



## D9.3 PRELIMINARY EXPLOITATION PLAN AND ROADMAPPING

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## Executive Summary

This Preliminary Exploitation Plan sets out the initial framework for leveraging the results of the NEXUS project. Prepared under WP 9 on Communication, Dissemination, and Exploitation, it sets the foundations for a comprehensive exploitation strategy to be delivered in Month 24. The report focuses on identifying the project's Key Exploitable Results (KERs), mapping ownership and contributions among partners, and defining preliminary pathways for their uptake in research, innovation, and market contexts.

The plan was developed through a structured process combining internal and external inputs. An internal survey was first launched to capture the perspectives of all consortium partners on their motivations for participating in the project, the outcomes they expect to produce, and their individual exploitable results. These inputs were consolidated during an internal workshop, where partners discussed complementarities and prioritised the results with the highest exploitation potential. Building on this, the project's consolidated KERs were presented to the External Advisory Board, which provided early feedback, including valuable contributions notably from metro operator representatives. This engagement helped to ensure that end-user perspectives are integrated from the outset and that the project's outcomes align with the sector's operational needs and realities.

In addition, the Preliminary Exploitation Plan also introduces the external support mechanisms that will underpin the strategy's evolution, most notably Horizon Results Booster services for go-to-market support, which will guide the definition of roadmaps and business approaches for each KER. These roadmaps will consider short, medium, and long-term actions, reflecting the different levels of maturity and market-readiness of the project results. A dedicated work package on business modelling is expected to further develop these strategies, with a detailed plan of activities to be presented to partners in April 2026.

Therefore, this document represents the first step in a dynamic and iterative process. As the project progresses, the exploitation strategy will be refined, incorporating new insights from technical developments, market analysis, carried out in WP8, and continued dialogue with potential end-users. The ultimate objective is to maximise the impact of the NEXUS' outcomes, ensuring that they contribute effectively to the priorities of the EU-Rail Multi-Annual Work Programme (MAWP), in what concerns the automation, digitalisation, and system integration in urban rail, and particularly the future development of automated metro systems.

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## LIST OF ABBREVIATIONS AND ACRONYMS

Acronym	Meaning
AMT	Azienda Mobilita E Trasporti Spa
ATO	Automatic Train Operation
AU	Aston University
CBTC	Communications-Based Train Control
C&D	Communication and Dissemination
CENELEC	European Committee for Electrotechnical Standardization
EC	European Commission
DMP	Data Management Plan
DPO	Data Protection Officer
EAB	External Advisory Board
ERTICO	European Road Transport Telematics Implementation Coordination Organisation - Intelligent Transport Systems & Services Europe
EU	European Union
FAIR	Findable, Accessible, Interoperable, and Reusable
GA	Grant Agreement
GDPR	General Data Protection Regulation
GoA	Grade of Automation
HRB	Horizon Results Booster
IEC	International Electrotechnical Commission
IP	Intellectual Property
IR	Innovation Radar
KER(s)	Key Exploitable Result(s)
KoM	Kick-off Meeting
KPI	Key Performance Indicator

Acronym	Meaning
MAWP	Multi-Annual Work Programme
METROS	Metropolitan JSC
PT	Performance Technologies Anonymos Etairia Pliroforikis
PT	Public transport
R&D	Research and Development
SAAS	Software-as-a-Service
SIEM	Siemens Mobility Austria GmbH
STAM	STAM SRL
SRIA	Strategic Research and Innovation Agenda
TCMS	Train Control and Monitoring System
TIS	TIS PT, Consultores Em Transportes, Inovacao E Sistemas, SA
TRL	Technology Readiness Levels
TUW	Technische Universitaet Wien
UITP	International Association of Public Transport
UKRI	UK Research and Innovation
VTU	Higher School of Transport – Todor Kableshkov
VIF	Virtual Vehicle Research GMBH
WP	Work Package
WS	Working stream

# 1 PURPOSE AND SCOPE OF THE REPORT

## 1.1 OBJECTIVE OF THE PRELIMINARY PLAN

The purpose of this preliminary exploitation plan is to establish an initial framework for how the NEXUS' results will be leveraged during and after its lifetime, ensuring that they generate tangible value for the consortium partners, the metro and rail sectors, and wider stakeholders. At this early stage, the plan focuses on early identification of opportunities, ownership, and pathways for utilisation of the project outcomes, laying the groundwork for a more comprehensive exploitation strategy to be developed in later phases.

The document sets out the preliminary objectives and scope of the exploitation activities by establishing a shared understanding of the project's Key Exploitable Results (KERs), their definition, typology, and potential impact (see section 2.1). It maps ownership and contributions to each KER among consortium partners (see section 2.4) and highlights partner-level exploitable assets as well as potential synergies with future EU-Rail initiatives (see section 2.2 and section 3.1). It also presents the support tools and external services, such as Horizon Results Booster, that will assist in refining the exploitation approaches (see section 3.2) and introduces a preliminary roadmap (see section 3.3). Finally, it outlines the next steps towards a consolidated exploitation strategy, including alignment with upcoming Work Package on Business Cases (WP8) (see section 4).

The preliminary nature of this plan reflects the current stage of the project: while the fundamental elements of exploitation are identified, further validation and refinement will occur as the technical work advances and external support, notably from Horizon Results Booster, becomes operational. This staged approach will ensure that the final exploitation plan is both comprehensive and actionable, fully aligned with the project's overall objectives and the priorities of the EU-Rail programme.

## 1.2 SCOPE AND METHODOLOGICAL APPROACH

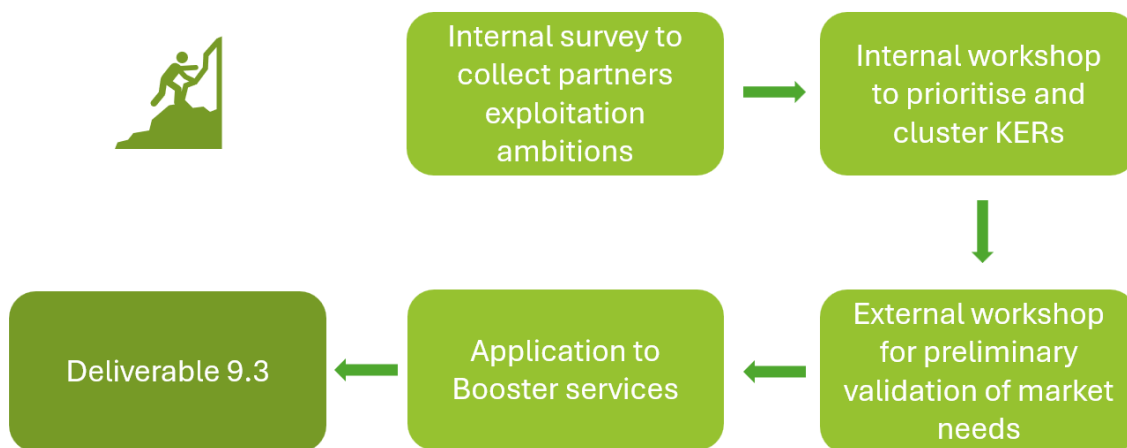
This report has been prepared under Work Package 9, which addresses Communication, Dissemination, and Exploitation activities within the project. It represents a preliminary step towards the final exploitation plan, which will be delivered in Month 24. The document reflects the progress made to date in defining the project's KERs, mapping partner contributions, and identifying initial pathways for future exploitation, while recognising that further refinement will occur as the project advances.

The methodological approach to developing this preliminary plan followed a stepwise process to ensure comprehensive input from both project partners and external stakeholders. The first step consisted of an internal survey launched among all consortium members (included in Annex 1 | Survey to project partners), which gathered insights into their motivations for joining NEXUS, their expectations regarding its main outcomes, and the joint exploitable results they envisage by partnering up with other partners. Building on the survey results, an internal workshop was organised with the primary objective of presenting these findings and, more importantly, fostering a collective discussion on which results hold the highest exploitation potential. This workshop also enabled partners to explore complementarities between individual results and to consolidate them into the project's main KERs.

As an outcome of this process, three strategic KERs were shortlisted, namely those considered most mature, replicable, and relevant to future exploitation efforts by both internal and external stakeholders. These will serve as the basis for further development under the upcoming business modelling activities.

Following this internal exercise, the consolidated KERs were presented to the External Advisory Board during a session held on 3 July 2025. Two representatives of metro operators (Turin and Lisbon) provided direct feedback on two of the three KERs, and written input from an additional metro operator representative (Prague) was received afterwards. This early engagement with end users is critical not only to establish direct communication channels but also to ensure that the solutions developed by the project are tailored to the specific needs of metro operators from the outset. Engagement with these stakeholders is expected to continue in the context of the Work Package dedicated to the business cases (WP8), ensuring their perspectives inform the project’s exploitation strategy at every stage, as well as in the context of the technical assistance from the Booster services (further explained in section 3.2.1.).

Figure 1: Stepwise approach towards D9.3



Source: own elaboration

In summary, the preparation of this preliminary exploitation plan has been characterised by a high level of involvement from both consortium partners and the External Advisory Board. This collaborative process ensures that all partners contribute to and benefit from a shared exploitation strategy, while maintaining their own individual approaches.

## 2 INITIAL IDENTIFICATION OF KEY EXPLOITABLE RESULTS

### 2.1 DEFINITION AND TYPOLOGY OF KERS IN THE PROJECT

KERs are the concrete outcomes of research and innovation activities that demonstrate clear potential for future use, whether in commercial, scientific, or operational contexts. In Horizon Europe, beneficiaries are required to identify and exploit results that can contribute to the wider impact of the programme. Annex V of the Annotated Model Grant Agreement<sup>1</sup> explicitly defines exploitation as the use of results in further research and innovation activities other than those covered by the action concerned, or in developing, creating and marketing a product or process, or in creating and providing a service, or in standardisation activities. This includes commercial, societal, or policy-related uses and underscores the obligation for beneficiaries to plan and implement tailored exploitation strategies throughout the project lifecycle.

Within the specific context of the rail sector, the Strategic Research and Innovation Agenda (SRIA) of the Europe's Rail Joint Undertaking<sup>2</sup> reinforces this approach by emphasising the need for results that are sufficiently mature, interoperable, and aligned with operational needs so they can be scaled up and implemented across EU rail systems. The SRIA also highlights the importance of integrating these results into deployment frameworks, regulatory and standardisation roadmaps, and industry innovation cycles. KERs in this domain are expected not only to advance the state of the art but also to serve as building blocks for future demonstrators, pilot deployments, or industrial products, thus contributing to the achievement of the Single European Railway Area and the Green Deal objectives.

In the framework of the NEXUS project, KERs are understood as concrete results that go beyond general project outputs. While the project operates primarily within low to mid Technology Readiness Levels (TRL up to 5), KERs are identified based on their potential to inform future development, replication, or application whether by industry stakeholders, public authorities, transport operators, researchers, or other relevant end users. Although some of these results may not yet be market-ready, they demonstrate potential added value to shape future innovation pathways, policy frameworks, or operational practices in the metro sector.

Hence, the identification of KERs at an early stage is essential to enable a proactive exploitation strategy. It allows project partners to recognise where value is being generated, understand how it may

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<sup>1</sup> European Commission, *Annotated Model Grant Agreement*, 2025, [https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/aga\\_en.pdf](https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/aga_en.pdf)

<sup>2</sup> Europe's Rail, *Strategic Research and Innovation Agenda*, 2020, [https://rail-research.europa.eu/wp-content/uploads/2020/12/RAIL-Strategic-Research-and-Innovation-Agenda-2020-\\_FINAL\\_dec2020.pdf](https://rail-research.europa.eu/wp-content/uploads/2020/12/RAIL-Strategic-Research-and-Innovation-Agenda-2020-_FINAL_dec2020.pdf)

align with market or policy needs, and plan suitable pathways for dissemination, transfer, or uptake. As mentioned in the description of the methodological approach, within NEXUS, the process of identifying KERs has been supported through a structured internal survey, enabling each partner to reflect on the results emerging from their activities and to distinguish those with concrete exploitation potential.

To guide the preliminary mapping and support the exploitation plan, two main categories of KERs have been defined:

- **Technological/Commercial KERs:** These include tools, software solutions, technical frameworks, or demonstrators that may be further developed into products, services, or licensable assets. Within NEXUS, examples include AI-based automation modules, simulation tools, interoperability frameworks, and other digital or hardware-based innovations with potential market relevance. These results often involve technical validation, prototyping, patenting or integration efforts and may lead to business-driven exploitation pathways, whether through internal use by partners or commercial offerings to third parties.
- **Scientific/Research KERs:** This category includes methods, models, scientific datasets, or research findings that can contribute to knowledge creation, standardisation, or future innovation. These results are typically of interest to research organisations, policy actors, or standardisation bodies. They may lead to further scientific publications, white papers, open datasets, or contributions to ongoing dialogues about metro system evolution and future control architectures. Importantly, they serve to consolidate NEXUS's position as a reference project in the European research landscape.

This typology provides a shared lens through which consortium members can assess and refine their contributions, ensuring alignment between individual partner efforts and the overall project impact strategy. It also supports the organisation of the next sections in this document, which detail the partner-level contributions and assets (Section 2.2), the current set of project-level KERs (Section 2.2), and the corresponding mapping of ownership and responsibilities (Section 2.4).

## 2.2 PARTNER-LEVEL KERs AND EXPLOITABLE ASSETS

The NEXUS project aims to generate a diverse and broad portfolio of KERs at the partner level, covering both research-driven outputs and technology-oriented assets. These results reflect the distinct roles, expertise, and exploitation ambitions of each partner. Out of the 20 identified KERs, half fall under the Scientific/Research category, while the remaining half are positioned as Technological/Commercial, illustrating a strong dual focus on advancing the state-of-the-art and preparing the ground for future deployment and commercialisation.

Moreover, the partners of the NEXUS consortium<sup>3</sup> have also outlined diverse pathways for exploiting the project's results, aligned with their organisational missions and roles in the rail innovation

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<sup>3</sup> Although this deliverable provides a detailed overview of Key Exploitable Results at partner level, information from two consortium members — notably ERTICO and Performance Technologies (PT) — have not yet been collected. As this is a preliminary version of the deliverable, their contributions will be integrated in the final version to ensure full representation of all partners and results.

ecosystem. These intentions span research and innovation activities, service development and commercialisation, and contributions to standardisation and future EU initiatives.

The project's academic and research partners have focused on developing scientific outputs and methodological tools that enhance understanding of metro system behaviour and support innovation in service planning and system design. The **University of Genoa** has played a central role in developing a high-fidelity simulation model for metro line performance analysis. This model, combined with simulation-based algorithms for system optimisation, provides a robust foundation for research dissemination and potential transfer to academic curricula or further R&I projects. In terms of exploitation, the University of Genoa expects to primarily exploit the results through high-impact academic dissemination and by using them as a basis for new research services. The knowledge gained will strengthen their expertise in metro automation and contribute to future project proposals at both national and European levels.

During the first year of the project, **Aston University** has produced in-depth literature reviews focusing on metro system modelling and the application of AI in passenger demand forecasting. Although these KERs are primarily scientific, they serve as essential reference points for future empirical research and are expected to inform the development of applied methodologies in subsequent innovation cycles. By systematising knowledge from across disciplines, Aston's results help contextualise the NEXUS project within ongoing academic discourse on urban mobility and intelligent transport systems. Looking at exploitation strategies, Aston University expects to build on the modelling tools and approaches from WP4 (Models supporting metro adaptability analysis) and WP7 (Validation, exploitation and improvement campaign) to further investigate AI, big data, and IoT applications in metro operations. The insights from NEXUS will serve as a baseline for future research into passenger demand forecasting and control system innovation and will be disseminated through academic outputs.

On the other hand, **TU Wien** has also contributed with foundational work by developing a comprehensive requirements catalogue, detailing functional, technical, and operational needs for future metro systems. This output is aligned with NEXUS's forward-looking approach and is expected to serve as a reference for system developers, operators, and policymakers. TU Wien's contributions also extend to advanced methods for maintenance planning and asset management, supporting longer-term improvements in reliability and life-cycle performance of metro infrastructures. In terms of exploitation, TU Wien aims to compile and publish a catalogue of optimisation measures derived from the project and to continue research with metro operators and infrastructure engineers. The insights will be shared with relevant stakeholders and used to inform follow-up research projects in urban mobility and automation.

Another technical academic partner, **VTU**, has focused its efforts on the integration of modern technologies for traffic management and optimization of carrying capacity. Its simulation tools allow for the analysis and correction of passenger and train operations. Furthermore, VTU's work supports the implementation of CBTC and ATO, contributing to safety, interoperability, and service reliability. Individual KERs in this area also include AI-based safety monitoring strategies, as well as the development of predictive modelling by integrating multiple real-time and long-term historical data sources, and they will support future scalability and adaptability of metro systems to urban transitions. In the context of exploitation activities, VTU will focus on scientific dissemination and the practical application of its work in local contexts, notably through conference publications and engagement with Metro Sofia administration. VTU has developed a predictive model for passenger flows, incorporating

impedance-based functions for origin-destination matrices, supporting improved passenger information systems.

Considering industry partners, **STAM** has developed simulation tools and AI-based functionalities with both research and application potential. Its behavioural models for crowd dynamics in metro stations and AI-driven demand forecasting tools offer valuable decision-support mechanisms. These results not only support the development of more efficient operational strategies but also open opportunities for follow-up research, particularly in human-centred design and the behavioural sciences applied to public transport environments. As part of the exploitation strategy, STAM intends to leverage the simulation engine and AI forecasting models as the foundation for new data-driven services supporting metro network planning and operations. Post-project, these models are expected to be refined and embedded in decision-support platforms to optimise scheduling, safety, and resource allocation for metro operators. Moreover, STAM plans to promote adoption through demonstrations, workshops, industry events, and publications, and to explore collaborations with public transport authorities for real-world validation and deployment.

**Virtual Vehicle** has developed system-level AI tools for metro operations optimisation. These tools support holistic planning by integrating multiple layers of operational data. Additionally, Virtual Vehicle has delivered methodologies for aligning and integrating knowledge across different European rail R&D initiatives, contributing to the creation of coherent innovation pipelines. Their KERs are highly strategic, as they not only generate immediate value but also help shape future R&D project concepts and policy-aligned research strategies. For exploitation purposes, Virtual Vehicle Research intends to capitalise on the project outcomes by pursuing contract research opportunities with metro operators and initiating new R&D collaborations. These efforts will focus on applying the developed methods and models to practical operational challenges in automated metro systems.

**TIS** will exploit project outcomes to deepen understanding of passenger and operator needs. These assets are expected to amplify the portfolio of consultancy services and be used in technical assistance to help operators optimise services provided and plan for dynamic mobility patterns. In concrete, TIS aims to leverage the project outcomes by pursuing research opportunities with metro operators and launching new R&D collaborations where the NEXUS models can be further exploited and applied to address practical operational challenges in automated metro systems.

**Siemens** proposes to contribute to two high-impact, technology-oriented KERs that are well aligned with its corporate strategic innovation roadmap. The first relates to next-generation communication technologies for driverless metro systems, targeting improvements in service continuity, operational reliability and system modularity. The second focuses on a holistic control system architecture designed to support modular and scalable automation. Both results are highly relevant for future commercial applications and may serve as reference architectures in the development of standardised, interoperable metro automation systems.

At the same time, Siemens' expertise and market position ensure that its contributions are not only of value for its own product development, but also for the wider metro industry, helping to shape the future of train control in Europe. This twofold benefit has already been visible in NEXUS first implementation period: several outcomes from WP5 were shared with External Advisory Board members in a dedicated workshop, illustrating that the project's developments are directly relevant for Siemens' business development while also enriching the sector's collective knowledge base.



Moreover, Siemens Mobility is evaluating collaboration opportunities with metro operators in shaping next-generation system concepts, drawing on insights gained through NEXUS. In addition to product development, Siemens aims to contribute insights to broader railway industry alignment efforts and explore their relevance for future collaborative frameworks at European level.

Among the operator and operators' representing partners within the NEXUS consortium, the Italian **AMT** proposes to bring a practice-oriented perspective, producing guidelines and methodologies that support the application of automation and AI technologies in public transport environments. Their work focuses on vehicle design optimisation, tailored for future metro needs, and on developing operational strategies that maximise the benefits of digitalisation. AMT's results are highly relevant for other transport operators facing similar transitions toward intelligent mobility systems. As part of the exploitation strategy, AMT sees an opportunity to technologically enhance its metro system with the solutions developed in NEXUS, with the potential to later exploit them economically by integrating them into commercial services or operational improvements.

**Sofia Metro** proposes to focus on technological implementation and service optimisation. Building on its experience with metro automation, it is expected to contribute with their practical experience related to the integration of CBTC, ATO, and AI-based predictive maintenance. During the first year of the project, Sofia Metro has also contributed for the development of operator-oriented guidelines based on passenger feedback and system performance data, ensuring that new solutions support safe, resilient, and user-centred services. As a result, a final KER includes a network optimisation model designed to maintain continuity and efficiency even under dynamic conditions, reinforcing operational robustness and flexibility.

Finally, **UITP**, as a key international stakeholder representing public transport authorities, operators and the public transport community of stakeholders at large, plays a central role in bridging project results with sectoral needs. Its KERs focus on strategic insights gained from the project, including an enhanced understanding of passenger and operator needs, and the development of AI-based tools for service planning and demand analysis. UITP also supports the uptake of emerging themes such as cybersecurity, GoA4 (Grade of Automation 4) driverless operations, and infrastructure resilience. These outputs position UITP to act as a decisive multiplier for the project's results within the wider public transport community, bringing NEXUS outcomes and developments closer to a wide set of different stakeholders, allowing them not only to know more, but also to concretely give a feedback and actively contribute to the project activities (also through the setup and management of the External Advisory Board). Finally, NEXUS outcomes have the potential to feed UITP advocacy activities and training opportunities, from which the whole community of public transport actors – including end users - can benefit in the short, medium and long run.

Overall, the diversity of KERs at partner level reflects the richness of the consortium and the multi-dimensional nature of the NEXUS project. While some partners have focused on foundational research and simulation, others have prioritised technological demonstrators, tools, and strategies for future deployment. The complementary nature of these assets creates opportunities for joint exploitation pathways, cross-sector innovation, and long-term impact both within and beyond the consortium, all of which are topics to be further explored in the next section.

## 2.3 PRELIMINARY SET OF PROJECT-LEVEL KERs

The identification of a preliminary set of project-level KERs in NEXUS has been guided by a structured and participatory methodology. This process aimed to distil the most mature, replicable, and strategically relevant outputs from across the project, building on individual partner contributions while identifying synergies at the system level.

Following the initial mapping of partner-level KERs through a structured survey, the consortium conducted an internal workshop to reflect collectively on the alignment, complementarity, and external relevance of the results. Each partner presented the exploitable assets they had identified and their intended exploitation intentions. This open exchange allowed the consortium to identify areas of overlap, potential integration, and the most promising solutions for wider impact beyond the project's immediate scope.

During the workshop, the partners worked together to cluster related results into broader, project-level KERs. This process enabled the consolidation of innovations – ranging from simulation models and AI tools to automation strategies and operational guidelines – into coherent and actionable results with higher added value. The maturity of each proposed KER was discussed in terms of technology readiness, validation context, and applicability across different urban and operational environments. While recognising that the project scope is limited to a maximum TRL of 5, the prioritised results were those already demonstrating early validation and holding strong potential for integration into future development pathways, as well as the ones that resolved stakeholder's needs.

The workshop also included a preliminary prioritisation exercise, supported by qualitative criteria such as cross-partner relevance, scalability to other metro systems, contribution to the objectives of the Europe's Rail JU, and alignment with urban mobility policies and innovation agendas. Based on this clustering and prioritisation exercise, three strategic KERs were identified as having the highest potential for replication and future exploitation by both internal and external stakeholders. These results consolidate several technological and methodological innovations developed throughout the project and might form the basis for the business case analysis under WP8.

The three strategic project-level KERs selected are:

1. The AI Handbook for Metro Operators.
2. Decision Support and Simulation Platform for Metro Operations.
3. Automation Architecture for Driverless Metro Systems.

### 2.3.1 KER 1: AI HANDBOOK FOR METRO OPERATORS

Based on the European Commission's Communication on Artificial Intelligence for Europe (2018)<sup>4</sup>, Artificial Intelligence can be defined as systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. As a result,

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<sup>4</sup> European Commission, Artificial Intelligence for Europe, 2018, [AI Communication](#)

Artificial Intelligence is reshaping industries across the world<sup>5</sup>, and transport is no exception. Nowhere is this more urgent than in urban mobility, where metro systems face growing pressure to become smarter, safer, and more responsive to real-time needs.

When it comes to metro operations, AI offers significant promise. From predictive maintenance and energy efficiency to dynamic passenger information and enhanced cybersecurity, the potential applications are wide-ranging. However, uptake in the metro domain remains cautious and fragmented. Despite the existence of several examples of innovation, operators are still grappling with how to unlock AI's full value in a safe, interoperable, and future-proof manner. Consultations conducted within the NEXUS project and feedback from the EAB underscored several critical challenges:

- Metro as a critical urban transport infrastructure.
- Metro-specific knowledge on AI, although progressing at an increasing pace, is still relatively scarce, and integration with legacy systems and siloed data architectures continues to pose barriers.
- Organisational readiness remains low, with limited workforce readiness and a general lack of trust or cultural acceptance of AI technologies.
- Uncertainties persist around cybersecurity and regulatory compliance, including GDPR and sectoral standards such as CENELEC TS 50701 and IEC 62443.

These insights underscored a clear demand from operators for a practical, comprehensive resource that could guide them through the complexities of AI implementation, bridging the gap between high-level potential and operational reality.

### **Proposed solution**

The proposed solution is an all-encompassing guidance document for metro operators, designed to empower them in navigating the complex landscape of Artificial Intelligence adoption. This resource offers a roadmap that combines technical insights, operational strategies, and organisational change management, tailored specifically to the context of metro systems, enabling operators to make informed, strategic decisions about AI adoption across all levels of automation (GoA1–GoA4).

The guidance addresses the specific challenges and opportunities faced by metro operators. It draws on extensive research during the early stages of the NEXUS project to provide:

- A curated catalogue of AI use cases relevant to metro operations, from predictive maintenance and cybersecurity to real-time passenger information and energy management.
- A step-by-step implementation roadmap covering readiness assessment, piloting, scaling, and integration into existing systems.
- Practical tools such as checklists, decision-making frameworks, and case studies to support operators at every stage of their AI journey.
- Guidance on managing organisational change, including workforce upskilling and aligning innovation with strategic goals.

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<sup>5</sup> European Commission, *The AI continent action plan*, 2025, <https://digital-strategy.ec.europa.eu/en/library/ai-continent-action-plan>

- Data governance and compliance guidance, ensuring responsible and secure implementation, ensuring operators can adopt AI in a responsible and secure way aligned with GDPR and sectoral regulations and standards.

This handbook is envisioned as both a standalone resource (in both digital and print formats) and can serve as the foundation for training modules and workshops that can be offered to metro operators worldwide. These complementary activities will enable operators to build internal capacity, be better equipped to make informed decisions and harness the full potential of AI technologies to enhance service quality, operational efficiency, and passenger experience.

### **Alignment with the MAWP**

The AI Handbook for Metro Operators directly responds to the EU-Rail objective of strengthening the uptake of digital solutions by providing a structured, accessible roadmap to AI integration in metro operations. It addresses the urgent need for targeted guidance and capacity-building among operators, thereby contributing to enhanced innovation maturity and more resilient, future-ready metro systems.

### **Unique Selling Point and Unique Value Proposition**

This solution delivers an all-encompassing guidance document and training resource specifically tailored to metro operators, providing:

- Metro-specific AI use cases: predictive maintenance, predictive passenger information, short term prediction of travel demands, energy optimisation, cybersecurity threat detection, dispatch management, passenger communication, station ambient control, passenger monitoring and obstacle detection.
- Actionable implementation roadmap: From readiness assessment to piloting and scaling.
- Risk and change management guidelines: To address privacy, ethical AI, workforce transition, and organisational barriers.
- Compliance tools: Aligned with GDPR, CENELEC TS 50701, and UITP best practices.
- Training and advisory potential, enabling real-world impact beyond the publication.

### **Target Market**

The guidance document has commercial potential and is aimed to be marketed as a professional resource and training module for operators worldwide across GoA levels (GoA1–GoA4 systems). It can also be a resource for:

- i) urban transport authorities,
- ii) public transport consultants and advisors,
- iii) universities and training centres in urban mobility,
- iv) decision makers and policy actors at local, national and European levels (including the European Commission), and
- v) industry and technology providers interested in aligning their solutions with future-ready metro automation frameworks.

### **Early Adopters**

Operators planning or piloting automation upgrades (GoA3–GoA4) and public authorities with smart mobility agendas seeking structured guidance on AI.

## Competitors

There are no direct competitors currently offering a metro-specific AI guidance product. Instead, existing initiatives can be considered complementary and beneficial for the sector, helping to amplify the impact of NEXUS in the medium and long term. For example:

- UITP's general training courses on innovation in public transport, which support sector-wide capacity building and can serve as a valuable channel for disseminating and embedding NEXUS outcomes. These trainings, attended by a wide spectrum of participants (from newcomers to senior technical experts), also provide opportunities for NEXUS to reach broader audiences worldwide.
- Vendor-driven implementation roadmaps, often focused on a single technology area (e.g., predictive maintenance software). While narrower in scope, they demonstrate industry interest in AI-enabled solutions and create opportunities for aligning and validating NEXUS guidance with ongoing technological developments.

## Go to Market Model

The commercialisation strategy includes:

- Sale of the guidance document: Digital and hardcopy versions.
- Training and workshops: Delivered by TUW and partners as part of UITP's training portfolio.
- Consultancy services: Tailored support for operators to apply the roadmap in their contexts.

## Timing

Commercial rollout is expected on the short-term (1–2 years) post-project. TUW and supporting partners are expected to finalise the guidance, validate it with selected metro operators, and launch it commercially within this horizon.

## IPR and Ownership

The content will be owned by TU Wien, which retains the rights to exploit the commercial version of the Handbook, including future updates and training revenues. The supporting partners involved in the preparation and validation of the Handbook are Aston University, UITP, and the NEXUS operator partners (AMT Genoa and Sofia Metro). Validation will take place through a multi-step process: (i) early drafts is peer-reviewed internally within the consortium (TUW, Aston, UITP); (ii) practical feedback might be gathered from operators participating in the Nexus project (AMT, Sofia Metro) and through UITP's wider operator network; and (iii) the consolidated version will be presented to the External Advisory Board for external validation, ensuring that the guidance is operationally relevant and aligned with end-user needs.

## 2.3.2 KER 2: DECISION SUPPORT AND SIMULATION PLATFORM FOR METRO OPERATIONS

In an increasingly complex urban mobility landscape, metro operators need sophisticated yet user-friendly tools to support planning, simulation, and real-time decision-making. The second key exploitable result of the NEXUS project focuses on a Decision Support and Simulation Platform designed specifically for metro operations. This result directly addresses the limitations of existing

simulation tools, such as AnyLogic or ExtendSim, which are powerful but require substantial customisation to fit the specific operational dynamics of metro networks.

As such, current approaches to crowd behaviour and demand forecasting often remain fragmented: crowd simulations are developed in isolation, either agent-based or flow-based, while demand models are statistical, relying primarily on historical data and lacking real-time adaptability. This fragmentation results in tools that are difficult to integrate and less suited for the planning and operational decision-making required by modern metro systems.

### **Proposed solution**

A modular simulation and modelling framework focused on metro networks, developed with usability and applicability in mind. Unlike generic simulation environments, this platform supports the creation of realistic operational models for metro lines, scalable to larger networks. Key features of the envisaged platform should include:

- Metro-focused operational models, with intuitive tools for importing and configuring line characteristics (e.g., travel times, stop spacing, service frequency, signalling constraints).
- Flexible integration of crowd simulation modules, tailored to station-level characteristics with varying spatial detail. These modules can simulate boarding/alighting flows, platform congestion, and emergency evacuation scenarios.
- Architecture with future AI integration in mind, allowing interoperability with other NEXUS KERs (notably KER3).

### **Alignment with the MAWP**

The decision support and simulation platform supports the deployment of advanced planning tools tailored to the operational complexity of metro systems. This directly contributes to the MAWP objectives related to integrated network and traffic management, as well as improving operational efficiency and responsiveness to demand variability.

### **Unique Selling Point and Unique Value Proposition**

This solution offers a modelling and simulation methodology tailored specifically to metro public transport operations. The framework supports the development of metro network models using customised software where network characteristics (e.g., stops, travel times, line structures) are easily imported into a database.

As mentioned before, compared to existing platforms or modelling environments, this framework is purpose-built for metro operations and simplifies the modelling process for transport operators and planners. However, while not aiming for full integration of all tools within the project, the approach facilitates future interoperability and complements other NEXUS outputs, such as AI-based demand forecasting. Metro network models will be readily adaptable across cases, while crowd models will be more case-specific, developed with a higher level of spatial detail per station.

### **Target market**

The platform is relevant for a wide range of stakeholders involved in the planning, design, and operation of metro systems, including metro operators, metro infrastructure planners and designers, consulting



firms in urban mobility, municipalities, and urban planners involved in public transport and infrastructure development.

### **Early Adopters**

Potential early adopters include operators undergoing automation or digitalisation upgrades, particularly those operating in high-growth cities, where demand forecasting is more critical; cities planning or expanding metro systems; transport authorities with innovation agendas; and consulting firms supporting metro planning or infrastructure optimisation.

### **Competitors**

While platforms like AnyLogic are widely used<sup>6</sup>, they serve more as frameworks for building models than direct competitors to the customised methodology proposed in this solution. The main advantage of the proposed tool lies in its simplicity for metro-specific applications and in offering pre-structured simulation setups. For metro networks, this methodology reduces modelling complexity by enabling straightforward data import and parameterisation. For crowd models, although high-detail tailoring is still required, the methodology ensures consistency and reusability of the modelling logic. Compared to general-purpose modelling environments such as AnyLogic, ExtendSim, Simul8 or even PTV Visum/Viswalk, this approach aims to lower the entry barrier for metro-specific use cases, reducing costs for metro operators.

#### *Weaknesses compared to the proposed solution:*

General-purpose platforms require significant customisation, and they lack ready-to-use metro modelling templates, unlike the NEXUS proposed tool. Furthermore, the integration between crowd simulation and metro network modelling is not typically available in these environments. Most also do not support demand-driven simulation unless heavily customised.

An additional limitation concerns data availability and formats: not all operators collect data in the same way or in compatible formats, which can hinder tool adoption if interoperability is not ensured. In some contexts – such as less developed metro systems or operators with limited digitalisation – data collection may still rely on paper-based or incomplete processes. This may reduce the accuracy of the tool's outputs or limit its applicability unless suitable solutions for flexible data input and adaptation are embedded.

### **Go to Market Model**

The proposed business model includes Software-as-a-Service (SaaS) offerings and consultancy services. Tailored implementation projects with metro operators or public authorities are foreseen, with the flexibility to provide both model development and training.

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<sup>6</sup> According to estimates by 6sense (<https://6sense.com/tech/simulation-modeling/anylogic-market-share>), AnyLogic holds about 1.6% of the simulation-modelling software market, competing among approximately 57 other tools in the category.



## Timing

Expected time to market is mid-term (approximately 5 years) post-project completion. Further development, validation, and pilot deployment will be necessary to ensure readiness and adaptation to operator-specific requirements. A follow-up initiative (e.g., a NEXUS 2 Innovation Action project) could accelerate this path, paving the way for subsequent scaling up through a HEU Pillar 3 acceleration programme.

## IPR Background

Content ownership and exploitation rights by STAM, with contributions and validation from other NEXUS partners.

### 2.3.3 KER 3: AUTOMATION ARCHITECTURE FOR DRIVERLESS METRO SYSTEMS

The last key exploitable result of the NEXUS project is the development of a next-generation automation architecture designed to enable fully driverless metro operations. This innovation responds to a critical challenge faced by metro operators and manufacturers: existing automation solutions are largely proprietary, rigid, and built on legacy communication infrastructures (typically Wi-Fi or proprietary radio systems) that do not provide the bandwidth, latency, or flexibility required for advanced automation and future operational needs. These limitations lead to high lifecycle costs, low scalability, and limited capacity to integrate emerging technologies such as AI-based decision-making or edge computing.

#### Proposed solutions

A next-generation automation architecture for driverless metro systems that integrates a flexible communication backbone (5G, Edge/Cloud, TCMS, CBTC) with an open, modular system design. This solution enables efficient data exchange, scalability, and easy adaptation to new operational or technological requirements, forming the "brain" of future driverless metro operations.

#### Alignment with the MAWP

The automation architecture for driverless metro systems addresses long-term transformation needs by proposing a scalable, modular framework to support GoA4 driverless operations. It supports the MAWP's focus on achieving a fully automated and interoperable railway system, by offering a path to overcome the current fragmentation and rigidity of proprietary solutions.

While metros are fully segregated from mainline and other modes, the principles of openness, scalability, and interoperability developed in NEXUS can still provide valuable lessons for the wider rail system, particularly in terms of reducing lifecycle costs, enabling modular upgrades, and fostering alignment with evolving standards.

#### Unique Selling Point and Unique Value Proposition

This KER introduces a modular, adaptable system architecture coupled with a modern communication layer (5G, Edge/Cloud, TCMS, CBTC). Together, they enable scalable, future-proof driverless metro operations with enhanced data handling, reduced latency, and seamless subsystem integration. The open, flexible architecture allows for easier adaptation to evolving standards and operator needs,



lowering lifecycle costs and improving system upgradeability compared to proprietary or legacy solutions.

### **Target market**

Metro system manufacturers, rolling stock and signalling suppliers, metro infrastructure managers, and public transport authorities planning driverless system deployments or upgrades.

### **Early Adopters**

Metro system suppliers or operators actively developing or deploying driverless or Grade of Automation (GoA) 4 systems; cities or transport authorities planning automation upgrades in the near term. Examples are Sydney, Vienna or Hamburg.

### **Competitors**

Proprietary automation system providers (e.g., Alstom, Thales), traditional metro automation solutions relying on legacy communication and tightly coupled system architectures.

Strengths of competitors: Proven systems, market experience, integrated packages.

#### *Weaknesses compared to the proposed solution:*

Limited flexibility and scalability; high adaptation costs; reliance on legacy communication infrastructure; lower openness to integration of new technologies. Against this backdrop, the NEXUS solution provides a distinctive alternative by enabling operators and manufacturers to avoid proprietary constraints and plan for incremental upgrades over time, in line with evolving standards and passenger needs.

### **Go to Market Model**

Direct industrial integration by Siemens Mobility into its future automation platforms, particularly CBTC and TCMS systems for GoA4 metro networks or technology transfer to OEMs or metro system integrators under licensing agreements.

### **Timing**

Expected mid- to long-term market entry (5+ years), depending on the results of the feasibility study carried out as part of NEXUS work programme, the pace of system certification, the complexity of industrial integration and the evolving regulatory and procurement environments. Consequently, initial validation activities may begin within the NEXUS timeframe or shortly after, but full-scale adoption is expected to follow in the next innovation cycle (e.g., via a NEXUS 2 or related EU-Rail project).

### **IPR Background**

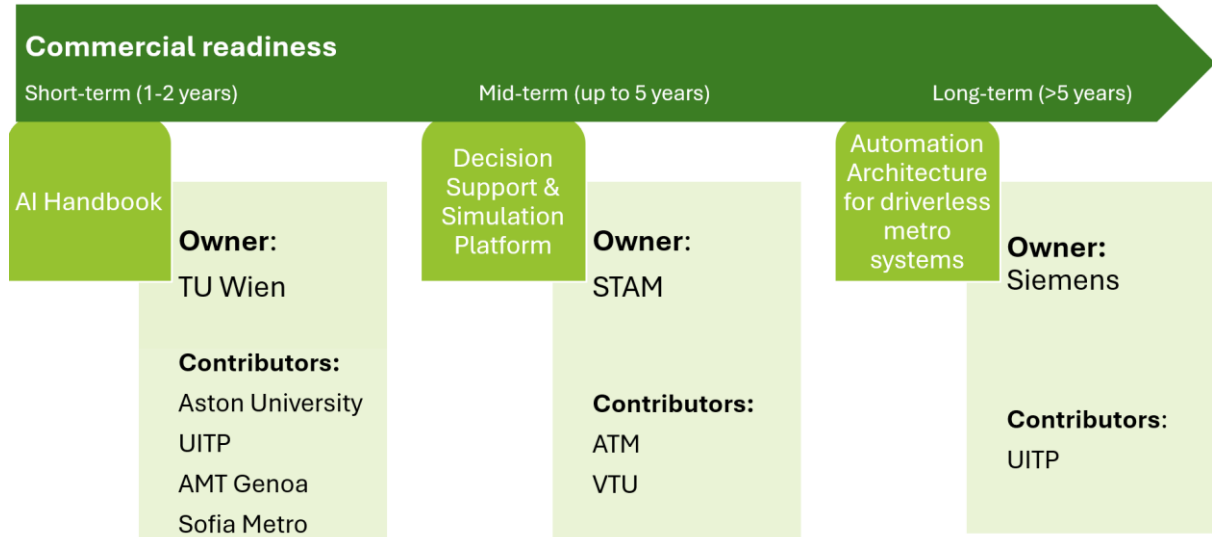
Content ownership by Siemens that retains exploitation rights, including integration into its automation portfolio and potential licensing models for broader adoption. Contributions and validation from other project partners and external stakeholders with the support of UITP.

## **2.4 MAPPING OF OWNERSHIP AND CONTRIBUTIONS**

The diagram below illustrates the mapping of ownership and contributions. It provides an overview of the three KERs identified in NEXUS, specifying their respective owners and main contributors. The AI Handbook is led by TU Wien, with contributions from Aston University and UITP. The Decision Support

and Simulation Platform is owned by STAM, with ATM and VTU as main contributors. Finally, the Automation Architecture for Driverless Metro is owned by Siemens, with UITP contributing.

Figure 2: Mapping of ownership and contribution of the 3 KERs



Source: own elaboration

## 3 LOOKING AHEAD

### 3.1 POTENTIAL FOR EXPLOITATION IN FUTURE EU-RAIL PROJECTS

The results generated by the NEXUS project provide a strong basis for future exploitation within the framework of the EU-Rail JU. By introducing a modular automation architecture and complementary tools such as simulation engines, AI forecasting models and optimisation catalogues, the project addresses critical priorities outlined in the Multi-Annual Work Programme, which include the digitalisation and automation of rail operations, improving system efficiency and reliability, and enabling seamless integration of innovative solutions across the European rail network. These outcomes are particularly relevant for the areas dedicated to digital and automated train operations, integrated network management, and intelligent asset management, which are central to the transition towards fully driverless and interoperable rail systems in Europe.

Building on these results, future EU-Rail projects could potentially extend the work carried out in NEXUS by adapting the architecture to a wider range of operational contexts and by conducting large-scale validation activities with infrastructure managers and rolling stock suppliers. The principles developed within NEXUS might also provide valuable input for standardisation initiatives on digital rail infrastructure and can inform future efforts to harmonise European approaches to train control and communications. In parallel, the integration of passenger-centric forecasting tools into broader concepts such as Mobility-as-a-Service and climate-neutral urban mobility hubs would strengthen the link between automation and user-oriented transport planning.

Through these avenues, the knowledge and technical building blocks produced by NEXUS can act as a stepping stone for subsequent innovation actions, ensuring continuity between project outcomes and the longer-term objectives of EU-Rail in developing scalable, future-proof automation solutions for both metro and regional networks.

### 3.2 EXPLOITATION SUPPORT TOOLS

#### 3.2.1 HORIZON RESULTS BOOSTER

To maximise the impact and uptake of NEXUS project results, the consortium has applied for tailored support through the Horizon Results Booster (HRB) during the project's second year. These services, funded by the European Commission, are designed to help EU-funded projects bring their results closer to market and policy application by offering expert-led guidance in areas such as exploitation strategy development, business modelling, and stakeholder engagement. This approach will also help NEXUS coordinate with other EU-funded projects facing similar challenges, further reinforcing its integration into Europe's innovation ecosystem.

This strategic engagement aligns with the ambitions of the recently launched EU EU Startup and Scaleup Strategy<sup>7</sup>, which highlights the need to strengthen Europe's capacity to turn research and innovation into marketable solutions and scale them up globally. The Strategy emphasises that *“successful scaling up requires sustained support and an enabling environment for innovation to thrive beyond the initial stages.”* This principle is particularly relevant for NEXUS, whose Key Exploitable Results (KERs) are far-reaching and will only fully materialise after the project's completion. They are therefore not confined to the project's duration but are part of a broader process of long-term value creation.

The Horizon Results Booster, in particular, provides free, hands-on support that bridges the gap between research outputs and real-world deployment. Its unique strength lies in a collaborative methodology focused on ensuring the sustainability of results beyond the project's lifecycle. This long-term orientation is especially significant for NEXUS, as our project's KERs are designed to deliver transformative impacts across the rail ecosystem beyond the life of the project:

- **A short-term KER** – a **guidance document** to support policy-makers and urban rail stakeholders, aiming for immediate influence in shaping planning frameworks and operational practices.
- **A medium-term KER** – corresponding to a **planning tool specifically designed for metro operations**, which requires a structured go-to-market strategy to evolve from a research prototype into a deployable solution with high uptake potential.
- **A long-term KER** – an **innovative train control system concept** with disruptive potential for the sector. This result demands extended innovation and certification cycles and requires careful planning of its exploitation pathway, including engagement with regulatory frameworks and standardisation bodies.

Through the Booster, NEXUS will:

- Refine and validate its KERs through expert analysis and feedback.
- Develop tailored dissemination and exploitation plans adapted to each result's maturity level and target audience.
- Explore business models, value chains, and partnerships to support deployment and scaling.
- Strengthen internal capacity for managing intellectual property (IP) and sustaining exploitation efforts beyond project completion.

In addition to these core modules, the consortium may also benefit from HRB's:

- Portfolio dissemination support, which facilitates clustering results with other Europe's Rail and Horizon projects to increase visibility and uptake.

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<sup>7</sup> European Commission, *The EU Startup and Scaleup Strategy Choose Europe to start and scale*, 2025, [https://research-and-innovation.ec.europa.eu/document/download/8f899486-6e4e-48df-8633-9582375f41eb\\_en?filename=ec\\_rtd\\_eu-startup-scaleup-strategy-swd.pdf](https://research-and-innovation.ec.europa.eu/document/download/8f899486-6e4e-48df-8633-9582375f41eb_en?filename=ec_rtd_eu-startup-scaleup-strategy-swd.pdf)

- Capacity building sessions covering IP management, business plan development, and pitching to investors and stakeholders.

The application for Booster services has already been performed and support has been secured. Their operational engagement is planned for the upcoming months and will be aligned with key project milestones to ensure that the support received contributes effectively to a dynamic and forward-looking exploitation strategy.

Importantly, it should be noted that NEXUS KERs vary significantly in terms of maturity, validation status, and market-readiness. Recognising this diversity, the consortium intends to take a differentiated approach to HRB support, ensuring that each KER receives guidance adapted to its specific stage of development and potential exploitation pathway.

### 3.2.2 INNOVATION RADAR

Complementary to the HRB, and as part of the exploitation strategy outlined in the Grant Agreement, the consortium intends to engage actively with the **EU Innovation Radar (IR)**. This initiative, managed by DG CONNECT, identifies and promotes high-potential innovations emerging from EU-funded research and innovation projects.

The Innovation Radar helps innovators bring their results closer to market by connecting them with potential users, investors, and partners. It assesses innovations based on their market readiness and potential, classifying them accordingly<sup>8</sup> and showcasing them on a public platform ([www.innoradar.eu](http://www.innoradar.eu)). This enhances visibility across Europe and supports broader uptake.

In practical terms, if it is possible to have the NEXUS innovations listed on the Commission's Innovation Radar under any of the existing TRL categories, this would not only enable an application for the annual Innovation Radar Prize but also provide external validation of the work carried out under NEXUS. Such recognition can strengthen future applications for additional funding or scaling initiatives, as well as offer access to tailored mentoring and matchmaking opportunities<sup>9</sup>.

This effort is also closely aligned with the forthcoming *Task 8.3: Accelerating the prototypes' readiness levels*, which is a core element of the NEXUS work plan. Task 8.3 aims to create the necessary conditions to accelerate the implementation of solutions identified as applicable and replicable during earlier project stages, particularly WP7. Given the lower Technology Readiness Levels of several NEXUS outputs, this task is essential to ensuring the sustainability of project outcomes beyond the NEXUS lifespan, paving the way for metro operators and stakeholders to access future financing mechanisms.

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<sup>8</sup> The Innovation Radar uses a structured methodology that classifies innovations into one of four categories: *Exploring*, *Tech Ready*, *Business Ready*, or *Market Ready*.

<sup>9</sup> It should be noted, however, that inclusion in the Innovation Radar requires activation by the Project Officer in Europe's Rail at the time of the project's annual review. Specifically, the PO must activate the Innovation Radar option in the PMON workflow (an internal EC tool) when setting up the review. This step might therefore be requested by the consortium at a later stage of the project development to ensure NEXUS results are considered for listing.

NEXUS has already initiated contacts with the team managing the Innovation Radar within DG CONNECT to explore the submission of its three KER and potentially apply to the Innovation Radar Award – which is awarded annually to the most promising EU-funded innovations across all sectors – which do date has not yet awarded any transport-related innovation.

Box 1: Innovation Radar Prize

### The innovation radar prize

The Innovation Radar Prize is the European Commission’s flagship award celebrating the most promising innovations emerging from EU-funded research and innovation projects. Each year, shortlisted innovators are invited to pitch their results to a jury composed of investors, entrepreneurs, and innovation experts. Winners gain high visibility across EU innovation ecosystems, access to tailored mentoring and investor matchmaking, and support to accelerate the scaling of their innovations towards market deployment. For NEXUS, this represents a unique opportunity to showcase its Key Exploitable Results and pioneer recognition for the rail and urban mobility sector.

By applying for both Horizon Results Booster support and the Innovation Radar services, NEXUS reinforces its commitment to transforming research outputs into tangible impacts. This approach directly supports the Europe’s Rail Joint Undertaking Masterplan<sup>10</sup>, aligns with the sector’s SRIA<sup>11</sup>, and contributes to the broader twin transition objectives of the Horizon Europe Strategic Plan<sup>12</sup>.

The outcomes of these activities, which aim to ensure that NEXUS results are technically robust and strategically positioned for long-term adoption, will be further documented in the project’s final exploitation plan (*D10.3 – Exploitation Plan and Road Mapping*), to be delivered by the end of the project.

## 3.3 PRELIMINARY ROADMAP AND NEXT STEPS

As mentioned above, the exploitation roadmap for the project will be supported by the Horizon Results Booster service, specifically through the Dissemination and Exploitation services on ‘Go-to-Market support’. This service, which extends over a period of up to six months, will provide tailored guidance to help structure and refine NEXUS approach towards the exploitation of project results. A dedicated contact point has already been assigned to our project, and the first coordination meetings with the Horizon Results Booster team have started to take place so as to shape the approach of the technical assistance programme.

In this context, the consortium has also confirmed its willingness to develop two building blocks. Specifically, NEXUS will initiate both a ‘Dissemination support’ service (primarily focused in supporting

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<sup>10</sup> Europe’s Rail, *EU Rail’s masterplan*, 2022, [https://rail-research.europa.eu/wp-content/uploads/2022/03/EURAIL\\_Master-Plan.pdf](https://rail-research.europa.eu/wp-content/uploads/2022/03/EURAIL_Master-Plan.pdf)

<sup>11</sup> Europe’s Rail, *Rail Strategic Research and Innovation Agenda*, 2020, [https://rail-research.europa.eu/wp-content/uploads/2020/12/RAIL-Strategic-Research-and-Innovation-Agenda-2020-\\_FINAL\\_dec2020.pdf](https://rail-research.europa.eu/wp-content/uploads/2020/12/RAIL-Strategic-Research-and-Innovation-Agenda-2020-_FINAL_dec2020.pdf)

<sup>12</sup> Publications Office of the European Union, *Horizon Europe strategic plan 2025-2027*, 2024, <https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/6abcc8e7-e685-11ee-8b2b-01aa75ed71a1>



the corresponding C&D activities) and a 'Go-to-market support' as from January 2026, ensuring that the project benefits from comprehensive technical assistance that spans communication, exploitation, and market readiness dimensions. Such work, particularly the go-to-market assistance, will help determining short, medium, and long-term actions for each KER, supporting a structured and realistic exploitation strategy that acknowledges the underlying distinct timelines of each KER, which require tailored work plans.

## 4 CONCLUSIONS

This Preliminary Exploitation Plan marks the first step in defining how the project’s results will be leveraged beyond its lifetime, both at the individual partner level and collectively. It has established an initial framework by identifying three KERs, mapping ownership and contributions, and outlining a preliminary approach to their exploitation. The collaborative process undertaken so far, involving internal surveys, workshops, and feedback from the External Advisory Board, has ensured that both partner perspectives and end-user insights are already embedded in the strategy from an early stage.

Importantly, the three project-level KERs identified so far also mirror the structure of the NEXUS project itself, which is organised around three core innovation streams.

- **KER 1 – AI Handbook for Metro Operators**, corresponds to Workstream 3, which focuses on the integration of AI and data science into metro operations. This KER translates the technical findings of WS3 into a practical, operator-focused resource that supports informed adoption of AI solutions across metro systems.
- **KER 2 – Decision Support and Simulation Platform** is directly aligned with Workstream 1, which aims to redefine metro adaptability to demand fluctuations. This KER provides the planning and modelling tools needed to analyse passenger dynamics, optimise service patterns, and support demand-responsive network management.
- **KER 3 – Automation Architecture for Driverless Metro Systems** reflects the objectives of Workstream 2, which explores next-generation train control systems and automation strategies. This KER represents the technical backbone for future fully automated operations and contributes to the project’s long-term vision for scalable, interoperable metro automation.

Table 1: Correspondence between KERs and NEXUS workstreams

WORKSTREAM	FOCUS	CORRESPONDING KER
WS1	Adaptability to demand fluctuations (planning, passenger flows, simulation)	KER2 – Decision Support and Simulation Platform
WS2	Advanced and future-oriented train control systems	KER3 – Automation Architecture for Driverless Metro Systems
WS3	AI, big data, and predictive modelling in metro operations	KER1 – AI Handbook for Metro Operators

While this plan lays a strong foundation, several aspects remain to be refined in the next iteration of the plan. At this stage, the definition of the three KERs is still high-level, with limited detail on their technical maturity, target markets, and exploitation pathways. These elements will require further analysis under WP8 and particularly in the context of the roadmap for short, medium, and long-term exploitation actions to be carried out as part of the collaboration with Horizon Results Booster services, which will provide essential guidance for market-oriented planning.

Further refinement is also needed regarding alignment with evolving market trends and regulatory frameworks in automated metro systems, as well as the integration of feedback from additional external



stakeholders beyond the initial EAB inputs. Addressing these gaps will be crucial to ensure that the final Exploitation Plan – to be delivered in Month 24 – provides a robust and actionable strategy capable of maximising the NEXUS' impacts.

## 5 ANNEX 1 | SURVEY TO PROJECT PARTNERS

This survey is intended to collect structured input from all NEXUS partners in support of the Draft Exploitation Plan (D9.3). It serves as a key step in identifying how the results of the project can be taken forward, both individually by each partner and collectively by the consortium.

Your responses will help to:

- Identify Key Exploitable Results (KERs) that are relevant for your organisation.
- Capture your intentions and capacities to build on NEXUS results.
- Explore opportunities for joint exploitation activities.
- Understand which directions could be further developed in a potential follow-up phase (e.g. "NEXUS 2").

This information will directly feed into the exploitation roadmaps that should be developed in the final version of the deliverable and contribute to shaping the long-term legacy and impact strategy of the project.

We kindly ask you to complete the survey no later than the **22<sup>nd</sup> of May**.

### Section A – Individual Exploitation Plans

#### 1. Partner details

- Organisation name:
- Country:
- Contact person & email:

#### 2. Institutional profile and motivation

- **Briefly describe your organisation's mission and strategic priorities relevant to the activities carried out in NEXUS.**  
*(e.g. focus areas in AI, resilience, urban mobility, cybersecurity, etc.)*

- **What drives your organisation to participate in NEXUS?**  
*(What challenges or opportunities is your organisation hoping to address through the project?)*

- **According to your current understanding, what are the main Key Exploitable Results (KERs) emerging from the NEXUS project?**

*(List or describe any results or innovations that you believe are particularly promising for your company/organisation to pursue in the future. A KER is an output of the project that has the potential for future use or value creation, whether scientific, technological, policy-*

*related, or societal. This could include a method, model, dataset, software, policy recommendation, or other innovation. Please list or describe any results or innovations that you believe are particularly promising.)*

### 3. Individual Key Exploitable Results (KERs)

Please complete one entry per result your organisation considers relevant for **individual exploitation**.

- **KER title:**
  - **Please classify its nature:**
    - Scientific / Research
    - Technological / Commercial
    - Policy / Regulatory
    - Other. Which one \_\_\_\_\_
- **Brief description:**
- **What problem does this result address and for which target groups?**
- **What is the current state-of-the-art?**
- **How do you perceive the result's unique value proposition?**
- **How do you intend to use or promote this result after the project?**  
(*e.g. build new services, contribute to policy, create IP or spin-offs, pursue further research, etc.*)

## Section B – Project-Level Exploitation

### 4. Expectations for wider exploitation

- **Which of these results would you be interested in pursuing jointly with other project partners?**  
(*List specific results and potential partner*)
- **Looking beyond your organisation, which results or thematic areas developed in NEXUS do you believe have the highest potential for future joint exploitation, and which of these should be prioritised for further development in a possible follow-up phase (e.g. “NEXUS 2”)?**  
*Think of technical components, policy insights, modelling tools, or other innovations with long-term relevance and broad uptake potential.*
- **Which stakeholder groups** (e.g. public transport operators, cities, infrastructure managers, research bodies, policymakers, tech industry) **should be more actively engaged in future exploitation efforts?**