Deliverable D32.3
Final Exploitation

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1. Executive Summary

Measures of exploitation of FP1-MOTIONAL results are together with communication and dissemination used to ensure and maximise impact of research and innovation projects. Exploitation is understood here as *"the use of results in further research and innovation activities other than those covered by the action concerned, including among other things, commercial exploitation such as developing, creating, manufacturing and marketing a product or process, creating and providing a service, or in standardisation activities."* [5]. A proper plan for implementing exploitation measures is crucial for Europe's Rail project FP1-MOTIONAL to ensure timeliness, coherency, and target-orientation. These measures for exploitation are subject of this report. Communication and dissemination, which are typically mentioned together with exploitation, are subject to separate deliverable D32.1 in FP1-MOTIONAL [2].

Europe's Rail Project FP1-MOTIONAL has two overall project aims:

1. to make rail the backbone of a multimodal transport system for passengers and freight. To enable this, subgroups SG1 to SG3 in workstream 1 will develop better planning and operational management for rail services.
2. to make rail industry of all Flagship Projects more competitive by developing an environment for digital enablers and provide this to all FAs of Europe's Rail. This is done in the subgroup SG4 in the workstream 2.

The purpose of this document is to outline a general strategy for exploiting the FP1-MOTIONAL project. Due to the specific nature of both workstreams, the approach to exploitation differs. In general, the workstream focused on digital enablers (2) places a stronger emphasis on internal exploitation, whereas better planning and operational management (1) will be focussed more on external exploitation.

Verification of technical content is outside the scope of D32.3 and remains the responsibility of WP Leaders, who are responsible for ensuring that the inputs to the exploitation activities reflect the actual output and progress within the respective WP.

This deliverable D32.3 provides a summary of all communication, dissemination and exploitation activities and their expected impact. A Results Ownership List (ROL) will be set up, completed and released at the end of the project. The first intermediate version has been released in M12 and updated throughout the project until the final version for M46.

2. Abbreviations and acronyms

Abbreviation / Acronym	Description
ATO	Automatic Train Operation
C-DAS	Connected Driver Advisory System
CER	Community of European Railway and Infrastructure Companies
CT5	Cooperation Tool 5
DC-Log	Log File for the Dissemination and Communication Measures
DC-Plan	Dissemination and Communication plan
DoA	Description of Action
DSS	Decision Support System
ECTRI	European Conference of Transport Research Institutes
Ep-Log	Log File for the Exploitation Measures
Ep-Plan	Exploitation Plan
ERA	European Union Agency for Railways
ERRAC	European Rail Research Advisory Council
EU	European Union
FA1	Flagship Area 1
FP1	Flagship Project 1
GA	Grant Agreement
JU	Joint Undertaking
KER	Key Exploitable Result
KPI	Key Performance Indicator
MAWP	Multi-Annual Work Programme
PEM	Potential Exploitation Measure
ROL	Result Ownership List
SP	System Pillar
STIP	Standardisation and TSI Input Plan
TMS	Traffic Management System
TRA	Transport Research Arena
TRL	Technology Readiness Level
TT	Transversal Topic
UIC	Union Internationale des Chemins de fer
WCRR	World Conference on Railway Research
WS	Work Stream
WP	Work Package

3. Background / Introduction

Project FP1-MOTIONAL (GA-No. 101101973) comprises the topics “Network management planning and control & Mobility Management in a multimodal environment” and the transversal “digital enablers” as described in the EU-RAIL Multi-Annual Work Plan (MAWP) [4]. The present document constitutes the Deliverable 32.3 “Final Exploitation” in FP1-MOTIONAL.

The first release of D32.2, “Project Exploitation Plan”, is planned for Month 10. It outlines the plan for exploitation activities abbreviated as Ep-Plan envisaged during the life of the project, while all the communication and dissemination activities are described in the “Project Dissemination and Communication Plan” in short DC-plan. As all three groups of activities will be strongly related, D32.2 follows the same structure as D32.1 or even refers to it in order to avoid duplications. Consequently, the measures for exploitation will be logged in the Ep-Log following the example of the DC-Log. Both, the Ep-Plan and the DC-Plan, will be updated when necessary (minimum twice per year) during the project.

The below-mentioned activities for exploitation will be in line with GA Annex 5 art. 17 and art. 18 [1]. For instance, both internal and external measures for exploitation, in conjunction with communication and dissemination strategies, such as meetings, media outreach, and publication activities, will adhere to the guidelines outlined in the GA. This includes participation in Europe's Rail Innovation Days and other relevant conferences like InnoTrans, WCRR and TRA.

4. Objective /Aim

The objective with this document is to describe the exploitation activities, as well as the related plans envisaged during the life of the project.

Project results and outputs are exploited widely and effectively with constant exchange with potential internal and external users of the developed results. The addressed target groups can be found in D32.1. Furthermore, to raise awareness at EU level of systems developed in FP1-MOTIONAL, the project intends to undertake exploitation measures not only to maximize the impact in reaching the objectives described above, but also to raise awareness of the technology developed, the results and the significance of their impact. Activities shall be supported by all the WPs and partners. Objects targeted for exploitation are also subject to dissemination and communication activities, including the provision of content for the public website, newsletters, and other dissemination materials, as well as the dissemination of results obtained from the project demonstrators. The work should ensure stakeholder engagement, through events and publications, with Trafikverket as WP Leader.

5. Definitions

Effective dissemination, communication and exploitation of results are crucial to the acceptance and implementation of technologies developed within the project by both suppliers and end users.

Throughout this document the terms “dissemination”, “exploitation” and “communication” will be used frequently. The following definition for “exploitation” used by the authors is based on the reference terms of the EC for research and innovations [5], as well as the related ones for “communication” and “dissemination” which can be found in D32.1 [2] and for “exploitation” in D32.2 [3]. All three definitions are basically in line with the definition of the European Commission to be used in Horizon Europe [5].

6. Organisation within the project

The overall structure of FP1-MOTIONAL is presented in Figure 1 in D32.1. FP1-MOTIONAL has designed a specific Work Package (WP32) and within it, there is one task (Task 32.3) to coordinate and manage the exploitation activities within the project. This task will interact with the two other tasks of WP32: Development and maintenance of dissemination and communication plan (Task 32.1) and Project communication and dissemination (Task 32.2).

The FP1-MOTIONAL project will establish contact with other FPs end users, enablers and other stakeholders such as the System Pillar, ERA, UNIFE, CER, UIC, ECTRI, ERRAC etc. in the transport sector during and after the project. The project delivers the project results to its target groups with tailored messages, through various channels in line with the Exploitation Plan (D32.2) as well as the Dissemination and Communication Plan (D32.1) [1]. Note that communication with the System Pillar and FA-FA Interactions are mostly foreseen in WP2 for workstream 1 as well as WP26 for workstream 2.

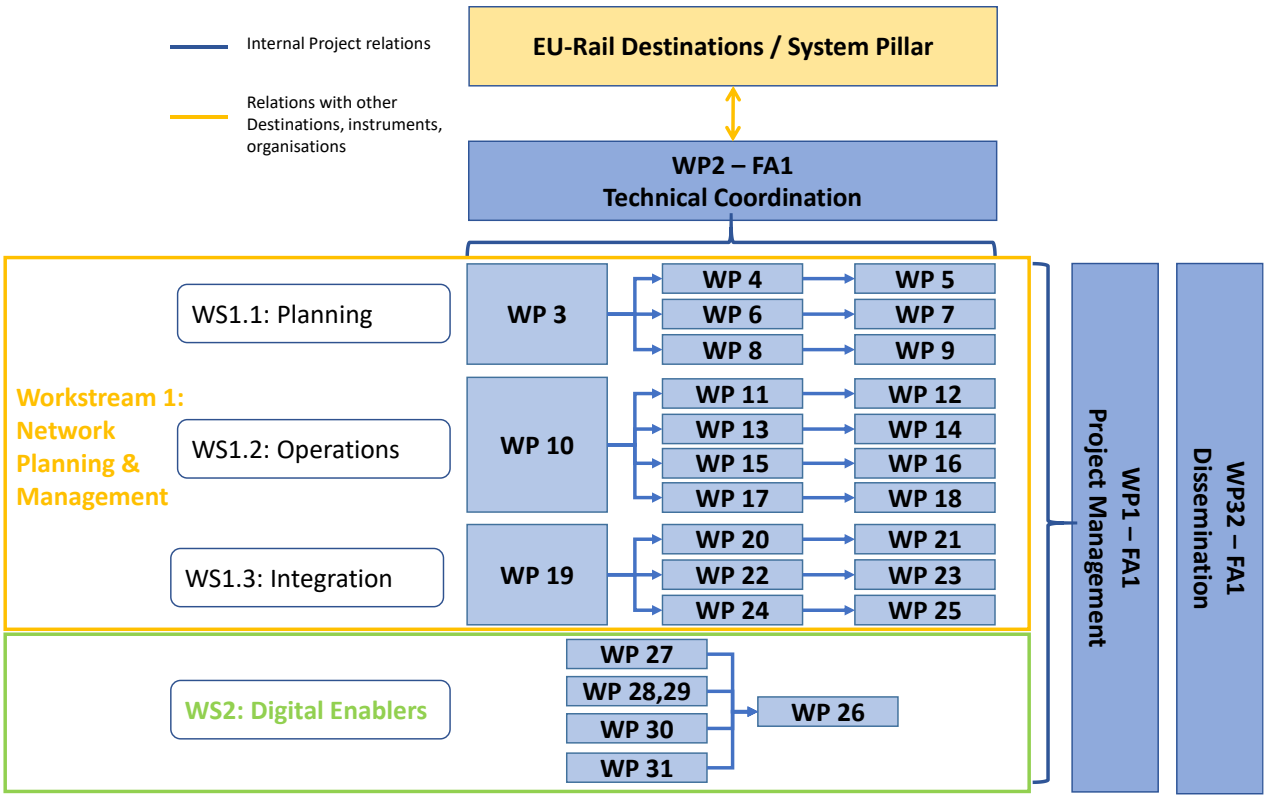


Figure 1: FP1-MOTIONAL organisation with Workstream 1 on Network Planning & Management and Workstream 2 on digital enablers [1]

Fig. 1 shows the two workstreams are quite separated in their WP-Structure. The same holds valid for the Key Exploitable Results, the Exploitation Measures and the related timeline. Therefore, they are presented in the following two chapters individually.

7. Summary of Dissemination and Communication Measures

FP1-MOTIONAL has implemented an extensive programme of dissemination and communication activities targeting the research community, the railway sector, policymakers, professional associations and other relevant stakeholders. The results show that the project used several complementary channels to raise the visibility of the systems, technical solutions, demonstrations and results developed within the project, see also Appendix 1.

Scientific dissemination was particularly extensive. A total of 27 scientific articles were published in peer-reviewed journals, compared with the target of five. Project results were also presented in 64 individual presentations at conferences and workshops, far exceeding the target of six presentations. In addition, seven articles were published in railway industry and professional association magazines, meaning that this target was also achieved. Taken together, these activities gave the project a considerable presence within both the scientific community and the wider transport and railway sectors.

The project participated in the EU-Rail Innovation Days and organised both a mid-term event and a final event. A total of 91 demonstrators were presented at various events and conferences, including major international industry events. Furthermore, seven webinars or workshops were organised for stakeholders from at least six countries. Five additional Demonstration Dissemination Events were organised by the project are described separately in own sections below. All these activities created opportunities for direct knowledge exchange, feedback and dialogue concerning the project's solutions and their potential applications.

Wider communication was undertaken through Europe's Rail channels, the project website, newsletters, social media, videos and images. Across the reporting periods, a substantial number of contributions to the Europe's Rail website, social media channels and newsletters were reported. The project published 44 website posts, compared with a target of at least 16, while 5 newsletter issues were produced. A total of 98 social media posts were published, more than three times the target of 30. A project brochure was also produced.

However, some planned activities were not fully implemented. Only one of the six planned press releases was issued. No activities involving the dedicated Horizon Europe dissemination tools were reported, and the planned short video presenting the demonstrations and their socio-economic impacts was not produced. Furthermore, the information provided does not confirm whether the planned demonstration surveys were ultimately carried out.

Overall, the volume, diversity and reach of the dissemination and communication activities indicate that FP1-MOTIONAL has made a substantial contribution to its stated ambitions. The combination of scientific publications, industry articles, conference presentations, demonstrators, stakeholder events, website content, newsletters and social media posts has significantly increased the visibility of the project, its progress and its expected results among relevant European target audiences. The particularly strong performance in scientific publishing, external presentations and digital communication suggests that appropriate channels were used to reach

both specialist and broader professional audiences.

Participation in EU-Rail Innovation Days, international conferences, webinars, workshops and other sector events also created valuable opportunities to exchange experience, identify synergies and interact with related projects and initiatives. Although the KPI data (Appendix 1) do not demonstrate the concrete outcomes of every interaction, the scale and international character of these activities provide a sound basis for collaboration and for extending the project's potential impact.

The 27 peer-reviewed publications, 5 demonstration dissemination events, 64 conference and workshop presentations and 91 demonstrators represent a particularly strong contribution to disseminating the knowledge, methodologies and technologies developed by the project. These activities enabled technical and scientific results to be shared through several formats and at different levels of detail. Provided that established procedures regarding confidentiality and intellectual property rights were consistently followed, the dissemination approach can be considered both extensive and appropriate.

The activities have also supported future exploitation by engaging relevant stakeholders, demonstrating solutions and making results accessible beyond the project consortium. This should improve the prospects for continued use, further development and uptake of the project outcomes after the formal end of FP1-MOTIONAL. However, the absence of activities using Horizon Europe dissemination tools, the limited number of press releases and the lack of the planned socio-economic impact video may have reduced the project's reach slightly.

In conclusion, the dissemination and communication activities carried out by FP1-MOTIONAL can be assessed as having contributed strongly to awareness-raising, visibility and dissemination, and meaningfully to knowledge exchange, synergies and stakeholder engagement.

7.1 Final Event & Dissemination series



Figure 2: FP1-MOTIONAL Final Event Cover Slide

7.1.1 Final event

The FP1-MOTIONAL Final Event was held online on 30th of June 2026 as a European webcast connecting studios in Stockholm, Paris, Madrid and Salerno. The purpose of the event was to present and discuss the main results achieved during the first wave of FP1-MOTIONAL, demonstrate how the project's different areas of research and innovation contribute to a more integrated European railway system, and consider the further work required to support implementation. The programme combined keynote addresses, thematic presentations, recorded demonstrations, discussions and a concluding round-table session.

The event opened in Stockholm with a keynote address by Roberto Maiorana, Director-General of Trafikverket. He highlighted the strategic importance of participation in Europe's Rail and of strengthening cooperation between infrastructure managers, the rail industry, research organisations and other stakeholders. He stressed that Europe's transport systems are interconnected and that challenges concerning climate, the environment, safety and security cannot be addressed solely at national level. Cooperation within Europe's Rail contributes to reduced fragmentation, increased interoperability, a more effective supplier market and lower costs, while also supporting the development of a sustainable and reliable railway system that meets the needs of passengers, freight customers and society.

Giorgio Travaini, Executive Director of Europe's Rail, subsequently placed FP1-MOTIONAL within the wider objectives of the Europe's Rail Joint Undertaking. He explained that the objective is not merely to address separate technical problems but to develop coordinated European solutions. Digitalisation was identified as a key enabler for improving the management of networks, fleets, trains and assets. However, its benefits can only be fully realised if solutions are coordinated and interoperable across the European railway system. The project's demonstrations provide evidence that the proposed technical solutions are feasible, while also helping to identify the steps required to progress towards a connected, digitalised, automated and cost-effective railway system.

FP1 Coordinator Lars Deiterding introduced the structure and overall storyline of the project. He used the examples of a passenger undertaking an international journey and a freight container moving across Europe to demonstrate the range of processes that shall function together. These include strategic network planning, timetable planning, capacity allocation, the continuous adjustment of plans, real-time traffic management, disruption management, cross-border information exchange and the provision of accessible multimodal services. Many of these processes take place behind the scenes but are essential to ensuring reliable and seamless journeys. The presentation also underlined the scale of the collaboration, involving nearly 100 partner organisations, including infrastructure managers, suppliers, operators, universities and research institutes.

The technical programme was structured around the project's five main thematic areas. The session on Cross-Border Operations, entitled Making Europe's Railways Truly European, presented seven demonstrations addressing capacity planning and traffic management across national borders. The solutions included automated exchanges between national capacity management systems and European coordination tools, interconnected traffic management systems, support for freight-yard coordination and decision-support tools for cross-border train paths. The demonstrations showed how improved system-to-system communication can reduce manual work, improve situational awareness and support faster and more consistent planning and operational decisions.

The Intelligent Planning session, Boosting Planners' Power with Smart Algorithms and Simulations, summarised the results of 27 demonstrations. These covered advanced optimisation algorithms, long- and short-term timetable planning, rolling-stock planning, simulation and feedback from operations to planning. The results indicated that advanced decision-support tools can shorten planning processes, enable planners to assess a larger number of scenarios and contribute to improved timetables for both passenger and freight services. The session also demonstrated how simulation can provide better knowledge of the capacity effects of technologies such as hybrid train detection (HTD), Connected Driver Advisory Systems (C-DAS) and Automatic Train Operation (ATO).

Real-Time Intelligence focused on the capacity of the railway system to respond rapidly to operational changes and disruptions. The presented solutions addressed real-time data exchange, forecasting, conflict detection, optimisation and decision support. The overall objective was not

to replace operational staff, but to provide them with more accurate, timely and interconnected information. By enabling faster and better-informed decisions, these solutions can improve punctuality, capacity utilisation, resilience and the ability of the railway system to recover from disturbances.

The afternoon programme covered Seamless and Inclusive Mobility and Digital Foundation. Seamless and Inclusive Mobility addressed the passenger perspective and the ambition of achieving "one Europe, one journey, zero barriers". The session considered how improved information exchange, integrated services and multimodal solutions could contribute to smoother and more accessible journeys. Digital Foundation presented the data-related enablers needed to support the wider digital transformation of the railway sector. These included common data models, digital twins, federated data spaces and cybersecurity. The session emphasised the need to ensure that the different digital components developed within the project can be combined into a coherent and adaptable ecosystem.

The concluding round-table discussion considered the next steps for network management planning and control, mobility management in a multimodal environment, and digital enablers. Participants emphasised that FP1-MOTIONAL had delivered a large number of demonstrations and that several solutions had reached relatively high levels of technical maturity. Nevertheless, further development, integration, validation and testing in operational or near-operational environments will be required before widespread deployment can take place. Alignment with standardisation, regulation, industrial capabilities and investment planning will also be essential.

A recurring conclusion was that research, deployment and implementation should not be treated as entirely separate sequential phases. Instead, the relevant actors need to work iteratively and in parallel to reduce implementation risks and ensure that research results respond to operational needs. The subsequent waves of FP1-MOTIONAL will build on the foundations established during Wave 1, with greater emphasis on integrated demonstrations, higher technology-readiness levels and preparation for deployment.

Watch the recording of the FP1-MOTIONAL Final Event HERE

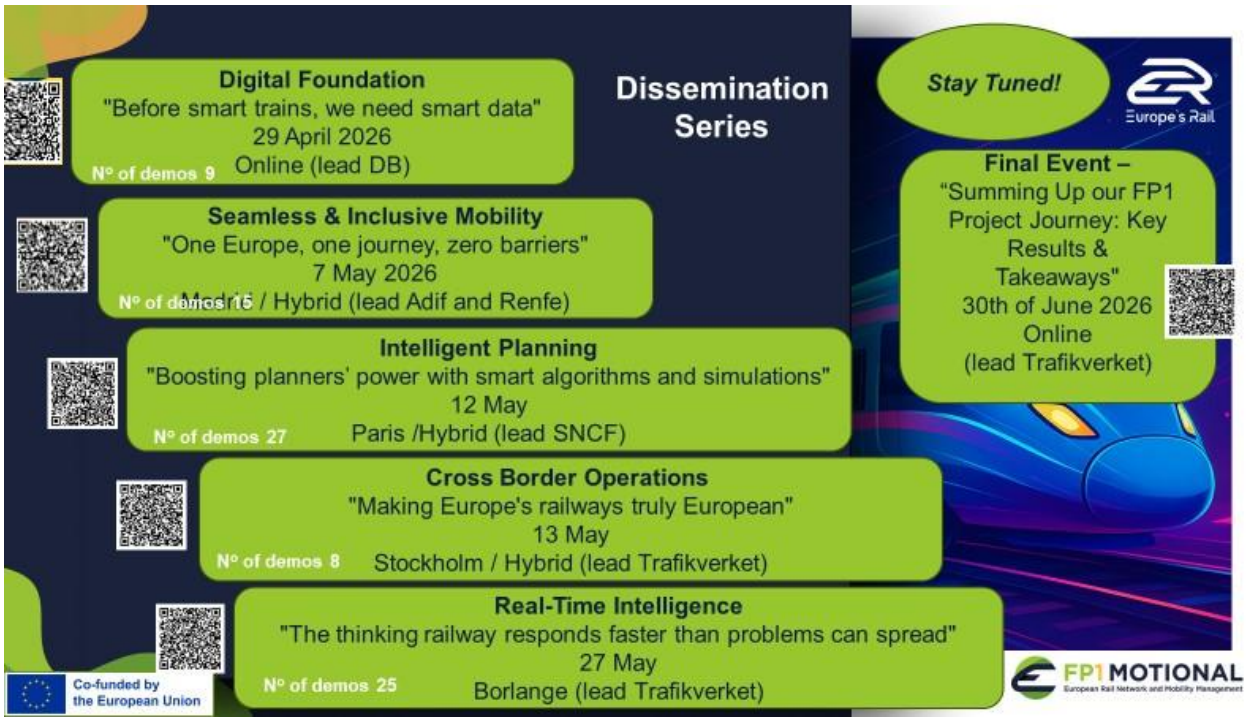


Figure 3: FP1-MOTIONAL Dissemination series schematic figure



Figure 4: FP1-MOTIONAL Dissemination Series Event #1 Cover Slide

7.1.2 Digital foundation

The Digital Foundation dissemination and validation event within the FP1-MOTIONAL project (#1), a key initiative under the European Rail Joint Undertaking (ERJU), marked an important milestone in advancing the digital transformation of Europe's railway system. Organised 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 a keynote address 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-organisational collaboration as essential enablers for the future of rail across Europe.

Dr. Patrick Marsch's 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.

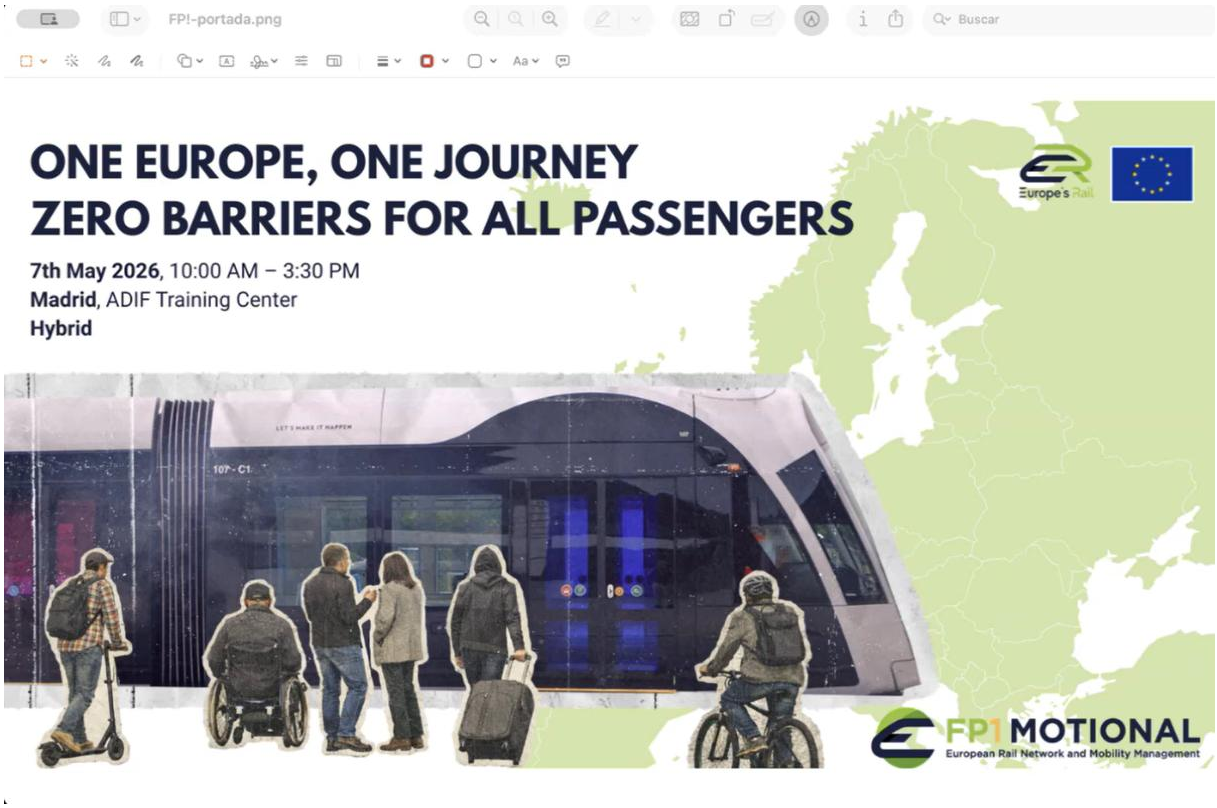


Figure 5: FP1-MOTIONAL Dissemination Series Event #2 Cover Slide

7.1.3 Seamless and Inclusive mobility

The Seamless and Inclusive Mobility Dissemination Event in Madrid on 7th of May 2026 (#2) 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.

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.



Figure 6: FP1-MOTIONAL Dissemination Series Event #3 Cover Slide

7.1.4 Intelligent planning

The Intelligent Planning Dissemination Event (#3), held in Paris at SNCF previous headquarters near Montparnasse station on 12th of May 2026, marked an important milestone for the future of European rail. Organised 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 organisational 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.



Figure 7: FP1-MOTIONAL Dissemination Series Event #4 Cover Slide

7.1.5 Cross Border Operations

On 13th of May 2026, 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, 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.

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



Figure 8: FP1-MOTIONAL Dissemination Series Event #5 Cover Slide

7.1.6 Real time Intelligence

The Demo Dissemination Event on Real-Time Intelligence (#5) was successfully held in Borlänge on 27th of May 2026, 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.

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

8. Summary of planned Exploitation Measures / Impact Categories

The following Tab. 1 shows the Key Exploitable Results (KER) as defined in the Description of Action (DoA) and their month of delivery [1]. In Fig. 2 from the DoA [1] the KER have been added in order to show the relation to the WPs within FP1. As most of them are subject to the sequence of "Specification, Development and Demonstration", the exploitable results, i.e. the demonstrated results will be delivered in the last phase of the project.

Table 1 for the WS1 and Table 4 for WS2 show generic potential exploitation measures (PEM) in addition to the KER as defined in the GA which could be applied by the WPs. The *impact categories shown in italic font* have been added during the course of FP1-MOTIONAL:

1. **Ensuring Access to the project results:** Publication of deliverables and further results on the official website of the project.
2. **Standardisation**: Publication of specifications, architectures or interface definitions for European (e.g. TSI) or International (e.g. ETSI) standardisation. Needs to go through the STIP of the System Pillar.
3. **Provision of Products** or Components by the rail supply industry stemming mainly from WS: Providing models, modules, components or systems e.g. for timetable planning, capacity management or operational traffic management.
4. **Provision of digital enablers** stemming mainly from SG4: Providing to all sectors e.g. a rail data space or digital twin environment
5. **Operational Application** by the railways: Application of the components, constituents and systems of all WS to offer door-to-door mobility to improve service quality and competitiveness.
6. **Generation of Knowledge** mainly – but not only - by the scientific and academic community, as well as all stakeholders of the sector: Scientific exploitation and publication with in-depth results of methods and applied models, as well as results of the large-scale demonstration, using models for the validation of new concepts (e.g. on-demand) (WS1) and using the digital enablers for scientific purposes (WS2).
7. **Knowledge Transfer** to other sectors: Application of models, architectures and interfaces, as well as digital enablers in other domains as e.g. urban transport, aviation, etc. *This includes the use of results for teaching and education.*
8. **Continuation of Development and Demonstration in FP1-MOTIONAL-2:** Most of the TEs are planned to be continued in FP1-MOTIONAL-2.
9. **Knowledge to be used for Market Studies and Tenders:** Some of the Users of the TEs (mostly Railways and PTOs) are planning to use the knowledge for market surveys, studies and tenders.

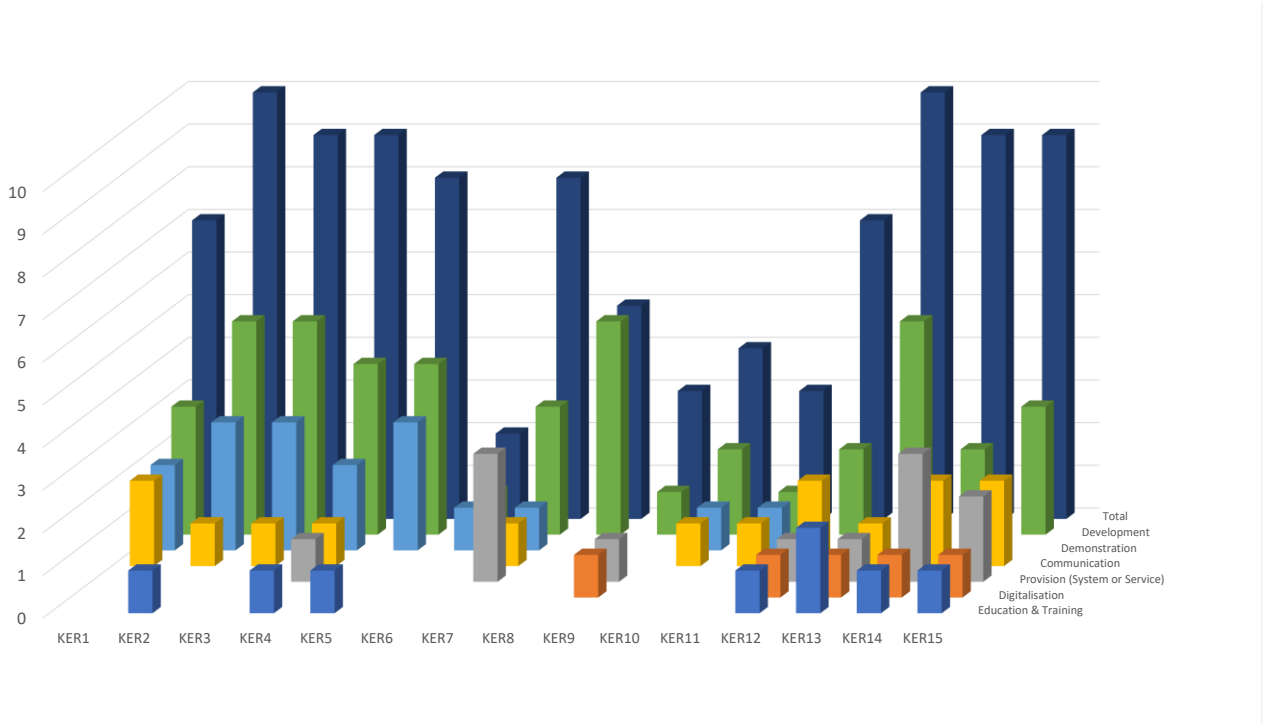


Figure 9: Summary of planned exploitation measures in FP1-MOTIONAL by KER and measure type

The two new impact categories relate primarily to the overall use of results by partners, rather than to individual KER. Hence, they are not reflected in the Fig. above.

The details of the EP-Log for all Partners can be found in Annex 2 (sensitive).

9. Impact

In this section is a mapping of the FP-MOTIONAL KER to the expected socio-economic impacts defined in the MAWP given. They can be found in the two tables below for FA1 and TT.

Table 1: Impact and KER related to FA1

	Expected Impact defined in the MAWP [4] Section 7.1.3	KER
	**Meeting evolving customer requirements** FA1 will support the delivery of much more flexible approaches to planning and traffic management of rail services, allowing rail to better serve customer needs. The primary impact will be a driver for the migration to a cohesive overall EU rail system. To make this happen the flagship will solve the rail system's pain points, lack of flexibility, lack of reliability, lack of capacity and also improve the resilience, punctuality and reactivity between actors.	**KER 3, KER 5, KER 9, KER 10, KER 11**
	**More sustainable and resilient transport** FA1 will provide more robust traffic management processes through integrating dynamic forecast asset status in the decision process and improved efficiency of maintenance operations due to better scheduling following more precise traffic forecast information that will result increased operational reliability (fewer service disruptions). Optimisation of the TMS and fewer disruptions of the train services will enable better utilisation of available resources and energy consumption.	**KER 2, KER 3, KER 4, KER 6, KER 7, KER 8, KER 11**
	**Harmonized approach to evolution and greater adaptability** FA1 will contribute to the common evolution of the system and greater harmonisation of the traffic management, in order to facilitate the delivery of the Single European Rail Area and improve the rate of deployment of new technologies. By developing a new approach for a European Traffic management with the System Pillar, including operational and functional requirements that allows to use the same system architecture for simple regional TMS applications with low effort as well as more sophisticated solutions for higher traffic densities and complex network topologies, FA1 is strengthening the treatment of trains when different network and business models meet each other, such as cross-border traffic as well as mainlines and regional lines.	**KER 1, KER 2, KER 4, KER 8, KER 11**
	**Reinforced role for rail in European transport and mobility** FA1 is supporting a better integration of the rail in a more sustainable Mobility system, in order to deliver better services for passengers and freight, and to bring higher usage and larger passenger volumes. Connecting transportation modes and breaking the silos between public and private transportation industry actors will enable door-to-door mobility. Developing the matching solutions for the special demands will allow incentivizing people in their choice of mobility and hence support the promotion of rail, the optimization of investments, and the contribution to health and wellbeing.	**KER 1, KER 2, KER 3, KER 4, KER 5, KER 6, KER 7, KER 8, KER 9, KER 10, KER 11**
	**Improved EU rail supply industry competitiveness** A successful introduction of FA1 results will make rail more attractive for present and future green transport systems and more competitive compared to the car industry, which will strengthen European rail industry. One of the main objectives of FA1 is to integrate better the rail	**KER 1, KER 2, KER 3, KER 4, KER 5, KER 6, KER 7, KER 8,**

	Expected Impact defined in the MAWP [4] Section 7.1.3	KER
	mode, and to preserve its role as the backbone of the mobility system. The evolution of the rail system will impact employees significantly. Persons dealing with capacity planning and operational processes will be supported by new tools and processes in order to improve rail operations. The quality of work and the attractiveness of the sector is increasing. By supporting the transformation of the current rail system into a central transport mode of tomorrow's European mobility, FA1 will build unique capabilities in the European rail industry, supporting its position in global markets.	**KER 9,** **KER 10,** **KER 11**

Table 2: Impact and KER related to TT

	Expected Impact defined in the MAWP [4] Section 7.8.3	KER
	**Reduced costs** To allow the deployment for existing networks, the representation and detailing of digital twins will be allowed to continuously improve over time and in areas where positive effects are to be expected. The twin capability will be not just help to understand history and present situation, but also simulate scenarios with continuation and forecast alternatives for use and maintenance evolution/change. This approach will lead to huge benefits and impacts in designing significant evolution of the railway system.	**KER 12,** **KER 13,** **KER 15**
	**Harmonised approach to evolution and greater adaptability** Design and planning based on verified performances all along the design cycle can be achieved following the digital twin approach, rather than design based on specifications. This would ensure a quicker development cycle: in the current approach if performance is not met at the end of the development cycle, it has to be restarted from the beginning. The proposed approach would lead to a continuous check that the performances are met all along the development cycle.	**KER 12,** **KER 13,** **KER 14,** **KER 15**
	**Improved EU rail supply industry competitiveness** The need of using real physical networks, data and systems for authorization processes will be significantly reduced by virtual validation and certification processes. The virtual certification resulting from this process is an important step to shorten and to make more efficient the time to market needed for railways assets e.g. the rolling stock. Some initiatives have been taken for several years, some by the stakeholders, some gathered in European projects. The TT approach will consolidate them and increase their impact. The digital twin will provide a much more realistic framework for virtual certification, already addressed in S2R than individual subsystem simulation could when strong connections with other subsystems are needed (like HIL testing philosophy).	**KER 12,** **KER 13,** **KER 14,** **KER 15**

10. Result Ownership List (RoL)

In the GA, there are Key Exploitable Results (KER) measures listed. During the execution of the project results have been produced. The Result Ownership List (RoL) is an element of the project reporting in the Horizon Europe portal. In order to provide the content for the portal the information has been requested from the partners listed in the following table.

Table 3: Information requested from the partners for the results to be included in the RoL

Information	Type
The Name of the result	**Text**
The result type	Dropdown Menu
Key results (does result have a high potential?)	Tick boxes
Description of the high potential	**Text**
Audience or target group	Dropdown Menu
Steps undertaken towards exploitation	Tick boxes
Market maturity (state of the market targeted by this result)	Dropdown Menu
This result is related to KER	Dropdown Menu
Type of result	Dropdown Menu
Description	Text
If the result is needed to validate the conclusions of a publication, briefly describe the provisions whereby you intend to make your output available, either in digital or physical form	Dropdown Menu
Type of Persistent Identifier, PID	Dropdown Menu
Insert PID reference (if available)	Text
Insert PID reference of the publication	Text
URL to repository landing page for the result service/webpage hosting the result (if available)	Text
What license is the result licensed under?	Dropdown Menu
Single or joint ownership result?	**Tick boxes**
Results owner	**Dropdown Menu**
Will the owners exploit the results?	Tick boxes
In which form will the result be made available to other consortium members and/or third parties?	Text
Does the exploitation of the results require access to background of one or several consortium members?	Tick boxes
Does the exploitation of the results require access to third party IPR?	Tick boxes

In order to prepare the input for the portal the abovementioned information has been collected by a specific template implemented in Excel which had to be filled by result. The elements marked in bold font are in the table in the Annex 3.

The elements with a dropdown menu were limited to exactly one answer, while the ones with Tick Boxes allow multiple answers. Especially, as the Excel Template allowed the allocation of a result to only one KER, results contributing to more than one KER are not reflected fully in the figure below. Partners, which have not reported any result are not included in the Fig. below. The Fig. shows the total number of results, which have been reported by partners per KER. In total 112 results have been reported.

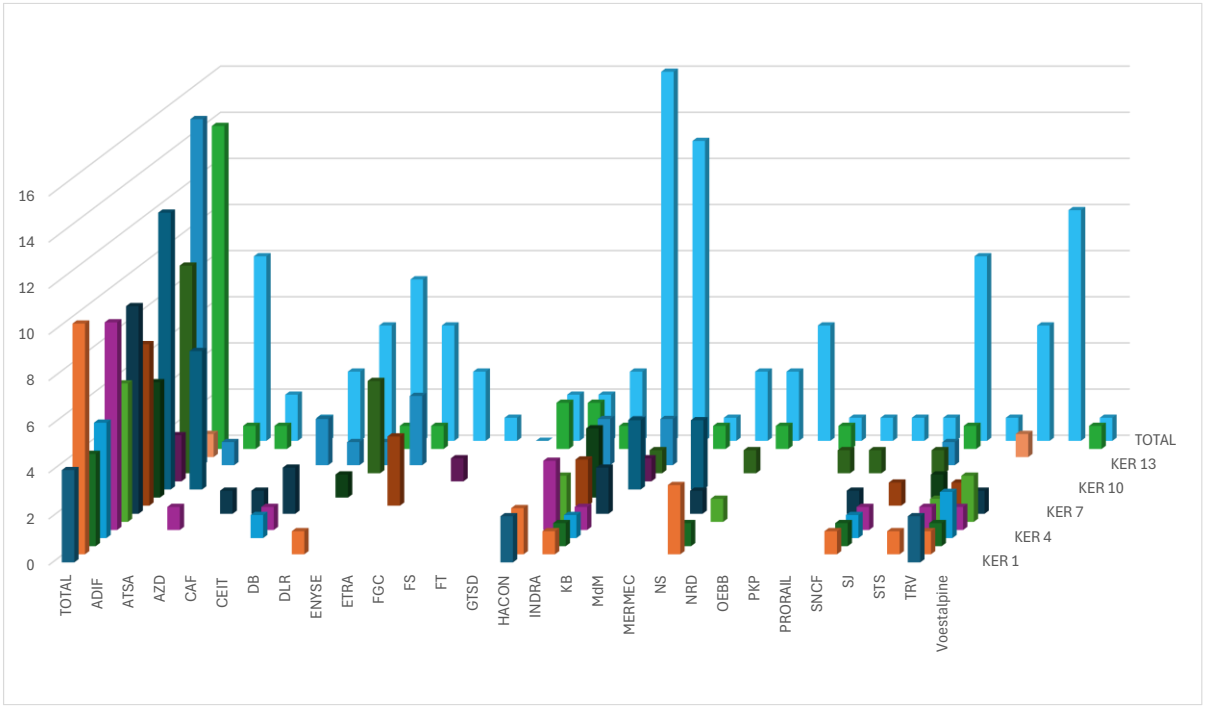


Figure 10: Summary of Results Ownership of FP1-MOTIONAL over Partners and KER

The partner-specific details of the results ownership can be found in Annex 3 (sensitive).

11. References

[1] FP1-MOTIONAL: GRANT AGREEMENT, Project 101101973 — FP1-MOTIONAL, Description of Action. 2022

[2] FP1-WP32-D-TRV-001-02. D32.1 Project dissemination and communication plan.

[3] FP1-MOTIONAL: Annex to D32.2: Work Log for Exploitation Activities. https://service.projectplace.com/pp/pp.cgi/0/1524512566?op=office_online

[4] Europe's Rail: Multi-Annual Work Program (MAWP). www.rail-research.europa.eu/wp-content/uploads/2022/03/EURAIL_MAWP_final.pdf

[5] European Commission. (2023). Horizon Europe (HORIZON) Programme Guide. Version 3.0. 01 April 2023. Retrieved 25th of September 2023, from https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/programme-guide_horizon_en.pdf

12. Conclusion

The purpose of this deliverable D32.3 is to outline a general strategy for exploiting the FP1-MOTIONAL project. It provides a summary of all communication, dissemination and exploitation activities and their expected impact. The results on the Dissemination and Communication KPI are given as e.g. almost 100 social media posts. The exploitation plans for the Key Exploitable Results (KER) of the partners are collected and statistically analysed. The individual details of the partner-specific exploitation with respect to KER are listed in a sensitive annex. A Results Ownership List (ROL) has been set up, completed and statistically analysed. The individual details of the partner-specific ROL are listed in a sensitive annex. In general terms for both the exploitation plan as well as the ROL have been covered completely.

13. Appendix 1: Dissemination KPI

Table 4: Summary of the Dissemination KPI

Description of Dissemination KPI (PR2 - PR4)	Status
More than 6 articles in rail industry and professional association magazines	7
5 scientific articles in peer review journals, targeting open access publication whenever possible	27
6 presentations at third-party workshops and conferences	64
Participation to the Annual EU-Rail Innovation Days (substituting, when possible, mid-term events and final event)	1 Innovation Days 1 Mid-Term Event 1 Final Event
Demonstrators, notably also through various events/ conferences such as InnoTrans, WCRR, TRA and other relevant events, also considering events beyond rail (i.e., technologies conferences, transport, etc.) and including any other conference in which EU-Rail is participating.	91
Use of Horizon Europe tools in order to boost the dissemination about the project. Among others, the project will consider horizon results platform, Booster, etc) - 20 actions	0
Inputs to Europe's Rail Website, Newsletters, social media, and delivering communicative videos and pictures of sufficiently quality to Europe's Rail. At least 1 per month.	Periodic Report 2: 42 (social media + website + videos) Periodic Report 3: 2 videos & 5 posts in newsletter. Periodic Report 4 until 4 Sept: 2 videos + 16 website & social media + 11 inputs newsletter
6 Press releases	1
1 Project brochure	1
Project website & Website posts (at least 4 posts per each year = at least total of 16)	44
Newsletter - 4 issues during the life of the project (in brackets - number of articles in the newsletter from the JU)	5
Webinars/workshops for stakeholders including at least six countries	5 Demo Dissemination Events and a large number of validation events
A short video about with the demos and the socio-economic impacts, to be posted on YouTube	Videos from the Mid-Term and Final Events, together with videos from the Demo Dissemination Events and approximately 20 videos presenting the demonstration.
Social media (at least 30 post)	98

Description of Dissemination KPI (PR2 - PR4)	Status
Demo Surveys	During the demonstrations, as part of the validation events held in autumn 2025 and winter/spring 2026.

14. Appendix 2: Compiled Exploitation Plans (EP-logs) [sensitive]

See separate Document

15. Appendix 3: Details of the Result Ownership List (ROL) [sensitive]

See separate Document