smartin

KNOWLEDGE BASE NAVIGATOR

PROJECT DELIVERABLE D2.1

DELIVERABLE ADMINISTRATION

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LEAD AUTHOR	Evangelia Manola (CERTH)
CO-AUTHORS	Annie Kortsari (CERTH) Georgia Ayfantopoulou (CERTH)
PEER REVIEWERS	Ntafloukas Konstantinos (INLECOM)

QUALITY CONTROL

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LEGAL DISCLAIMER

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PROJECT EXECUTIVE SUMMARY

SMARTIN brings together leading research institutions, industry partners and public authorities to reimagine the way transport infrastructure is planned, monitored and managed across Europe and accelerate the adoption of innovative digital tools.

The project harnesses the power of digitalisation, artificial intelligence and data-driven innovation to improve the performance, safety and environmental sustainability of transport networks. By leveraging existing advanced digital technologies and developing further tools for monitoring, predictive maintenance and performance assessment, the implementation of SMARTIN aims to improve the safety, efficiency, resilience and inclusiveness of urban mobility systems.

A key ambition of the project is to ensure that digitalised infrastructure assets and mobility optimisation services can operate in harmony. AI-driven analytics will fuse data from multiple sources and geospatial levels, enabling proactive incident detection and supporting infrastructure providers in efficient operations and maintenance management. This will be achieved through the development of an integrated platform that brings these technologies seamlessly together as coherent system of systems, creating interconnected synergies.

The project is driven by a co-creation approach, engaging stakeholders in the design and development of user-centric solutions, which are both scalable and transferable. These innovations will be tested and validated under real-world conditions at four pilot sites across Europe. They will showcase their potential to improve infrastructure accessibility and resilience, promote multimodality, and accelerate the uptake of digital solutions.

Ultimately, SMARTIN contributes to the objectives of the European Green Deal, Vision Zero and Digital Europe, helping Europe move towards a more connected, inclusive and low-carbon transport future.

Social Media link:

@smartin-heproject

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DELIVERABLE EXECUTIVE SUMMARY

Transport infrastructure management across Europe is under increasing pressure to overcome barriers in order to deliver safer, more inclusive, and low-carbon mobility services, while dealing with ageing assets and rapidly evolving digital technologies. The SMARTIN project addresses this challenge by developing an integrated operational architecture that combines data-driven tools, decision support, and digital twins to support infrastructure managers and mobility planners.

Within Task T2.1 Knowledge Base Navigator (KBN) has been developed. It regards a curated, interactive repository of tools, methods, and best practices relevant to modern transport infrastructure management. The three main areas the KBN focuses on are: Infrastructure Health (monitoring, control, and prediction), Traffic and Mobility Management, and Multimodal Travel and Dynamic Use of Space. It consolidates the consortium's collective background expertise and other related external references into a single repository that supports capacity building and informed selection of digital solutions in this domain.

This deliverable documents the objectives, methodology, system requirements, and user guidance for the KBN. It specifies how information was collected and structured, how the functional and non-functional requirements were derived, and how the tool is integrated into the SMARTIN architecture. Also, it describes how the KBN will support subsequent work packages, including technical implementation and pilot demonstrations, by informing use-case development, component selection, and knowledge transfer across sites.

The document concludes with the next steps, including incremental enrichment of the knowledge base, tighter integration with other SMARTIN components (e.g., decision theatre, digital twin services), and the use of KBN insights to support replication and exploitation beyond the four pilot sites.

Keywords: Knowledge Base Navigator, Tool repository, Transport Infrastructure management

LIST OF ABBREVIATIONS AND ACRONYMS

ACRONYM	MEANING
EC	European Commission
GA	Grant Agreement
IoT	Internet of Things
KBN	Knowledge Base Navigator
PET	Privacy Enhancing Technologies
TRL	Technology Readiness Level
WP	Work Package

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1 INTRODUCTION

1.1 OBJECTIVE AND SCOPE OF DELIVERABLE

This report is intended to accompany the primary deliverable, which consists of the tool itself ('OTHER'). It provides supporting documentation, including context, methodology, and guidance, to facilitate a comprehensive understanding and effective use of the tool.

The objective of this document is to describe the design, implementation, and intended use of the Knowledge Base Navigator (KBN) developed in Task T2.1. It provides a consolidated description of the tool's purpose, its functional and technical specifications, and guidance for project partners and external stakeholders.

The scope covers:

- The conceptual role of the KBN in SMARTIN architecture.
- The methodology and data sources used to build the underlying knowledge base.
- The system requirements and high-level design choices.
- Practical instructions for accessing and using the KBN (the Manual).
- Its contribution to subsequent work packages and pilot activities.

Detailed implementation aspects of other SMARTIN components (e.g., decision theatre, digital twins, pilot-specific tools) are outside the scope of this deliverable.

1.2 PROJECT CONTEXT AND BACKGROUND

The ongoing demands in managing transport infrastructure systems require substantial upgrades to comply with safety, resilience, inclusiveness, and decarbonization requirements. Innovative digital tools offer a significant opportunity to support these upgrades by enhancing performance and optimising mobility services, often in real time. At the same time, the increase of data-driven solutions creates multiple challenges: their coherent management, their alignment with infrastructure management, and their proper interoperability and scalability.

SMARTIN, which commenced in July 2025 and will be running for three years, aims to respond to these challenges by developing an operational architecture that integrates infrastructure monitoring, traffic and mobility management, and multimodal travel support. The project combines infrastructure monitoring data, digital connectivity, operations and maintenance processes, and governance aspects into a common framework.

The KBN is an important foundation step in this effort. It provides an online repository of existing tools, methods, and solutions that can be leveraged within the project, enabling partners to capitalise on prior experience, avoiding duplication, and accelerating the design of the SMARTIN architecture and pilots.

1.3 TARGET AUDIENCE

The primary audience of this deliverable includes:

- SMARTIN technical partners, which are involved in technical design, tool development, and integration.
- Pilot site leaders and local stakeholders who need to gain an understanding of which tools and best practices are most relevant to their local transportation needs.
- Work package (WP) leaders responsible for use case development, deployment planning, and evaluation.

A secondary audience includes external stakeholders such as infrastructure managers, transport authorities, operators, and researchers.

1.4 STRUCTURE OF THE DOCUMENT

The remainder of this document is organised as follows.

- Chapter 2 presents the methodology and data sources used to define the requirements and populate the KBN.
- Chapter 3 provides the system requirements specification, including functional requirements and key non-functional aspects.
- Chapter 4 offers a user-oriented guide to accessing and using the KBN.
- Chapter 5 describes the impact and contribution of the KBN to other work packages and to the overall SMARTIN objectives.
- Chapter 6 summarises the conclusions and outlines the next steps for further development and exploitation.

2 METHODOLOGY AND DATA SOURCES

2.1 REQUIREMENTS AND SCOPE OF THE TOOL

The definition of the KBN requirements followed an iterative, user-centred process.

First, initial needs were identified from project partners in Task 2.1 discussions, focusing on the information required to support architecture design, use case development, and pilot planning, with a particular focus on supporting pilot leaders in Barcelona, Turin, Budapest and Latvia. The pilot cities highlighted the need practical tool information in order to inform use case development and realistic plot planning, especially due to their diverse contexts.

Second, these needs were translated into high-level objectives for the KBN, and specifically the need for a structured inventory of tools and solutions, which support filtering by domain and use case, and offer concise descriptions. This led to including searchable fields such as asset types (urban roads, bridges, inland waterways), data inputs (GTFS, crowdsourced data, IoT sensors), and maturity levels. This would later enable them to identify suitable solutions that match their local data availability and needs.

Third, the scope was defined around three core domains that are aligned with SMARTIN's technical focus and reflecting each of the pilots' priorities.

- Infrastructure Health: Monitoring, Control & Prediction: this addresses Barcelona's detection of safety of bike lanes, obstacle detection, crack detection in roads and Budapest's prediction of collision risks and understanding high-risk zones.
- Traffic & Mobility Management: this would address the dynamic lane allocation in Turin and simulation of traffic scenarios, as well as real-time traffic scenarios in Budapest.
- Multimodal Travel & Dynamic Use of Space: this could contribute to Turin's dynamic lane management and coordination of bus and rail schedules for Latvia.

The KBN serves as a true central resource where users can search, filter, and learn from lessons learned across the consortium and external sources. Several constraints, such as the project timeline, the available resources, and the need for maintainability, were also considered. This led to a first operational version that can be expanded and refined during the project.

2.2 DATA COLLECTION PROCESS

The KBN was populated through a structured collection process designed to ensure consistency and searchability.

A key element was the creation of a Microsoft Forms online template with mandatory and optional fields covering essential characteristics of each tool or solution. This template was distributed to all partners with clear completion guidelines. All required fields needed to be completed to the best of each contributor's knowledge.

WP2 partners were allocated primary responsibility for one of the three subject domains most relevant to their expertise, with encouragement to contribute across all categories. Each partner was requested to submit three to five entries per assigned subject. This ensured comprehensive coverage while leveraging domain-specific knowledge within the consortium. The number of tools for which information was collected is 48.

The completed Microsoft Forms template and submission guidelines are provided in Annex A for reference.

The allocation can be seen in Table 1:

TABLE 1: DOMAIN ALLOCATION PER PARTNER

SUBJECT 1 - INFRASTRUCTURE HEALTH: MONITORING, CONTROL & PREDICTION	SUBJECT 2 - TRAFFIC & MOBILITY MANAGEMENT	SUBJECT 3 - MULTIMODAL TRAVEL & DYNAMIC USE OF SPACE
FACTUAL	FRONTIER	DOTS
LINKS	BME	ATD
INLECOM	CERTH	NTUA
HFIP	OTHER	CERTH
NTUA		OTHER
OTHER		

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2.3 SOURCES OF INFORMATION

WP2 Partners drew information from several sources to populate their KBN template submission of information. These were:

- Internal tools and solutions, including existing platforms, algorithms, and services already deployed in other contexts.
- Relevant European and national projects, together with publicly available tools and best practices.
- Scientific and technical literature documenting methods and architectures that are compatible with the objectives of SMARTIN.

This multiple source approach ensured that the KBN reflects both the consortium's practical experience and the broader landscape of relevant digital solutions for transport infrastructure management.

2.4 STRUCTURE OF TOOL

Each entry submitted through the template follows a consistent structure across six categories. This enables comprehensive filtering, comparison, and selection of solutions for SMARTIN use cases and pilots. The categories are:

A. Record Identity and Fit. Entry ID, tool/solution name, short description, primary and secondary subgroups (for example, AI for Incident Detection, Dynamic Optimization of Traffic Signals), main goal (monitoring, prediction, optimisation, control, decision support), and network or asset type (urban roads, highways, public transport network, etc.).

B. Evidence and Maturity. TRL level (1 to 9), deployments with details on city or site and timeline, scale of implementation (area covered, fleet size, intersections monitored), achieved impact across key performance indicators (safety, efficiency, environment, reliability, accessibility, user satisfaction) with units and confidence rating, and a short justification for impact confidence.

C. Data and Analytics Profile. Data modalities used (traffic sensors, crowdsourced data, incident data, IoT, visual sensors, etc.), primary modality driving core functionality, spatial granularity (point, link, network level), algorithms applied (incident detection, dynamic signal control, computer vision, reinforcement learning, etc.), and indicators for digital twin readiness, real time data availability and open data availability.

D. Gap Analysis. Main gaps or barriers limiting wider use (lack of labelled datasets, data privacy restrictions, interoperability issues, site specificity, low TRL, etc.), identification of the single most critical gap, and suggested mitigation actions or plans.

E. Social Context. Target users (traffic control centres, public transport operators, city planners, fleet operators, emergency services, travellers), and stakeholder engagement level (low, medium, high).

F. Bibliography and URLs. Links to project websites, datasets, academic papers, technical reports, or other references.

This structured approach transforms qualitative partner knowledge into a searchable, comparable resource that directly supports pilot tool selection.

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3 SYSTEM REQUIREMENTS SPECIFICATION

The KBN is designed as a lightweight, web accessible tool or equivalent interface that allows users to explore and query the KBN. The need for practical and usable tools for integration into pilot planning led to the selection of the following functional requirements.

The following capabilities reflect these needs:

- **Store structured records of tools, methods, and practices, each tagged by domain and by use case relevance.** Distinguishing between the three core domains (Infrastructure Health, Traffic Management and Multimodal Space) was important and could instantly create links with concrete use cases (for example micromobility safety on Barcelona). Free text description would make it difficult to search and compare between the provided tools.
- **Provide search and filtering functions, for example, by domain, technology, maturity level, or pilot relevance**. The filtering functions in tools like Navigators is crucial to be able to match local constraints and capacities to different available data types. This gives a decision-support element to the platform.
- **Display concise descriptions, including key attributes and links to additional documentation where available.** The concept of one page per tool with key facts (inputs, outputs, maturity, gaps etc.) replaces lengthy reports but also the option is given for a deeper dive by providing links where available for more information. Traceability and rapid tool selection are key elements of this capability.

3.1 DATA ACQUISITION AND STORAGE

The system supports the input of relevant tool information/data in an optimized and structured form, and it stores these records in a repository that can be updated and extended during the project.

3.2 HARDWARE AND INFRASTRUCTURE CONSTRAINTS AND CONNECTIVITY

The online tool is accessible through standard web browsers used by partners without requiring any local installation on their hardware or without any specific connectivity requirements apart from secure web access and a firewall that are handled by the hosting institution. The design of the online tool will remain lightweight to ensure performance remains acceptable even with limited bandwidth conditions.

3.3 USER INTERFACES

The user interface supports browsing the full list of entries with the help of a search engine. For each entry, detailed information can be viewed in a clear layout.

3.4 DATA PROTECTION AND PRIVACY ENHANCING TECHNOLOGIES (PETS)

The KBN does not store personal data, and the entries only focus on tools, methods and deployments in city contexts rather than individual persons. Any contact information stored, for example, contact project email addresses, is compliant with data protection regulations and internal project guidelines.

4 USER GUIDE OF THE TOOL

The SMARTIN Knowledge Base Navigator (KBN) platform is an online tool designed to facilitate the discovery of innovative transport and mobility solutions. This user guide provides instructions for navigating the platform, using its advanced filtering system, and interpreting the data provided for each tool. The platform is accessible via any modern web browser at the following URL: https://smartinkbn.imet.gr/. Upon entering the site, users are greeted by a landing page that introduces the SMARTIN project's objectives and provides direct access to the tool repository.

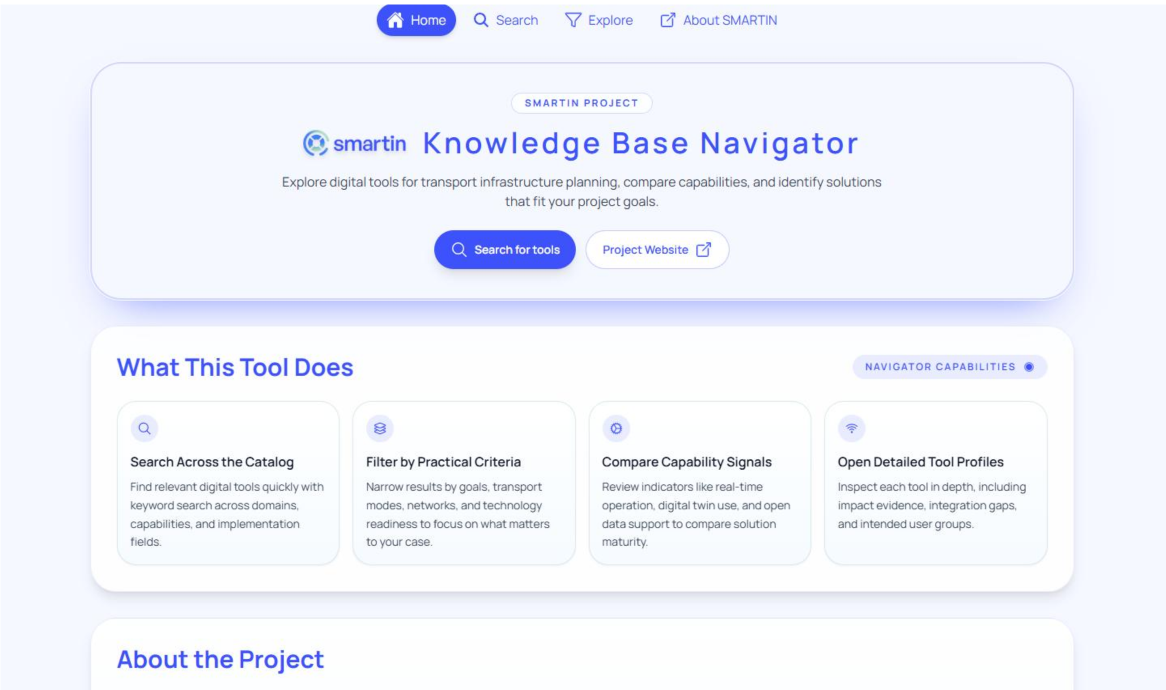

Figure 1: The SMARTIN KB homepage, introducing the project and providing the primary entry points for tool discovery.

Upon landing on the homepage, users are presented with two distinct paths for exploration. For users seeking inspiration or a broad overview of the repository's contents without specific criteria in mind, the platform offers a "Wild Card" functionality. By clicking this button, the system automatically selects and displays a randomized set of tools that may be useful to the user, bypassing the traditional search process to encourage the discovery of diverse innovations.

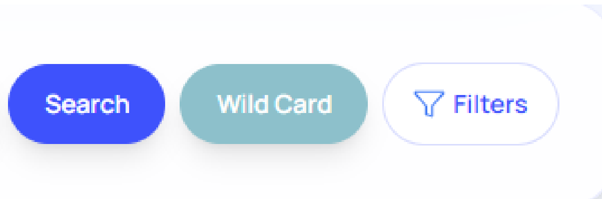

Figure 2: The Wild Card selection button

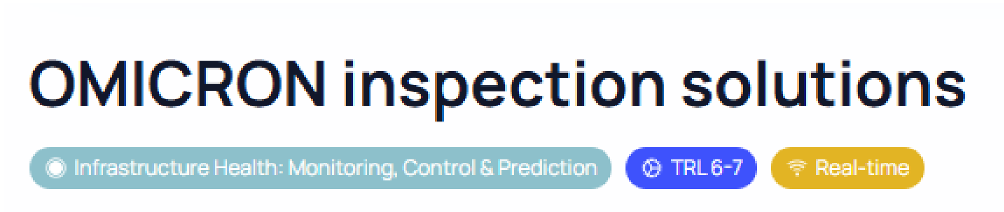

Figure 3: The result of the Wild Card selection, presenting a randomized assortment of tools from the database to the user.

For users with specific requirements, the **"Explore Tools"** button provides access to the full repository and its advanced filtering system. In this mode, users can apply multiple filters through the sidebar to narrow down the database. The filtering criteria include Tool Category, Application Area (e.g., Public Transport, Freight), Technology Readiness Level (TRL), Target Stakeholder, and Geographical Scale.

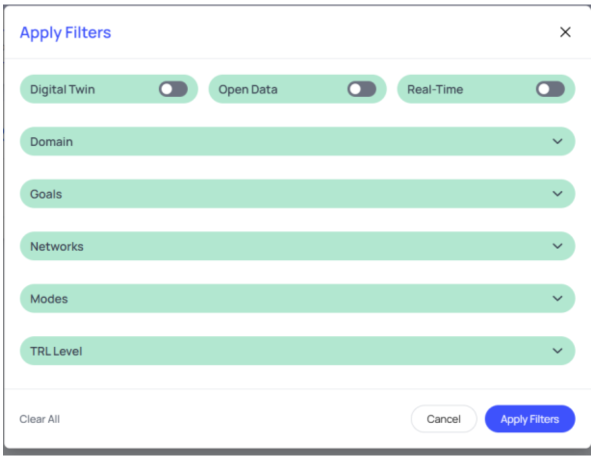

Figure 4: The "Apply Filters" Interface.

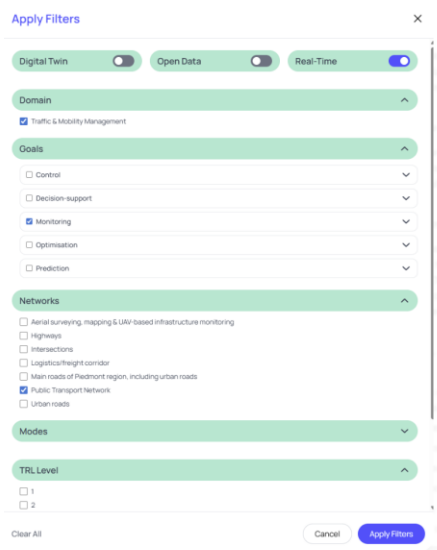

Figure 5: Example criteria for generating the suitable tool.

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As a practical example, a user looking for infrastructure-related management tools can navigate to the **Application Area** filter and select **Infrastructure**. This specific configuration triggers the platform to instantly filter the results grid, highlighting suitable matches such as the "**Traffic Management Platform"** tool.

Once a suitable tool has been identified and selected by the user, the platform opens a dedicated, detailed page. This page is structured to provide a 360-degree view of the innovation, categorized into specific sections for thorough evaluation:

- **Classification:** Displays the primary metadata tags, including the Tool Category and the specific Application Area it serves.
- **Capabilities:** Outlines the core functionalities and technical characteristics.
- **Implementation:** Details the Technology Readiness Level (TRL) and the geographical scale for which it is intended.
- **Impact:** Analyses the potential benefits and outcomes of deploying the tool within a transport network.
- **Data:** Provides information on data requirements, software dependencies, and hardware compatibility.
- **Integration:** Explains how the tool interacts with existing infrastructure or other digital systems.
- **Users:** Identify the target stakeholders, such as local authorities, operators, or end users.
- **More Information:** Offers developer contact details and direct links to external websites, technical manuals, or related project documentation.

By utilizing these features, stakeholders can move efficiently from a high-level project introduction to a specific, data-backed analysis of tools tailored to their unique transport challenges.

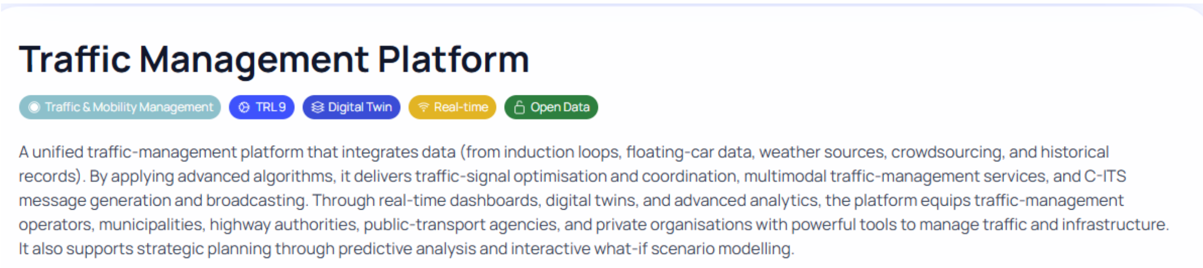

Figure 6: The comprehensive tool view page, displaying technical characteristics, TRL status, and a detailed description of the selected innovation.

5 IMPACT AND CONTRIBUTION TO THE PROJECT

5.1 CONTRIBUTION TO WP3, WP4, WP5 (TECHNICAL IMPLEMENTATION)

The KBN directly supports the technical Work Packages in several important ways. It serves as a horizontal tool that contributes to the progress of Work Packages 3, 4 and 5. It provides a shared reference of existing tools and methods that can be adopted and adapted within the SMARTIN architecture. It helps partners identify potential components for integration into the decision theatre, the digital twin and related services. It also reduces duplication of effort by making prior developments visible and comparable, supporting, in that way, more informed design choices.

By consolidating knowledge across domains and partners, the KBN creates a common vocabulary and shared understanding that facilitates technical discussions and decisions.

Specifically, it contributes in the following ways:

- **State-of-the-art inventory:** The KBN is a searchable repository of solutions that are relevant to WP3 infrastructure monitoring and prediction, to WP4 integrated management tools and to WP5 multimodal and dynamic space applications. The fields regarding data modalities, algorithms and maturity levels enable relevant WP partners to quickly identify tools that match their requirements and pilot contexts.
  Current platforms combine IoT sensor fusion, real-time analytics and visualisation tools, but face interoperability gaps, proprietary limitations and insufficient AI-driven decision support. Adaptive traffic systems and digital twins show promise for congestion prediction and space optimisation, yet lack seamless integration across infrastructure, operations and multimodal services. Vehicle routing algorithms and traffic control advance steadily, but struggle with real-time scalability and cross-stakeholder data sharing required for holistic urban solutions.
- **Evidence-based decision making for tool selection**: Included in the KBN is a detailed documentation of how each solution was deployed, what the achieved impacts were (KPIs, confidence ratings) and how the technologies were integrated (digital twin readiness, real-time data, etc.), and this has as a result informed decision making regarding validating the solutions and coupling with SMARTIN architecture.
- **Gap analysis investigation**: The information included in the KBN regarding gaps in implementation of the different tools (data gaps, interoperability issues, low TRL) creates a common understanding of what the tools of SMARTIN will be trying to achieve, in order to address shortcomings from other existing solutions.
- **User-centred solutions:** In the KBN, there is a real focus on who the target users are and the stakeholder engagement levels. This is to show that there is a shared goal that all WPs aim to achieve, and the KBN is contributing to. This is to show that there is a shared goal that all WPs aim to achieve, and the KBN is contributing to. The objective is having solutions that are user-centred, and that can be realistically deployed and scaled up with social user acceptance.

5.2 CONTRIBUTION TO WP6 (PILOT DEMONSTRATIONS)

Regarding the contribution to WP6, which is relevant to the pilot demonstration of SMARTIN solutions, the KBN also plays a crucial and supportive role. Pilot site leaders are given the opportunity to investigate and identify relevant tools for their local context and constraints based on the information included (deployment of the tools in different-sized cities with different contexts). There are inputs included that can be used for use case development, for example, which monitoring tools or mobility management solutions can be realistically deployed at which pilot site.

Baseline capabilities outlined in the tool for each solution can become a basis for the solutions' implementation and operation in the pilot sites. As pilots progress, feedback from the implementation and operation can be fed back into the KBN, in order to enrich entries with lessons learned and practical recommendations.

6 CONCLUSIONS & NEXT STEPS

In this deliverable, the Knowledge Base Navigator Platform that was built as part of Task 2.1 is presented. The tool is helpful to all SMARTIN partners for contributing to knowledge sharing and better-informed decision-making. The KBN addresses the need for a structured and accessible overview of tools and methods relevant to infrastructure health, traffic and mobility management, and multimodal travel and dynamic use of space. In the KBN, the consortium's expert knowledge is captured and will now be available for research and identification of suitable tools by all involved in SMARTIN.

Next steps will focus on incrementally enriching the knowledge base with additional entries and updated information from project activities. The links between the KBN and other SMARTIN components will be strengthened, for example, by using KBN data to inform use case development and component profiling in later tasks. The project will also explore opportunities to open or adapt the KBN for wider use beyond SMARTIN, in line with the exploitation and replication strategy.

As the project advances, the KBN is expected to evolve from an internal reference tool into a mature asset that can support broader communities working on digital transport infrastructure management.

7 REFERENCES

1. smartin | Knowledge Base Navigator

ANNEX

ANNEX A – KBN QUESTIONNAIRE

Subject 1 - Infrastructure Health: Monitoring, Control & Prediction

A. Record Identity and Fit

Entry ID:
Tool / Solution name:
Short description:
Primary subgroup: *(pick one)*:

Monitoring Infrastructure for Pedestrians & Micromobility
Advanced Damage Detection for Infrastructure
Advanced Predictive Maintenance
Real-time Infrastructure Health Monitoring
Other: ____________

Secondary subgroup(s): *(pick one)*:

Monitoring Infrastructure for Pedestrians & Micromobility
Advanced Damage Detection for Infrastructure
Advanced Predictive Maintenance
Real-time infrastructure health monitoring

Main goal:

- Monitoring – observing current state
- Prediction – forecasting future conditions or failures
- Control – automatic or operator-assisted actions triggered by data
- Decision-support – visual analytics or planning guidance (without direct control)
- Other: ____________

Mode/Asset:

Pedestrians
Micromobility
Roadway
Bridge
Tunnel
Dams
Public transport lanes
Waterway
Other_____________________

B. Evidence and maturity

TRL (1-9):
Deployments/implementation: (city/site and when)
Scale of implementation: e.g. bridge length and width/road kms/number of structural entities.
Achieved impact *(with units %/Δ, period, sample size)* across KPIs:

Safety,
Efficiency/Delay,
Environment/GHG,
Robustness/Failure probability,
Accessibility/ Inclusivity
Other_____________

- For each KPI selected above, indicate the unit (%/Δ), period, and sample size used to measure impact.

Evidence quality / reliability (1–5): rate your confidence

1 2 3 4 5

Impact confidence (short justification 1–2 sentences): __________________________

C. Data and analytics profile

Data modalities: select one or more below

- Visual and imaging sensors
- Positioning and motion sensors
- Active remote sensing
- Infrastructure-embedded and field sensors
- Digital and network data feeds
- User and crowdsourced data
- Administrative and operational records
- Environmental and contextual data
- Historical data (e.g., weather, climate)
- Other_______________________

Primary modality: indicate which sensor drives the tool's core functionality (from above): _____________

Spatial granularity: *(point, link, segment, corridor, network, asset-level)*

Algorithms used: choose or complete other

Computer vision (CV) – interpreting visual data (images/video)
Defect detection and classification – domain-specific recognition of infrastructure anomalies
Anomaly detection – unsupervised or threshold-based detection of outliers
Predictive /forecasting models – anticipating deterioration or events

Reinforcement / control learning – adaptive systems optimizing maintenance or control actions
Graph / network models and event processing – modelling complex interdependencies in infrastructure networks
Other: _____________

Digital-Twin ready/applied (Y/N):
Real-time data available (Y/N):
Open data available (Y/N):

D. Gap analysis

What are the main gaps or barriers that currently limit the wider use or transferability of this tool/solution? Please select up to three of the most critical gaps or barriers for this solution (max 3 choices)

- Known gaps (datasets, standards, transferability) (choose all that apply)
- Lack of high-quality labelled datasets
- Insufficient real-time data streams
- Missing historical/benchmark data
- Lack of multimodal data integration (e.g. GNSS + video + IoT)
- Inconsistent data formats or metadata standards
- Data privacy / GDPR restrictions
- Tool not compliant with existing standards (specify which)
- Lack of open APIs or data-sharing protocols
- Limited interoperability with legacy systems
- Highly site- or mode-specific (difficult to generalise)
- Dependent on local governance or regulation
- Requires proprietary or costly hardware/software
- Limited user acceptance or organisational readiness
- Low TRL/SRL (immature technology or social adoption)
- Lack of economic viability for wide deployment
- Missing guidelines or best practices for adaptation
- Other (please specify): ___________________________

Optional: *Which one is the single most critical gap?* Copy-paste from above: ___________________________

Mitigation actions or future plans (short justification 1–2 sentences): __________________________

E. Social context

Target users include: (choose one or more)
- Operators
- Maintainers
- Planners
- Vulnerable Road Users (VRUs) (i.e., pedestrians, cyclists, micromobility users)
- Ship crews

Stakeholder Engagement Level:

- Low
- Medium
- High

F. Bibliography / URLs

Provide URL:

Linked Pilot / Project:

Reference type:

Academic paper

Technical report

Dataset

Website

G. Final comments

Please add any additional information or context that you were not able to include in the previous sections.

Subject 2 - Traffic & Mobility Management

A. Record Identity and Fit

Entry ID:
Tool / Solution name:
Short description:
Primary subgroup: *(pick one)*:

AI for Incident Detection & Analysis
Predicting Mobility System Performance
Dynamic Optimization of Traffic Signals & Infrastructure
Optimizing Fleet & Resource Scheduling
Planning Proactive Responses to Traffic Incidents
Other: ____________

Secondary subgroup(s): *(pick one)*:

AI for Incident Detection & Analysis
Predicting Mobility System Performance
Dynamic Optimization of Traffic Signals & Infrastructure
Optimizing Fleet & Resource Scheduling
Planning Proactive Responses to Traffic Incidents

Main goal:

- Monitoring – observing real-time traffic and mobility conditions
- Prediction – forecasting congestion, travel times, or incidents
- Optimisation – fleet performance adaptation for incident response
- Control- automated or operator-assisted adjustment of signals, routes, or resources

Decision-support – analytical guidance for planning or incident response
Other: ____________

Network/Asset:

Urban roads
Highways
Intersections
Public transport network
Parking/curb management
Logistics/freight corridor
Other_____________________

B. Evidence and maturity

TRL (1-9):
Deployments/implementation: (city/site and when)
Scale of implementation: e.g. area covered km^2, fleet size managed, number of intersections monitored.
Achieved impact *(with units %/Δ, period, sample size)* across KPIs:

Safety
Efficiency/Delay / Travel Time
Environment/GHG
Reliability
Accessibility/ Inclusivity
User Satisfaction / Acceptance
Automation
Other_____________

Evidence quality / reliability (1–5): rate your confidence

1 2 3 4 5

Impact confidence (short justification 1–2 sentences): ___________________________

C. Data and analytics profile

Data modalities: select one or more below

- Traffic sensors (loops, radar, cameras)
- Crowdsourced / mobile app data
- Public transport data
- Incident / event data (police, control center, social media)
- Infrastructure IoT data (signals, VMS, parking sensors)
- Visual and imaging sensors
- Active remote sensing
- Infrastructure-embedded and field sensors
- User and crowdsourced data
- Environmental and contextual data
- Historical data (e.g., weather, climate)
- Other________________________

Primary modality: indicate which sensor drives the tool's core functionality (from above): _____________

Spatial granularity: *(point, link, segment, corridor, network, asset-level)*

Algorithms used: choose or complete other
Incident detection / classification
Dynamic signal control / optimization
Network simulation / assignment models
Computer vision (CV) – interpreting visual data (images/video)
Anomaly / event detection (statistical, AI)
Reinforcement / adaptive learning control
Other: _____________

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Digital-Twin ready/applied:
Real-time data available:
Open data available:

D. Gap analysis

What are the main gaps or barriers that currently limit the wider use or transferability of this tool/solution? Please select up to three of the most critical gaps or barriers for this solution (max 3 choices)

- Known gaps (datasets, standards, transferability) (choose all that apply)
- Lack of high-quality labelled datasets
- Insufficient real-time data streams
- Missing historical/benchmark data
- Lack of multimodal data integration (e.g. GNSS + video + IoT)
- Inconsistent data formats or metadata standards
- Data privacy / GDPR restrictions
- Tool not compliant with existing standards (specify which)
- Lack of open APIs or data-sharing protocols
- Limited interoperability with legacy systems
- Highly site- or mode-specific (difficult to generalise)
- Dependent on local governance or regulation
- Requires proprietary or costly hardware/software
- Limited user acceptance or organisational readiness
- Low TRL/SRL (immature technology or social adoption)
- Lack of economic viability for wide deployment
- Missing guidelines or best practices for adaptation
- Other (please specify): ____________________________

Optional: *Which one is the single most critical gap?*
Copy-paste from above: ____________________________

Mitigation actions or future plans (short justification 1–2 sentences): ___________________________

E. Social context

Target users include: (choose one or more)
Traffic control centers
Public transport operators
City planners / policy makers
Fleet operators / logistics managers
Emergency services
Travelers / public

Stakeholder Engagement Level:

- Low
- Medium

- High

F. Bibliography / URLs

Provide URL:

Linked Pilot / Project:

Reference type:

Academic paper

Technical report

Dataset

Website

Subject 3 - Multimodal Travel & Dynamic Use of Space

A. Record Identity and Fit

Entry ID:
Tool / Solution name:
Short description:
Primary subgroup: *(pick one)*:

Predicting Demand for Mobility Services
Planning Multimodal Transport Services
Smart Routing & Nudging for Travelers
Dynamic Management of Public Spaces (Lanes, Parking)
Understanding User Behavior & Digital Tool Adoption
Other: ____________

Secondary subgroup(s): *(pick one)*:

Predicting Demand for Mobility Services
Planning Multimodal Transport Services
Smart Routing & Nudging for Travelers
Dynamic Management of Public Spaces (Lanes, Parking)
Understanding User Behavior & Digital Tool Adoption

Main goal:

- Monitoring – observing current mobility and space use
- Prediction – forecasting future demand or travel behavior
- Control – automated or operator-assisted actions on mobility or space allocation
- Decision-support – planning and management guidance (without direct control)
- Other: ____________

Mode/Asset:

Pedestrians
Micromobility
Public transport
Shared mobility
Private vehicles
Freight / logistics
Parking / curbside
Urban space / Street space

☐ Other _____________________

B. Evidence and maturity

TRL (1-9):
Deployments/implementation: (city/site and when)

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Scale of implementation: e.g. number of modes coordinated, number or area of dynamic assets managed, number of trips analysed.
Achieved impact *(with units %/Δ, period, sample size)* across KPIs:
Safety,
Efficiency/Delay,
Environment/GHG,
User satisfaction/Acceptance
Accessibility/ Inclusivity
Other_____________

Evidence quality / reliability (1–5): rate your confidence

1 2 3 4 5

Impact confidence (short justification 1–2 sentences): ___________________________

C. Data and analytics profile

Data modalities: select one or more below

- User and crowdsourced data (apps, surveys)
- Network data/feeds (GTFS, APIs, ticketing)
- Visual and imaging data (CCTV, street cameras)
- Positioning/navigation and motion sensors (GPS, GNSS, mobile traces)
- Administrative and operational data (parking, ticketing, occupancy)
- Third-party APIs (Maas, telecom, mobility providers)
- Other________________________

Primary modality: indicate which sensor drives the tool's core functionality (from above): _____________

Spatial granularity: *(stop-level, zone, corridor, network, region)*

Algorithms used: choose or complete other
Simulation / agent-based models
Behavioral models (discrete choice, hybrid choice, social learning)
Demand forecasting models (statistical, ML, hybrid)
Reinforcement / adaptive control algorithms
Routing / optimization algorithms
Other: _____________

Real-time data available:
Open data available:
Integration readiness:
Standalone
Connectable via API

Integrated with platform (MaaS, TCC, Digital Twin)

D. Gap analysis

What are the main gaps or barriers that currently limit the wider use or transferability of this tool/solution? Please select up to three of the most critical gaps or barriers for this solution (max 3 choices)

- Known gaps (datasets, standards, transferability) (choose all that apply)
- Lack of high-quality labelled datasets
- Insufficient real-time data streams
- Missing historical/benchmark data
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- Lack of economic viability for wide deployment
- Missing guidelines or best practices for adaptation
- Other (please specify): ___________________________

Optional: *Which one is the single most critical gap?*
Copy-paste from above: ___________________________

Mitigation actions or future plans (short justification 1–2 sentences): __________________________

E. Social context

Target users include: (choose one or more)
- Travelers/ end-users
- Mobility operators
- City planners/ Policy makers
- Traffic Control Centers (TCC)
- Service providers (MaaS, public transport, shared mobility)

Stakeholder Engagement Level:
- Low
- Medium
- High

F. Bibliography / URLs

Provide URL:

Linked Pilot / Project:

Reference type:

Academic paper

Technical report

Dataset

Website

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