Project deliverable D4.8

Sofia – Detailed Implementation Plan Part A

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Legal disclaimer

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Project executive summary

The establishment of a common European mobility data space (EMDS) aims to accelerate the digital and green transformation of the European mobility and transport sector. The deployEMDS project contributes to the further development of the common European mobility data space as announced in the European Strategy for Data and the Sustainable and Smart Mobility Strategy. It builds on PrepDSpace4Mobility, a Coordination and Support Action funded under the Digital Europe Programme and is the first deployment action foreseen under the EMDS initiative.

The deployEMDS project advances EU policy priorities by developing a technical infrastructure for an operational data space in the mobility sector. It aligns with the European Data Strategy's goal to facilitate data access, pooling, and sharing. The project supports the European Green Deal's aim to accelerate sustainable and smart mobility, thereby contributing to a reduction in transport emissions. Additionally, it aligns with the Sustainable and Smart Mobility Strategy, ITS Directive, and the NAPCORE project. The diverse consortium of partners implements 16 use cases across nine European cities and regions, aiming to create and deploy an operational data space with a common technical infrastructure. The project aims to make data available in machine-readable format, while facilitating innovative services and applications and contributing to the development of a European mobility data sharing ecosystem.

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Deliverable executive summary

Key words

Use case, implementation approach, implementation plan

Multimodal, environmental impact of mobility, data-driven decision making, walking, park-and-ride

Executive summary

This document details the approach of the deployEMDS local use cases in Sofia, Bulgaria. Use case SOF_1, titled “Connected Green & Shared Journeys (GreenMob)”, is implemented under the leadership of Dessislava Petrova-Antonova, Professor & Research Group Lead at GATE Institute, together with the Sofia Urban Mobility Centre (SUMC) and Sofia Municipality.

This deliverable comprises the first of two iterations.

List of abbreviations and acronyms

Acronym	Meaning
EMDS	Common European mobility data space
KPI	Key performance indicator
WP	Work package
MVP	Minimal viable product
PT	Public transport
API	Application programming interface

1 Purpose of the deliverable

This Document is one of 9 deliverables produced in the deployEMDS action to detail the local use cases that are put forward and will be implemented by the nine local implementation sites of the action. These Detailed Implementation Plans are devised in two waves: This first wave of reports – titled Detailed Implementation Plan Part A – is published in Month 6 of the project (April 2024), and concern a refinement of the overall use case objective, scope and context as well as a detailed delineation of the approach to be taken in the local implementation project.

In combination with the efforts of WP2 ("Development of an operational data space across borders"), in particular the continued analysis of technical requirements of the use cases, this report will lay the foundation for the Detailed Implementation Plan Part B. In Part B the overall steps, responsibilities and timelines of the local implementation projects relative to the overall development of the EMDS technical and governance building blocks will be defined in detail. Part B will be published in the autumn of 2024.

1.1 Intended audience

The detailed elaboration of the objectives, context, scope, and approach of the use cases proposed and implemented by the local implementation sites in deployEMDS aims to establish a common and clear understanding of these local projects across the sites and inform horizontal actions in deployEMDS. Part A of the Detailed Implementation Plan allows for this understanding by providing necessary contextual information regarding the technical characteristics and requirements of the use cases analysed in WP2, and addressing governance-related aspects elaborated in WP3 (“Development of common governance mechanisms across borders”).

For interested stakeholders outside the consortium, this series of reports offers an initial understanding of the real-world challenges and objectives in the field of urban mobility data sharing, that the EMDS may address.

1.2 Structure of the deliverable and links with other work packages/deliverables

This first set of reports, titled Detailed Implementation Plan Part A, summarise the use case ideation and refines the overall approach considerations of the use cases proposed by the local implementation sites in deployEMDS. For each use case, the reports provide general information, an analysis of the use case context, the definition of the use case objective, and a delineation of pathways to the use case implementation. Based on these analyses, the primary implementation product, or minimum viable product (MVP) of the use case, as well as potential subsequent implementation products, is defined. Each local implementation site chooses an approach: either “cascading” with a more comprehensive MVP or more agile iterations with a simpler MVP to start with. The report also provides a preliminary reflection on the subsequently elaborated Part B of the Detailed Implementation Plan.

This deliverable describes the Use Case SOF_01 developed in Sofia.

The Detailed Implementation Plan Part A, along with the use case ideation outlined in this document, draws from the technical analysis of local use cases conducted in WP2 and the insights outlined in Deliverable D2.1, which specifies the technical infrastructure requirements for deployEMDS. D2.1 is accessible on the deployEMDS project website and outlines essential technical, functional, and operational capabilities

necessary to establish a data space to support the various mobility use cases, aiming to standardise mobility data and facilitate interoperability.

The Implementation Plan builds on this foundation, directly referencing information from D2.1, particularly in defining the implementation products for the use cases.

2 Implementation approach for use case SOF_01

2.1 General information

The following provides a set of general information of the use case and introduces the consortium partners that form the local implementation project consortium.

Use case title	
Connected Green & Shared Mobility Journeys (GreenMob)	
Mobility themes addressed in the use case	
Multimodality, environmental impact, data-driven decision making Use case cluster	
Use case cluster	
Multimodality	
Roles	
Use case implementation lead	**Dessislava Petrova-Antonova**, Professor & Research Group Lead, GATE
Consortium partners involved in the use case implementation	**GATE Institute (GATE**) is the first Big Data and AI Center of Excellence in Eastern Europe, funded by the Horizon 2020 Teaming programme. GATE research includes four major technology areas focused on AI and smart data-driven decision-making models: Data Visualisation, Data Analysis, Data Management, and Engineering of Big Data-Based Systems. GATE´s research is applied to four strategic domains: Future Cities, Intelligent Government, Smart Industry, and Digital Health. As a hub of IDSA, GATE initiated the establishment of the first urban data space in Bulgaria, facilitating the development of Sofia´s urban digital twin.
	Sofia Urban Mobility Centre (SUMC) is responsible for the organisation, management, supervision, and financing of Sofia's public transport system and the short-term paid parking zones in the city. SUMC operates the automatic vehicle location system for public transport vehicles and the public transport ticketing system. SUMC provides real-time information for vehicle arrival at all public transport stops in Sofia and offers a public transportation journey planner at www.sofiatraffic.bg. SUMC operates the Park&Ride facilities at 5 metro stations.
	Sofia Municipality (Sofia) is an administrative unit with the status of a region covering the entire Bulgarian capital and divided into 24 districts, each administered by a local mayor. The Municipal Administration is divided into nine sectors with different spheres of activity, including Investment and Construction, Transport and Transport infrastructure, Social Activities, Healthcare, Culture and Education.

2.2 Analysis of the use case context

The following seeks to summarise the overall use case context by reflecting on the current situation in the implementation site and the challenges or opportunities for value creation related to the use case.

2.2.1 Overall context and geographical scope

Sofia, the capital of Bulgaria, is the largest urban area and economic centre in the country. Around 43% of the country's GDP is produced in the city. Officially, the city has just below 1.3 million inhabitants. However, it is estimated that the real figure is between 1.6 and 1.8 million people, as many people living in Sofia are registered elsewhere. In addition, the city attracts many daily commuters from nearby cities. A considerable portion of these commuters travel by car to the city centre, where much of the economic activity is concentrated.

Growing traffic flows have led to congestion and daily traffic jams in the city. The share of private car use in the modal split is currently 35%. Car ownership has been increasing over the past three decades. With 663 cars per 1,000 inhabitants (2020), the number of private vehicles registered per capita in Sofia is one of the highest in Europe. Additionally, many vehicles in use are also old and emit pollutants. A quarter of all vehicles are over 20 years old, and 60% are between 10 and 20 years old. Road traffic contributes to air pollution, a significant problem in Sofia. According to two recent studies, the health and other economic costs of air pollution are equivalent to more than 10% of the city's GDP.

In 2019, the total length of the bicycle network was 55.5 km, lacking uninterrupted safe routes through the city, resulting in cycling having less than a 2% share of the total number of trips in Sofia. To improve cycling conditions, the municipality aims to increase the length of the cycling network by up to 160 km by 2025; currently, five major cycle lanes are currently under construction.

Amongst other recent investments, the metro network has been extended significantly over the past decade. Its latest extension opened in 2020 and the current network now has four lines with a total length of 52 km with 47 stations; a further extension is being developed and planned with co-financing of the EU.

Customers of Bulgaria's mobile operators may park on public streets and squares within the municipality, which are within the zones for short-term paid parking, by sending a short text message (SMS).

To encourage travel by public transport, Sofia has constructed Park&Ride facilities at five major metro stations, where car users may leave their cars free of charge if they continue their journey by metro or PT.

2.2.2 Current situation

Sofia Urban Mobility Centre (SUMC) is a transport authority in Sofia, well-positioned regarding the generation of high-quality data across different modes of transport. For example, SUMC provides high-quality, static and real-time PT data, including network and timetable data, as well as real-time vehicle locations, delay events, and vehicle occupancy. Since 2023, this open data has already used by different third-party services acting as multimodal transport information services (MMTIS).

In the field of parking, particularly at park-and-ride stations, data is available on tariffs, usage conditions (e.g., time limit for parking), and, in some cases, occupancy. However, this data is fragmented and not consistently made available through application programming interfaces (APIs).

Mobility data is fragmented across different departments and agencies. While a variety of shared mobility providers operate in the city, there is currently no infrastructure in place to report data on their usage to public authorities or to integrate shared mobility information.

As a member of the International Data Space Association (IDSA) and an IDSA hub for Bulgaria, GATE continues its efforts to incubate and expedite innovations that rely on the sharing and utilising data at both national and regional levels. Among those activities is initiation of the first Urban Data Space in Bulgaria as a secure, sovereign, and trusted ecosystem that facilitates data sharing, allowing all participants to realise the added value of the data in various urban scenarios, including air pollution, mobility, urban planning, and energy efficiency. Currently, an integrated data space environment comprising all components of the IDS Reference Architecture Model is set up on GATE infrastructure. In addition, GATE data space connector certification is in progress.

2.2.3 Current challenges or opportunities for value creation

Creating a consistent mobility data infrastructure would allow for the defragmentation of existing data and could guide the development of new data generation tools and services to increase the amount and quality of data available. Specifically, all types of shared mobility providers could be connected to provide new information services through data sharing using the same infrastructure. The data infrastructure would also enable a consistent feedback or return flow of augmented data based on the use of certain information services, such as Origin-Destination information from service providers and travel apps. The conditions for the use of data provided on this data infrastructure also enable the city and SUMC to ensure adequate use of the data and truthful presentation of the state of the mobility system across all interfaces, public and commercial.

2.3 Objective of the use case

2.3.1 Objective statement

The use case aims to develop a multimodal journey planner employing the vision and value proposition of a data space approach and involving all main mobility players of the city of Sofia to offer a seamless experience to users. The application will allow easy planning by combining multiple travel modes in the same trip based on real-time data shared through the common EMDS by all mobility providers while optimising the carbon footprint of each trip. Booking all trip segments with different providers will require a user profile for an effortless user experience and enable a single payment method as a future direction for improving the journey planner. The availability of high-quality mobility data through the data space will facilitate the development of additional mobility services and business models beyond the multimodal journey planner.

2.3.2 Overall use case narrative

By leveraging the potential of shared data through the common EMDS, the end users of the journey planner will be able to plan multimodal trips by combining public transport with services provided by green on-demand mobility operators like e-scooters, shared bicycles and e-cars. In addition, to discourage the use of private cars and consequently reduce traffic in the city, taxi operators will also be involved, especially in areas in the city where green mobility operators cannot provide services. Finally, the park-and-ride facilities will be considered to deliver a service for Sofia’s citizens and those living outside but working in the city by enabling them to park their private cars and continue to travel with other means of transportation. Travellers can choose the most eco-friendly and/or low-cost option with a single thought and get a seamless experience between multiple mobility operators at no additional cost. Thus, the data space will contribute not only to the provision of improved mobility services in the city but also to the development of measures for addressing problems related to traffic and air quality.

2.4 Elaboration of implementation pathways

The following sections explore the actions and interactions required for successful implementation of the use case.

The pathway elaboration begins with the exploration of the most ideal implementation in an idealised, fictional scenario where all circumstances for implementation are favourable. Subsequently, the idealised pathway is adjusted to real-world circumstances at the implementation site by identifying potential barriers induced by this context and requiring alternate actions to address them. This chapter also explores how specific, realistic aspects, initially outside the scope of the use case, may influence its design or serve as subsequent development steps. This ensures the use case's longevity by considering potential additions during the initial implementation.

2.4.1 Ideal implementation pathway

Transportation offers in cities are becoming increasingly complex, with many companies offering mobility services such as e-scooters, shared bicycles, ride-hailing services, and more. Each provider operates its own platform to lock in ridership. Users are faced with many choices and often remain unaware of the variety of services available to them. Using multiple modes of transportation is made more difficult as it requires booking through different platforms, which can discourage users. As a result, optimal trips in terms of time and carbon footprint are overlooked due to the lack of easy-to-use comprehensive information that allows users to make informed choices.

The data space building blocks developed by deployEMDS horizontal activities will be used to implement the local instance of the EMDS in Sofia. The use case aims to enable users to make informed decisions on their mobility and to encourage them to reduce the use of personal cars during their daily trips. A key factor for its success is to establish a network of trusted partners providing mobility services who are willing to share data through the common EMDS. A common data model will be defined for all partner services and published in the vocabulary component of the data space. The partners are asked by GATE to share their data offerings through APIs to facilitate data sharing through data connectors. Data for real-time locations of the vehicles, which is crucial for journey planners, is publicly available on the respective mobility providers' platforms. This also includes public transportation schedules and stops, public parking lot occupancies, operational zones of the e-scooters, shared bikes, e-cars, etc. Moreover, the partners will be asked to share the estimated cost of their services. To pay for mobility services, users should visit the partners' apps. A trip planner will utilise all the real-time data shared by the partners through the data space and calculate the trip duration, trip cost and trip carbon footprint to propose optimal trips. Its architecture will be designed to easily add future partners and scale up the service offering (for example, taxis and regional trains). The trip planner will be provided as a service through the App Store component of the data space, thus enabling its integration into the mobility providers' platforms.

2.4.2 Alternate pathways to implementation

A key success factor for the use case is the involvement of different mobility operators as data providers in the data space, who are willing to share real-time data for the available mobility services. Some mobility operators might be unable to share relevant information in real-time. In that case, the journey planner should be based on schedules instead of real-time data for those services. For instance, Metropolitan operates the metro in Sofia and is a separate body of SUMC. Real-time data for the metro might not be shared, but the metro schedule can be used instead, considering that underground transportation is not affected by traffic and scheduling changes are less frequent.

Issues related to the use of the data in terms of privacy, licenses, and usage conditions may arise, although the journey planner will be designed to utilise only publicly available data from respective mobility providers' platforms. If the data collected through the journey planner is shared in the data space, it will either be preliminary anonymised beforehand or only non-sensitive data will be considered, such as journey travels without personal information about the users.
Since the journey planner uses data in real-time, it is crucial for partners providing mobility services to share dynamic data, preferably through APIs. However, developing such APIs may require additional resources that are currently not planned.

2.4.3 Additional pathways to amend the use case implementation

No additional pathway is currently foreseen.

2.5 Primary use case implementation products

The following sections define the primary use case product or the minimal viable product design, to be implemented in the first iteration of the implementation project.

2.5.1 Description of the primary use case product (MVP)

The MVP of the use case will be a journey planner, integrating data for the public transport and park-and-ride facilities provided by Sofia Urban Mobility Centre, along with services from three on-demand mobility operators (e-scooters operated by BinBin, shared bicycles operated by Cyrcl, and e-cars operated by Spark). The journey planner will use real-time data provided by the partners to calculate trip duration, cost, and carbon footprint, proposing optimal routes. Travellers will be able to specify their preferred mode of transportation and choose the most eco-friendly and/or low-cost option.

The public transport data, both static and dynamic, is available in GTFS format. Sofia Urban Mobility Centre will transform the data to comply with other standards, such as NeTex, if needed. Currently, Spark and BinBin have APIs for sharing real-time data about vehicle availability, while Cyrcl is developing such an API for sharing. If the data shared by on-demand mobility operators needs to be restructured, integrated, or transformed in another format to meet certain standard requirements, GATE will provide appropriate services, taking on an additional intermediary role in the data space.

To speed up and secure the implementation of MVP, a journey planner prototype will be developed in advance based on the shared data through APIs. This process involves investigating existing solutions, including the availability of open-source ones, specifying requirements, designing the product, while considering key features and functionalities, development with a focus on speed and efficiency to minimise time to market, testing to identify any bugs, usability issues, or areas for improvement. Testing may involve internal testing by the development team and alpha and beta testing with a select group of users, with the active involvement of the Sofia Municipality and Sofia Urban Mobility Centre. Feedback from users is collected and used to iterate on the prototype. After testing and iteration, the prototype will be launched to a broader audience to gather additional feedback and validate assumptions before further scaling. Following the launch, user feedback will be continuously gathered, and key metrics to assess its performance will be monitored. Based on this feedback, iterations are made to the product, adding new features, improving existing ones, and addressing any issues or pain points identified during testing and usage. Additionally, to build trust among the use case participants, demonstrations showcasing the functionality of the data space based on shared data will be provided. For this purpose, the IDS reference testbed available on GATE infrastructure can be used, or the EDC demo tool, provided by IONOS can be employed. With an understanding of the mechanisms for data sovereignty and the fair data use, the use case participants will potentially identify additional business cases and mutual benefits of data sharing and reuse. Thus, the

journey planner will go beyond the traditional MaaS application, as it will demonstrate how a fair share of the value generated by the data reuse should be distributed to the data providers.

When the data space building blocks will be developed as a result of the deployEMDS horizontal activities, an implementation of a local instance of the EMDS will be initiated. Subsequently, the technical and governance requirements for the onboarding of the use case participants will be outlined, developed, and deployed in conjunction with the overall technical and governance development of the common EMDS. The data provided through APIs by use case participants will be shared in the data space through data connectors, and data offers will be published through the catalogue component of the data space. The journey planner prototype will be migrated to operate in a production environment by using data shared in the data space.

2.5.2 Steps of the primary use case implementation

Step 1: Main partner identification (GATE)
Meetings with local stakeholders will be conducted to present the project and Sofia's use case. The participants willing to share data will be identified and the partners collaborating in developing the MVP will be involved in the subsequent steps. Currently, three public mobility operators have expressed interest in participating in EMDS, namely Cyrcl (bike sharing), BinBin (e-scoters) and Spark (e-cars). Taxi companies such TaxiMe and Yellow are also contacted and considered as an opportunities to expand the impact of the use case. An agreement for cooperation will be signed between the GATE and the partners who agree to participate in the EMDS.

Step 2: Specification of data flow for the use case (GATE)
The datasets and respective data products required for implementing the MVP and its further development will be specified in a more detail, aiming to develop a common data model. Data transformation needs will be identified and performed if required (e.g., data transformation from GTFS to NeTEx). Currently, the data from public mobility operators (e-scooters, bike sharing and e-cars) is specified as a single data product. After receiving sample datasets from those public mobility operators, separate data product offerings will be considered. Data flow for the implementation of the use case will also be defined.

Step 3: Receiving access to data for MVP through APIs (SUMC and on-demand mobility operators)
SUMC and on-demand mobility operators will share data through APIs to develop a journey planner prototype. If necessary, the data will be transformed into another format to comply with specific standards and/or data models.

Step 4: Specification of requirements for local data space and journey planner implementation (GATE and SUMC)
The local data exchange and governance requirements will be analysed and mapped to the common technical building blocks, with governance mechanisms elaborated within WP2 and WP3. Infrastructure and network requirements to ensure the deployment of data space components and communication between them will be defined. Decisions will be made on whether to use the cloud infrastructure provided by IONOS or the on-premises infrastructure of GATE. Technical, functional, and non-functional requirements for implementing the journey planner will be specified. They will be aligned to the dataspace building blocks and governance mechanisms.

Step 5: Design and development of a journey planner prototype (GATE)
Open-source solutions for trip planning will be investigated and assessed in terms of their applicability for implementing the use case. A prototype of the journey planner will be implemented by directly consuming data from the APIs, thus not waiting for local deployment of the data space and minimising time to market. Testing will be conducted to identify any bugs, usability issues, or areas for improvement.

Step 6: Local data space deployment
The technical building blocks implemented within WP2 will be adapted to local use case requirements and specifications, and deployed to operate and make data space functional. Development, integration and deployment of additional data space components needed for the use case are also considered. Governance mechanisms delivered by WP3 will be integrated in relation to the regulatory-compliant model for implementation of the use case.

Step 7: Onboarding of data space participants (SUMC and shared mobility providers)
Data space participants will be onboarded in the local data space by deploying connectors to share their data. GATE will implement a dedicated connector for consuming data needed for the journey planner functionality.

Step 8: EMDS added value demonstration (GATE)
Demonstration events for local stakeholders and the deployEMDS ecosystem will be organised to show the added value of data sharing and reuse. A mobile app for journey planning will be made available for the citizens, promoting the usage of public transport and "green" mobility as a way to contribute to a more safe, healthier and more connected urban environment.

2.5.3 Participants in the primary use case product

2.5.3.1 Data providers

Data provider 1:	**Sofia Urban Mobility Centre (SUMC)**		
Type of organisation:	Transport authority		
Project partner:	Yes		
Data product 1A	**So.DPO.01.01 - Real-time PT data, position, timetable and occupancy**		
Data type:	Both static and dynamic		
Access:	Open data		
Conditions:	No specific conditions		
Components:	Data sources/ data points		Data model/specification
	Real-time public transport vehicle positioning and occupancy		GTFS
	Schedules and public transport stops		GTFS
Data product 1B	**So.DPO.01.02 - Static and dynamic data on locations and real-time occupancy data from P+R facilities**		
Data type:	Both static and dynamic		
Access:	Open data		
Conditions:	No specific conditions		
Components:	Data sources/ data points		Data model/specification
	Locations of P+R		tbc
	Real-time occupancy		tbc

	Data Product 1C	**So.DPO.01.03 - Static data of the geospatial location of short-term paid parking zones**	
	Data type:	Static	
	Access:	Open data	
	Conditions:	No specific conditions	
	Components:	Data sources/ data points	Data model/specification
		tbc	tbc
Data Provider 2:		**Shared Mobility Providers (Cyrcl, BinBin, Spark)**	
Type of Organisation:		Mobility Service Provider	
Description:		Public mobility providers operated in Sofia, such as Cyrcl (bike sharing), BinBin (e-scooter sharing), Spark (car-sharing).	
Project Partner:		Cyrcl, BinBin, Spark, not partners of the deployEMDS but ready to share data within a partnership with GATE	
Motivation to participate:		Visibility in the journey planner of the transport authority, goodwill and willingness to collaborate with local authority	
Data Product 2A		**So.DPO.01.04 - Location and real-time availability of shared mobility services**	
Data Type:		Both static and dynamic	
Access:		Selectively accessible data	
	Conditions:	Conditions tbc.	
Components:		Data sources/ data points	Data model/specification
		Locations of vehicles	tbc
		Availability of vehicles	tbc
Data Provider 3:		**GATE Institute (GATE)**	
Type of organisation:		Research institute at Sofia University	
Project partner:		Yes	
	Data product 3A	**So.DPO.01.05 - Air quality data**	
	Data type:	Dynamic	
	Access:	Open data	
	Components:	Data sources/ data points	Data model/specification
		Air quality data	tbc
Data Provider 4:		**Geographic Information System – Sofia Ltd. (GIS – Sofia)**	
Type of organisation:		Land surveying company	
Description:		GIS – Sofia is one of the largest land surveying companies in Bulgaria. The company was established in 1999 as a trading company of Sofia Municipality. For over 20 years, it has been building, maintaining, and managing the	

		information system of the cadastral, regulation and construction plans for the territory of Sofia Municipality, named SOFCAR. The company provides quality services in the fields of geodesy, cadastre, spatial planning, and geographic information systems.	
Project partner:		GIS – Sofia, not partner of the deployEMDS but ready to share data within a partnership with GATE	
Motivation to participate:		Relation to the municipality of Sofia	
	Data product 4A	**So.DPO.01.06 - Infrastructure data, including street network and sidewalks**	
	Data type:	Static	
	Access:	Selectively accessible data	
	Conditions:	The data will be shared free of charge for the implementation of the use case. In any other case, a one-time payment is required.	
	Components:	Data Sources/ data points	Data model/specification
		Steet network data	tbc

2.5.3.2 Data intermediaries

GATE may consider providing an aggregation service for shared mobility providers if direct on-boarding into the data space is not feasible.

2.5.3.3 Data consumers

GATE will act as a data consumer in the use case, taking responsibility for implementing the journey planner. There is interest from start-up companies in Sofia in participating in the data space, but this will be further negotiated.

2.6 Subsequent implementation products

The following sections outline (potential) subsequent implementation products that may be introduced in subsequent iterations of the local implementation project.

A second iteration could involve enhancing the journey planner to meet the needs of persons with reduced mobility and/or wheelchair users. This would require additional data to be shared regarding the transit stations and vehicles adapted for such use. Additional mobility providers need to be involved to cater to special needs and provide safe pick-up and drop-off for users with reduced mobility.

A third iteration could involve additional mobility operators such as taxis like TaxiMe and Yellow, e-scooters operated by Lime, and e-cars operated by GOeGO. In addition, developing advanced analytical tools is considered to provide insights into mobility demand, user categories, and mobility trends to participants involved in implementing the use case. Statistical analysis on usage over time, the most visited areas, and the flow of vehicles can be performed, and the results offered as a new data product in the data space. Thus, the participants will be able to determine target audiences based on user behaviour and understand if their marketing campaigns impact ridership. Reporting and evaluation of transit needs will be automated and regular. This could replace traditional processes like quarterly reports and provide more flexible tools to the participants to evolve and improve their service offerings. By increasing the added value for data providers through the delivery of new data services, a contribution to the sustainability of the EMDS will be made.

3 Initial reflections on Detailed Implementation Plan Part B for use case SOF_01

The project plan is expected to be finalised during the upcoming months, based on local technical and governance requirements as well as developments made in other work packages. Preliminary considerations are described above in chapter 2.5.2 Steps of the Primary Use Case Implementation.

4 Conclusions

This report provides a detailed understanding of the local context of Sofia and summarises the objective, scope and preliminary implementation approach of use case SOF_01, as envisioned and proposed by the local project consortium of the Sofia implementation site.

The contextual information outlined in Part A of the Detailed Implementation Plan for each of the nine implementation sites offers a comprehensive understanding of the local projects for all consortium members and interested external parties. In combination with the ideation and elaboration process carried out by the respective local project consortia leading up to this refined summary of the use cases, these reports establish a clear agenda for deployEMDS to address in the upcoming months.

To pave the way for the Detailed Implementation Plan – Part B series, which will outline in detail the project plans for the EMDS deployment within (local use cases) and across (transversal use cases) the nine implementation sites, the following factors have been identified as particularly challenging and will be addressed by autumn 2024:

- **The lack of clarity in conceptualising the common EMDS**
  The prevailing heterogeneity among the Implementation Plans – Part A largely stems from the lack of clarity surrounding the EMDS concept and the technical possibilities offered by the European data sharing framework. While some implementation sites, experienced in decentralised data sharing within mobility or other locally significant sectors, view their use cases as facilitated by this common data sharing framework, others see the EMDS as an auxiliary tool. In these instances, the relevant data sets for the use cases are made available but without an immediate need for data space components. This question closely relates to the missing European or cross-border harmonisation dimensions in the deployEMDS use cases, as outlined in Deliverable D2.1 describing the technical requirements. This will be addressed during the development of the transversal use case frameworks in WP4 and in the project's strategic alignment process. Alignment with SIMPL, the Data Spaces Support Centre (DSSC) and other sectorial data space deployment actions will support this process.
- **The challenge of sustaining the common EMDS beyond project lifespan**
  The use case products proposed by local implementation sites do not merely pilot actions but rather address real-world mobility challenges in a sustainable manner. This underscores the need to ensure the sustainability of the implemented data exchange solutions beyond project end. However, implementation sites may hesitate to fully embrace the EMDS as the facilitating data sharing framework for their use case products due to uncertainties regarding its long-term viability and pathway. This is exacerbated by the overall ambiguity surrounding the EMDS conceptualisation. To

tackle this issue, the strategic alignment process and WP3 on governance will define development scenarios for the EMDS beyond project end, taking into account initiatives such as the EMDS technical support study funded under CEF.

- **The missing or unclear link between the EMDS and existing common mobility data frameworks**
  The greatly varying levels of awareness for European (mobility) data legislation among local and regional stakeholders lead to a missing or unclear link between deployEMDS use cases and existing frameworks like the National Access Points (NAPs) mandated under the ITS Directive. Several data sets required for the use cases are already published in the NAPs by mandate of the MMTIS and RTTI delegated regulations. However, uncertainty surrounding the connection to the NAPs exists and is reinforced by the overall lack of clarity in conceptualising the common EMDS. The collaboration effort with NAPCORE (the National Access Point coordination effort), coordinated within WP3 of the action, will identify how these missing links can be established to ensure complementarity.

- **The lack of understanding regarding capabilities of data space components and technical governance to tackle data sharing challenges**
  The use cases proposed by the nine implementation sites tackle real-world mobility challenges that can be addressed with data-driven solutions or data-enriched products. Many data sharing challenges for these use cases could be resolved with technologies less powerful than a data space but the scaling of these solutions cross-border is potentially limited without a truly European framework. The question of technological choice and refining local use cases for EMDS deployment, while ensuring their real-world relevance to the co-funding cities, regions, and project partners will be addressed through the strategic alignment process within WP4, WP2 on technical infrastructure, and WP3 on governance. Further workshops and trainings will provide a better understanding of data space components and their concrete application in specific future-oriented use cases, especially for scalable data sharing ecosystems and sharing of non-public data where trust and compliance by design may play an important role.

In summary, both the reports and the elaboration process of the Detailed Implementation Plans – Part A have yielded valuable insights for strategic alignment in deployEMDS. Specifically, this report offers a clear and comprehensive initial description of the approach for the local implementation project in Sofia and the eight other sites across Europe. By autumn 2024, the Detailed Implementation Plan – Part B series will detail the final use case definitions and the detailed steps for their implementation, marking the first step toward deploying common infrastructure, governance and use cases as part of the common European mobility data space.