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DATA SPACE 4 MOBILITY MODELS INTEGRATION

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DS4MOB MODELS

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Definitions, Acronyms and Abbreviations

Acronym	Title
API	Application Programming Interface
ATMB	Metropolitan Transport Authority of Barcelona
ATMV	Metropolitan Transport Authority of Valencia
CRTM	Regional Transport Consortium of Madrid
DGT	Dirección General de Tráfico
DS4MOBMODELS	Data Space for Mobility Models Integration
EDIM	Integrated Mobility Data Space
EGTC	European Grouping of Territorial Cooperation
EMT	Municipal Transport Company of Madrid
FCD	Floating Car Data
FPD	Floating Phone Data
ICT	Information and Communication Technologies
ITS	Intelligent Transport Systems
KPI	Key Performance Indicator
LEZ	Low Emission Zone
MaaS	Mobility as a Service
MITMS	Ministry of Transport and Sustainable Mobility
NAP	National Access Point
RSD	Remote Sensing Device
SCT	Servei Català de Trànsit
SEITT	State Company for Land Transport Infrastructures
SUMI	Sustainable Urban Mobility Indicators
TEN-T	Trans-European Transport Network
TMB	Metropolitan Transport of Barcelona
VMP	Personal Mobility Vehicle

Executive Summary

Data spaces represent a new paradigm for collaborative work aimed at delivering added value to society, with data playing a central and differentiating role in this process. In this context, the Data Space 4 Mobility Models project is based on cooperation among diverse stakeholders (public authorities, private companies, universities, etc.), with the objective of generating value to multiple challenges in the mobility area.

Based on the individual needs, resources, and objectives of the stakeholders, the project team identifies common interests across different geographical scales and thematic areas. The definition of use cases for each pilot (national, regional, metropolitan, and cross-border) constitutes a key phase in the project's development. This activity requires close cooperation and active participation from stakeholders, fostering trusted relationships built upon an agreed set of principles.

This document establishes three main lines of work. First, it defines the methodology applied for the comprehensive specification of use cases. The adopted methodology comprises seven sequential phases, with the final stages focusing on validation and scalability testing of the previously defined steps.

Second, the document presents a structured summary of the information and requirements collected through individual stakeholder interviews. The analysis of the interview results served as the basis for identifying and consolidating candidate use cases, which will be discussed and refined during the workshop sessions.

Finally, the workshop framework integrated both informational and participatory components. The document concludes with the presentation of the use cases to be developed within each of the project's pilot trials. The requirements, priorities, and technical scope of the use cases associated with each pilot are agreed upon with the involved stakeholders.

Overall, the document captures the developed workflow and highlights the project's integrative approach. Subsequent project advancements, building upon the defined theoretical framework, will determine the success in achieving the established objectives.

1 Context

DS4MOBMODELS aims to define and deploy a Mobility Data Space that integrates public and private data sources related to transportation and mobility in Spain, cross-border regions with France and Portugal, and selected metropolitan areas. The project is structured around a series of pilots designed to validate specific use cases in real-world environments. These pilots – national, regional, metropolitan, and cross-border – serve as operational frameworks for stakeholder engagement.

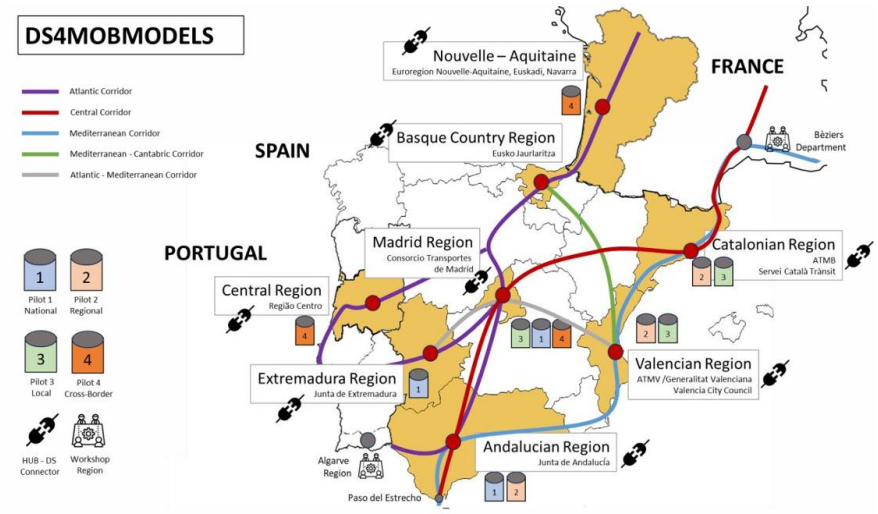


Figure 1: Geographic location of the DS4MOBMODELS pilots

In the previous deliverable, the needs and use cases proposed individually by stakeholders were identified through specific meetings and interviews. The identified use cases were classified into four main sectors: public transport, freight transport, traffic, and sustainability.

Building on the results of these meetings, the main objective of the current deliverable is to define the use cases of each pilot, in alignment with the stakeholders involved and the Grant Agreement. The definition of the use cases follows a methodology that primarily requires the establishment of the objective, the data to be used, the models to be developed and/or applied, and the key performance indicators (KPIs) associated with each use case. These use cases are designed to jointly benefit mobility and transportation within the stakeholders' areas of interest.

Deliverable 2.3 encompasses tasks 2.2 (Definition of the use cases of the national pilot), 2.3 (Definition of the use cases of the regional pilots), 2.4 (Definition of the use cases of the local/metropolitan pilots), and 2.5 (Definition of the use cases of the cross-border pilot). It also provides input to Work Packages 3 (Data Interoperability and Fairness), 4 (AI Data Science and Simulation Transport Models), and 5 (Mobility Data Space).

The insights gathered from individual interviews formed the foundation for the workshop with stakeholders, which focused on discussing and prioritizing the pilots to be developed. Stakeholders collaborated in groups organized around shared thematic areas and related use cases. The selection of use cases for each pilot was guided by their alignment with stakeholder needs, their feasibility, and their expected impact. The synergies identified through this participatory approach—driven by common objectives and the available information—are essential for shaping the pilots that structure the Mobility Data Space platform.

2 Objectives of the Use Cases Definition

The Use cases definition process pursues the following main objectives:

1. **Explain the use case methodology applied in the project**
   The methodology consists of seven phases, each with specific requirements. This methodology enables a systematic definition of the selected use cases for each pilot.
2. **Propose use cases associated with each project pilot**
   During the interview phase, the objective was to identify predefined use cases or gather proposals for new use cases relevant to each stakeholder. The working team identified synergies among the needs of different stakeholders, allowing for the proposal of common use cases aligned with interoperability criteria and delivering outcomes of value to multiple stakeholders.
3. **Present the work carried out during the workshop**
   The workshop structure included an informative process presenting the outcomes of the interviews, as well as a participatory process where stakeholders contributed to defining the necessary data types, roles to be established, potential models to be developed, and challenges to be addressed for the optimal implementation of the identified use cases.
4. **Establish and define the final use cases for each pilot**
   The proposed common use cases were presented and discussed in an in-person workshop with stakeholders. The established methodology was then applied to concretely define the final use cases, as agreed with stakeholders, which will be implemented in each pilot. In some cases, this process also revealed the underlying needs for the development of the use cases.

3 Key Performance Indicators (KPIs)

To assess the degree of achievement and progress toward the objectives defined in this deliverable, a set of Key Performance Indicators (KPIs) has been established. These KPIs are designed to quantitatively monitor critical aspects of the pilot definition process.

KPI	Description and threshold	Value
Effective stakeholder participation	Number of key stakeholders actively participating in the workshops	8
Proposed use cases selected	Number of total use cases selected for implementation after reaching consensus among stakeholders (0-22)	10
Pilots with selected use cases	Number of pilots with stakeholder agreement to develop relevant use cases (0–7)	7
Availability of required data and sources	Number of pilots with data sources identified and accessible (0-7)	7
Modelling scope	Number of pilots with identified models for application and/or development (0–7)	7
KPIs establishment	Number of pilots with Key Performance Indicators to measure their success (0–7)	7
Use cases with pending preliminary tasks	Number of use cases requiring definition of participation, external stakeholders, and/or data sources not yet available	3

Table 1: Key Performance Indicators for Definition of Use Cases

4 Risk Assessment and Mitigation Strategies

Risks identified during the use case definition process are presented below. Each risk is classified according to its potential impact and accompanied by proposed mitigation measures, aiming to anticipate potential obstacles and ensure proper alignment between the stakeholders and project objectives of the deliverable.

Identified Risk	Impact	Mitigation Measures
Insufficient data availability	High	Identify alternative data sources; validate data quality before modelling.
Inadequate model selection	High	Conduct a preliminary assessment of model suitability; pilot-test models on sample datasets.
Data integration challenges	Medium	Standardize data formats; define clear data pipelines and validation procedures; implement ETL (Extract, Transform, Load) best practices.
Dropout or reduced participation of a key stakeholder after pilot definition	High	Identify critical stakeholders early; maintain constant communication and formal participation agreements; design contingency plans, including the possibility of replacing the stakeholder or adapting the use case to reduce dependence on a single actor.

Table 2: Identification, Impact and Mitigation Measures

5 Use Case Definition Methodology

The methodology for use case definition consists of seven phases, which are outlined below:

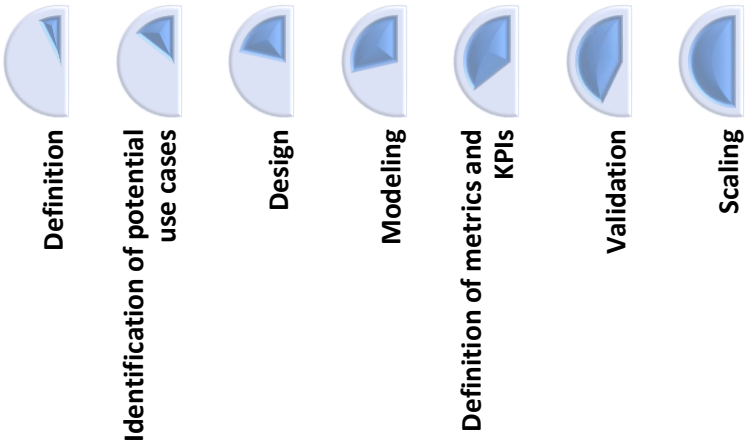
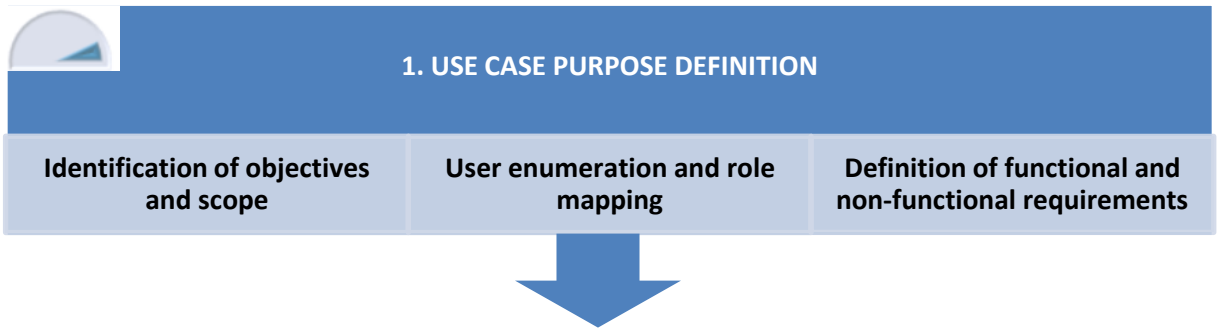


Figure 2: Phases of the methodology

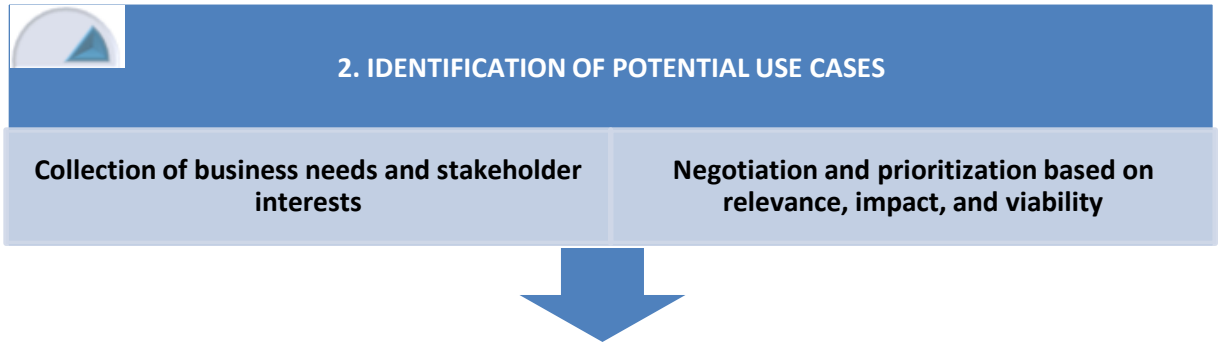
In this deliverable, only the first five phases are addressed, which include: use case purpose definition, identification of potential use cases, use case design, use case modelling, and definition of success metrics and KPIs. The final two phases will be covered in subsequent deliverables once the use cases are developed and ready for deployment.



The use case purpose definition establishes the fundamental parameters through different technical processes. It starts with the specification of the specific objectives for each use case within the project scope, generating a role map of the stakeholders involved and their interdependencies for development. The following aspects are considered for each use case

- Each stakeholder may have a different level of participation according to interaction patterns, privilege levels and access matrices.
- Each use case requires functional requirements (data, modelling, expected systemic behaviors) and non-functional requirements (performance parameters, scalability, reliability and security) to ensure successful implementation.

This framework constitutes the technical reference framework that guides the subsequent phases of the development cycle. In addition, potential risks and their corresponding mitigation strategies should be identified and established.

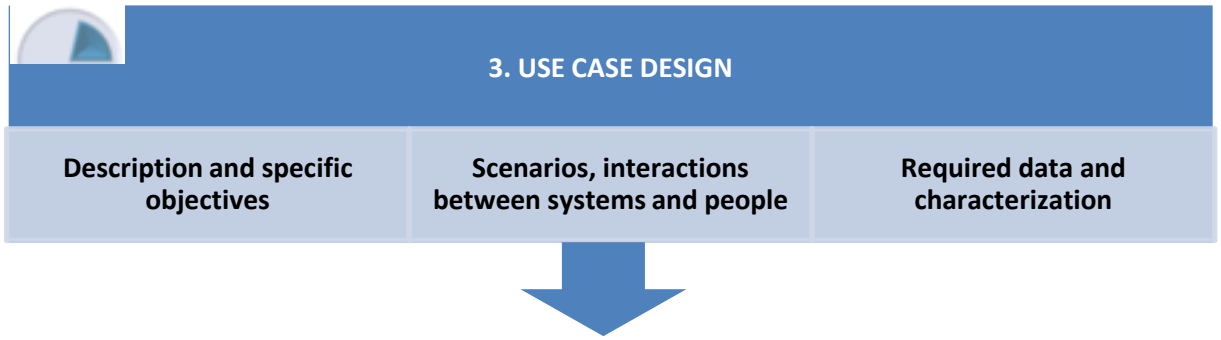


The identification of potential use cases is structured around two complementary technical processes.

First, the systematic collection of stakeholder needs and interests documents the expectations of all key stakeholders using both qualitative and quantitative techniques. Structured interviews are conducted with each stakeholder, allowing the direct gathering of information regarding their expectations, priorities, and areas of interest. This process also collects information on the datasets, analytical tools, and models currently available to each stakeholder, ensuring a comprehensive understanding of the resources at hand, as well as of the requirements and motivations of all participants.

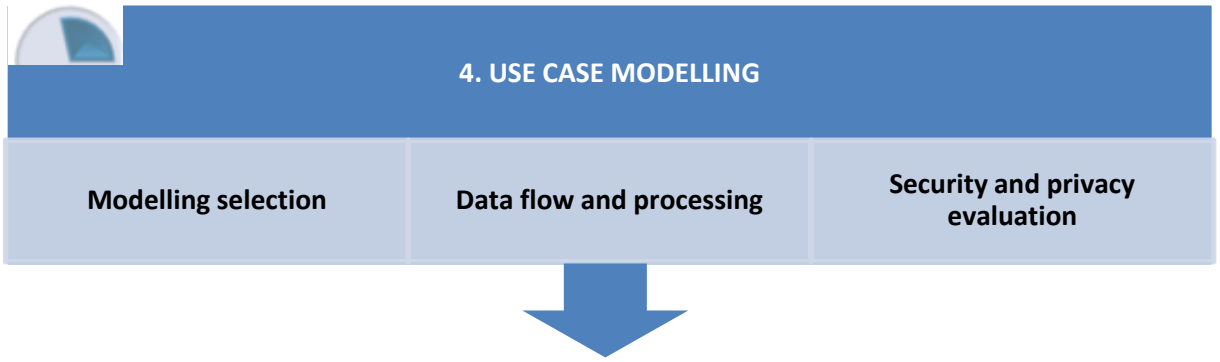
Second, based on the results of these interviews, negotiation and prioritization are carried out to determine which requirements are critical for the success of each use case. Criteria such as relevance, business impact, and technical feasibility are applied to identify the most valuable and implementable use cases, complying with the KPIs defined in the Grant Agreement. The results obtained from the interviews and the work carried out during the workshop contribute to this phase.

Together, these two phases provide a structured framework for strategically selecting use cases with the highest potential value, while mitigating risks related to stakeholder conflicts, deviations from project objectives, or technically unfeasible requirements.



The use case design phase defines the functional architecture of the system in close alignment with the stakeholders involved. It begins by precisely describing the use case, its purpose, and its specific objectives, providing detailed context, goals, and expected benefits. Building on this foundation, the phase develops the operational scenarios and interactions between systems and stakeholders, outlining the workflows in which the use case will be executed. Finally, it characterizes the required data and models, specifying the information necessary to ensure the proper operation of the system.

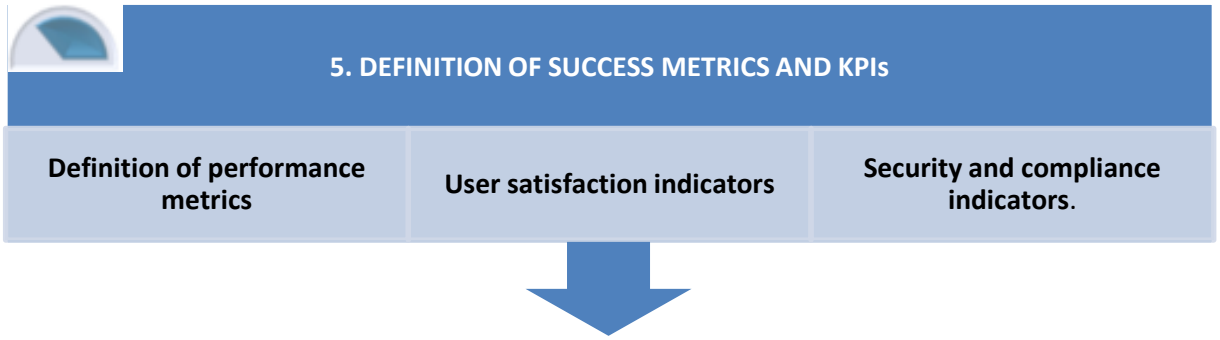
This three-dimensional structure provides the technical blueprint of the use case, mitigating risks such as ambiguous objectives, incomplete scenarios, or data integration problems, facilitating an implementation aligned with organizational needs.



The modelling phase transforms the conceptual use case into a technically implementable system through a multidimensional structure that articulates the following:

This phase involves identifying the type of model to be developed in order to achieve the defined objectives, based on the required data. According to the Grant Agreement, models can be implemented using data collection only (identifying relevant sources, databases, field data...), through additional processing such as the fusion of data from multiple sources, or by employing advanced AI, data science, and/or transport simulation models developed in WP4.

Finally in the modelling phase, the security architecture must be implemented in an ecosystem that includes authentication systems and granular access control, privacy protocols aligned with regulatory frameworks, and cryptographic infrastructure that protects data throughout all phases of its lifecycle. Additionally, governance policies and clearly defined roles must be established to ensure proper management, accountability, and compliance across all stakeholders involved. This multidimensional structure constitutes the technical-operational master scheme that neutralizes potential threats such as unmanaged complexities, omitted scenarios, security vulnerabilities, and scalability limitations, enabling a robust implementation aligned with objectives.



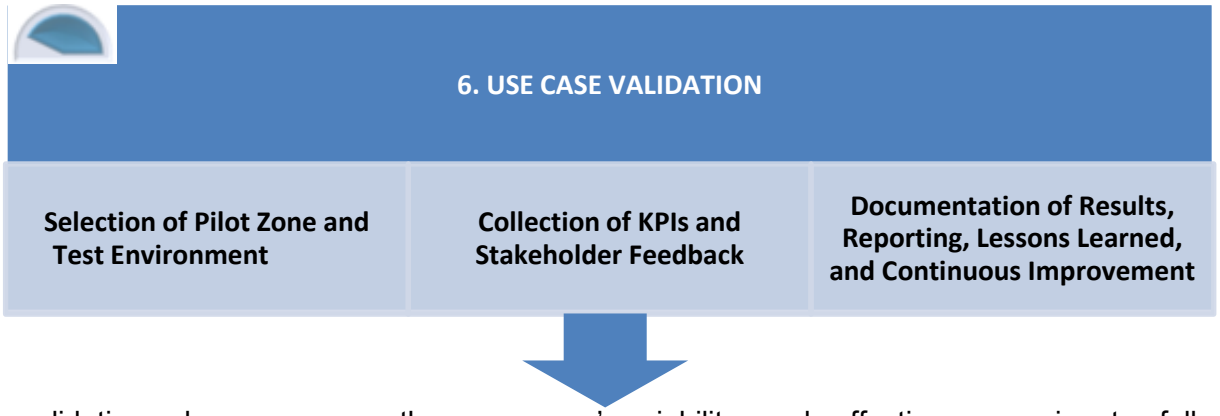
In this phase, a comprehensive evaluation framework is established to measure the performance, outcomes and value of each use case. It addresses three specific points, forming a three-dimensional framework:

- **Key Performance Indicators (KPIs)** are defined based on quantifiable parameters that evaluate the technical and operational performance of the system. Depending on the use case, KPIs may be derived solely from data collection (e.g., specific sources, databases, filed data), from combined or fused datasets, or from AI data science and transport simulation models developed in WP4.
- **User satisfaction indicators** are incorporated to measure the experience and perception of end users. These indicators are developed through surveys and interviews with stakeholders,

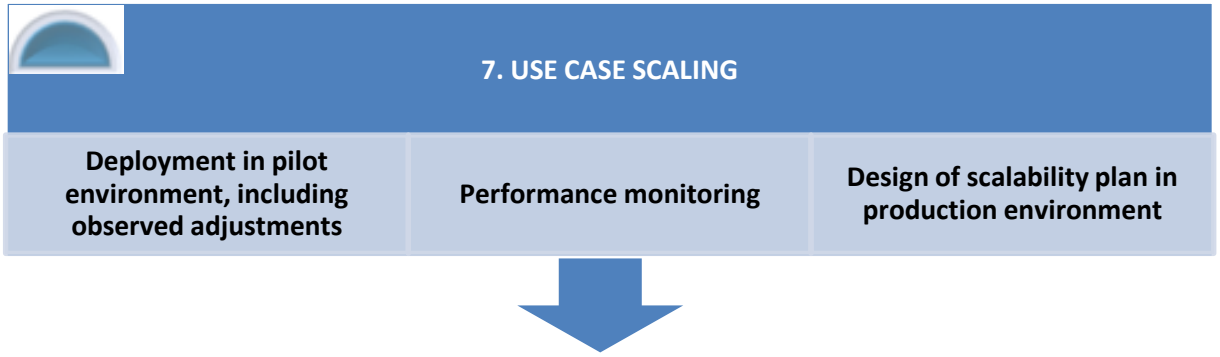
analysis of interaction patterns, and systematic observation of functionality adoption and utilization.

- **Security and compliance indicators** ensure that the system meets applicable security standards and regulatory requirements. These include compliance and security reports, evaluations of implemented controls, regulatory audits, identification of vulnerabilities, and real-time monitoring of risk metrics.

This integrated three-dimensional evaluation framework provides a holistic view of use case performance, balancing technical efficiency, user experience, and regulatory compliance. Its effective implementation mitigates risks such as lack of historical data, selection of inappropriate metrics, misalignment with objectives, biased user feedback, and regulatory complexities or lack of real-time visibility.



The validation phase ensures the use case's viability and effectiveness prior to full-scale implementation. It involves selecting a pilot zone, defining the scope, and establishing clear success metrics. Initial deployment and controlled testing allow for the collection of KPI data, functional and performance evaluations, and stakeholder feedback. This evaluation enables the identification of potential adjustments, process optimization, and ensures that the use case meets its defined objectives.

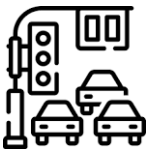


The final phase involves transitioning the use case from a controlled pilot environment to full-scale implementation. It begins with deployment under monitored conditions, validating functionality and performance while making adjustments based on observations. Performance monitoring ensures the use case operates as expected, identifying potential issues and providing insights for improvement through key metrics, dashboards, and regular analysis. The phase concludes with the design of a scalability plan, defining the transition strategy, adapted technical architecture, and validation protocols to enable expansion or deployment in new contexts.

This process ensures a controlled rollout, mitigating risks related to compatibility, security, user experience, and unforeseen costs.

6 Individual Use Cases

The DS4MOBMODELS project predefines 22 use cases across four key thematic areas**: Public Transport** (6 use cases), **Freight Transport** (4 use cases), **Traffic** (5 use cases), and **Sustainability** (7 use cases).

SECTOR	Use Case		Tipology
Public transport 	1	Optimization of bus routes and frequencies	Planning
	2	Bus fleet route analysis and optimization	Operation
	3	Intermodal node demand analysis	Planning
	4	Real-time public transport user information:	Operation
	5	Cross-border passenger transit analysis	Operation
	6	Urban transport eak demand analysis	Planning
Freight transport 	7	Port-based freight flow analysis	Operation
	8	Airport-origin freight flow analysis	Operation
	9	Logistics platform location in corridors	Planning
	10	Cross-border freight transit nalysis	Operation
Traffic 	11	Main road segment capacity analysis	Planning
	12	Predictive bottleneck resolution	Operation
	13	Highway and main road congestion monitoring	Operation
	14	Special operations congestion prediction	Planning
	15	Real-time network traffic mapping	Operation
Sustainability 	16	Transport emissions evaluation	Planning
	17	Informed shared mobility	Operation
	18	Freight emissions analysis	Planning
	19	Electric vehicle charging infrastructure	Operation
	20	Urban mobility tracking by mode and distance	Operation
	21	Low Emission Zone monitoring	Operation
	22	Active mobility monitoring	Operation

Following the interview phase with each stakeholder, we have added new use cases in coordination with them:

- Winter service management: emergency parking for heavy vehicles.
- Demand prediction by user profile based on mobile app. validation.
- Distribution of public transport ticket sales point
-

Some stakeholders have chosen one or more use cases related to the project, while for others, no specific use case suitable for development has been identified at this stage. These stakeholders will remain engaged and are expected to contribute their perspectives during the upcoming workshop focused on the definition of the final use cases.

A detailed description of the use cases of interest for each stakeholder is shown below.

6.1 SEITT

The most relevant use cases identified through the interview with SEITT are strategically interconnected and address critical challenges in transport management:

- Bus fleet route analysis and optimisation (*Use Case 2*), which focuses on improving public transport efficiency through the selection of optimal routes that minimise journey times and operational costs.
- Highway and main road congestion monitoring (*Use Case 13*), designed to provide real-time assessment of traffic conditions on primary corridors.
- Real-time network traffic mapping (*Use Case 15*), which enables dynamic visualisation of traffic flow patterns across the entire road network.
- Transport emissions evaluation (*Use Case 16*), which calculates environmental impact based on vehicle typology and implements dynamic pricing strategies to incentivise cleaner transport options.

For the development of the proposed use cases, the integration of multiple data sources is required, including traffic intensity data, FCD (Floating Car Data), road infrastructure characterisation, incident information, and mobile network data. This data integration will enable the development of three fundamental technological components:

- A real-time traffic monitoring system that processes multiple data streams including floating car data (FCD),
- Traffic intensity measurements and incident information
- Aa machine learning-based predictive model trained on historical and real-time data to anticipate congestion episodes and traffic patterns; and an emissions calculation framework that utilises the COPERT methodology to quantify environmental impact and support dynamic toll pricing strategies.

The synergistic operation of these components enables SEITT to position toll roads as efficient alternatives to free motorways, optimising infrastructure utilisation whilst promoting sustainable mobility patterns and ensuring the economic viability of toll concessions.

Regarding the proposed models, the Real-Time Traffic Model uses machine learning techniques to create a dynamic visualization of traffic status, allowing not only an understanding of the current moment but also the prediction of future mobility behaviours.

Similarly, the Emissions Model constitutes another fundamental base, employing the COPERT methodology to calculate vehicle emissions with precision based on vehicle typology and traffic conditions. This precise emissions data serves as the foundation for the Dynamic Pricing Model, which implements tariff strategies that incentivize the use of less polluting vehicles, transforming transport infrastructure into an active tool for environmental sustainability.

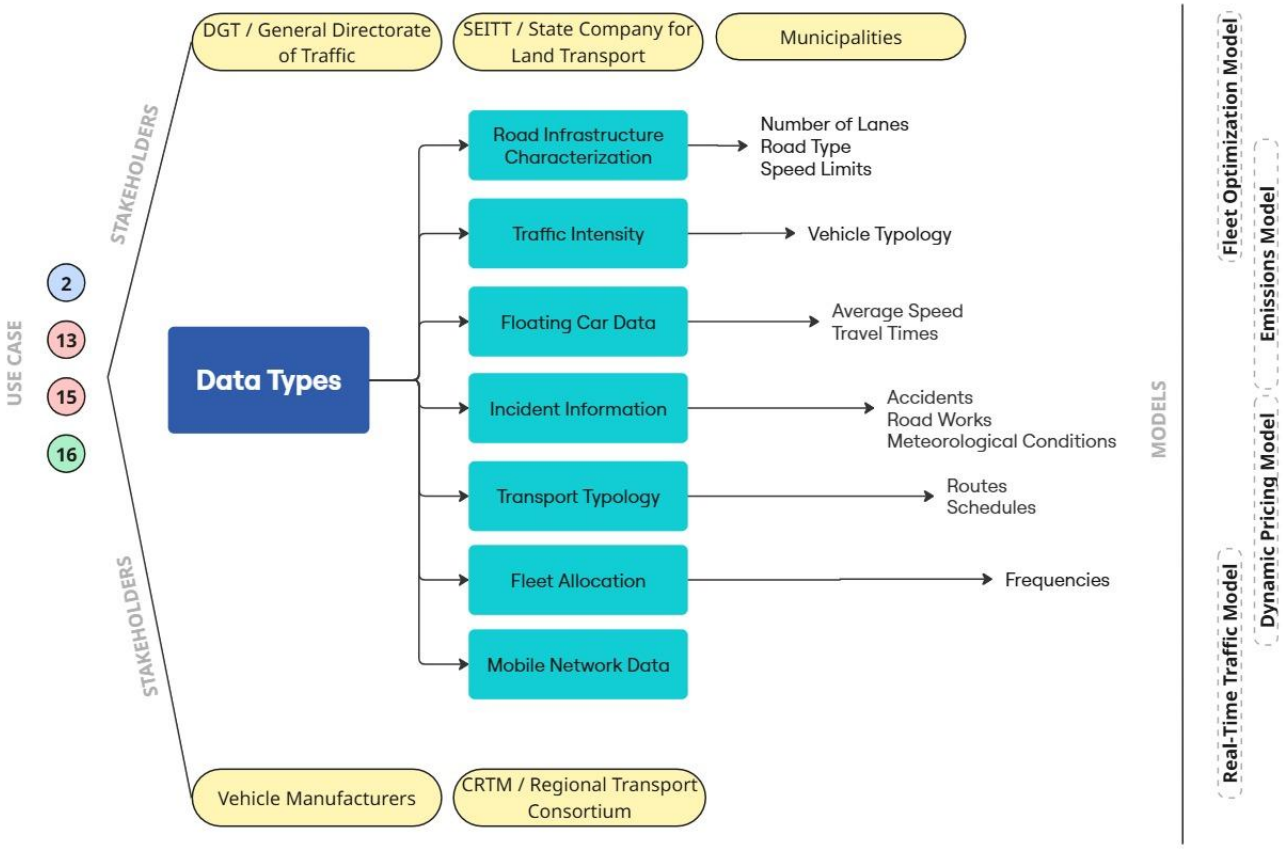


Figure 3: SEITT. Data Architecture Framework

Regarding the identified challenges, these represent critical aspects that must be addressed. Traffic prediction accuracy and real-time data availability constitute fundamental challenges, as inaccurate predictions or loss of connectivity may affect system reliability. Additionally, the complexity of vehicle emissions identification presents technical challenges for implementing dynamic tariffs, whilst limitations in signalling infrastructure may reduce the capacity for effective communication with drivers about optimal alternative routes.



Figure 4: Challenges SEITT

The identified challenges can be opportunities for innovation. Each limitation represents an improvement point that drives the project's technological development.

6.2 BASQUE GOVERNMENT

The Basque Government has developed a mobility digital twin that integrates essential components such as: a datalake for information consolidation, an offline simulation model for scenario studies, and an online predictive model that anticipates real-time traffic situations. Based on this foundation, the Basque Government focuses on working with use cases applied to the public transport and traffic sectors. The most relevant cases include bus route and frequency optimisation, demand analysis at intermodal nodes, real-time congestion monitoring, and transport emissions evaluation, all oriented towards improving both operational efficiency and environmental sustainability of the Basque mobility system.

The technological ecosystem is underpinned by the integration of diverse data sources: mobility flow data including vehicle traffic counts, LPR (licence plate recognition) and FCD (Floating Car Data); transport network data encompassing GTFS and GTFS-RT information for public transport, as well as GIS cartography of the road network; and meteorological data that complement the contextual analysis. This data architecture feeds the three technological components of the digital twin.

The integrated operation of these components enables the Basque Government to optimise transport planning and traffic management at interurban and interprovincial scales, with scalability prospects towards the municipal level, thereby contributing to the digital transformation of the Basque territory.

The following models are proposed:

A. Digital Twin Simulation Model: Provides a comprehensive approach to mobility analysis, integrating diverse data sources to understand complex urban transportation interactions through both offline scenario planning and online predictive capabilities.
   - AIMSUN microsimulation engine for detailed traffic modeling
   - AWS cloud infrastructure for scalable data processing
   - Real-time GTFS-RT integration for public transport monitoring
   - Historical traffic pattern validation algorithms

B. Advanced Analytics and Integration Model: Employs sophisticated analytical techniques to consolidate multiple data streams and transform raw mobility information into actionable intelligence for strategic decision-making.
   - Machine learning algorithms for demand prediction
   - Data fusion protocols for LPR, FCD, and traffic count integration
   - Automated quality assurance and data cleansing procedures
   - Multi-source data correlation and validation frameworks

C. Mesoscopic Mobility Transformation Model: Enables scalable mobility analysis from macro-regional to municipal levels, supporting interinstitutional digital transformation through standardised data protocols.
   - Interurban corridor capacity analysis
   - Municipal-level traffic flow optimization
   - Cross-jurisdictional data sharing protocols
   - Policy impact assessment simulation tools

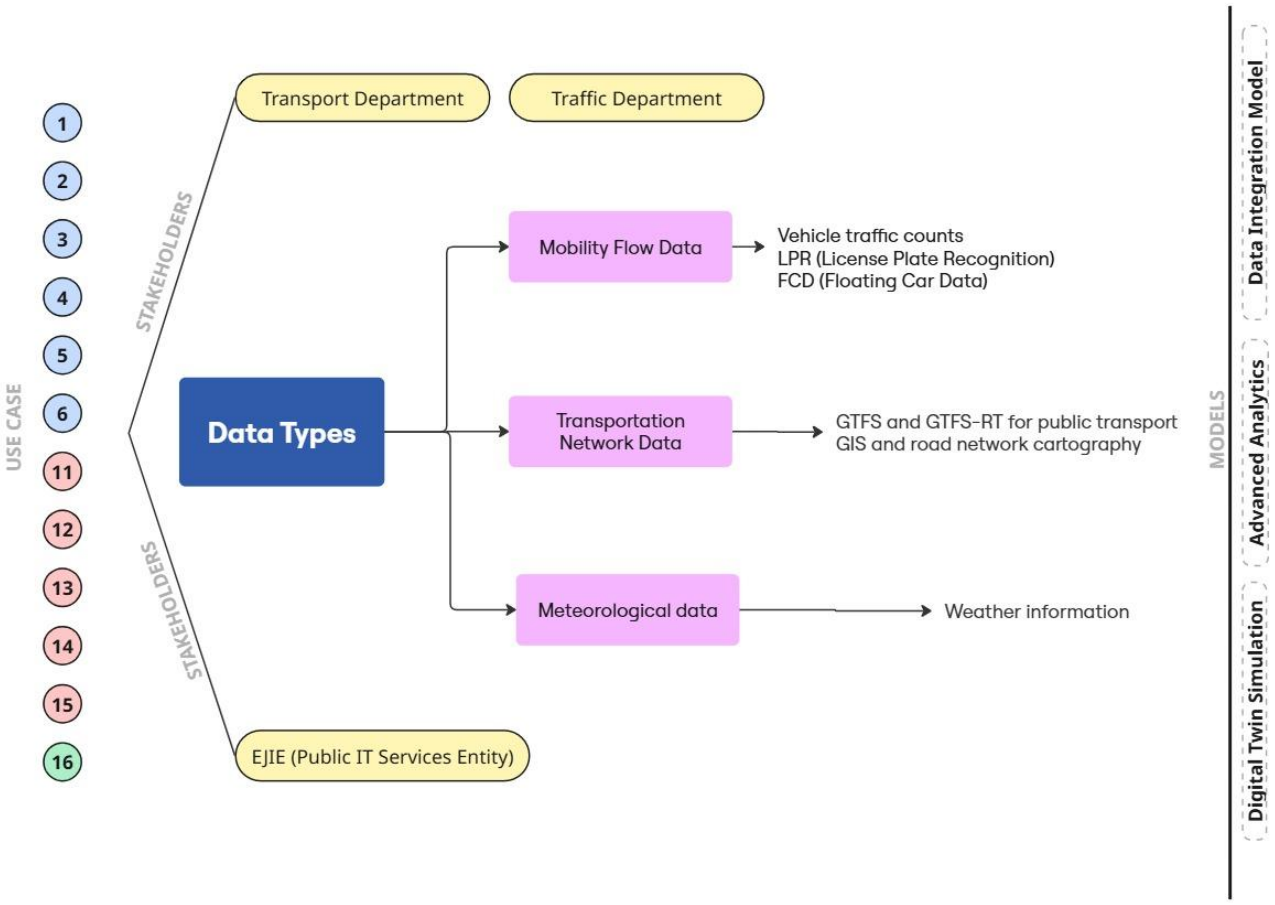


Figure 5: Basque Government. Data Architecture Framework

The implementation of these innovative models is not without challenges. Key obstacles include data quality and granularity limitations, technical interoperability issues, and the need for continuous model refinement to adapt to rapidly changing urban mobility landscapes.

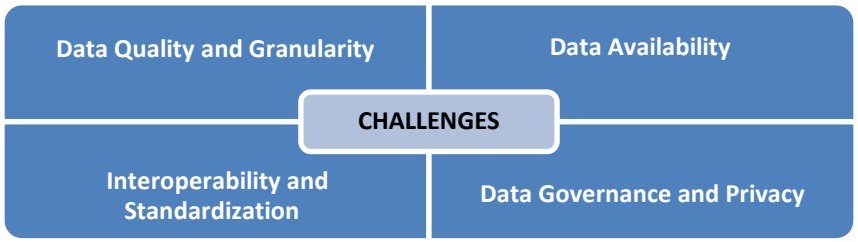


Figure 6: Challenges Basque Government

6.3 SERVEI CATALÀ DE TRANSIT

The strategic use cases identified with Servei Català de Trànsit (SCT) are centred on the comprehensive understanding of urban and interurban mobility:

- Urban mobility monitoring by mode and distance (*Use Case 20*), which enables the characterisation of travel patterns between urban and interurban environments disaggregated by transport typology.
- Active mobility monitoring (*Use Case 22*), oriented towards monitoring and predicting travel patterns in sustainable modes such as walking, cycling, and personal mobility vehicles (PMVs).

These use cases seek to improve real-time traffic management and facilitate integrated transport planning through the analysis of interactions between urban and interurban areas, being their primary objective.

For the development of these use cases, the integration of diverse data sources is required: mobility flow data including origin-destination (O/D) matrices, mobile phone data (FPD), and user intensity data (vehicles, pedestrians, cyclists, PMVs); transport infrastructure data encompassing infrastructure characterisation, mobility restrictions such as Low Emission Zones (LEZs), and route and network information; demographic and socioeconomic data including population, density, age distribution, employment, and socioeconomic profiles; and transport validation data comprising public transport ticket validations and mobility surveys.

The integration of these components enables SCT to develop a model for estimating urban and interurban journeys, alongside machine learning-based predictive models to anticipate active mobility patterns, thereby contributing to more efficient traffic management and the promotion of sustainable transport modes.

In terms of modelling, the Catalan Traffic Service is transforming mobility management through advanced predictive modelling. Leveraging machine learning algorithms such as Random Forest, it aims to unravel the dynamics of urban and interurban transport, turning complex data into strategic information.

Its innovative approach goes beyond traditional monitoring, seeking to anticipate mobility patterns and proactively adapt infrastructure to emerging transportation trends. This technological strategy represents an intelligent vision of urban mobility as a dynamic and responsive network.

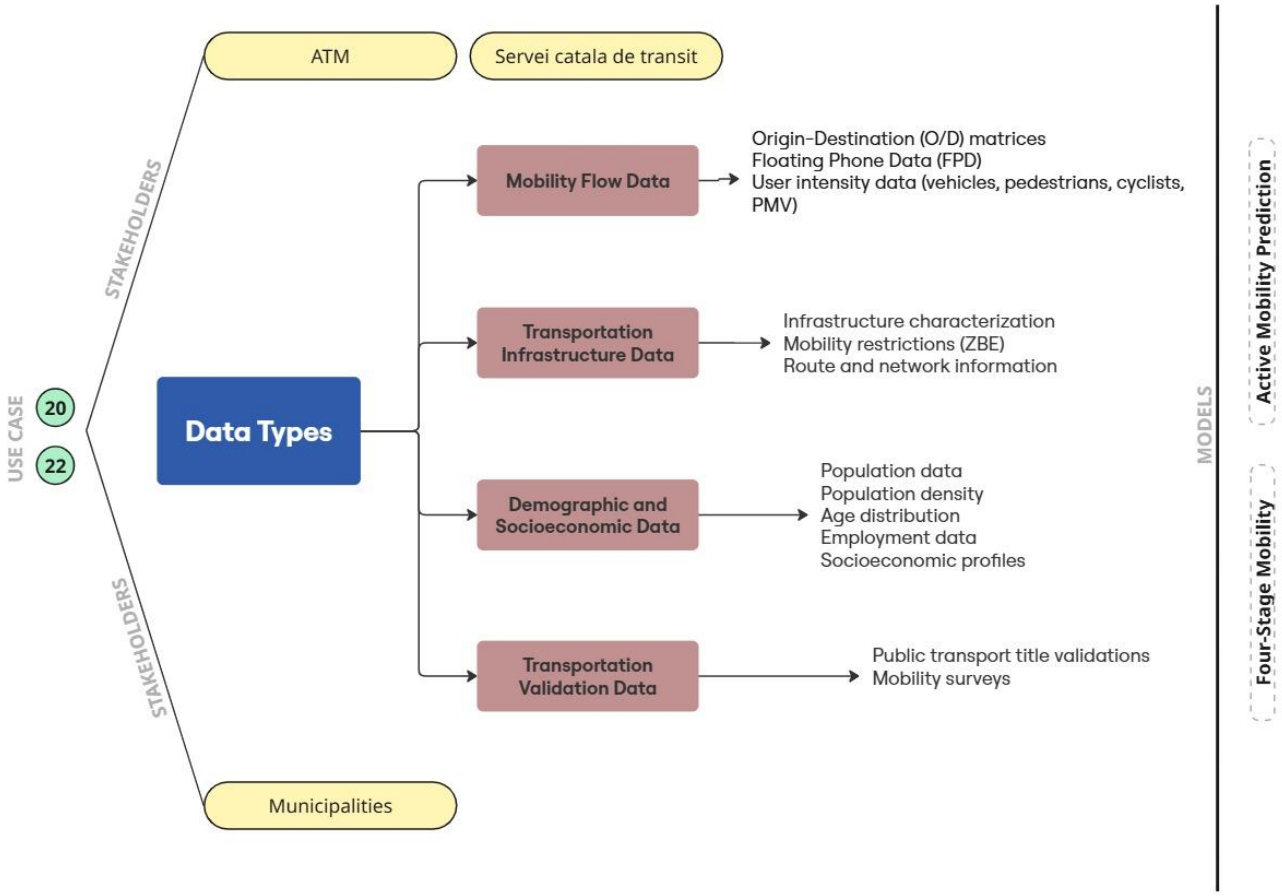


Figure 7: SCT. Data Architecture Framework

Generally, the challenges mentioned include data quality and granularity, particularly for less digitalised modes such as active mobility, difficulties in model validation due to the lack of detailed reference data, challenges in data coverage to capture all types of journeys, and instability in predictive patterns caused by changes in external conditions that temporarily alter mobility.

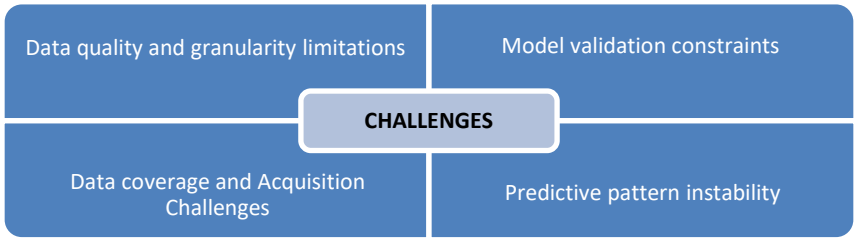


Figure 8: Challenges SCT

6.4 ATM BARCELONA

ATM Barcelona has identified a new use case centred on the analysis of digital behaviour amongst public transport users: *Analysis of mobile application validation usage*, which seeks to understand user behaviour patterns when validating their travel tickets through digital tools, identifying how, when, and where these validations are performed to optimise user experience and operational efficiency of the metropolitan transport system.

For the development of this use case, the integration of three main data categories is required: mobile validation data including validation timestamps, user identification, journey origin, vehicle number, and line used; transport service data encompassing real-time information on railway and bus services, as well as transport mode data in the Catalonia region; and network topology data comprising GTFS information and public transport network structure.

This data integration enables ATM Barcelona to develop origin-destination matrices to analyse mobility patterns and implement machine learning-based predictive models that anticipate user demand across different transport modes and services, facilitating supply adjustment, resource optimisation, and improvement of the traveller experience in the Barcelona metropolitan area.

Leveraging machine learning techniques, ATM Barcelona aims to understand digital user validation patterns and optimise public transport services through data-driven insights. The Origin-Destination Matrix Model provides comprehensive analysis of mobility movements between zones, enabling strategic transportation planning based on actual user behaviour patterns. Simultaneously, the Demand Prediction Model employs historical validation data to anticipate transportation mode usage, identifying emerging mobility trends that support proactive service adjustments and strategic decision-making for metropolitan transport optimisation.

The following models are proposed:

A. Origin-Destination (OD) Matrix Model
   - Represents mobility movements
   - Analyzes movement patterns between zones
   - Supports transportation planning

B. Demand Prediction Model
   - Machine learning-based
   - Uses historical data
   - Predicts user transportation mode usage
   - Identifies mobility trends
   - Supports strategic decision-making

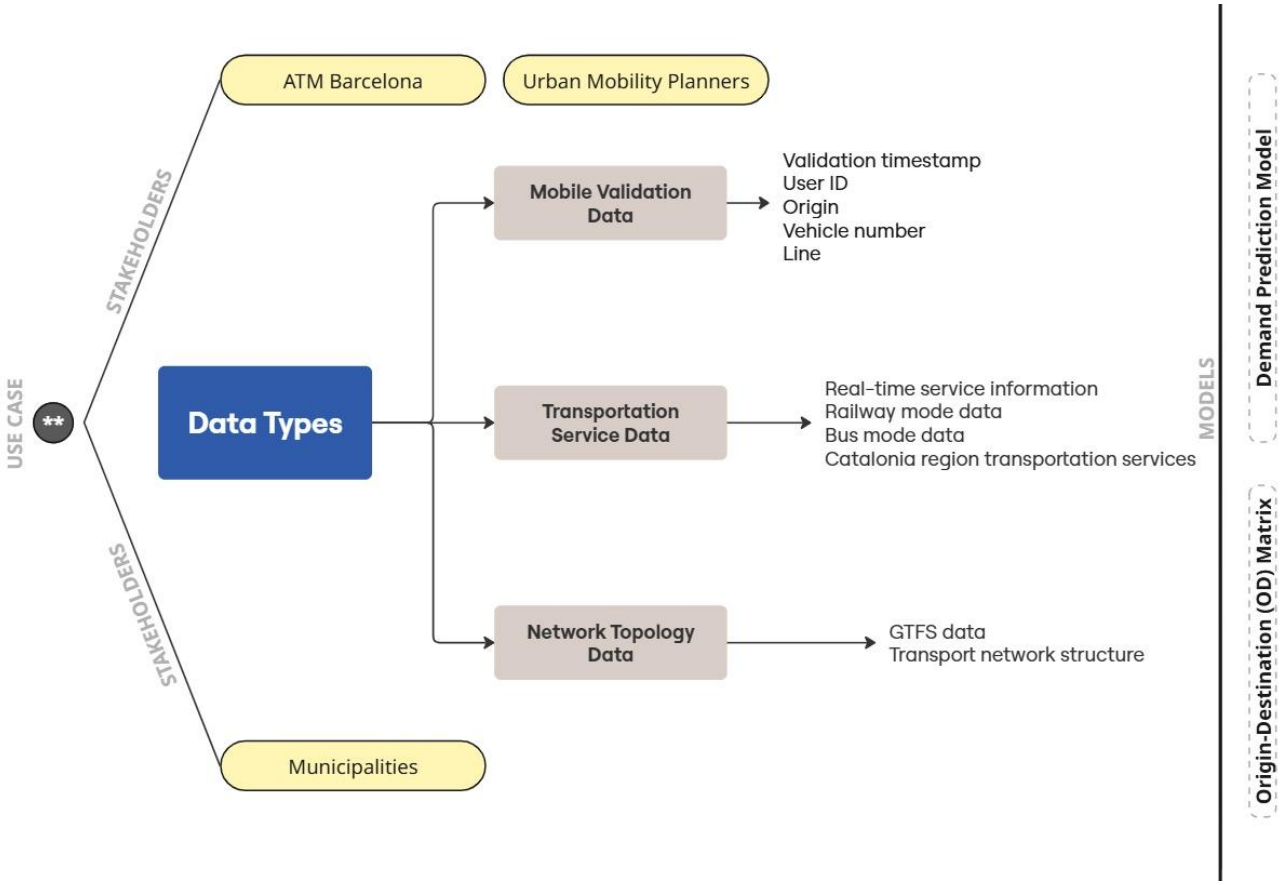


Figure 9: ATM Barcelona. Data Architecture Framework

Regarding the main challenges, these include difficulties in user identification and profiling based on digital validations, adoption barriers that limit migration towards mobile validation methods, technological accessibility limitations for certain population segments, and variability due to device diversity that affects the quality and consistency of collected data.



Figure 10: Challenges ATM Barcelona

6.5 REGIONAL GOVERNMENT OF ANDALUSIA

Two strategic use cases have been identified for the Regional Government of Andalusia that address critical needs in regional transport planning:

- Intermodal node demand analysis (*Use Case 3*), oriented towards identifying optimal locations for new intermodal transport nodes based on existing network configuration and observed mobility flows.
- Transport emissions evaluation (*Use Case 16*), focused on obtaining detailed data on emissions by transport type, mode, and distance travelled, as well as determining the proportion of emissions attributable to transport modes under regional responsibility.

These use cases seek to analyse demand patterns between origin-destination pairs and evaluate the impact of mobility policies on emissions evolution at the regional level.

Regarding data, it is important to integrate the following sources: mobility flow data including origin-destination matrices derived from mobile phone data and Household Mobility Surveys (EDM) to characterise real travel patterns; transport network data encompassing urban and interurban road networks, transport network topology with GTFS information, and metro and tram data; vehicle fleet data comprising public transport inventories classified by fuel type and age, as well as vehicle fleets by municipality; validation and ticketing data with anonymised user entry and exit information; emissions and traffic data including traffic counts and emission factors expressed in gCO_2/km; and geodemographic and socioeconomic data including population statistics, employment data, income and education levels, land use, and modal dependency.

The above will enable the development of advanced methodologies including exploratory analysis of intermodal nodes using GIS tools, spatial multicriteria evaluation (MCDA-GIS) to identify high-potential areas, impact simulation through transport models, and a multivariable emissions model that integrates mobility demand, fleet composition, and network data, thereby contributing to more efficient and sustainable transport planning in the Andalusian territory.

The Multicriteria Spatial Decision Analysis Model provides a comprehensive approach to intermodal node planning, integrating diverse data sources to understand complex interactions between mobility, infrastructure, and territorial development. The Transport Impact Simulation Model employs advanced analytical techniques to examine transportation system performance, enabling strategic understanding of mobility patterns and transforming transportation infrastructure data into valuable tools for regional mobility management. Complementing these capabilities, the Transport Emissions Assessment Model utilizes multivariable approaches integrating mobility demand, vehicle fleet composition, and network data to provide precise spatial emissions analysis, supporting evidence-based policy development for sustainable transportation in Andalusia.

The following models are proposed:

A. Intermodal Nodes Diagnostic Model
   - Calculates accessibility index
   - Uses GIS spatial analysis
   - Identifies priority development areas

B. Multicriteria Spatial Decision Analysis Model (MCDA-GIS)
   - Evaluates potential zones
   - Ranks technical parameters
   - Supports location decisions

C. Transport Impact Simulation Model
   - Designs functional scenarios
   - Estimates modal shift benefits
   - Analyses network performance

D. Transport Emissions Assessment Model
- Calculates emissions by vehicle type
- Determines emission factors
- Provides system emissions profile

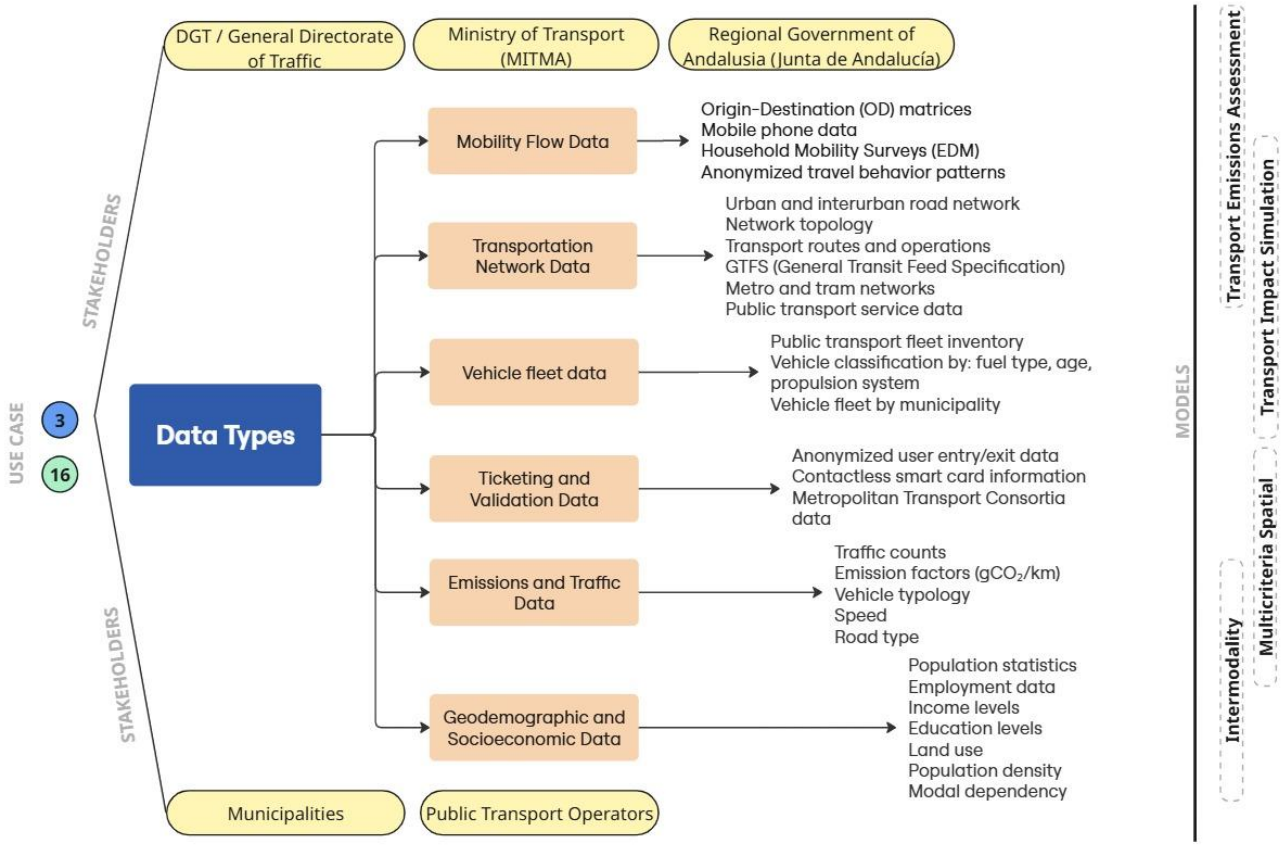


Figure 11: Regional Government of Andalusia. Data Architecture Framework

The challenges include limitations in data availability and quality such as reliable OD matrices, access barriers to sensitive data sources such as mobile phone information, limitations in simulation models that may generate inaccurate results due to inadequate calibrations, and urban planning constraints related to zoning and land availability for intermodal infrastructure development.

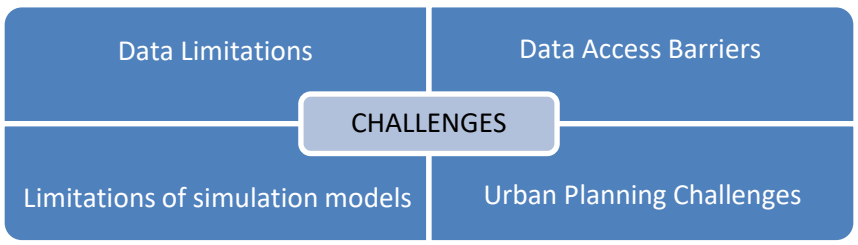


Figure 12: Challenges Regional Government of Andalusia

6.6 REGIONAL GOVERNMENT OF EXTREMADURA

The Regional Government of Extremadura has focused primarily on the Public Transport topic. As strategic cases, they address both regional public transport improvement and cross-border mobility:

Bus route and frequency optimisation, Bus route analysis to optimise fleets, Intermodal node demand analysis, and Transport emissions evaluation (*Use Case 16*) at regional level; as well as Cross-border passenger flow analysis and Cross-border freight flow analysis (*Use Case 10*).

The afore mentioned use cases seek to provide the necessary tools to improve public transport systems by adapting them to the real and potential demand of Extremadura, with particular attention to connections with Portugal for both passengers and freight.

For the development of these use cases, the following are required: *i*. mobility flow data including origin-destination matrices derived from MITMS mobile phone data, *ii*. traffic volumes and border crossings, as well as population and activity data; *iii.* transport infrastructure encompassing interurban and urban road networks, public transport supply in GTFS format and all existing transport modes; *iv*. vehicle fleet data comprising public transport fleets and general vehicle stock; *v*. demand data including information on public transport demand; and emissions data encompassing carbon footprint data and emission factors expressed in gCO_2/km by typology, speed, and road type.

Based on the above, it will be possible to develop an analytical model based on mobile phone data to identify cross-border mobility flows between Spain and Portugal, a multivariable emissions model that integrates demand, fleet, and road network, and scenario simulations including fleet renewal, electrification, modal changes, and implementation of low emission zones, thereby contributing to more efficient and sustainable transport planning with a regional and cross-border focus.

The following models are proposed:

A. Demand Model (4-Stage Model): The Demand Model framework, these analytical tools transform transportation data into valuable instruments for regional mobility management, supporting both domestic public transport optimization and international connectivity planning between Spain and Portugal.
   - Comprehensive transportation demand analysis
   - Requires additional data
   - Challenges in technical feasibility
   - Needs Home Mobility Survey (currently not available)

B. Multivariate Emissions Model: The Multivariate Emissions Model provides comprehensive analysis of transportation systems, integrating diverse data sources to understand complex interactions between mobility, infrastructure, and environmental impact across the Extremadura region
   - Integrates demand, fleet, and road network data
   - Applies emission factors by: technology, road type, average speed
   - Scenario simulations: fleet renewal, electrification, modal shift changes, low emission zones implementation, public transport reinforcement.

C. Cross-Border Mobility Analytical Model: The Cross-Border Mobility Analytical Model constitutes another fundamental pillar, employing sophisticated mobile telephone data analytics to examine mobility patterns between Spain and Portugal through Extremadura's border crossings. This model enables strategic understanding of transboundary transportation flows, identifying peak periods, typical travel patterns, and infrastructure needs for enhanced cross-border connectivity
   - Based on mobile telephone data
   - Identifies main mobility flows between Spain and Portugal
   - Complemented by: vehicle volumen data at border crossings, public transport supply and demand information

- Analyzes mobility for different periods and typical days

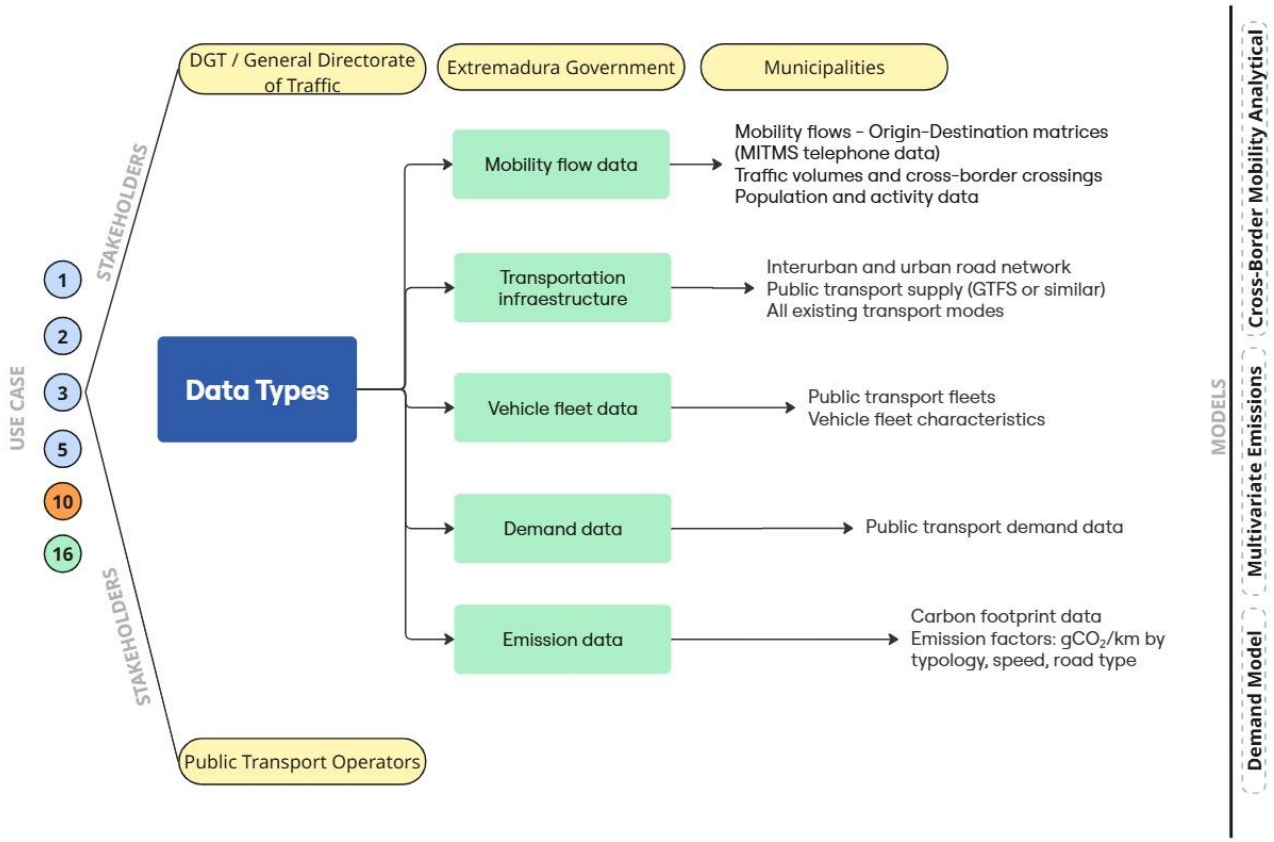


Figure 13: Regional Government of Extremadura. Data Architecture Framework

The identified challenges reflect the specific complexities of regional and cross-border transport planning in Extremadura. Data availability and completeness issues include the absence of Household Mobility Surveys necessary, limiting the technical feasibility of certain analyses. Cross-border mobility complexity presents unique challenges for capturing and analysing travel patterns between Spain and Portugal, requiring coordination between authorities from both countries. Precision in emissions calculation demands accurate integration of multiple data sources on fleets, emission factors, and usage patterns, whilst technical feasibility of advanced modelling is constrained by current data availability and the need for complementary information for results validation.

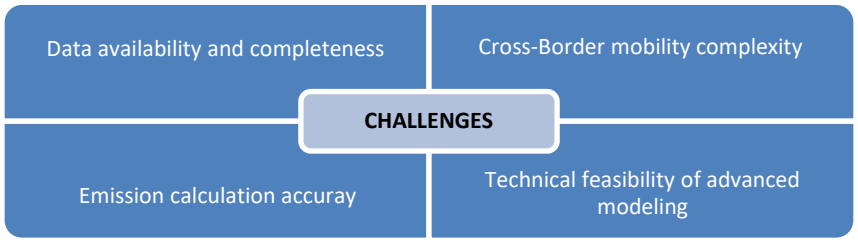


Figure 14: Challengers Regional Government of Extremadura

6.7 MADRID REGIONAL TRANSPORT CONSORTIUM

The Madrid Regional Transport Consortium (CRTM) focuses on the Public Transport sector, specifically on two use cases:

- Intermodal node demand analysis (*Use Case 3*), oriented towards identifying optimal locations for the installation of new intermodal nodes within municipal boundaries, integrating accessibility criteria, potential demand, connectivity with existing modes, and land availability.
- Distribution of public transport ticket sales points, a new use case that seeks to optimise the network of CRTM ticket sales and top-up points to improve user accessibility to the public transport system, cover demand efficiently, and enhance ticket acquisition and top-up.

For the above, the integration of multiple data categories is important: ticketing data including bus and suburban rail information with card ID, date, profile type, origin and expedition, as well as transport demand data through validations; parking and traffic data encompassing information on vehicle flows and number of people transiting per area; urban planning and infrastructure data comprising general urban development plans, Sustainable Urban Mobility Plans (SUMPs), information on land use and transport infrastructure locations; demographic and socioeconomic data including population, density, age distribution, employment, and socioeconomic profiles; accessibility and mobility data covering access times, physical barriers, and accessibility for people with reduced mobility; and points of interest (POIs) data including location of all sales points, competition, coverage, and underserved areas.

With this data, it will be possible to develop multicriteria analysis (MCA) for comparative location evaluation, location optimisation models using p-median or p-center algorithms, coverage analysis based on Location Set Covering Problem (LSCP), and demand predictive models employing machine learning techniques such as Random Forest or XGBoost, thereby contributing to strategic public transport planning that improves modal and territorial connectivity and user experience in the Madrid metropolitan region.

The following models are proposed:

A. Intermodal Node Location Model: The Intermodal Node Location Model provides a comprehensive approach to transportation infrastructure optimization, integrating multicriteria analysis, cost-benefit assessment, and stakeholder consensus processes to identify optimal locations for new intermodal facilities within municipal territories.
B. Sales Point Accessibility Model: The Sales Point Accessibility Model constitutes a fundamental component, employing machine learning regression algorithms, clustering techniques, and location optimization algorithms to examine user accessibility patterns and service coverage dynamics. Through Location Set Covering Problem (LSCP) methodologies and demand prediction models, this system enables strategic understanding of transportation service distribution, transforming ticketing, demographic, and mobility data into valuable tools for intelligent urban planning.
C. Scenario Simulation Model: The Scenario Simulation Model complements these capabilities by providing decision-support simulations for opening or closing sales points, allowing comprehensive assessment of accessibility impacts and facilitating evidence-based strategic planning for enhanced user experience in Madrid's metropolitan transport system

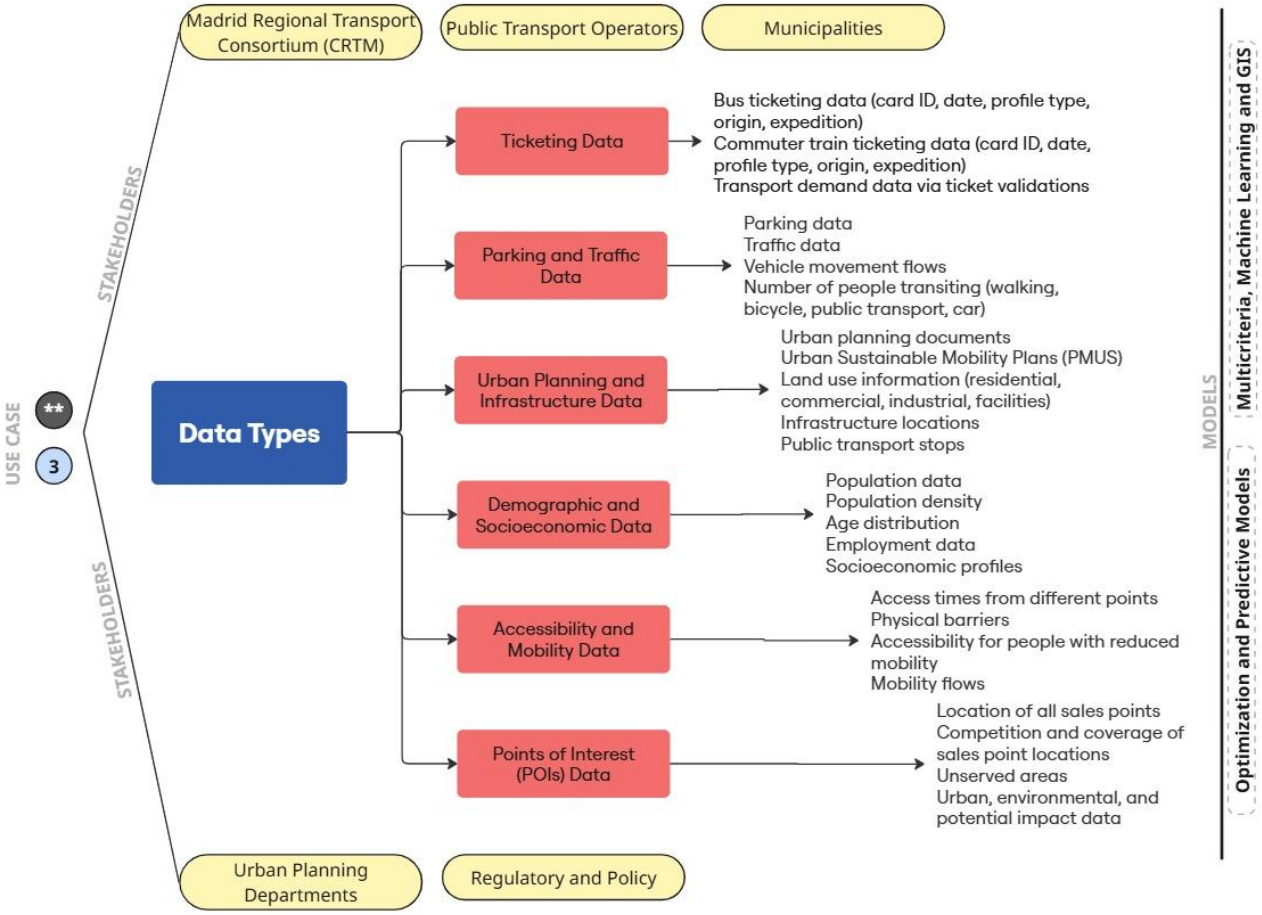


Figure 15: CRTM. Data Architecture Framework

Regarding the challenges***¡Error! No se encuentra el origen de la referencia.***, these include lack of p recise data on population and demand that may generate suboptimal locations, urban planning restrictions that limit the viability of technically ideal locations, limited information on purchasing habits that affects the reliability of predictive models, and risk of coverage gaps in vulnerable areas that require special attention to ensure equity in service access.

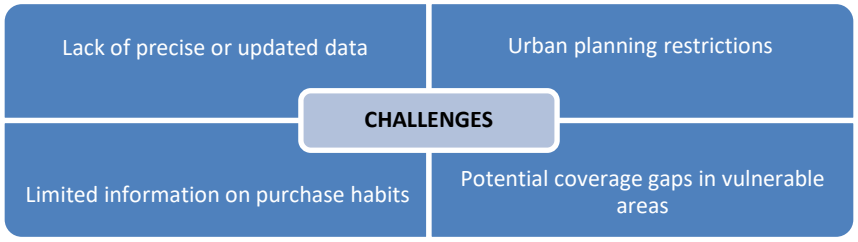


Figure 16: Challenges CRTM

6.8 GECT EUROREGION AQUITAINE EUSKADI NAVARRE

The NAEN Euroregion (Nouvelle-Aquitaine, Euskadi and Navarra) has developed a pioneering cross-border initiative centred on use cases that address mobility integration between territories:

- Cross-border passenger flow analysis (Use Case 5), focused on the daily cross-border mobility model of workers and students who cross the border; Cross-border freight flow analysis.
- Cross-border freight flow analysis (*Use Case 10*), oriented towards logistic coordination between territories.
- Electric vehicle charging infrastructure (Use Case 19), directed towards the coordinated deployment of charging infrastructures.

These use cases seek to establish a cross-border mobility data space that enables administrations and operators to design coordinated strategies in regional transport planning, daily transit management, and adaptation to ecological transition.

For the development of the aforementioned cross-border use cases, the integration of limited but strategic data sources is required: public transport data including GTFS timetables and local and regional transport information on both sides of the border; accessibility and infrastructure data encompassing open road networks and information on administrative boundaries; and mobility flow data comprising cross-border passenger movements, daily commuter travel patterns, and modal split information. The cross-border nature of the project requires particular attention to data interoperability between French and Spanish systems.

The integration of these components enables the NAEN Euroregion to develop demand and supply simulation models in cross-border multimodal contexts, demand behaviour monitoring systems during special events, and simulation tools for joint climate policy impacts such as Low Emission Zones (LEZs) and promotion of sustainable modes, thereby establishing a functional data space prototype that facilitates coordinated decision-making between territories and contributes to the consolidation of a robust, citizen-centred cross-border mobility data infrastructure.

The Cross-Border Mobility Flow Model analyses transboundary movement patterns, integrating data from French and Spanish territories to understand daily commuting dynamics. The Transboundary Data Interoperability Model establishes the technical backbone for secure, compliant data exchange between different institutional systems. Together, these models transform fragmented national mobility data into coordinated cross-border intelligence, supporting evidence-based decision-making for the NAEN Euroregion's integrated transport planning.

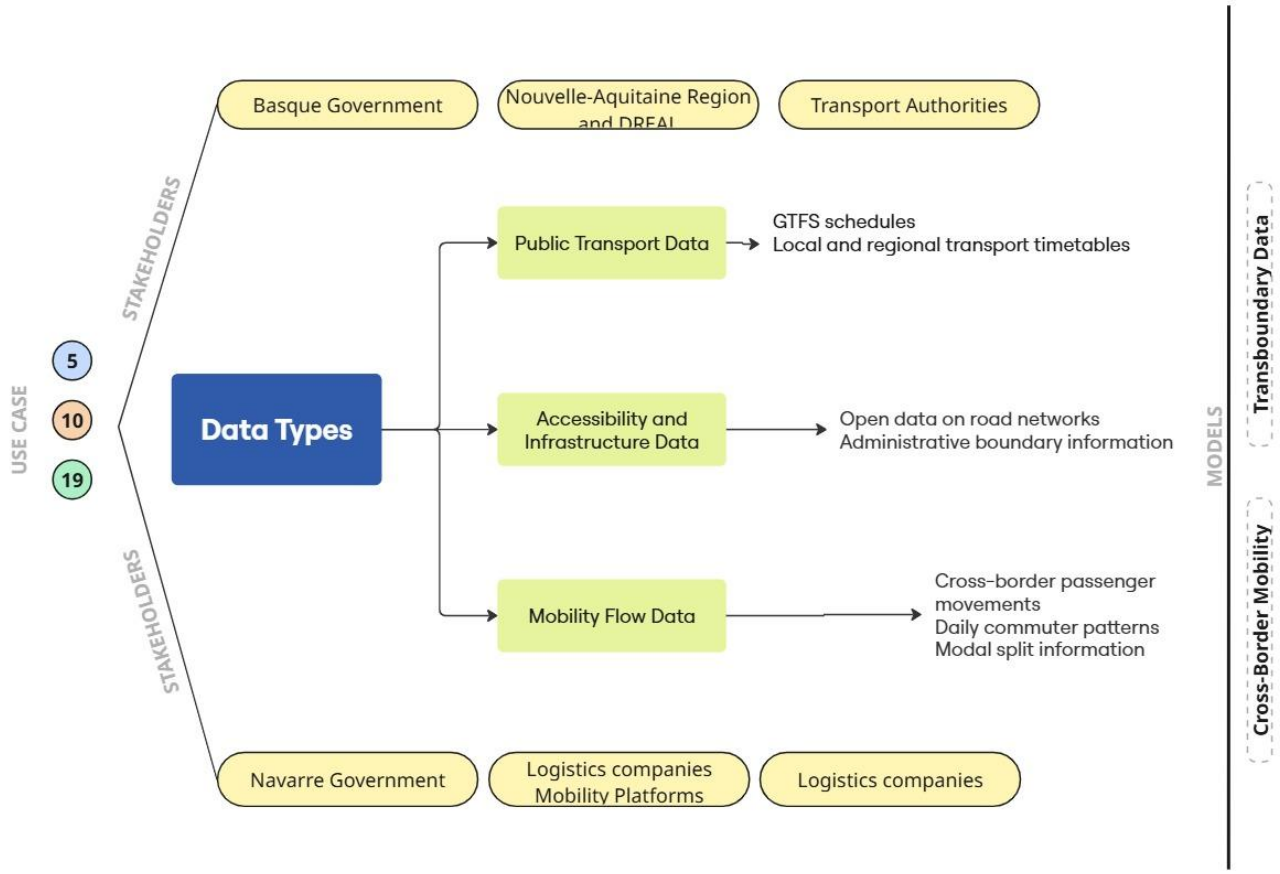


Figure 17: The EGTC Euroregion Nouvelle Aquitaine Euskadi Navarra. Data Architecture Framework

The main challenges are cross-border cooperation between territories with different institutional and legal frameworks. Key challenges include regulatory differences between France and Spain affecting data exchange and policy coordination, lack of standardisation between independently developed information systems, real-time data exchange limitations due to technical barriers and GDPR restrictions, and institutional interoperability deficits requiring shared governance models to overcome cultural, linguistic, and administrative differences.

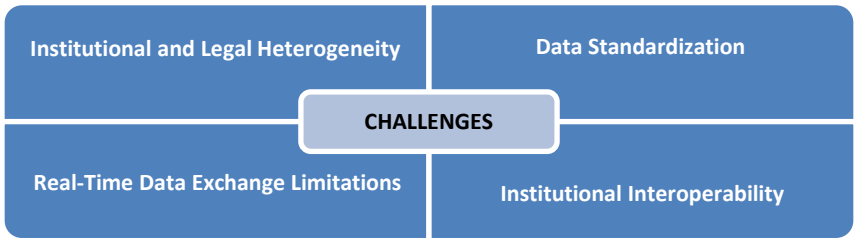


Figure 18: Challenges The EGTC Euroregion Nouvelle Aquitaine Euskadi Navarra

6.9 NAVARRA GOVERNMENT

Traffic management is the main topic for Navarra Government; therefore they have focused on two strategic use cases:

- Winter service management for heavy vehicle emergency parking (*Use Case* **), oriented towards the management of heavy vehicle staging areas during winter road episodes.
- Main road segment capacity analysis (*Use Case 11*), focused on traffic management on Pamplona's ring road in response to incidents such as accidents, roadworks, lane closures, or new urban developments.

These use cases seek to provide assistance in real-time traffic management, given that current resources are limited for identifying and managing these operational problems.

The data required for the above includes: parking area locations including information on total spaces and real-time availability; road infrastructure characterisation with data on number of lanes, road types, and speed limits; traffic intensity data disaggregated by vehicle typology, particularly to quantify heavy vehicle demand; floating car data (FCD) to obtain average speeds, journey times, and congestion indicators; road incident information including accidents, roadworks, and lane closures; meteorological data encompassing historical climatological incidents, AEMET alert forecasts, and meteorological station data; mobile network data for mobility pattern estimation; and Variable Message Panel (VMP) locations for driver communication.

The integration of the above will enable a real-time monitoring model of staging area status and heavy traffic during climatological episodes, a machine learning-based predictive model to anticipate heavy vehicle intensities when weather forecasts alert of adverse episodes, and a macroscopic road network assignment model for traffic management on Pamplona's ring road, thereby contributing to more efficient operational management of Navarrese traffic with advanced technological resources.

The following models are proposed:

A. Real-Time Parking Area Management Model
   - Real-time representation of parking area status
   - Heavy vehicle traffic tracking
   - Vehicle location prediction
   - Notifications through Variable Message Panels (VMP)

B. Predictive Traffic Intensity Model
   - Machine learning-based techniques
   - Anticipate heavy vehicle intensities
   - Adverse meteorological episode prediction
   - Dynamic parking area capacity management

C. Macroscopic Road Network Assignment Model
   - Traffic assignment to road network
   - Main segment capacity analysis
   - Evaluation of different traffic scenarios

D. Incident Management Model
   - Real-time traffic disruption detection
   - Impact assessment of: accidents, road Works, urban development changes

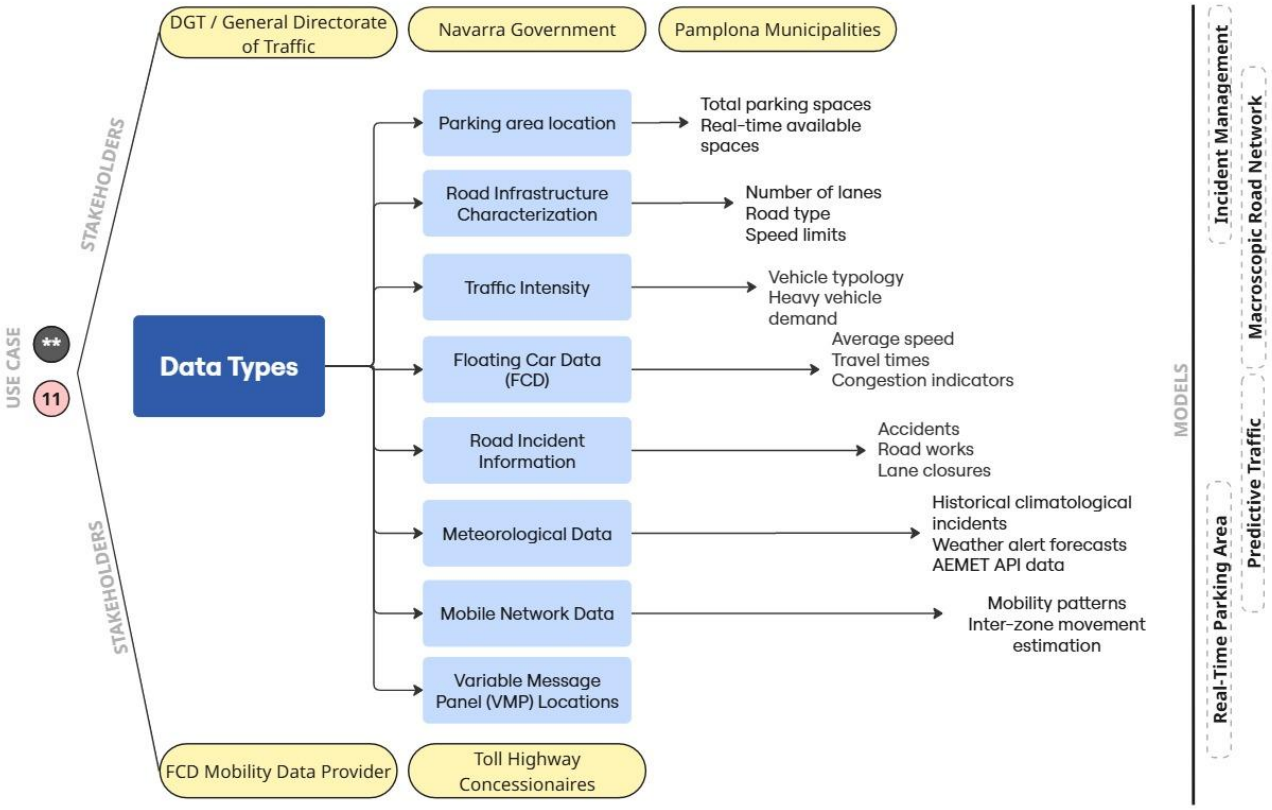


Figure 19: Navarra Government. Data Architecture Framework

The main challenges include traffic prediction accuracy that may generate erroneous decisions about staging, real-time data availability critical for detecting area capacity, operational complexity of winter services with risk of automatic system failures, and signalling limitations that prevent effective communication with drivers at strategic points.



Figure 20: Challenges Navarra Government

7 Proposed Use Cases

The project team has identified initial synergies among different stakeholders using the individual use cases discussed during each interview. The objective of the project is to identify interoperable use cases, where data is contributed from multiple sources, various stakeholders are involved, and common challenges are addressed.

The use cases presented in the following table are initially proposed for each of the pilots, along with the potential stakeholders involved.

USE CASES	DGT	SEITT	BASQUE GOV.	SCT	MITMS	ATMB	ATMV	J.ANDALUSIA	J.EXTREMADURA	VALENCIA C.C.	CRTM	CCDRC	EGCT	NAVARRA GOV.
Pilot 1. National pilot														
New use case: Winter service management: emergency parking for heavy vehicles	✅	✅	✅	✅	✅									✅
UC13: Highway and main road congestion monitoring	✅	✅	✅	✅	✅									✅
Pilot 2.a. Regional pilot Andalusia														
UC16: Transport emissions evaluation		✅	✅					✅						
Pilot 2.b. Regional pilot Catalonia														
UC22: Active mobility monitoring				✅		✅								
Pilot 2.c. Regional pilot Comunitat Valenciana														
UC21: Low Emission Zones monitoring							✅			✅				
Pilot 3. Metropolitan pilot														
UC3: Intermodal node demand analysis				✅		✅	✅			✅	✅			
Pilot 4.1. Cross border pilot Nouvelle -Aquitaine – Euskadi - Navarra EuroRegion														
UC5: Cross-border passenger transit analysis			✅										✅	✅
UC10: Cross-border freight transit analysis			✅										✅	✅
UC18: Freight emissions analysis			✅										✅	✅
UC19: Electric vehicle charging infrastructure			✅										✅	✅
Pilot 4.2. Cross border pilot Iberia Central West Region														
UC5: Cross-border passenger transit analysis									✅			✅	✅	
UC10: Cross-border freight transit analysis									✅			✅	✅	
UC18: Freight emissions analysis									✅			✅	✅	
UC19: Electric vehicle charging infrastructure									✅			✅	✅	

Table 3: Use cases

This proposal represents the initial version presented at the workshop held in September, which served as the basis for the workshop activities with the involved stakeholders.

8 Workshop inputs

The workshop was held within the framework of WP 2 of the project on September 25, 2025, at Novotel City Las Ventas (Madrid). This workshop represents the next phase following the interview process. At a general level, the objective is to gather input from stakeholders in order to establish the use cases for the different project pilots. Once the use cases to be addressed are established, the workshop will also focus on the required data, the models to be used and/or developed, and the establishment of key performance indicators (KPIs) related to each use case, in collaboration with the stakeholders involved in each use case.

The Workshop Objectives were:

- Present potential use cases by sector, based on needs identified through the interview process
- Agree on and define the specific use cases to be developed in each project pilot, together with the relevant stakeholders.
- Organize working group sessions to refine each selected use case, aiming to: I. Assess current data availability and identify missing data. II. Identify data security and privacy requirements. III. Define the models to be used and/or developed. IV. Establish relevant KPIs (existing and proposed). V. Explore potential new data partnerships to fulfil dataset requirements.



Image 1: Workshops photographs

The workshop included participation from representatives who are experts in mobility, sustainability, and planning.

#	STAKEHOLDER	NAME
1	INGARTEK	Isidro Arrieta
2	UPC	Lidia Montero
3	SEITT	Simone Montefiori
4	AIMSUM	Toni Pellicer
5	TEIRLOG	Ingrid Castellar
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7	DG Transportes Junta de Extremadura	Cristóbal Maza
8	Gob. Regional Centro Portugal, Departamento Cooperación	Lidia Martins

#	STAKEHOLDER	NAME
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10	SEITT	Pablo Boyero Gonzalez
11	Infonet	Alberto Garabato Sixto
12	Infonet	Diego Tajes Mayo
13	GVA	Manuel Ríos Pérez
14	GVA	Jose Moltó
15	UPC	Marc Manzanares
16	SEITT	Jose Antonio Pérez
17	CRTM	Soledad Pérez-Galdos
18	CRTM (TEKIA)	Marisa Gonzalez
19	ITS	Luis Briceño
20	Junta de Extremadura	María Lopez
21	NTT DATA	Julián Larios
22	NTT DATA	Iñigo Bolado
23	CPS	Daniella Rodríguez
24	CPS	Carlos Mora
25	CPS	David Saura
26	CPS	Jesus Alba
27	CPS	Daniela Segura
28	CPS	Marta Muñoz

Table 4: List of workshop participants

8.1 Methodology

Regarding the working methodology, an agenda was defined spanning from 11:00 hrs to 17:00 hrs. The session was organized into three (3) main blocks:

1. Introduction phase: context of the work carried out and presentation of the results obtained from the interviews, along with the proposed use cases associated with each pilot.
2. Interactive working session: active group work to establish the use cases associated with each pilot and to define them in agreement with the stakeholders involved. Each use case contains its objective; data catalog taking into account the main source; and KPIs contextual and operational according to the Grant Agreement and those agreed upon jointly with stakeholders.
3. Summary and conclusions, showing the definitive use cases selected for each pilot.

DS4MOBMODELS >> Connecting Europe Facilities (CEF)

September 25			
Time	**Session**	**Lead**	**Content**
11:00-11:30	Registration		Chack-in and reception
11:30-12:30	Summary of Use Cases	Jesus Alba (CPS)	Check-in and reception 37 selected cases 9 prioritized cases Partners covered (all members) Pilot proposals
12:30-13:30	1st Group Activity (Split into 4 groups	Working Group	About the cases prioritized by sector Critical evaluation of available data in each case Reassessment of prioritized cases Sharing results
13:30-15:00	**Lunch Break – 1.5 hour**		
15:00-16:00	2nd Group Activity (2 groups: PT+Sus	Working group	About the cases prioritized by sector Critical evaluation of available data in each case Reassessment of prioritized cases Sharing results
16:00-17:00	Debate and Conclusions	Jesus Alba (CPS)	Discussion on the cases Discussion on the pilots Definition of waiting list Conclusions New meeting commitment and next steps

Image 2: Workshop schedule

8.1.1 Introduction phase

In this phase, the preliminary work carried out during the interviews was presented, along with the most relevant use cases with particular emphasis on those proposed for the different project pilots, which would be further developed in the next phase.

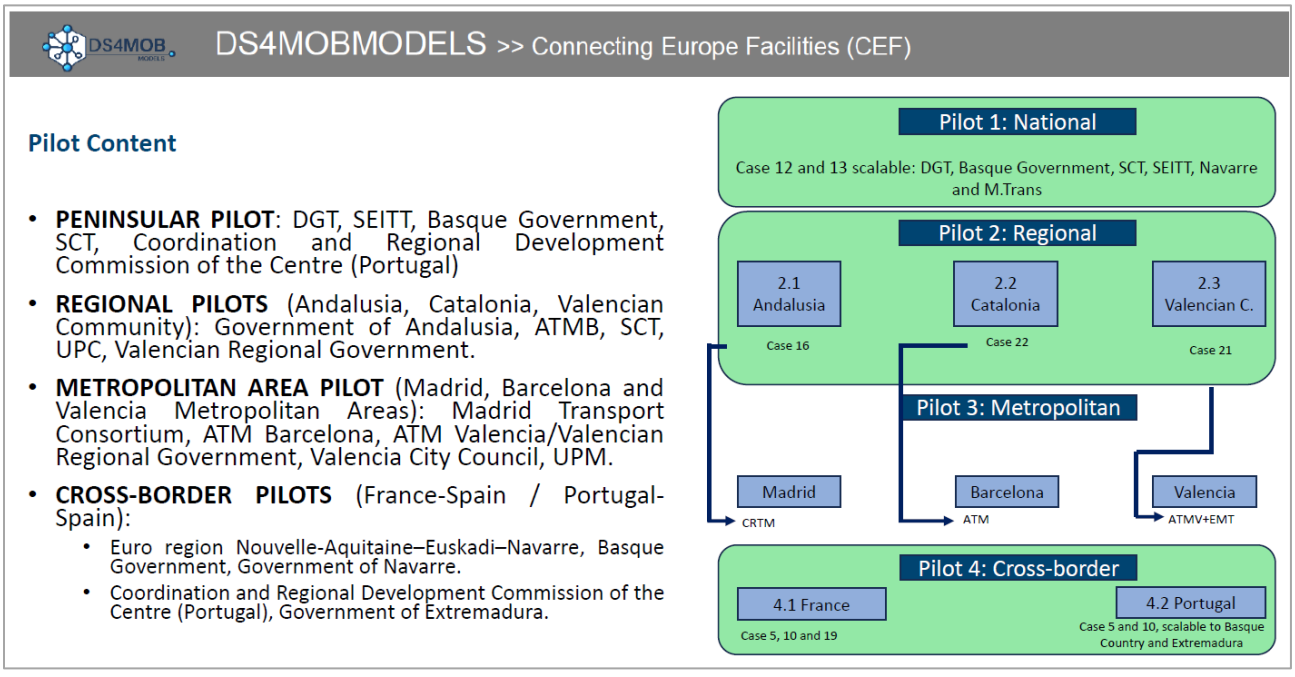


Image 3: Presentation of pilot content in the workshop

8.1.2 Interactive working session

Four sector-based working groups were established, each focused on defining the use cases relevant to their area. The main contributions from each group are presented below, associated with the use cases they worked on:

8.1.2.1 Working Group 1: Traffic

Participants:

INGARTEK	Isidro Arrieta
UPC	Lidia Montero
SEITT	Simone Montefiori
AIMSUM	Toni Pellicer
CPS	Carlos Mora
CPS	Daniella Rodríguez

Results by Use Case:

- **New use case: Winter Service Management: Emergency Parking for Heavy Vehicles**

A consensus was reached on its relevance and usefulness for development within the national pilot. Participants agreed that use cases should be reusable across different stakeholders and should allow for evolution throughout the project.

However, the group reached a final agreement that Use Case 12, as renamed, is a valid and valuable option for the national pilot, provided that it is multi-stakeholder, scalable, and contributes to the overall KPI framework.

- **Use Case 13: Congestion Monitoring on Highways and Main Roads**

This use case was considered a priority for SEITT. SEITT expressed willingness to provide existing data, although they currently do not extensively exploit it. The Basque Government noted that use cases 11 to 15, including those related to public transport, have already been implemented in their region. They showed interest in scaling their mesoscopic models to Navarra and the border area with France.

The DGT was identified as a key stakeholder for this use case, and the availability of their data is essential for its successful development. It was concluded that this is a valid and comprehensive use case, allowing the pilot to operate on a national scale. This use case contributes significantly to the broader objectives of the national pilot project, especially when combined with other use cases and pilot projects.

Both Use Cases 12 and 13 were recognized as relevant and feasible for the national pilot, provided that their definitions are adjusted to meet the multi-stakeholder, reusable, and KPI-aligned criteria discussed during the workshop.

A detailed list of required data, including technical specifications (schemas, sources, protocols, frequency, granularity, formats, etc.), will be developed under WP3.1. It is essential to engage all relevant stakeholders, particularly the DGT, which was absent during the workshop, to finalize the information and data necessary to execute the defined use cases.

8.1.2.2 Working Group 2: Freight transport

Participants:

DG Movilidad y Transportes, Junta de Extremadura	Cristóbal Maza
Divisão de Cooperacão Territorial, CCDRC - Comissão de Coordenação e Desenvolvimento Regional do Centro, I. P. (Portugal)	Lídia Martins
Catedrático de Transportes, TRANSyT UPM	Andrés Monzón
CPS	David Saura
TEIRLOG	Ingrid Castellar

Results by Use Case:

- **Use Case 10: Cross-border freight transit analysis**

It was proposed to rename this case as "Analysis of Cross-Border Freight Flows in the 2 Cross-Border Pilot Projects: Spain-Portugal and Spain-France". This use case will be applied in both cross-border pilots and will analyze both the current freight flow situation and the expected impact of new cross-border infrastructure developments.

Spain-Portugal

Currently, there is no high-capacity road infrastructure connecting Extremadura (Spain) and the Central Region of Portugal. Existing links rely exclusively on secondary roads, which support very limited freight traffic. However, a new motorway connection project—comprising the EX-1 and A-23 routes between Coria (Spain) and Monfortinho (Portugal)—is under development. This infrastructure has the potential to absorb a significant share of freight traffic between Madrid and Lisbon, offering a faster and toll-free alternative route.

Use Case 18 (Freight Emissions) was also identified as highly relevant and complementary to this analysis.

Spain-France

"Analysis of Current and Future Cross-Border Freight Flows between New Aquitaine, Basque Country, and Navarra." The same ES-PT approach is replicated.

- Focus on the Atlantic TEN-T corridor, especially the Irun crossing, with specific interest from New Aquitaine.
  - Navarra, although not included in the Grant Agreement, showed great interest in participating and including the analysis of the TEN-T network in its environment (Pamplona).
  - It is proposed to leverage the Basque Country's mesoscopic model and extend it to the other two regions.
  - Aquitaine's interest in analyzing secondary border crossings required by the EU, where there is currently no data.
  - It was suggested to conduct spot counts or install sensors, if allowed by the grant agreement or if external data can be acquired.

Use Cases 10 (Cross-Border Freight Flows) and 18 (Freight Emissions) are considered highly relevant for both cross-border pilot areas—Spain–Portugal and Spain–France—due to their strategic value in supporting coordinated logistics planning and ecological transition. The analysis will focus on key TEN-T corridors and border crossings, leveraging existing transport models and identifying data gaps, particularly in secondary crossings. Given the expressed interest from regions not initially included in the Grant Agreement (Navarre and Alentejo), their potential incorporation will be further assessed.

To advance implementation, bilateral technical meetings will be held, and a detailed data requirements list will be developed to ensure feasibility and alignment across involved stakeholders.

8.1.2.3 Working Group 3: Sustainability

Participants:

UPM	Allison Fernandez Lobo
SEITT	Pablo Boyero Gonzalez
Infonet	Alberto Garabato Sixto
GVA	Manuel Ríos Pérez
GVA	Jose Moltó
CPS	Daniela Segura
CPS	Jesús Alba

Results by Use Case:

- **Use Case 16: Evaluation of emissions from transport**
  Identified as the use case to be developed within the Andalusia regional pilot. The region provides road intensity data on its own network, enabling the estimation of transport-related emissions
- **Use Case 19: Electric Vehicle Charging Infrastructure**
  Aimed at analyzing and optimizing the national electric vehicle charging network. It has been defined as a use case of interest for both cross-border pilots with France and Portugal, with the main data sources and variables identified.
- **Use Case 21: Low Emission Zone Monitoring**
  Focused on tracking transport activity and sustainability indicators in LEZs. Selected for implementation in the Valencia regional pilot, with data sources, analytical models, and KPIs clearly outlined.
- **Use Case 22: Active Mobility Monitoring**
  Targeted at analyzing pedestrian and cyclist mobility in metropolitan and urban areas. Designated for the Catalonia regional pilot, with data collection to be coordinated with the Servei Català de Trànsit.

In summary, the working group has defined multiple use cases that are well aligned with both regional and cross-border pilot objectives, ensuring a balanced and strategic implementation across geographies.

8.1.2.4 Working Group 4: Public Transport

Participants:

INGARTEK	Isidro Arrieta
UPC	Lidia Montero
SEITT	Simone Montefiori
AIMSUM	Toni Pellicer
CPS	Marta Muñoz
CRTM	Soledad Perez-Galdos
CRTM (TEKIA)	Marisa González
NTT DATA	Julián Larios
NTT DATA	Iñigo Bolado

Results by Use Case*:*

- **Use Case 3: Intermodal Nodes.**
  Defined as a primary use case for the Madrid Metropolitan pilot. The analysis focuses on three potential locations: Majadahonda, San Sebastián de los Reyes, and Aranjuez (along the A-1, A-6, and A-4/R-4 corridors). Relevant datasets, modelling approaches, and KPIs have been identified. The case is considered scalable to Valencia and Barcelona, depending on data availability.
- **Use Case 4: Real-time Information for Public Transport Users.**
  Significant barriers were identified, including lack of real-time data for all modes and insufficient interoperability between systems operated by different providers. Although initially of interest to several regions, the lack of data prevents its development within any of the pilots at this stage.
- **Use Case 5: Cross-Border Passenger Transport Analysis**
  Aimed at evaluating mobility flows between Extremadura and Portugal, and comparing them with public transport availability and infrastructure. Work has focused on identifying relevant and available data sources.

Overall, progress has been made on two use cases, aligned with the metropolitan and cross-border pilots. Scalability of these use cases is tied to the ability to feed the models with existing or easily accessible data sources (e.g., ticketing systems, mobile phone data, operator authorisations).

9 Definitive use cases per pilot

The work carried out during the interactive session enabled the definition and allocation of the previously discussed use cases to each of the project pilots, in line with Tasks 2.2, 2.3, 2.4, and 2.5 of the Grant Agreement. The definition of each use case follows the methodology presented during the workshop, which focuses on stakeholder collaboration and alignment with project-level KPIs.

9.1 Definition of the use cases of the National pilot



Image 4: Stakeholders involved. National pilot

9.1.1 NEW USE CASE. Winter Service Management: Emergency Parking for Heavy Vehicles

Objective:

To implement an automatic system for redirecting heavy vehicles to emergency parking areas during snow alerts, using driver notifications via Variable Message Panels (VMPs).

Scenario and context of application:

The use case is primarily applicable in northern regions of Spain, on roads equipped with emergency parking areas for heavy vehicles, as well as nearby main roads of strategic interest.

Data catalog:

DATA CATALOG	DATA SOURCE
Emergency parking capacity	Open Data ◆
Real-time availability/occupancy of spaces in emergency parking	Administration ◆
Characteristics of roads of interest	Administration[(a)] ●
Length	
Number of lanes	
Speed limits	
Traffic intensity on roads of interest	Administration ▲
Light vehicles	
Heavy vehicles	
Floating Car Data	Private ◆
Average speed	
Roadworks	
Congestion indicators	
Active incidents	
Accidents	

DATA CATALOG	DATA SOURCE
Roadworks	Administration ◆
Closed roads/lanes	
Active restrictions	
Location of Variable Message Signs	Administration ◆
Typology of Variable Message Signs	Administration ◆
Real-time operation of Variable Message Signs	Administration ◆
Meteorological data	Open Data ▲
Snowfall alerts	
Snowfall historical data	
Floating Phone Data	Private ●
Emissions data	Open Data ▲
Charging infrastructure data	Administration ▲
Location of logistics platforms	Administration ▲
Cross-border public transport supply	Administration ▲
Traffic counts at cross-border roads	Administration ▲

Table 5: Data catalog new use case

◆ *Low: applied when the number of cases is between 1 and 2.*
▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*
(a) This data can alternatively be obtained from Geographic Information Systems (GIS) such as OpenStreetMap.

Model applied:

A real-time monitoring and machine learning–based prediction model will be adapted subject to data availability, capable of forecasting heavy vehicle flows during adverse weather conditions and informing users through variable message signs (VMS).

Security and privacy:

Raw data will not be accessible to stakeholders and will only be collected under active snow alerts. The model will only display anonymized results via the VMPs.

KPIs:

The following Key Performance Indicators are defined for this use case to evaluate its effectiveness and alignment with project objectives:

#	KPI	DATA	CALCULATION METHOD	UNIT	SO
1	Adequacy of the national transport network to the main origin-destination relationships for passengers and goods included in the TEN-T corridors (core and comprehensive)	Traffic intensity on roads of interest, Characteristics of roads of interest	Ratio of intensity to capacity --> Level of Service	A-F	**(O)
2	Capacity of different sections of the TEN-T corridors of intercity or metropolitan character	Characteristics of roads of interest	Capacity of the analyzed roads	Number of vehicles	**(O)
3	Transport demand of the main national intermodal	Traffic intensity on roads of interest	Intensities on the analyzed roads	Number of vehicles	**(C)

#	KPI	DATA	CALCULATION METHOD	UNIT	SO
	nodes included in the core TEN-T network				
4	Pollution generated in the core and comprehensive TEN-T corridors	Traffic intensity on roads of interest, Inventory and typology of vehicle fleet, Emission factors (COPERT, HBEFA), Temporal evolution of vehicle fleet, Average speeds by section	Vehicle intensity by typology × consumption by vehicle typology	veh × (g/km)	**(O)
5	Density of electric or hydrogen chargers in the TEN-T corridors	Current location of chargers; Number of chargers at each location; Characteristics of roads of interest	Number of chargers / km of roads of interest	Chargers/km	**(O)
6	Density of logistics platforms in the TEN-T corridors	Location of logistics platforms on the roads of interest	Location of logistics platforms on the roads of interest / km of roads of interest	Units/km	**(O)
7	Density of secure parking facilities for freight vehicles in the TEN-T corridors	Emergency parking capacity	Total number of available spaces in emergency parking / km of roads of interest	Parking lots/km	**(O)
8	Cross-border public transport services between Spain and France and Portugal of the TEN-T core corridors: Mediterranean, Central, Atlantic, Cantabrian-Mediterranean and Atlantic-Mediterranean	Number of travelers per day crossing the border on public transport lines	Daily demand of lines crossing the border	Number of vehicles	**(C)
9	Heavy duty and light vehicles crossing the borders between Spain and France and/or Portugal along the core TEN-T corridors	Traffic intensity on roads of interest	Traffic intensity on roads of interest, light and heavy vehicles	Number of vehicles	**(C)
10	Main origin-destination nodes in the Spanish territory for freight transport	Floating Phone Data	FPD data for OD matrix	OD Matrix	**(O)
11	Availability of heavy vehicle data in weather alert situations across all administrations	Traffic intensity on roads of interest	Administrations providing data / Total participating administrations in the use case	%	*(O)
12	Variable message signs operational status	Real-time operation of Variable Message Panels	Total operational panels of interest / Total panels of interest	%	*(O)
13	Number of heavy vehicles detected at sensors beyond emergency areas during snowfall alerts	Traffic intensity on roads of interest	Heavy vehicles detected beyond the parking area / Heavy vehicles detected before the parking area	%	*(O)

Table 6: KPIs Data catalog new use case

S.O. (Select Origin)
*** Expected in Grant Agreement*
**Common proposal with stakeholders*
C: Contextual; O: Operational

9.1.2 UC13: Highway and main road congestion monitoring

Objective:

To provide real-time assessment of traffic conditions on Spain's primary road corridors for predictive traffic management.

Scenario and context of application:

The use case is focused on Spain's main corridors, particularly those within the core and comprehensive TEN-T network. It aims to support traffic monitoring at national level.

Data Catalog:

DATA CATALOG	DATA SOURCE
Characteristics of roads of interest	Administration[(a)] ●
Length	
Number of lanes	
Speed limits	
Location of detectors on roads of interest	Administration ◆
Location of toll sections of interest	Administration ◆
Length	
Number of lanes	
Speed limits	
Traffic intensity on roads of interest	Administration ▲
Light vehicles	
Heavy vehicles	
Historical traffic intensities on roads of interest	Administration ▲
Light vehicles	
Heavy vehicles	
Floating Car Data	Private ●
Average speed	
Roadworks	
Congestion indicators	
Active incidents	Administration ◆
Accidents	
Roadworks	
Closed roads/lanes	
Active restrictions	
Meteorological data	Open Data ▲
Floating Phone Data	Private ●
Connected vehicle data	Private ▲
Special Traffic Operations calendar	Open Data ◆
Emissions data	Open Data ▲
Charging infrastructure data	Administration ▲
Location of logistics platforms	Administration ▲
Cross-border public transport supply	Administration ▲
Traffic counts at cross-border roads	Administration ▲

Table 7: Data catalog use case 13

◆ *Low: applied when the number of cases is between 1 and 2.*
▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*
(a) This data can alternatively be obtained from Geographic Information Systems (GIS) such as OpenStreetMap.

Model applied:

The proposed model will process data in real time and perform predictive analysis based on historical and live traffic information, with the aim of anticipating short-term congestion periods and supporting real-time decision-making.

Security and Privacy:

All raw data is used exclusively for modelling, kept confidential, outputs are aggregated and anonymized, and data use complies with GDPR and public sector information reuse regulations.

KPIs:

The following Key Performance Indicators are defined for this use case:

#	KPI	DATA	CALCULATION METHOD	UNIT	SO
1	Adequacy of the national transport network to the main origin-destination relationships for passengers and goods included in the TEN-T corridors (core and comprehensive)	Traffic intensity on roads of interest, Characteristics of roads of interest	Ratio of intensity to capacity --> Level of Service	A-F	**(O)
2	Capacity of different sections of the TEN-T corridors of intercity or metropolitan character	Characteristics of roads of interest	Capacity of the analysed roads	Number of vehicles	**(C)
3	Transport demand of the main national intermodal nodes included in the core TEN-T network	Traffic intensity on roads of interest	Intensities on the analysed roads	Number of vehicles	**(C)
4	Pollution generated in the core and comprehensive TEN-T corridors	Traffic intensity on roads of interest, Inventory and typology of vehicle fleet, Emission factors (COPERT, HBEFA), Temporal evolution of vehicle fleet, Average speeds by section	Light vehicle intensity × average consumption of light vehicles + Heavy vehicle intensity × average consumption of heavy vehicles	veh × (g/km)	**(O)
5	Density of electric or hydrogen chargers in the TEN-T corridors	Current location of chargers; Number of chargers at each location; Characteristics of roads of interest	Number of chargers / km of roads of interest	Chargers/km	**(O)
6	Density of logistics platforms in the TEN-T corridors	Location of logistics platforms on the roads of interest	Location of logistics platforms on the roads of interest / km of roads of interest	Units/km	**(O)
7	Density of secure parking facilities for freight vehicles in the TEN-T corridors	Emergency parking capacity	Total number of available spaces in emergency parking / km of roads of interest	Parking lots/km	**(O)
8	Cross-border public transport services between Spain and France and Portugal of the TEN-T core corridors: Mediterranean, Central, Atlantic, Cantabrian-Mediterranean and Atlantic-Mediterranean	Number of travelers per day crossing the border on public transport lines	Daily demand of lines crossing the border	Number of vehicles	**(C)
9	Heavy duty and light vehicles crossing the borders between Spain and France and/or Portugal along the core TEN-T corridors: Mediterranean, Central, Atlantic, Cantabrian-Mediterranean and Atlantic-Mediterranean	Traffic intensity on roads of interest	Number of vehicles by type (heavy/light)	Number of vehicles	**(C)

#	KPI	DATA	CALCULATION METHOD	UNIT	SO
10	Main origin-destination nodes in the Spanish territory for freight transport	Floating Phone Data	FPD data for OD matrix	OD Matrix	**(O)
11	Availability of detector data by corridor	Traffic intensity on roads of interest, Historical intensities on roads of interest, Location of detectors on roads of interest	Percentage of information provided every 24 hours per corridor	%	*(C)
12	Traffic prediction accuracy per corridor	Traffic intensity on roads of interest	Calculated traffic intensity / Actual traffic intensity on roads of interest	%	*(C)

Table 8: KPIs use case 13

S.O. (Select Origin)
*** Expected in Grant Agreement*
**Common proposal with stakeholders*
C: Contextual; O: Operational

9.2 Definition of the use cases of the regional pilots



Image 5: Stakeholders involved. Regional pilots

9.2.1 ANDALUSIA - UC16: Transport emissions evaluation

Objective:

To obtain detailed and spatialized data on transport-related emissions, disaggregated by transport type, mode, and distance travelled, and to determine the share of emissions attributable to transport modes under regional responsibility, in order to support regional transport planning and the evaluation of sustainability and environmental impact mitigation policies.

Scenario and context of application:

The model is applied to the regional (autonomous) road network of Andalusia, with a particular focus on the interurban network and regionally relevant corridors. The analysis does not aim to achieve an urban-level level of detail, but rather adopts an approach consistent with the regional scale, suitable for the aggregated assessment of traffic flows and emissions. The approach is potentially scalable to other autonomous communities, such as the Basque Country and Extremadura, depending on data availability.

Data catalog:

DATA CATALOG	DATA SOURCE
Characteristics of roads of interest	Administration
Length	
Number of lanes	
Speed limits	
Autonomous road hierarchy	

DATA CATALOG	DATA SOURCE
Average travel speed	
Traffic intensity on roads of interest	Administration[a] ▲
Light vehicles	
Heavy vehicles	
Historical traffic intensities on roads of interest	Administration
Light vehicles	
Heavy vehicles	
Seasonal variation of traffic	
Floating Phone Data	Private ●
Household Mobility Surveys (EDM)	Private ◆
Trip origins and destinations	
Modal split	
Trip purposes	
Trip frequency	
Vehicle fleet data	Open Data ▲
Public transport vehicles by fuel type	
Public transport vehicles by age	
Private vehicle fleet composition	
Commercial vehicle fleet composition	
Emissions data	Open Data ▲
Public transport supply data	Open Data ◆
Number and capacity of interchange nodes	Open Data ◆
Charging infrastructure data	Administration ▲
Freight transport data	Private ▲
Port facilities data	Open Data ◆

Table 9: Data catalog use case 16

◆ *Low: applied when the number of cases is between 1 and 2.*
▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*

(a) This data can alternatively be obtained from Geographic Information Systems (GIS) such as OpenStreetMap.

Model applied:

The analysis will be based on an existing model, which will allow the assessment of the current situation and the comparison of alternative scenarios at a regional scale. The model is intended for strategic and aggregated analysis and is not designed for real-time decision-making. For this specific case study, GIS tools will be implemented to support the spatial analysis and visualisation of results.

Security and Privacy:

All raw data is used exclusively for modelling, kept confidential, outputs are aggregated and anonymized, and data use complies with GDPR and public sector information reuse regulations.

KPIs:

The following Key Performance Indicators are defined for this use case:

#	KPI	DATA	CALCULATION METHOD	UNIT	SO
1	Adequacy of the public transport network to the main regional origin-destination relationships through the TEN-T (core and comprehensive) corridors	Mobile phone data (O-D) and Household Mobility Surveys (EDM) focused on TEN-T disaggregated by typology, public transport supply in the network of interest (Number of daily services and vehicle capacity)	(Public Transport Capacity offered) / (Total regional public transport demand)	Ratio (Desirable ≥1.0)	**(O)

#	KPI	DATA	CALCULATION METHOD	UNIT	SO
2	Capacity of different TEN-T sections of interurban character channelling regional movements	Characteristics of roads of interest	Capacity of the analysed roads	Number of vehicles	**(C)
3	Occupancy rate of the parking lots of the ports assigned to the Paso del Estrecho Special Operation (Crossing the Strait Operation or Marhaba Operation)	Vehicles detected in waiting areas (from real-time data with AI through pavement sensors or cameras), Total capacity of waiting area spaces	Traffic intensity on adjacent roads / Total port parking occupancy	%	**(O)
4	Main regional freight origin-destination relations	Mobile phone data (O-D) filtered for cargo vehicles	FPD data for OD matrix	OD Matrix	**(C)
5	Pollution generated in the basic and comprehensive TEN-T corridors of the region	Emission factors (COPERT, HBEFA), km of interest in TEN-T	gCO_2/km per segment of the TEN-T basic and comprehensive network	gCO_2/km	**(O)
6	Modal interchange nodes in the core network	Intermodal transport infrastructure data, public transport service data	Number and capacity of interchange nodes	Units	**(C)
7	Density of electric or hydrogen chargers in the TEN-T corridors	Location of charging stations, Road network data	Number of charging points per km of TEN-T corridor	Charging points/km	**(O)
8	Density of logistics platforms in the TEN-T corridors	Location of logistics platforms, Road network data	Number of logistics platforms per km² of TEN-T corridor area	Platforms/km²	**(O)
9	Density of secure parking facilities for freight vehicles in the TEN-T corridors	Location of secure parking areas, Road network data	Number of secure parking facilities per km of TEN-T corridor	Facilities/km	**(O)
10	Regional fleet electrification	Public transport fleet quantity by fuel type	Number of electric buses / Total number of buses	%	*(O)
11	Average CO_2 emissions per passenger-km	Traffic volume data, Vehicle occupancy data, Emission factors	Total CO_2 emissions / (Number of passengers × Distance travelled)	gCO_2/passenger-km	*(O)
12	Average CO_2 emissions per ton-km (freight)	Freight volume data, Emission factors	Total CO_2 emissions / (Tons of freight × Distance travelled)	gCO_2/ton-km	*(O)
13	Total transport related CO_2 emissions	Traffic volume data, fleet composition data (by vehicle type and fuel)	Sum of CO_2 emissions generated by all transport models over the analysed network or corridors	t CO_2	*(O)

Table 10: KPIs use case 16

S.O. (Select Origin)
*** Expected in Grant Agreement*
**Common proposal with stakeholders*
C: Contextual; O: Operational

9.2.2 CATALONIA - UC22: Active mobility monitoring

Objective:

Active mobility monitoring through several indicators related to travel patterns in sustainable modes such as walking, cycling, etc.

Scenario and context of application:

The use case will be applied in areas of special interest to the Servei Català de Trànsit (SCT), where policies promoting sustainable and active mobility are being considered or implemented. These areas may include urban centers, low emission zones (LEZs), and corridors with significant potential for modal shift towards active travel. Primarily, the methodology could be applied in a city like Barcelona.

Data catalog:

DATA CATALOG	DATA SOURCE
Floating Phone Data	Private / Open Data ●
Kilometers of cycling network	Administration ◆
Kilometers of road network	Open Data ◆
Location of loading/unloading zones	Administration ◆
Operating hours of loading/unloading zones	Administration ◆
Location of cargo distribution centers	Open Data ◆
Mobility surveys	Open Data (a) ▲
Traffic intensity on roads of interest	Administration ▲
Light vehicles	
Heavy vehicles	
Inventory and typology of vehicle fleet	Administration/Open Data ◆
Average speeds by section	Administration /Open Data ◆
Demand at transport interchanges	Administration ◆
Current location of electric or hydrogen chargers	Private ◆
Emissions data	Private(b) ▲
Location of logistics platforms	Administration ◆
Emergency parking	Open Data ◆
Location and capacity	Administration
Real-time availability/occupancy of spaces	Administration
Emissions data	Open Data ▲
Freight transport data	Open Data/Private ▲
Location of the main trip attractors' centers	Administration ◆

Table 11: Data catalog use case 22

◆ *Low: applied when the number of cases is between 1 and 2.*
▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*
(a) This data can alternatively be obtained from urban mobility plans or urban geoportal
(b) This data can alternatively be obtained from urban mobility plans

Model applied:

The indicators will be calculated in absolute or comparative terms based on different types of models. These models will be implemented using GIS tools and 4-stage transport model.

Security and Privacy:

All raw data is used exclusively for modelling, kept confidential, outputs are aggregated and anonymized, and data use complies with GDPR and public sector information reuse regulations.

KPIs:

The following Key Performance Indicators are defined for this use case:

#	KPI	DATA	CALCULATION METHOD	UNIT	SO
1	Levels of service of the different TEN-T sections of intercity or metropolitan character channelling regional movements	Traffic intensity on roads of interest (TEN-T sections of intercity or metropolitan), Characteristics of roads of interest	Ratio of intensity to capacity --> Level of Service	A-F	**(O)
2	Main origin-destination of heavy vehicles circulating along the border with France	Heavy vehicle traffic intensity; Floating Phone Data	OD Matrix	Unit	**(O)
3	Traffic intensities on the core TENT-T corridor in Catalonia	Traffic intensity on roads of interest (TENT-T corridor in Catalonia)	Traffic intensity	Number of vehicles	**(C)
4	Main goods origin-destination relations	Location of loading/unloading zones; Operating hours of loading/unloading zones; Location of cargo distribution centers; Delivery company routes	OD Matrix	%	**(O)
5	Pollution generated in the core and comprehensive TEN-T corridors of the region	Traffic intensity on roads of interest, Inventory and typology of vehicle fleet, Emission factors (COPERT, HBEFA), Temporal evolution of vehicle fleet, Average speeds by section	Vehicle intensity by typology × consumption by vehicle typology	gCO_2/km	**(O)
6	Modal interchange nodes in the core network	Demand at transport interchanges	Travel demand at interchange points	Travel demand at interchange points	**(C)
7	Density of electric or hydrogen chargers in the TEN-T corridors	Current location of chargers; Number of chargers at each location; Characteristics of roads of interest	Number of chargers / km of roads of interest	Chargers/km	**(O)
8	Density of logistics platforms in the TEN-T corridors	Location of logistics platforms on the roads of interest; Characteristics of the road of interest	Location of logistics platforms on the roads of interest/Length of the road of interest	Units/km	**(O)
9	Density of secure parking facilities for freight vehicles in the TEN-T corridors	Emergency parking capacity	Total number of available spaces in emergency parking	Number of spaces	**(C)
10	Cycling network	Length of cycling infrastructure; Total length of roads	Length of cycling infrastructure / Total length of roads	%	*(O)

Table 12: KPIs use case 22

S.O. (Select Origin)
*** Expected in Grant Agreement*
**Common proposal with stakeholders*
C: Contextual; O: Operational

9.2.3 VALENCIA - UC21: Low Emission Zone monitoring

Objective:

To obtain air quality and sustainable mobility indicators for monitoring Low Emission Zones (LEZ), in compliance with Royal Decree 1052/2022 and aligned with the data quality objectives of Royal Decree 102/2011 on improving air quality.

Scenario and context of application:

It will be implemented in the city of Valencia, and depending on data availability, it can be scaled to the cities of Castellón, Benidorm, Alicante, and Elche. These municipalities will share data to evaluate the impact of the Low Emission Zone (LEZ) implementation, both before and after.

Data Catalog:

DATA CATALOG	DATA SOURCE
LEZ delimitation	Administration ◆
Municipality surface area	Open Data ◆
Population	Open Data ◆
Characteristics of roads of interest	Administration [a] ●
Length	
Number of lanes	
Speed limits	
Length of pedestrian infrastructure	Administration[a] ●
Bicycle lanes	Administration ◆
Location	
Length	
Historical traffic intensities on roads of interest	Administration[b] ▲
Light vehicles	
Heavy vehicles	
Air quality monitoring stations data	Open Data ◆
Number of vehicles accessing the LEZ	Administration[c] ◆
Mobility surveys	Administration ◆
Traffic counts	Administration[b] ◆
Cars	
Motorcycles	
Bicycles	
Personal mobility vehicles	
Buses	
Environmental labelling of municipal vehicle fleet	Open Data ◆
Age of municipal vehicle fleet	Open Data ◆
Public transport passenger data	Administration[d] ◆
Number of zero-emission buses in circulation	Administration[d] ◆
Public transport line data	Open Data ◆
Routes	
Stops	
Frequencies	
Journey times	
Location and identification of regional and national intermodal nodes	Administration/Public ◆
Freight transport data	Private ▲
Parking location	Administration ◆
Number of parking spaces by type	Administration[e] ◆
Parking occupancy data	Administration[e] ◆
Location of electric charging points	Open Data ▲
Number of electric chargers	Administration ◆
Location of bicycle parking facilities	Administration ◆
Number of bicycle parking facilities	Administration[b] ◆
Location of loading and unloading zones	Administration[b] ◆
Operating hours of loading and unloading zones	Administration[b] ◆
Types of loading and unloading vehicles	Private ◆
Location of cargo distribution centers	Administration ◆
Delivery company routes	Administration/Private ◆
Operational restrictions	Administration ◆
Floating Phone Data	Private ●
Floating Car Data	Private ▲
Number	
Consumption	
Range	
Emission factors	Open Data ▲

Table 13: Data catalog use case 21

◆ *Low: applied when the number of cases is between 1 and 2.*

▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*
(a) This data can alternatively be obtained from Geographic Information Systems (GIS) such as OpenStreetMap.
(b) This data can alternatively be obtained from urban mobility plans or LEZ projects
(c) This data can alternatively be obtained from LEZ projects or hypothetical scenarios
(d) This data can alternatively be obtained from urban mobility plans, LEZ projects or private transport operators
(e) This data can alternatively be obtained from Open Data or urban mobility plans or LEZ projects

Model applied:

The indicators will be calculated in absolute or comparative terms based on different types of models, such as traffic, dispersion, or modal share, among others. These models will be implemented using GIS tools and City transportation models.

Security and Privacy:

All raw data is used exclusively for modelling, kept confidential, outputs are aggregated and anonymized, and data use complies with GDPR and public sector information reuse regulations.

KPIs:

The following Key Performance Indicators are defined for this use case:

#	KPI	DATA	CALCULATION METHOD	UNIT	SO
1	Consistent and standardized data model for interoperability services between urban areas	Municipality data	Type of data provided by each region / Types of data needed	%	**(O)
2	Adequacy of the public transport network to the main Origin-Destination structure	Mobility surveys; Public transport routes	Cluster of public transport line data	%	**(O)
3	Levels of service and capacity of the different TEN-T sections of intercity or metropolitan character	Characteristics of roads of interest; Traffic counts	Level of Service	A-F	**(O)
4	Transport demand of the main regional intermodal nodes and interoperability with National intermodal nodes	Mobility surveys; Public transport line data; Historical traffic intensities	Sum of traffic counts in the areas of interest	Unit	**(O)
5	Demand at transport interchanges	Public transport passenger data	Number of passengers at modal interchange points	Unit	**(C)
6	Demand of the different public transport lines	Public transport passenger data	Number of passengers per public transport line	Unit	**(C)
7	Relationship between the main mobility relationships and public transport routes	Mobility surveys; Traffic counts: buses; Public transport routes; FPD; Connected Vehicle Data	Number of passengers in TP/Total number of passengers	%	**(O)
8	Levels of service in the accesses to the capitals of the metropolitan areas	Characteristics of roads of interest; Traffic counts	Level of Service	A-F	**(O)
9	Number of e-charging stations per inhabitants	Number of electric chargers; Population	Number of electric chargers / Population	%	**(O)
10	Demand for regulated parking	Parking occupancy data	Cluster	Unit	**(O)
11	Main freight origin-destination matrix	Location of loading/unloading zones; Operating hours of	OD Matrix	%	**(O)

#	KPI	DATA	CALCULATION METHOD	UNIT	SO
		loading/unloading zones; Location of cargo distribution centers; Delivery company routes			
12	Urban Freight Distribution (DUM) – LEZ	DUM circulation permits within the LEZ; Access control sensors at LEZ entry points.	Number of DUM vehicles entering the LEZ / time period.	%	**(O)
13	Percentage of zero-emission vehicles	Environmental labelling of municipal vehicle fleet; Traffic counts	Number of vehicles with 0 label / Total number of vehicles	%	*(O)
14	Modal share in active modes	Total and active trips	RMma = RMp + RMb RMp = Walking trips / Total trips (%) RMb = Bicycle trips / Total trips (%)	%	*(O)
15	Provision of charging infrastructure	Location of electric charging points; Number of electric chargers	Number of electric charging points	Unit	*(C)
16	LEZ Carbon Footprint	Vehicle consumption for private and public transport	Carbon Footprint = Activity Data × Emission Factor	%	*(O)

Table 14: KPIs use case 21

S.O. (Select Origin)
*** Expected in Grant Agreement*
**Common proposal with stakeholders*
C: Contextual; O: Operational

9.3 Definition of the use cases of the local/metropolitan pilots

Image 6: Stakeholders involved. Metropolitan pilot.

9.3.1 MADRID - UC3: Intermodal node demand analysis

Objective:

To identify optimal locations for new intermodal public transport nodes within municipal boundaries by integrating: i. Network configuration, ii. Observed and estimated mobility flows, iii. Accessibility and connectivity indicators, iv. Socioeconomic and land use data, v. Potential demand and modal integration feasibility, vi. Availability of suitable land for infrastructure.

Scenario and context of application:

The pilot is initially applied in three areas of the Madrid Metropolitan Region, selected for their strategic position along key motorway corridors and rail axes:

- Majadahonda (A-6 corridor)
- San Sebastián de los Reyes (A-1 corridor)
- Aranjuez (A-4/R-4 corridor)

These locations are closely connected to the Cercanías Renfe commuter rail network and represent opportunities for multimodal transfer hubs including Park & Ride options. It will be scalable to Barcelona and Valencia.

Data Catalog:

DATA CATALOG	DATA SOURCE
Characteristics of roads of interest	Administration [(a)] ●
Traffic intensity on roads of interest	Administration ▲
Floating Phone Data (FPD)	Private ●
Public transport supply: Routes, stops, and schedules	Open Data ◆
Ticketing data: Boarding counts per mode (from CRTM)	Administration ◆
Traffic volumes: Available from regional traffic authorities	Administration ◆
Socioeconomic data: INE datasets on population and employment	Open Data ◆
Land use: Urban development and zoning data (Madrid Regional Urban Planning Portal)	Open Data ◆
Household Mobility Survey (EDM 2018)	Open Data ◆
Points of interest	Open Data ◆
OD Matrix (MITMA)	Administration ◆
Synthetic Survey (CRTM)	Administration ◆
Big Data Contract (CRTM)	Administration ◆
Location of electric charging points	Administration ◆
Regulated parking occupancy data	Administration ◆
Public bicycle system usage data	Administration ◆
Public bicycle stations inventory	Administration ◆
Vehicle fleet composition data	Administration ▲
Emission factors	Open Data ▲
Logistics platforms inventory	Administration ◆

Table 15: Data catalog use case 3

◆ *Low: applied when the number of cases is between 1 and 2.*
▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*

(a) This data can alternatively be obtained from Geographic Information Systems (GIS) such as OpenStreetMap.

Model applied:

The analysis will use a combination of complementary modeling approaches, including:

- Multicriteria Analysis (MCA) to perform comparative assessments of candidate areas.
- Location optimization models, such as p-median and p-center models, to minimize travel distance or time from demand nodes, as well as Location Set Covering Problems (LSCP) to ensure coverage of high-demand areas.
- Machine learning–based predictive models to forecast demand at interchanges, using techniques such as Random Forest and XGBoost.
- Cost–Benefit Analysis (CBA) to prioritize feasible interventions with the highest expected impact.
- Data integration and spatial analysis tools, including GIS-based analysis and accessibility modeling.

Security and privacy:

All raw data is used exclusively for modelling purposes and is kept strictly confidential. The outputs generated are fully aggregated and anonymized to prevent any individual identification. All data processing complies with the General Data Protection Regulation (GDPR) and applicable regulations on the reuse of public sector information.

KPIs:

The following Key Performance Indicators are defined for this use case:

#	KPI	DATA	CALCULATION METHOD	UNIT	SO
1	Demand of the different public transport lines	Travel demand per line	Daily travelers per line connecting with the new intermodal zone	travelers/day	**(O)
2	Relationship between key mobility demands and public transport routes in the central TEN-T corridors through the sharing of mobility data and information	Mobility surveys; PT routes; FPD	Cluster of public transport routes versus main movements	%	**(O)
3	Demand at transport interchanges	Travel demand at interchange points	Travel demand at interchange points	travelers/day	**(O)
4	Number of e-charging stations per inhabitants	Charging points and inhabitants in the study area	Charging points/inhabitants	charging points/1000 inhabitants	**(O)
5	Demand for regulated parking	Traffic counts; Population; Road infrastructure	Cluster	Unit	**(C)
6	Demand for public bicycles	Traffic counts; Population; Cycling infrastructure	Cluster	Unit	**(C)
7	Levels of service in the accesses to the metropolitan areas through predictive and operational models	Characteristics of roads of interest; Traffic counts	Level of service	A-F	**(O)
8	Pollution generated in the main urban nodes of the TEN-T corridors	Traffic intensity in study areas, Inventory and typology of vehicle fleet, Emission factors (COPERT, HBEFA), Temporal evolution of vehicle fleet, Average speeds	Vehicle intensity by typology × consumption by vehicle typology	veh × (g/km)	**(O)
9	Density of logistics platforms in the main urban nodes of the TEN-T corridors	Capacity in logistics platforms	Number of logistics platforms in TEN-T network nodes	Number of logistics platforms	**(O)
10	Traffic levels in Low Emission Zones	Traffic intensity in LEZs	Traffic volume in specific zones	Number of vehicles	**(O)
11	Accessibility coverage	Population distribution	% of population within X meters from a multimodal node	%	*(O)
12	Public transport integration	Multimodal connectivity data	Total number of modes connecting in an intermodal zone	Number of modes	*(O)

Table 16: KPIs use case 3

S.O. (Select Origin)
*** Expected in Grant Agreement*
**Common proposal with stakeholders*
C: Contextual; O: Operational

9.4 Definition of the use cases of the Cross-border pilot

France-Spain. Nouvelle-Aquitaine-Euskadi-Navarre EuroRegion



Image 7: Stakeholders involved. Cross-border pilot.

9.4.1 UC5: Cross-Border Passenger Transport

Objective:

Analyze cross-border passenger mobility between France and Spain to evaluate the adequacy of existing transport services and infrastructure, supporting key indicators on public transport supply, network capacity, and international commuting dynamics.

Scenario and Interaction:

Focus on main cross-border connections between France and Spain.

Data catalog:

DATA CATALOG	DATA SOURCE
Characteristics of roads of interest	Administration [a] ●
Traffic counts at cross-border roads	Administration ▲
Cross-border public transport supply	Administration ▲
Cross-border road infrastructure	Administration ◆
Bilateral mobile phone data (ES-PT)	Private ◆
Vehicle fleet composition data	Administration ▲
Emission factors	Open Data ▲
Vehicle registration/nationality data	Administration ◆
Secure parking facilities inventory	Administration ▲
Location of electric charging points	Administration ▲

Table 17: Data catalog use case 5 (France-Spain)

◆ *Low: applied when the number of cases is between 1 and 2.*
▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*
(a) This data can alternatively be obtained from Geographic Information Systems (GIS) such as OpenStreetMap.

Model applied:

Cross-Border Mobility Analytical Model, comprising:

- Analysis based on mobile phone data to identify main mobility flows between France and Spain.
- Integration of traffic count data and public transport supply and demand.
- Temporal analysis of typical travel days and peak periods.
- The Transboundary Mobility Flow Model maps commuting patterns and infrastructure needs.

- A Data Interoperability Model ensures secure, compliant data exchange between Spanish and French institutions and systems.

Security and Privacy:

All raw data is anonymized and used solely for modelling purposes, ensuring compliance with GDPR and public sector information reuse regulations. Outputs are aggregated and do not allow user identification.

KPIs:

The following Key Performance Indicators are defined for this use case:

#	KPI	DATA	CALCULATION METHOD	UNIT	S.O.
1	Capacity of the different TEN-T sections of interurban or metropolitan character	Characteristics of metropolitan roads of interest	Traffic intensity and Characteristics of metropolitan roads of interest	A-F	**(C)
2	Intensity of light and heavy vehicles on the TEN-T and those crossing the border between the two countries	Traffic intensity at border crossing points	Traffic intensity at border crossing points	Number of vehicles	**(C)
3	Pollution generated on the core and comprehensive TEN-T corridors	Traffic intensity on metropolitan roads of interest, Inventory and typology of vehicle fleet, Emission factors (COPERT, HBEFA), Temporal evolution of vehicle fleet, Average speeds by section	Vehicle intensity by typology × consumption by vehicle typology	veh × (g/km)	**(O)
4	Nationality of vehicles circulating at the border crossing points	Country of origin per vehicle, license plate reading	Number of vehicles according to country of registration	Number of vehicles	**(C)
5	Cross-border public transport services running on the TEN-T corridors	Number of travelers per day crossing the border on public transport lines	Daily demand of lines crossing the border	Travelers/day	**(C)
6	Location of secure car parks on the TEN-T corridors	Location of secure parking in the area of cross-border crossings	Location (coordinates) of secure parking	Number of parking facilities	**(O)
7	Location of e-charging stations on the TEN-T corridors	Location of charging stations in the area of cross-border crossings; Characteristics of cross-border crossing roads	Location (coordinates) of charging points	Number of charging points	**(O)
8	Cross-border passenger volume	Passenger counts at border crossing points by mode	Total number of passengers crossing the border per time period by transport mode	Passengers/day	*(O)
9	Cross-border service frequency	Public transport timetables for cross-border services	Average number of cross-border services per day	Services/day	*(O)

Table 18: KPIs use case 5 (France-Spain)

*** Expected in Grant Agreement*
**Common proposal with stakeholders*
C: Contextual; O: Operational

9.4.2 UC10: Cross-border freight transit analysis

Objective:

Analysis of freight transit across the Spain–France border, aimed at improving logistic coordination and interoperability between both territories.

Scenario and Interaction:

Focus on main cross-border connections between France and Spain.

Data Catalog:

DATA CATALOG	DATA SOURCE
Freight transport surveys	Administration ◆
CMR Convention data (regulated commercial contract compliance). Future application that channels data	Private ●
Freight flow data (volume, routes, origin-destination)	Administration ◆
Types of goods (general conventional, refrigerated ATP, Dangerous ADR, Car carrier, Steel, other)	Administration/Private ●
Historical evolution of data on goods flows	Administration ●
Traffic intensity at border crossings	Administration ◆
Light vehicles	
Heavy vehicles	
Existing models: Spanish National Transport Model	Administration ◆
Planned infrastructure projects and studies relevant to new or upgraded corridors	Administration ◆
Factors for projecting goods flows: GDP, fleet type (age, characteristics), modal share	Administration ●
Cross-border public transport routes and schedules	Administration ▲
Vehicle nationality at border points	Administration ◆
Road infrastructure characteristics	Administration ●
Vehicle fleet composition data, age of the fleet	Administration ▲
Emission factors	Open Data ▲
Fuel	
Distance travelled	
Load occupancy rate	
Vehicle type	
Age of the vehicle	
Secure parking facilities inventory	Administration ▲
Location of electric charging points	Administration ▲

Table 19: Data catalog use case 10 (France-Spain)

◆ *Low: applied when the number of cases is between 1 and 2.*
▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*

Model applied:

Development of a freight traffic forecasting model for the analysed corridors. This model will estimate future freight flows under different infrastructure and policy scenarios. It may incorporate elements from existing national transport models for consistency and comparability.

Security and Privacy:

All input data will be used exclusively for modelling purposes and handled confidentially. Output results will be anonymised and aggregated. Compliance with GDPR and French/Spanish data protection and reuse frameworks is ensured.

KPIs:

The following Key Performance Indicators are defined for this use case:

#	KPI	DATA	CALCULATION METHOD	UNIT	S.O.
1	Capacity of the different TEN-T sections of interurban or metropolitan character	Characteristics of roads of interest	Capacity of the analyzed roads	Number of vehicles	**(C)
2	Intensity of light and heavy vehicles on the TEN-T corridors and those crossing the border between the two contries	Traffic intensity on roads of interest	Traffic intensity on roads of interest, light and heavy vehicles	Number of vehicles	**(C)
3	Pollution generated on the core and comprehensive TEN-T corridors	Traffic intensity on roads of interest, Average consumption of vehicle fleet by type	Light vehicle intensity × average consumption of light vehicles + Heavy vehicle intensity × average consumption of heavy vehicles	veh × (g/km)	**(O)
4	Nationality of vehicles circulating at crossing borders	Traffic intensity on roads of interest	Traffic intensity on roads of interest	Number of vehicles by country	**(C)
5	Cross-border public transport services running on the TEN-T corridors	Number of travelers per day crossing the border on public transport lines	Daily demand of lines crossing the border	Travelers/day	**(C)
6	Location of secure car parks on the TEN-T corridors	Location of emergency parking areas; Characteristics of roads of interest	Current location of chargers on each road of interest / Total roads of interest analyzed	%	**(O)
7	Location of e-charging stations on the TEN-T corridors	Current location of chargers; Characteristics of roads of interest	Location of electric charging stations on each road of interest / Total roads of interest analyzed	%	**(O)
8	Corridor coverage	Characteristics of roads of interest; Traffic intensity on roads of interest	Percentage of analyzed corridor length (km) with freight flow estimates and infrastructure characterization	%	*(O)
9	Border crossing bottleneck identification	Traffic intensity border points and corridor segments	Number of critical border points and corridor segments with capacity constraints identified	Number of border points and corridor segments	*(O)
10	Tons transported by road crossing the border	Tonnes per day in cross-border sections	Total tons per border section	Nº tons	*(O)
11	Annual growth	Tonnes evolution per year	% annual growth in tonnes	%	*(O)
12	Main hubs for the generation/attraction of goods	O/D Volumes	O/D by province/country	% tons	*(O)

Table 20: KPIs use case 10 (France-Spain)

*** Expected in Grant Agreement*
**Common proposal with stakeholders. C: Contextual; O: Operational*

9.4.3 UC18: Freight emissions analysis

Objective:

Calculate emissions generated by freight transport on key cross-border corridors.

Scenario and Interaction:

Focus on main cross-border connections between France and Spain.

Data catalog:

DATA CATALOG	DATA SOURCE
Characteristics of roads of interest	Administration[a] ●
Length	
Number of lanes	
Speed limits	
Traffic intensity on roads of interest	Administration ▲
Light vehicles	
Heavy vehicles	
Historical traffic intensities on roads of interest	Administration ▲
Heavy vehicles	
Meteorological data	Open Data ▲
Vehicle fleet data	Administration ▲
Freight transport data	Private ▲
Secure parking facilities inventory	Administration ▲
Vehicle fleet composition data	Administration ▲
Emission factors	Open Data ▲
Fuel	
Distance travelled	
Occupancy rate	
Vehicle type	
Age of vehicle	
Cross-border public transport routes and schedules	Administration ▲
Location of electric charging points	Open Data ▲
Vehicle nationality at border points	Administration ◆

Table 21: Data catalog use case 18 (France-Spain)

◆ *Low: applied when the number of cases is between 1 and 2.*
▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*
(a) This data can alternatively be obtained from Geographic Information Systems (GIS) such as OpenStreetMap.

Model applied:

The analysis will be based on an existing network model that integrates demand, fleet composition, and road network data. It applies emission factors considering vehicle technology, road type, and average speed. The model can simulate different scenarios, such as fleet renewal, electrification, modal shifts, the implementation of low emission zones, and the reinforcement of public transport.

Security and Privacy:

All data used in this use case will be handled in strict compliance with applicable data protection regulations, including: Regulatory compliance, data handling principles, Anonymization and aggregation, Cross-border data sharing, technical security measures.

KPIs:

The following Key Performance Indicators are defined for this use case:

#	KPI	DATA	CALCULATION METHOD	UNIT	S.O.
1	Capacity of the different TEN-T sections of interurban or metropolitan character	Characteristics of roads of interest	Capacity of the analysed roads	Number of vehicles	**(C)
2	Intensity of light and heavy vehicles on the TEN-T corridors and those crossing the border between the two countries	Traffic intensity on roads of interest	Traffic intensity on roads of interest, light and heavy vehicles	Number of vehicles	**(C)
3	Pollution generated on the core and comprehensive TEN-T corridors	Traffic intensity on roads of interest, Average consumption of vehicle fleet by type	Light vehicle intensity × average consumption of light vehicles + Heavy vehicle intensity × average consumption of heavy vehicles	veh × (g/km)	**(O)
4	Nationality of vehicles circulating at crossing borders	Traffic intensity on roads of interest	Traffic intensity on roads of interest	Number of vehicles by country	**(C)
5	Cross-border public transport services running on the TEN-T corridors	Number of travellers per day crossing the border on public transport lines	Daily demand of lines crossing the border	Travelers/day	**(C)
6	Location of secure car parks on the TEN-T corridors	Location of emergency parking areas; Characteristics of roads of interest	Current location of chargers on each road of interest / Total roads of interest analysed	%	**(O)
7	Location of e-charging stations on the TEN-T corridors	Current location of chargers; Characteristics of roads of interest	Location of electric charging stations on each road of interest / Total roads of interest analysed	%	**(O)
8	Modal emissions from freight transport	Emission factors (COPERT, HBEFA) by transport mode per year; *Traffic intensity on roads of interest*	gCO_2 per year from freight mode / Total transport emissions	gCO_2	*(C)
9	Future transit model flows	Future traffic intensity	Traffic intensity on border sections	Nº vehicles	*(O)

Table 22: KPIs use case 18 (France-Spain)

*** Expected in Grant Agreement*
**Common proposal with stakeholders*
C: Contextual; O: Operational

9.4.4 UC19: Electric vehicle charging infrastructure

Objective:

Establish a cross-border mobility data space to enable administrations and operators to design coordinated strategies for electric vehicle (EV) charging infrastructure planning, daily management, and support ecological transition.

Scenario and Interaction:

Main connection routes between the French and Spanish border.

Data Catalog:

DATA CATALOG	DATA SOURCE
Characteristics of roads of interest	Administration[(a)] ●
Length	
Number of lanes	
Speed limits	
Historical traffic intensities on roads of interest	Administration ▲
Light vehicles	
Heavy vehicles	
Connected vehicle data from electric vehicles	Private ▲
Consumption	
Range	
Charging time	
Current location of chargers	Administration ▲
Number of chargers at each location	Administration ◆
Power of each charger	Administration ▲
Electric fleet (labeled) by province/municipality	Administration ◆
Projection of electric vehicles by country	Private ◆
TEN-T corridor electric charging stations	Administration ◆
Location	
Distance between stations	
Service level classification	
Integration with rest areas and service stations	
Highway electric charging stations	Open Data/Private ◆
Number of charging points per station	
Maximum power capacity	
Multiple vehicle simultaneous charging capability	
Average service time	
Charging station usage patterns	Private ◆
Peak usage hours	
Average charging duration	
Charger availability	
Charging infrastructure types	Administration ◆
Fast chargers (50-100 kW)	
Ultra-fast chargers (>150 kW)	
Standard chargers (<50 kW)	
Connector types (CCS, CHAdeMO, Type 2, etc.)	
Electric vehicle type distribution	Administration ◆
Passenger vehicles	
Light commercial vehicles	
Heavy duty vehicles	
Vehicle nationality at border points	Administration ▲
Cross-border public transport routes and schedules	Administration ▲
Secure parking facilities inventory	Administration ▲
Emission factors databases	Open Data ▲

Table 23: Data catalog use case 19 (France-Spain)

◆ *Low: applied when the number of cases is between 1 and 2.*
▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*
(a) This data can alternatively be obtained from Geographic Information Systems (GIS) such as OpenStreetMap.

Model applied:

Cluster analysis to identify optimal and high-demand charging locations.

Security and Privacy:

All raw data is used exclusively for modelling, kept confidential, outputs are aggregated and anonymized, and data use complies with GDPR and public sector information reuse regulations.

KPIs:

The following Key Performance Indicators are defined for this use case:

#	KPI	DATA	CALCULATION METHOD	UNIT	S.O.
1	Capacity of the different TEN-T sections of interurban or metropolitan character	Characteristics of roads of interest	Capacity of the analysed roads	Number of vehicles	**(C)
2	Intensity of light and heavy vehicles on the TEN-T corridors and those crossing the border between countries	Traffic intensity on roads of interest	Traffic intensity on roads of interest, light and heavy vehicles	Number of vehicles	**(C)
3	Pollution generated on the core and comprehensive TEN-T corridors	Traffic intensity on roads of interest, Average consumption of vehicle fleet by type	Light vehicle intensity × average consumption of light vehicles + Heavy vehicle intensity × average consumption of heavy vehicles	veh × (g/km)	**(O)
4	Nationality of vehicles circulating at crossing borders	Traffic intensity on roads of interest	Traffic intensity on roads of interest	Number of vehicles by country	**(C)
5	Cross-border public transport services running on the TEN-T corridors	Number of travellers per day crossing the border on public transport lines	Daily demand of lines crossing the border	Travelers/day	**(C)
6	Location of secure car parks on the TEN-T corridors	Location of emergency parking areas; Characteristics of roads of interest	Current location of chargers on each road of interest / Total roads of interest analysed	%	**(O)
7	Location of e-charging stations on the TEN-T corridors	Current location of chargers; Characteristics of roads of interest	Location of electric charging stations on each road of interest / Total roads of interest analysed	%	**(O)
8	Percentage of electric vehicles relative to traffic intensity per road during the period of interest	Electric vehicle type distribution; Historical traffic intensities on roads of interest	Electric fleet intensity / Total traffic intensities on roads of interest	%	*(O)
9	Compliance with maximum distance between charging stations according to AFIR regulation	Current location of chargers; Characteristics of roads of interest	Distance/Cluster between charging stations on the same road	Km	*(O)

Table 24: KPIs use case 19 (France)

*** Expected in Grant Agreement*
**Common proposal with stakeholders*
C: Contextual; O: Operational

Portugal-Spain. Iberia Central West Region



Image 8: Stakeholders involved. Cross-border pilot.

9.4.5 UC5: Cross-Border Passenger Transport

Objective:

To analyse passenger mobility between Extremadura and Portugal, evaluating cross-border public transport services, vehicle flows, and the adequacy of transport networks to international travel demand.

Scenario and context of application:

The case study focuses on the central Portuguese region and the Spanish province of Extremadura, with the potential to extend the analysis to the Alentejo region in Portugal. This corridor represents a strategic transboundary connection with social, economic, and logistical relevance.

Data catalog:

DATA CATALOG	DATA SOURCE
Characteristics of roads of interest	Administration[(a)] ●
Traffic counts at cross-border roads	Administration ▲
Big Data study (2023) provided by the Extremadura Regional Government	Open Data ◆
Cross-border public transport supply	Administration ▲
Cross-border road infrastructure	Administration ◆
Bilateral mobile phone data (ES-PT)	Private ◆
Vehicle fleet composition data	Administration ▲
Emission factors	Open Data ▲
Vehicle registration/nationality data	Administration ◆
Secure parking facilities inventory	Administration ▲
Location of electric charging points	Open Data ▲

Table 25: Data catalog use case 5 (Portugal-Spain)

◆ *Low: applied when the number of cases is between 1 and 2.*
▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*
(a) This data can alternatively be obtained from Geographic Information Systems (GIS) such as OpenStreetMap.

Model applied:

Cross-Border Mobility Analytical Model:

- Based on mobile phone data to identify main cross-border flows.
- Integrates additional inputs such as public transport supply, demand, and vehicle volumes at crossing points.
- Capable of analysing patterns over different timeframes and day types (e.g., peak vs. off-peak, weekday vs. weekend).

Transboundary Mobility Flow Model:

- Integrates data from both sides of the border to understand commuting and travel behaviour.
- Supports planning decisions and network optimisation for cross-border mobility.

Transboundary Data Interoperability Model:

- Establishes a technical framework for secure and GDPR-compliant data exchange between Spanish and Portuguese entities.
- Addresses interoperability across national information systems and supports joint governance.

Security and privacy:

All data used in this use case complies with GDPR and national regulations for data protection and public sector information reuse. Raw mobile data is anonymised and aggregated prior to analysis. Data exchange protocols are designed to ensure institutional interoperability and confidentiality.

KPIs:

The following Key Performance Indicators are defined for this use case:

#	KPI	DATA	CALCULATION METHOD	UNIT	S.O.
1	Capacity of the different TEN-T sections of interurban or metropolitan character	Characteristics of metropolitan roads of interest	Traffic intensity and Characteristics of metropolitan roads of interest	A-F	**(C)
2	Intensity of light and heavy vehicles on the TEN-T and those crossing the border between the two countries	Traffic intensity at border crossing points	Traffic intensity at border crossing points	Number of vehicles	**(C)
3	Pollution generated on the core and comprehensive TEN-T corridors	Traffic intensity on metropolitan roads of interest, Inventory and typology of vehicle fleet, Emission factors (COPERT, HBEFA), Temporal evolution of vehicle fleet, Average speeds by section	Vehicle intensity by typology × consumption by vehicle typology	veh × (g/km)	**(O)
4	Nationality of vehicles circulating at the border crossing points	Country of origin per vehicle, license plate reading	Number of vehicles according to country of registration	Number of vehicles	**(C)
5	Cross-border public transport services running on the TEN-T corridors	Number of travelers per day crossing the border on public transport lines	Daily demand of lines crossing the border	Travelers/day	**(C)
6	Location of secure car parks on the TEN-T corridors	Location of secure parking in the area of cross-border crossings	Location (coordinates) of secure parking	Number of parking facilities	**(O)
7	Location of e-charging stations on the TEN-T corridors	Location of charging stations in the area of cross-border crossings; Characteristics of cross-border crossing roads	Location (coordinates) of charging points	Number of charging points	**(O)

#	KPI	DATA	CALCULATION METHOD	UNIT	S.O.
8	Cross-border passenger volume	Passenger counts at border crossing points by mode	Total number of passengers crossing the border per time period by transport mode	Passengers/day	*(O)
9	Cross-border service frequency	Public transport timetables for cross-border services	Average number of cross-border services per day	Services/day	*(O)

Table 26: KPIs use case 5 (Portugal-Spain)

S.O. (Select Origin)
*** Expected in Grant Agreement*
**Common proposal with stakeholders*
C: Contextual; O: Operational

9.4.6 UC10: Cross-border freight transit analysis

Objective:

Cross-border freight flow analysis oriented towards logistic coordination between territories. These use cases seek to establish a cross-border mobility data space that enables administrations and operators to design coordinated strategies in regional transport planning, daily transit management, and adaptation to ecological transition.

Scenario and context of application:
The analysis focuses on two key international corridors:

- Madrid – Badajoz – Elvas – Lisbon
- Salamanca – Fuente de Oñoro – Aveiro / Castelo Branco – Lisbon

These corridors are essential for freight transport between Spain and Portugal and are part of the broader TEN-T network.

Data catalog:

DATA CATALOG	DATA SOURCE
Freight transport surveys	Administration
CMR Convention data (regulated commercial contract compliance). Future application that channels data	Private
Freight flow data (volume, routes, origin-destination)	Administration
Types of goods (general conventional, refrigerated ATP, Dangerous ADR, Car carrier, Steel, other)	Administration/Private
Historical evolution of data on goods flows	Administration
Traffic intensity at border crossings	Administration
Light vehicles	
Heavy vehicles	
Existing models: Spanish National Transport Model	Administration
Planned infrastructure projects and studies relevant to new or upgraded corridors	Administration
Factors for projecting goods flows: GDP, fleet type (age, characteristics), modal share	Administration
Cross-border public transport routes and schedules	Administration
Vehicle nationality at border points	Administration
Road infrastructure characteristics	Administration
Vehicle fleet composition data, age of the fleet	Administration
Emission factors	Open Data

DATA CATALOG	DATA SOURCE
Fuel	
Distance travelled	
Load occupancy rate	
Vehicle type	
Age of the vehicle	
Secure parking facilities inventory	Administration ▲
Location of electric charging points	Administration ▲

Table 27: Data catalog use case 10 (Portugal-Spain)

◆ *Low: applied when the number of cases is between 1 and 2.*
▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*

Model applied:

Development of a freight traffic forecasting model for the analysed corridors. This model will estimate future freight flows under different infrastructure and policy scenarios. It may incorporate elements from existing national transport models for consistency and comparability.

Security and privacy:

All raw data used in the modelling will remain confidential, and all outputs will be aggregated and anonymized. Compliance with GDPR and international data-sharing regulations is required, especially for bilateral telephony or operator data.

KPIs:

The following Key Performance Indicators are defined for this use case

#	KPI	DATA	CALCULATION METHOD	UNIT	S.O.
1	Capacity of the different TEN-T sections of interurban or metropolitan character	Characteristics of roads of interest	Capacity of the analysed roads	Number of vehicles	**(C)
2	Intensity of light and heavy vehicles on the TEN-T corridors and those crossing the border between the two contries	Traffic intensity on roads of interest	Traffic intensity on roads of interest, light and heavy vehicles	Number of vehicles	**(C)
3	Pollution generated on the core and comprehensive TEN-T corridors	Traffic intensity on roads of interest, Average consumption of vehicle fleet by type	Light vehicle intensity × average consumption of light vehicles + Heavy vehicle intensity × average consumption of heavy vehicles	veh × (g/km)	**(O)
4	Nationality of vehicles circulating at crossing borders	Traffic intensity on roads of interest	Traffic intensity on roads of interest	Number of vehicles by country	**(C)
5	Cross-border public transport services running on the TEN-T corridors	Number of travellers per day crossing the border on public transport lines	Daily demand of lines crossing the border	Travelers/day	**(C)

#	KPI	DATA	CALCULATION METHOD	UNIT	S.O.
6	Location of secure car parks on the TEN-T corridors	Location of emergency parking areas; Characteristics of roads of interest	Current location of chargers on each road of interest / Total roads of interest analysed	%	**(O)
7	Location of e-charging stations on the TEN-T corridors	Current location of chargers; Characteristics of roads of interest	Location of electric charging stations on each road of interest / Total roads of interest analysed	%	**(O)
8	Corridor coverage	Characteristics of roads of interest; Traffic intensity on roads of interest	Percentage of analysed corridor length (km) with freight flow estimates and infrastructure characterization	%	*(O)
9	Border crossing bottleneck identification	Traffic intensity border points and corridor segments	Number of critical border points and corridor segments with capacity constraints identified	Number of border points and corridor segments	*(O)
10	Tons transported by road crossing the border	Tonnes per day in cross-border sections	Total tons per border section	Nº tons	*(O)
11	Annual growth	Tonnes evolution per year	% annual growth in tonnes	%	*(O)
12	Main hubs for the generation/attraction of goods	O/D Volumes	O/D by province/country	% tons	*(O)

Table 28: KPIs use case 10 (Portugal-Spain)

S.O. (Select Origin)
*** Expected in Grant Agreement*
**Common proposal with stakeholders*
C: Contextual; O: Operational

9.4.7 UC18: Freight emissions analysis

Objective:

Calculate emissions generated by freight transport on key cross-border corridors.

Scenario and Interaction:

Study the current freight transport corridors of the TEN-T Atlantic Corridor, including:

- Madrid–Badajoz–Elvas–Lisbon
- Salamanca – Fuente de Oñoro – Aveiro / Castelo Branco – Lisbon

Data catalog:

DATA CATALOG	DATA SOURCE
Characteristics of roads of interest	Administration[(a)] ●
Length	
Number of lanes	
Speed limits	
Traffic intensity on roads of interest	Administration ▲
Light vehicles	
Heavy vehicles	
Historical traffic intensities on roads of interest	Administration ▲
Heavy vehicles	
Meteorological data	Open Data
Vehicle fleet data	Administration
Freight transport data	Private ▲

DATA CATALOG	DATA SOURCE
Secure parking facilities inventory	Administration ▲
Vehicle fleet composition data	Administration ▲
Emission factors	Open Data ▲
Fuel	
Distance travelled	
Occupancy rate	
Vehicle type	
Age of vehicle	
Cross-border public transport routes and schedules	Administration ▲
Location of electric charging points	Open Data ▲
Vehicle nationality at border points	Administration ◆

Table 29: Data catalog use case 18 (Portugal-Spain)

◆ *Low: applied when the number of cases is between 1 and 2.*
▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*
(a) This data can alternatively be obtained from Geographic Information Systems (GIS) such as OpenStreetMap.

Model applied:

The analysis will be based on an existing network model that integrates demand, fleet composition, and road network data. It applies emission factors considering vehicle technology, road type, and average speed. The model can simulate different scenarios, such as fleet renewal, electrification, modal shifts, the implementation of low emission zones, and the reinforcement of public transport.

Security and Privacy:

All data used in this use case will be handled in strict compliance with applicable data protection regulations, including: regulatory compliance, data handling principles, anonymization and aggregation, cross-border data sharing, technical security measures.

KPIs:

The following Key Performance Indicators are defined for this use case:

#	KPI	DATA	CALCULATION METHOD	UNIT	S.O.
1	Capacity of the different TEN-T sections of interurban or metropolitan character	Characteristics of roads of interest	Capacity of the analysed roads	Number of vehicles	**(C)
2	Intensity of light and heavy vehicles on the TEN-T corridors and those crossing the border between the two countries	Traffic intensity on roads of interest	Traffic intensity on roads of interest, light and heavy vehicles	Number of vehicles	**(C)
3	Pollution generated on the core and comprehensive TEN-T corridors	Traffic intensity on roads of interest, Average consumption of vehicle fleet by type	Light vehicle intensity × average consumption of light vehicles + Heavy vehicle intensity × average consumption of heavy vehicles	veh × (g/km)	**(O)

#	KPI	DATA	CALCULATION METHOD	UNIT	S.O.
4	Nationality of vehicles circulating at crossing borders	Traffic intensity on roads of interest	Traffic intensity on roads of interest	Number of vehicles by country	**(C)
5	Cross-border public transport services running on the TEN-T corridors	Number of travellers per day crossing the border on public transport lines	Daily demand of lines crossing the border	Travelers/day	**(C)
6	Location of secure car parks on the TEN-T corridors	Location of emergency parking areas; Characteristics of roads of interest	Current location of chargers on each road of interest / Total roads of interest analysed	%	**(O)
7	Location of e-charging stations on the TEN-T corridors	Current location of chargers; Characteristics of roads of interest	Location of electric charging stations on each road of interest / Total roads of interest analysed	%	**(O)
8	Modal emissions from freight transport	Emission factors (COPERT, HBEFA) by transport mode per year; *Traffic intensity on roads of interest*	gCO_2 per year from freight mode / Total transport emissions	gCO_2	*(C)
9	Future transit model flows	Future traffic intensity	Traffic intensity on border sections	Nº vehicles	*(O)

Table 30: KPIs use case 18 (Portugal-Spain)

S.O. (Select Origin)
*** Expected in Grant Agreement*
**Common proposal with stakeholders*
C: Contextual; O: Operational

9.4.8 UC19: Electric vehicle charging infrastructure

Objective:

Establish a cross-border mobility data space to enable administrations and operators to design coordinated strategies for electric vehicle (EV) charging infrastructure planning, daily management, and support ecological transition.

Scenario and Interaction:

Main connection routes between the Portugal and the Spanish border.

Data Catalog:

DATA CATALOG	DATA SOURCE
Characteristics of roads of interest	Administration [(a)] ●
Length	
Number of lanes	
Speed limits	
Historical traffic intensities on roads of interest	Administration ▲
Light vehicles	
Heavy vehicles	
Connected vehicle data from electric vehicles	Private ▲
Consumption	
Range	
Charging time	
Current location of chargers	Open Data ▲
Number of chargers at each location	Open Data ▲
Power of each charger	Open Data ◆
Electric fleet (labeled) by province/municipality	Open Data ◆

DATA CATALOG	DATA SOURCE
Projection of electric vehicles by country	Private ◆
TEN-T corridor electric charging stations	Open Data ◆
Location	
Distance between stations	
Service level classification	
Integration with rest areas and service stations	
Highway electric charging stations	Open Data ◆
Number of charging points per station	
Maximum power capacity	
Multiple vehicle simultaneous charging capability	
Average service time	
Charging station usage patterns	Administration ◆
Peak usage hours	
Average charging duration	
Charger availability	
Charging infrastructure types	Open Data ◆
Chargers type (>50, 50-150, >150 kW)	
Electric vehicle type distribution	Administration ◆
Passenger vehicles	
Light commercial vehicles	
Heavy duty vehicles	
Vehicle nationality at border points	Administration ▲
Cross-border public transport routes and schedules	Administration ▲
Secure parking facilities inventory	Administration ▲
Emission factors databases	Open Data

Table 31: Data catalog use case 19 (Portugal-Spain)

◆ *Low: applied when the number of cases is between 1 and 2.*
▲ *Medium: applied when the number of cases is between 3 and 6.*
● *High: applied when the number of cases is greater than 6*
(a) This data can alternatively be obtained from Geographic Information Systems (GIS) such as OpenStreetMap.

Model applied:

Cluster analysis to identify optimal and high-demand charging locations.

Security and Privacy:

All raw data is used exclusively for modelling, kept confidential, outputs are aggregated and anonymized, and data use complies with GDPR and public sector information reuse regulations.

KPIs:

The following Key Performance Indicators are defined for this use case

#	KPI	DATA	CALCULATION METHOD	UNIT	S.O.
1	Capacity of the different TEN-T sections of interurban or metropolitan character	Characteristics of roads of interest	Capacity of the analysed roads	Number of vehicles	**(C)
2	Intensity of light and heavy vehicles on the TEN-T corridors and those crossing the border between countries	Traffic intensity on roads of interest	Traffic intensity on roads of interest, light and heavy vehicles	Number of vehicles	**(C)

#	KPI	DATA	CALCULATION METHOD	UNIT	S.O.
3	Pollution generated on the core and comprehensive TEN-T corridors	Traffic intensity on roads of interest, Average consumption of vehicle fleet by type	Light vehicle intensity × average consumption of light vehicles + Heavy vehicle intensity × average consumption of heavy vehicles	veh × (g/km)	**(O)
4	Nationality of vehicles circulating at crossing borders	Traffic intensity on roads of interest	Traffic intensity on roads of interest	Number of vehicles by country	**(C)
5	Cross-border public transport services running on the TEN-T corridors	Number of travellers per day crossing the border on public transport lines	Daily demand of lines crossing the border	Travelers/day	**(C)
6	Location of secure car parks on the TEN-T corridors	Location of emergency parking areas; Characteristics of roads of interest	Current location of chargers on each road of interest / Total roads of interest analysed	%	**(O)
7	Location of e-charging stations on the TEN-T corridors	Current location of chargers; Characteristics of roads of interest	Location of electric charging stations on each road of interest / Total roads of interest analysed	%	**(O)
8	Percentage of electric vehicles relative to traffic intensity per road during the period of interest	Electric vehicle type distribution; Historical traffic intensities on roads of interest	Electric fleet intensity / Total traffic intensities on roads of interest	%	*(O)
9	Compliance with maximum distance between charging stations according to AFIR regulation	Current location of chargers; Characteristics of roads of interest	Distance/Cluster between charging stations on the same road	Km	*(O)

Table 32: KPIs use case 19 (Portugal-Spain)

*** Expected in Grant Agreement*
**Common proposal with stakeholders*
C: Contextual; O: Operational

9.5 Summary of Data source and importance

An analysis of the datasets collected for the different use cases shows that most of the information belongs to the Public Administration domain. Although some datasets are classified as Public and a smaller proportion as Private, the majority originates from governmental or administrative entities. In general, the use cases rely heavily on data produced and managed by public authorities.

This highlights the key role of administrative data in supporting decision-making and operational processes, while also pointing out relevant challenges related to data sensitivity, access restrictions, regulatory compliance, and data governance.

The following section organises the datasets by thematic areas and by source type (Public Administration, Public, and Private), which helps assess their potential availability and the expected requirements.

Symbols to identify:

- ♦ Low: applied when the number of cases is between 1 and 2.
- ▲ Medium: applied when the number of cases is between 3 and 6.
- ● High: applied when the number of cases is greater than 6.

These categories apply generally, without considering specific zones or areas.

9.5.1 Public administration data

Traffic and Mobility	◆ Active incidents ◆ Average speeds by section ▲ Historical traffic intensities on roads of interest ▲ Traffic intensity on roads of interest ◆ Location of detectors on roads of interest ◆ Operating hours of loading/unloading zones
Cross-Border Mobility	▲ Cross-border public transport supply: Complex to obtain due to liberalised operation. Information will be extracted from private operator authorisations (routes, stops, schedules) ◆ Cross-border road infrastructure: Road typology, number of lanes, speed limits, and pavement condition ◆ Vehicle nationality at border points ▲ Traffic counts at cross-border roads: Average Daily Intensity (ADI) available for key routes
Active Mobility and Micromobility	◆ Bicycle lanes ◆ Public bicycle stations inventory ◆ Public bicycle system usage data ● Length of pedestrian infrastructure
Electromobility	▲ Charging infrastructure data ◆ Number of chargers at each location ◆ Power of each charger ◆ Electric fleet (labeled) by province/municipality ◆ Electric vehicle type distribution
Parking and Logistics Zones	◆ Number of parking spaces by type ◆ Real-time availability/occupancy of emergency parking ◆ Location of loading/unloading zones ▲ Secure parking facilities inventory ◆ Location of cargo distribution canters ▲ Location of logistics platforms
Environmental Data	◆ LEZ delimitation

Intelligent Transport Systems (ITS)

- Location of Variable Message Signs
- Typology of Variable Message Signs
- Real-time operation of Variable Message Signs

Mobile Data, Surveys and Models

- Mobility surveys
- Synthetic Survey (CRTM): Pending validation of methodology and applicability
- OD Matrix (MITMA): use under evaluation. Fixed zonification; if insufficient, acquisition of new mobile data may be required
  Existing models: Spanish National Transport Model
- Big Data study (2023) provided by the Extremadura Regional Government: includes mobility flows between Extremadura and Portugal, based on Spanish users
- Big Data Contract (CRTM): Availability for the project currently under evaluation

Vehicle Fleet Data

- Inventory and typology of vehicle fleet
- Vehicle fleet composition data
- Vehicle fleet data

Infrastructure and Operational

- Location of toll sections of interest
- Demand at transport interchanges
- Characteristics of roads of interest
- Planned infrastructure projects and studies relevant to new or upgraded corridors
- Location and identification of regional and national international nodes
- Parking location
- Number of parking spaces by type
- Parking occupancy data
- Operational restrictions

Ticketing and Operational Data

- Ticketing data: boarding counts per mode (CRTM)

Transport and Operations	◆ Public transport passenger data ◆ Number of zero-emission buses in circulation ◆ Location of logistics platforms

9.5.2 Private Data

Mobile and Telecom. Data	◆ Bilateral mobile phone data (ES–PT): Requires acquisition of anonymised, aggregated data covering both Spanish and Portuguese users to generate OD matrices and flow analyses for different day types (e.g., weekday in winter, weekday in summer) ● Floating Phone Data ◆ Floating Car Data
Connected Vehicle Data	▲ Connected vehicle data ▲ Connected vehicle data from electric vehicles
Electromobility	◆ Charging station usage patterns ◆ Types of loading and unloading vehicles
Freight and Logistics Data	◆ Delivery company routes ▲ Freight transport data ◆ Freight flow data (volume, routes, origin–destination)
Surveys and Behavioural Data	◆ Household Mobility Surveys (EDM)

9.5.3 Public data

Environmental and Meteorological Data	◆ Air quality monitoring stations data ▲ Emission factors ▲ Emissions data ▲ Meteorological data
Electromobility Infrastructure	◆ Current location of hydrogen chargers ▲ Location of electric charging points ◆ Highway electric charging stations

- Projection of electric vehicles by country

Transport and Operations

- Public transport supply data
- Public transport supply: routes, stops and schedules
- Special operations calendar
- Number and capacity of interchange nodes

Infrastructure and Network

- Kilometres of road network
- Port facilities data

Parking and Micromobility Facilities

- Location of bicycle parking facilities
- Number of bicycle parking facilities
- Parking location
- Emergency parking capacity

Demographic and Territorial Data

- Population
- Municipality surface area
- Location of main trip attractors centers

10 Conclusions

The work carried out within the tasks defining this deliverable highlights the collaborative challenge involved in the creation of a Data Space. Active stakeholder participation is crucial for the successful development of the project and for achieving tangible benefits in the field of mobility. Likewise, the commitment of the entire project team is essential for establishing and coordinating the overall working structure.

The interview process reflects a high level of interest and engagement from a wide range of stakeholders across different sectors. This engagement is evidenced through the evaluation of predefined use cases and the proposal of new use cases addressing specific challenges identified by each stakeholder.

The participatory process has enabled the identification of initial synergies among stakeholders, leading to the proposal of relevant use cases across all sectors and geographical scopes. The in-person workshop further demonstrated the strong level of involvement and commitment of all participating stakeholders.

Nevertheless, data spaces constitute a novel platform and, despite their significant potential, they require a continuous process of awareness-raising and information sharing regarding their operation for all participants. In addition, achieving data interoperability demands a sustained effort from the project team, which plays a key supporting role for the rest of the stakeholders.

The definition of the use cases, in accordance with the proposed methodology, represents the first step toward advancing subsequent work packages related to data interoperability, the models to be applied, the analysis of results through Key Performance Indicators (KPIs), and the establishment of the Mobility Data Space together with its associated functionalities.

In this context, the DS4MM project represents an evolution both in conventional working structures and in technical development approaches for addressing challenges in the mobility area.