more sustainable, connected, and efficient system. Looking ahead, the project's

continued efforts will address emerging challenges, with the aim of accelerating the digitalisation and modernisation of Europe's rail networks. With strong partnerships in place, FP1 MOTIONAL is set to help shape the future of rail transport.

For further details and information, visit FP1 MOTIONAL.

Michel Gabrielsson, Trafikverket

Leader of Dissemination and Communication

6th SmartRaCon Scientific Seminar

The 6th edition of the SmartRaCon Congress was hosted by CEIT in San Sebastián (Spain) on 23rd and 24th of October. Established six years ago, this event aims to highlight the scientific achievements of the Shift2Rail and Europe's Rail initiatives. This year, FP1 MOTIONAL was featured in the keynote presentation given by Marco Ferreira, offering a comprehensive overview of its contributions to improve Europe's railway systems. Additionally, other elements of the project were highlighted in various research and PhD presentations, demonstrating its scientific depth and practical applications. The event reinforced SmartRaCon's role as a hub for collaboration and knowledge exchange in the European rail research community. The seventh edition was announced for October 2025 in Stuttgart (Germany) hosted by DLR.

Pablo Ciaurriz, CEIT

Member of WP 32

Workstream 1.1

"WP8 Progress Update: Advancing Railway Traffic Simulation and Capacity Optimisation in FP1 MOTIONAL"

On the 10th and 11th of September, the Work Package (WP) 8 participants of our EU-Rail Flagship Project FP1 MOTIONAL met at the ProRail headquarters in Utrecht (The Netherlands) to conclude the development phase and prepare for the upcoming two-year demonstration phase.

The objective of this work package is to develop and improve railway traffic simulation methods, models, and knowledge to enable more reliable and effective capacity and punctuality evaluation and predictions of the railway network. The methods and models we are developing will strengthen feedback between operations and planning, providing valuable insights into how new technologies—such as Connected Driver Advisory Systems (C-DAS), Automatic Train Operation (ATO), European Train Control System Level 2 (ETCS L2) with optimised braking curves, and ETCS Hybrid Level 3— can impact capacity.

Over the next two years, a capacity analysis will be carried out using these new technologies, which will allow us to optimise European Rail Traffic as much as possible.

Isabel Meseguer Hijós, CAF Signalling a.e. CAF

Member of WP8/9

Workstream 1.2

AI and Optimisation in Railway Operations: MOTIONAL's Breakthrough in Real-Time Traffic Management

The FP1 MOTIONAL team involved in the development of automated decision-making systems and decision support for real-time traffic management marks a significant advancement in the application of AI and optimisation techniques in railway operations. The team met in September in Vienna to put the final touches to the development phase, whose goal was to design algorithms capable of detecting and resolving train conflicts in real time, particularly in complex environments like depots and terminal stations. The work involved analysing existing systems, designing new algorithms using mathematical models and operational research, or AI techniques such as reinforcement learning, and multi-agent search approaches. Simulations showed that these algorithms could improve the efficiency and safety of railway traffic by reducing delays and optimising train schedules, and the results are promising, even if further validation in real operational conditions is needed.

Christelle Lerin, SNCF

Coordination of SNCF activities in MOTIONAL

Workstream 1.3

Illuminated Platform Edge: Enhancing Safety and Passenger Experience with Smart Light Signals

The Illuminated Platform Edge consists of single individual modules which are arranged in a row and interact with each other. These are made of a special concrete slab, an integrated light guide and an intelligent electronic unit in which train-specific data is received, processed and translated into light signals. Each concrete slab can be controlled individually to display static and dynamic light patterns in a wide range of colors. Embedded in the platform of the Station Berlin Suedkreuz, the guidance system visualises a large variety of train information in advance in an intuitive and internationally understandable way. In our DB-Project the system will warn for incoming and leaving train by a red flashing, it will show the train stopping position and it will show the capacity of the incoming train compartments. Due to the wide range of visualisation as well as data connection, the Illuminated Platform Edge offers great potential for passengers and the operators in terms of safety enhancement, guidance and provision of information.

The goals of the Iluminated Platform Edge:

- **Safety:** Increased attention on platforms by warning signals directly in the floor
- **Passenger Information**: improved orientation and distribution of waiting passengers due to information being displayed directly in the floor like the stopping position, train capacity and multi-purpose compartment
- **Punctuality**: Reduced stopping times and satisfied customers by enhanced punctuality of trains
- **Attractiveness:** Increased attractiveness of stations due to the aesthetic, innovative and modern element

Christopher Schubert, Deutsche Bahn

Work Package 22 contributor

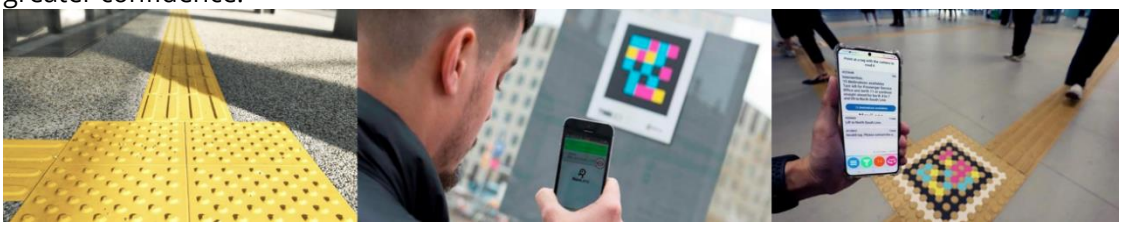
Advancing in Accessible Travel: Innovations to Enhance Mobility and Independence

We are developing several innovative solutions aimed at improving accessibility in transportation, making travel easier, especially for people with disabilities. With these advancements, we aim to not only enhance mobility but also promote inclusivity and independence for all travelers. Here are the key developments:

- **T-AIS Accessible Information Totem:** An accessible information totem providing real-time updates to passengers, enabling those with disabilities to navigate the station independently. This totem is designed with features to accommodate diverse needs, from visual and auditive assistance to Persons with Reduced Mobility, cognitive and others potential special needs. By empowering all users with critical travel information, we're fostering a more inclusive and seamless station experience.

- **Train Car Location with Projected Signage through Gobos:** Projected signage that guides passengers to accessible carriages on the platform, ensuring ease and clarity in orientation. This solution provides clear, highly visible directions to help all travelers, especially those with a wheelchair, to quickly locate accessible boarding options. By enhancing wayfinding on the platform, we're improving overall accessibility and creating a smoother transit experience for everyone.

- **Tactile Pathways and NaviLens:** Tactile pathways combined with NaviLens technology enhance station accessibility for visually impaired passengers. This integrated system provides both physical guidance through tactile indicators and digital navigation support via NaviLens, delivering relevant route information in 36 languages. Together, these features empower visually impaired travelers to navigate stations independently and with greater confidence.



- **Intelligent Accessible Robots**: Intelligent robots designed to assist passengers with reduced mobility, offering support in navigating the station or carrying luggage. These robots are equipped with advanced sensors, enabling them to respond to passenger needs and provide real-time assistance. By helping travelers find their way and manage their belongings, these robots enhance independence and ease of travel within the station.

- **Gap Filler:** A platform adjustment tool that bridges the gap between the train and the platform, ensuring safe and accessible boarding for all passengers. This innovative solution enhances safety by providing a smooth transition, especially for wheelchair users, parents with strollers, and those with limited mobility. By reducing physical barriers, the gap filler promotes a more inclusive and comfortable boarding experience.

Victoria Guryn, ADIF FM

Work Package 24 Leader and Work Package 22 contributor

Workstream 2

The European Rail Data Space

The European rail sector is advancing into a transformative era with the launch of the European Rail Data Space (ERDS). This new initiative builds a secure, interoperable framework to allow trusted data exchange across various rail industry participants—train operators, local transit authorities, manufacturers, ticket vendors, and maintenance providers. Through the ERDS, these

players can securely share valuable data peer-to-peer, laying the groundwork for a connected, efficient, and sustainable rail system that benefits all stakeholders.

The ERDS promotes an open, decentralised data ecosystem where standardised and verified data chains improve operations and enhance passenger experiences. The setup enables collaboration in digital maintenance, reducing unexpected disruptions by allowing preventive care that maximises the availability of trains. Travelers benefit, too, from timely, precise updates that make rail journeys smoother and more predictable.

This data-centric ecosystem was developed as part of the FP1 MOTIONAL. Designed to stimulate innovation, ERDS addresses the critical need for a digitally transformed rail system that supports EU-wide environmental goals and modern mobility demands.

On September 24, the Rail Data Space was officially launched at InnoTrans 2024. It was an opportunity for all stakeholders to engage with the developers of this system. Attendees gained insights into how ERDS will reshape rail networks by reducing inefficiencies, supporting green mobility, and enabling cutting-edge services that meet the needs of the passengers.

For further insights into the European Rail Data Space and its transformative potential for the rail industry, we have prepared a video that provides an overview of how the initiative will streamline operations, enhance services, and promote sustainability across Europe. Watch the video here.

What's next? To further establish the ERDS, a Governing Body will be formed to set the standards and rules. Contact Meike.vantHoen@knorr-bremse.com to learn more and get involved in this formative phase.

Meike van't Hoen, Knorr-Bremse SfS GmbH

Director Product Management Digital Products & Services

Get in Touch with FP1 MOTIONAL!

Contact: https://projects.rail-research.europa.eu/eurail-fp1/contacts/

Website: https://projects.rail-research.europa.eu/eurail-fp1/

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