FP1 MOTIONAL
European Rail Network and Mobility Management

Newsletter #4/2026

European rail is entering a new era, where digital technologies are turning ambitious visions into practical solutions that benefit both passengers and operators. Across Europe, FP1 MOTIONAL has demonstrated how data-driven innovation can improve accessibility, simplify cross-border travel, strengthen operational resilience and support more informed decision-making. From seamless passenger services and intelligent planning tools to advanced capacity management and real-time traffic control, the project has delivered tangible results that address some of the railway sector's most pressing challenges. The achievements presented in this edition highlight a shared commitment to creating a more connected, efficient, inclusive and sustainable European railway system for the future.

All of these topics will be discussed at the Final Event, taking place online on 30 June. More information about the Final Event can be found here.

Michel Gabrielsson, Trafikverket

Content

Digital Foundation - A Journey Through the Future European Railway

The first Digital Foundation dissemination and validation event within the FP1 MOTIONAL project, a key initiative under the European Rail Joint Undertaking (ERJU),marked an important milestone in advancing the digital transformation of Europe's railway system. Organized under the guiding theme *"A Journey through the Future European Railway,"* the event brought together project partners and stakeholders to showcase, assess, and discuss the digital foundations shaping a more interoperable and data-driven rail ecosystem.

The event opened with an inspiring keynote by **Dr. Patrick Marsch**, Head of Technical System Architecture, Technology Foundations and IT Platforms at DB InfraGO AG. In his address, he emphasized the critical role of robust digital foundations, harmonized European standards, and cross-organizational collaboration as essential enablers for the future of rail across Europe.

His remarks set a clear direction for the discussions and demonstrations that followed throughout the day.

A central highlight of the event was a series of live demonstrations showcasing ongoing innovations under FP1 MOTIONAL. These included:

- **Digital Asset Engineering – Planning Outcomes (Demo 27.3)**, presented by **Waseem Ul Aslam Peer (DB InfraGO AG)**, demonstrating advanced approaches to infrastructure planning.
- **Multimodal decision support, load estimation, and multimodal planning (Demos 21.2 & 25)**, delivered by **Hantz Krzysztof (PKP)**, highlighting integrated transport intelligence across different mobility modes.

- **Digital Twin applications**, including use cases for braking & traction systems and point machines, presented by **Blas Blanco Mula (CAF)** and **VijayaBhaskar Adusumalli (Hitachi Rail)**, illustrating how virtual representations are transforming railway operations and maintenance.
- **Federated Rail Data Space**, introduced by **Alexander Meierhofer (Virtual Vehicle Research Center)**, showcasing secure and collaborative data-sharing frameworks for the rail sector.
- **Conceptual Models and Ontology**, presented by **Airy Magnien (UIC)**, alongside the **Use Case Repository Tool** demonstrated by **Bokolo Anthony Jnr. (IFE)**, emphasizing structured knowledge and reuse of digital solutions across projects.

The insights and outcomes from these demonstrations underscored a shared conclusion: developing a strong digital foundation is a fundamental step toward achieving a fully interoperable, efficient, and future-ready European railway system.

The event not only served as a platform for technical validation but also fostered meaningful engagement among stakeholders, enabling valuable feedback and collaboration. Such collective efforts are vital in ensuring that innovation aligns with real-world operational needs and contributes to a cohesive European rail ecosystem.

The FP1 MOTIONAL project continues to demonstrate how strategic alignment, technological innovation, and collaboration across borders can drive the rail sector forward. As the journey toward a digitally enabled railway system progresses, events like this play a crucial role in turning vision into reality.

Acknowledgment
A sincere thank you to all contributors, participants, and partners for their active engagement, insights, and continued commitment to advancing the future of European rail.

Waseem ul Aslam Peer, DB InfraGO AG

Download the PowerPoint presentation from the event HERE

Future of Seamless and Inclusive European Rail Travel

The Seamless and Inclusive Mobility Dissemination Event in Madrid on 7 May showcased how European rail is moving closer to a future where passengers can travel across borders with greater ease, accessibility and confidence than ever before.

Bringing together leading railway operators, infrastructure managers, technology providers and mobility experts, the event demonstrated how four years of innovation have translated into practical solutions that support the vision of “One Europe, One Journey, Zero Barriers.”

At the heart of FP1 MOTIONAL are pioneering digital technologies designed to improve both passenger experience and operational efficiency. Through a series of successful demonstrations across Europe, project partners presented solutions that make travel more

accessible for people with reduced mobility, simplify multimodal journey planning and provide real-time support throughout the travel experience.

Among the highlights were intelligent accessibility totems, indoor navigation systems, assistive robotics, seamless ticket validation technologies and advanced disruption-management tools. Together, these innovations help passengers navigate stations more independently, receive timely travel information and enjoy smoother journeys from departure to destination.

The project also delivered powerful operational tools for railway managers, including demand forecasting, digital twins, multimodal data hubs and automated decision-support systems. These solutions enable operators to anticipate passenger flows, respond more effectively to disruptions and optimise resources across increasingly complex transport networks.

Cross-border mobility was another key focus, with demonstrations showing how travellers can plan and book international rail journeys through a single platform while operators benefit from standardised data exchange and automated settlement processes.

The event confirmed that FP1 MOTIONAL is not only developing innovative technologies but actively shaping a smarter, more connected and more inclusive future for European rail travel.

Michel Gabrielsson, Trafikverket

Digital Magazine from the event are available for download HERE.
Download the PowerPoint presentation from the event HERE.
And a full event recording is available HERE.

Intelligent Planning - Solutions to Transform European Rail

The Intelligent Planning Dissemination Event, held in Paris at SNCF previous headquarters near Montparnasse station on 12th of May, marked an important milestone for the future of European rail. Organized by SNCF, this key event brought together around 100 industry

leaders, experts, and stakeholders in the rail sector to share FP1 MOTIONAL results on innovative approaches for boosting planners' power with smart algorithms and simulations.

The event opened with inspiring keynotes by **François Marchal**, Director of Digital Steering and Innovation at SNCF Réseau and **Tijmen Voet**, Director Timetable Development & Resource Planning at NS, offering valuable perspectives on the strategic importance of these innovations for the future of European rail.

A central highlight of the event was a series of live presentations showcasing ongoing innovations under FP1 MOTIONAL. These included:

- **Method for processing historical data and implement delay distribution for stochastic models**, presented by Axel Valentin (SNCF Réseau), aiming to improve the performance and efficiency of stochastic simulations in operation studies.
- **Timetable and capacity simulation of new DATO-technologies in signalling and train operation**, presented by Augustin Arachtingi (SNCF Réseau), David Koopman (ProRail), Emil Jansson (KTH) and Isabel Meseguer (CAF), demonstrating capacity and robustness benefits with ERTMS HTD (Hybrid Train Detection, former HL3), ATO (Automatic Train Operation), NG Brake (Next Generation Brake).
- **Making timetable optimization usable and useful for planners**, presented by Sara Gestrelius from RISE
- **Demonstrate functionalities for short-term planning for rescheduling timetables in case of Temporary Capacity Restrictions (TCR)**, presented by Giorgio Sartor from SINTEF
- **Optimized residual capacity management in railway networks**, presented by Karim Terfasse from SNCF, aiming to meet more last-minute train paths requests
- **Rolling stock stabling, improved automated planning by decomposition**, presented by Sam Hesselmans (NS), showing that new algorithms are a large improvement over the original ones and a good step in the right direction.

The event also featured **live poster sessions** where all **27 Innovative Demonstrators in Intelligent Planning** were presented and debated. The key takeaways and results from these sessions reinforced a common vision: building robust Intelligent Planning capabilities is essential to creating a fully interoperable, high-performing, and future-proof European railway network.

To conclude, **a panel discussion**—moderated by Isabelle Tardy (NRD)—brought together key stakeholders, including Magnus Wahlborg (TRV), François Marchal (SNCF Réseau), and Tijmen Voet (NS). The conversation delved into **how intelligent planning can maximize network efficiency**, bridging the gap from strategic long-term planning to dynamic real-time adaptations, while integrating advanced IT ecosystems and digital twin technologies.

The panel also highlighted the organizational and cultural shifts required to embrace modern, data-driven railway planning, as well as the evolving roles within the sector. A key takeaway was how **FP1 MOTIONAL's innovative solutions and testing initiatives are accelerating the transition from concept to real-world deployment.** Lastly, the session underscored the critical importance of collaboration and knowledge-sharing among Europe's public and private railway partners to drive collective progress.

Christelle Lerin, SNCF

Cross Border Operations - Demonstrations Showcase the Future of European Rail Capacity Management

On 13 May, the fourth of five Demonstration Dissemination Events was held in Stockholm, with participants from 12 European countries.

A series of demonstrations at the FP1 MOTIONAL event highlighted how digital technologies, automation and interoperability can transform capacity planning, traffic management and freight operations across the continent. The presentations focused on practical solutions that support the objectives of the forthcoming Capacity Regulation and the wider goal of creating a more integrated European railway network.

One of the key demonstrations presented an advanced cross-border capacity management solution designed to automate timetable coordination between infrastructure managers. Using standardised TSI Telematics messages and bidirectional data exchange, the system enables real-time timetable updates, automated conflict detection and intelligent optimisation. The demonstration showed how international train path requests can be processed more efficiently while maintaining full compliance with European interoperability standards.

A second demonstration focused on identifying and visualising residual network capacity for additional freight services. By combining timetable analysis, optimisation algorithms and simulation, the tool helps planners identify feasible train paths and evaluate their robustness before decisions are made. Validation exercises involving professional timetable planners confirmed the potential to reduce manual effort and improve coordination, particularly for long-distance and cross-border freight traffic.

Another presentation showcased an operational planning and coordination system for freight yards. The platform provides a shared real-time view for infrastructure manager dispatcher, terminal operator Mertz and Marschalling operator at Malmö yard, replacing fragmented planning processes and telephone communication between actors with instead a common digital environment with optimisation functionality. Automated track allocation, conflict management and integration with existing traffic management systems were demonstrated,

From the left to right: Peter Hysing, Green Cargo, Cecilia Dagerholm, XRail, Linda Thulin, Trafikverket, Nicolas Furio, Europes Rail Joint Undertaking, Lars Deiterding, HaCon and Magnus Wahlborg, Trafikverket.

with users reporting significant improvements in visibility and operational efficiency. This could allow when implemented promising improvement of the capacity in the Railway system.

The event also highlighted ongoing work on optimisation algorithms for yard operations, shunting processes and dynamic dispatching. Together, the demonstrations illustrated how research is progressing from concept to practical implementation, providing railway stakeholders with tools that improve decision-making, increase capacity utilisation and support a more reliable, interoperable and customer-focused European rail system.

Michel Gabrielsson, Trafikverket

Digital posters from the presented demonstrations are available for download HERE.

Real Time Intelligence - Towards Intelligent and Automated Railway Traffic Management

The Demo Dissemination Event on Real-Time Intelligence was successfully held in Borlänge on 27 May, attracting professionals, researchers and stakeholders from 13 European countries.

The event featured an impressive programme of 26 demonstrations, highlighting the latest developments in real-time intelligence, automation and decision-support solutions for railway operations. The focus is on addressing the growing complexity of modern rail networks, where increasing traffic density places significant pressure on dispatchers, controllers, and train operators.

Several demonstrations explored the integration of Automated Train Operation (ATO) systems with traffic management tools in realistic human-in-the-loop simulation environments. These studies highlighted the potential for closer coordination between traffic management decisions and automated train operations, particularly in complex and high-density networks. At the same time, researchers examined the impact of automation on human operators, finding that inadequate decision-support mechanisms and mismatched operational procedures can increase controller workload.

A major theme was the development of closed-loop Traffic Management Systems (TMS), enabling continuous interaction between planning and real-time operations. By updating forecasts and automatically generating revised plans, these systems can detect and resolve conflicts earlier, improving service reliability and reducing delays for passengers.

Many projects demonstrated AI-based conflict detection and resolution tools capable of predicting and addressing operational conflicts before they occur. Solutions ranged from semi-automated systems requiring dispatcher validation to fully automated approaches, with several teams incorporating optimisation algorithms, machine learning, and large language model interfaces to improve usability. These technologies aim to reduce stress, lower workload, and support faster, more informed decision-making.

Overall, the demonstrations illustrated a clear vision for the future of railway operations: increasingly automated, data-driven, and collaborative systems in which human operators move from routine control tasks towards supervisory and strategic decision-making roles, ultimately delivering more reliable and efficient rail services.

Michel Gabrielsson, Trafikverket

A digital poster collection from the presented demonstrations are available for download HERE.

UPCOMING - Final Event

The achievements and insights will culminate in the FP1 MOTIONAL Final Event, which will take place online on 30 June. Further information about the Final Event is available here.

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