DELIVERABLE T1.3.3

Strategy for data based mobility planning in Functional Urban Areas (FUAs)

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Executive Summary

Deliverable description:

This strategy aims to provide insights into the key challenges of a data-based mobility planning for Functional Urban Areas (FUAs) including aspects like how to develop a data strategy and a trustful data sharing framework among different stakeholders in a FUA. As public transport (PT) is a backbone for creating low-carbon mobility systems in a FUA, this strategy focuses on PT stakeholders and data and how data-based planning processes can be realized in the process of Sustainable Urban Mobility Planning (SUMP). This strategy reflects the rising trend in the importance of data for mobility planning, in particular for the public transport sector, and presents different approaches and activities around data-based mobility planning processes – based on LOW-CARB project activities – along the planning phases and activities of a SUMP process.

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1. Introduction

1.1. Why this strategy?

Public transport generates millions of data sets on a daily basis within a FUA. This data can be used to plan for better and low-carbon mobility in a FUA. Therefore, a data strategy and concepts for data sharing are a basis to stimulate innovation and value creation. Data sets are growing fast in mobility – consumer and service provider data, triggered by rapid developments in digitalisation such as an increase in the use of data-generating devices like smartphones (UITP 2020). There is a growing demand in the PT sector to understand and analyse this data as a basis for a better mobility planning including both the improvement of existing PT services and the development of new ones. Therefore, a holistic view, including data strategy, sharing and culture as well as risks assessment of data usage in mobility is needed, that covers all aspects of mobility planning. The concept of the Sustainable Urban Mobility Plan (SUMP) emphasises such a need to cover all aspects of mobility, i.e. modes and services in an integrated manner, and to plan for the entire FUA, as opposed to a single municipality within its administrative boundaries. Hence, this strategy describes the usage of data for an improved mobility planning process along the phases and activities of a SUMP process.

1.2. From data to value with a SUMP

Data sets – considered as the new "oil" - as such are only loosely gathered numbers, symbols and signs without contextual information. To create value based on data, mobility planners - including PT authorities and companies – need to put data into context, e.g. through classification, to assign meaning to it and to create information and knowledge. A reasonable use of the data includes discovering relationships between variables (= information) and as a next step to detect patterns (= knowledge). Thus, it needs context and a structuring process to create knowledge based on data and information, which can be used for mobility planning. The SUMP approach provides a framework for context in terms of mobility planning and includes all levels of value creation from data collection, e.g. for mobility modes, via information on modal splits through structuring and analysing data and knowledge creation based on context of mobility objectives and deriving measures to improve the mobility system.

In the following, the eight basic principles of a SUMP process and the relevance of data usage for these principles are described.

2. The 8 SUMP principles in the context of data-based planning

2.1. Plan for sustainable mobility in the 'functional city'

A comprehensive and holistic SUMP should consider all existent flows of people and goods, identifying the city's functional urban area (FUA). This is not always limited to the city's administrative boundaries, as key connections often exist with their surroundings (e.g., a peri-urban area, an entire polycentric region, or another constellation of municipalities).

A definition of such functional space has been agreed upon by the OECD, the European Commission's statistics office (Eurostat), and its Directorate-General for Regional and Urban Policy. Parameters for its identification look towards "population density to define urban cores, and on travel-to-work flows to identify the hinterlands whose labour market is highly integrated with the cores".

Effectively addressing the entirety of the FUA in the planning process requires a common knowledge basis. The collection, processing and analysis of data need to take place in a coordinated and consistent manner. Ensuring such integration of information can present significant challenges when dealing with diverse institutional structures, different regulations, and a large number of stakeholders to cooperate with (e.g., transport operators throughout the FUA). In this way, it is important to consider all data sources and to guarantee their operationalisation and timely collection.

To create value of data for mobility planning in a FUA, a commonly shared understanding of data value and the need to share data among stakeholders and actors in a FUA is key. Therefore, a data governance is needed to develop a data ecosystem. Furthermore, joint criteria for formats and quality need to be established.

2.2. Develop a long-term vision and a clear implementation plan

Defining a long-term vision for transport and mobility development is a fundamental part of Sustainable Urban Mobility Planning, which should result from a cooperative analysis of current conditions and a well-informed outlook into future scenarios. Also, a SUMP contains strategies for the short-term realisation of objectives and targets through measure packages. It includes an implementation timetable and budget as well as a clear allocation of responsibilities and an outline of the resources required.

A well-informed definition of a common vision for the city's development relies on the effective handling of uncertainties. To achieve a broad and balanced understanding of current and future mobility conditions, and to analyse the impacts of different development scenarios, it is essential to count with a comprehensive database, covering all transport modes and mobility aspects.

Moreover, the definition of measurable and realistic targets and objectives to guide SUMP action planning and its implementation can only be fully exploited if the defined indicators can be assessed regularly through systematic and integrated data collection. To this end, it is important to set up strategies among all stakeholders, both public and private, to facilitate data sharing and cooperation.

Also, through the consistent evaluation of the measures executed, and subsequent adjustment of implementation strategies, effective planning for innovative solutions, for which previous data and experiences are usually lacking, is enabled.

2.3. Assess current and future performance

A Sustainable Urban Mobility Plan builds on a thorough assessment of the current and future performance of the transport system in the functional urban area. It provides a comprehensive review of the existing situation and establishes a baseline against which progress can be measured. Data about the current mobility system is an important basis for assessing strengths and weaknesses as well as risks and opportunities, and provides useful insights for developing aims and objectives for a mobility strategy.

Such continuous assessment of performance as the basis for informed decision making takes a central role within the planning methodology. Its strategic approach and rationale seek to identify a set of key metrics which are instrumental throughout the process. In this way, after providing a comprehensive overview of the current mobility situation, strategic objectives are materialised in realistic and measurable targets, for which concrete indicators should be defined.

Proper identification of the required data collection and processing efforts, to support the planning process, as well as to effectively monitor its implementation, allows authorities to ensure the availability of resources and capacities to fulfil these tasks. Delays and uncertainties can be avoided through the timely identification of data gaps and alternative sources.

2.4. Develop all transport modes in an integral manner

Furthermore, a SUMP aims to foster a balanced and integrated development of all relevant transport modes, while prioritising sustainable mobility solutions. To do so, the plan should present an integrated set of measures that effectively addresses the various aspects of urban mobility, including service quality, security, safety, accessibility, and cost-effectiveness of the overall mobility system.

Fulfilling this directive requires a fact-based understanding of the challenges and opportunities to be faced for each transport mode, including collective mobility (traditional public transport as well as new services based on sharing, including new business models); active mobility (walking and cycling); intermodality and door-to-door mobility; road safety; moving and stationary vehicles; freight and service delivery; logistics; mobility management; and Intelligent Transport Systems (ITS).

Ensuring the opportune collection of data, enables cities to effectively address all modes in a balanced way. However, there are technical and political challenges to be considered, such as coordinating strategies for data-sharing and interoperability among all involved actors.

An optimal preparation starts with achieving a common understanding of which data is required to enable planning for all transport modes in an integral manner and tacking stock of the available sources of information. Cities are encouraged to consider solutions such as open-data sources and low-cost collection methods.

Data enables an efficient and transparent allocation of resources, such as road-space, to each mode. Through real-time data collection, adjustments can be made in a flexible and agile manner to optimise such allocation of priority and deploy traffic management solutions that consider all transport modes.

2.5. Cooperate across institutional boundaries

The development and implementation of a Sustainable Urban Mobility Plan should be based on strong cooperation, coordination and consultation across different levels of government and between institutions in the planning area. Data-based decision support systems can significantly boost agile cooperation by setting a common understanding of the priorities and challenges to be addressed and defining a transparent approach towards action planning and conflict resolution. To this end, authorities should aim to establish data-sharing strategies across the FUA, ensuring an adequate standardisation and integrated analysis of the information, and exploiting open-data sources.

It is important to develop the necessary capacities and institutional framework to support data collection efforts, including regulations and data management systems (addressing safety and privacy issues). This can enable the consider multiple data sources (on all governance levels and sectors) and facilitate public-private cooperation. Besides, administrations can become more effective as parallel data collection, processing and analysis efforts can be avoided and the synergies can be exploited.

Data sharing across institutional boundaries in a FUA needs to be based on a data strategy that covers data governance and a well-established data sharing culture.

2.6. Involve citizens and relevant stakeholders

In its aim to meet the mobility needs of people in the functional urban area, as well as institutions and companies based there, a SUMP follows a transparent and participatory approach to actively involve citizens and other stakeholders throughout the plan's development and implementation. Participatory planning is a prerequisite for people to take ownership of the Plan and the policies it promotes, thus steering public acceptance, minimising political risks and facilitating implementation.

Ensuring effective knowledge exchange is essential for the success of such participatory processes. Yet, maintaining high levels of engagement and ownership poses a significant challenge. A well-designed strategy to share information, with attractive and understandable visualisations, useful tools and illustrations (e.g., of the mobility conditions and potential future scenarios), can significantly increase the levels of interest and commitment in the planning process.

Besides, opening data to society in a transparent way enables stakeholders and citizens to assess, validate and improve the quality of information collected. It also enables collaborative data collection strategies, with direct input from mobility users and co-creation efforts. Customer data is a very important source for public transport authorities and companies to analyse passengers' preferences and their use of the mobility system, e.g. personal data, mobility behaviour data, customer journey data and customer relationship management (UITP 2020). Through public-private cooperation towards data-sharing and participatory planning, synergies can be exploited, and efforts aligned for the improvement of mobility services.

2.7. Arrange for monitoring and evaluation

Close monitoring is essential to effectively manage the implementation of a Sustainable Urban Mobility Plan. Through the assessment of performance indicators and the achieved progress towards the plan's objectives, cities can adjust targets and, if necessary, take corrective action in implementation.

Yet, successful monitoring of the SUMP requires timely access to the relevant data and statistics. A continuous and systematic data collection effort is of key importance. Alternative and innovative collection mechanisms should be considered, and cooperation strategies developed to involve private actors and civil society.

The results of the monitoring and evaluation should be shared and communicated with citizens and stakeholders, informing them about the progress in development and implementation of the Sustainable Urban Mobility Plan, to further encourage ownership and commitment towards the city's mobility development.

Data is an important basis for monitoring and evaluation activities, and there are different evaluation and monitoring methods and data sources on which all stakeholders have to agree.

2.8. Assure quality

A Sustainable Urban Mobility Plan is a key document for the development of an urban area. Having mechanisms in place to ensure its general professional quality and to validate its compliance with the requirements of the SUMP concept and methodology is an effort worth taking.

To this end, the assurance of data quality and risk management during implementation require specific attention. Defining standards for the data utilised and developing capacities and tools can significantly facilitate this analysis and evaluation. Such tasks can be delegated to external quality reviewers or another government institution (e.g. on the regional or national level), while it can be facilitated by the use of tools like the SUMP Self-Assessment Tool.

Quality of data is key to ensure a high-quality SUMP process. The data's value for the SUMP process increases with its quality. Thus, the more accurate it is, the better, as ensuring quality and integrity of data ensures both unbiased and appropriate mobility planning processes and solutions (UITP 2020).

3. Steps towards Data-Based SUMP

The following chapters are structured along the phases and activities of SUMP process and highlight the relevance of data along this planning cycle. The process consists of 4 Phases with 12 main Steps that are further broken down into 32 Activities. Good practice examples are taken from LOW-CARB partners project activities, and additionally initiatives and examples, which are useful to illustrate activities that are part of the process and highlight the importance of data for developing and implementing a SUMP.

3.1. Preparation and analysis

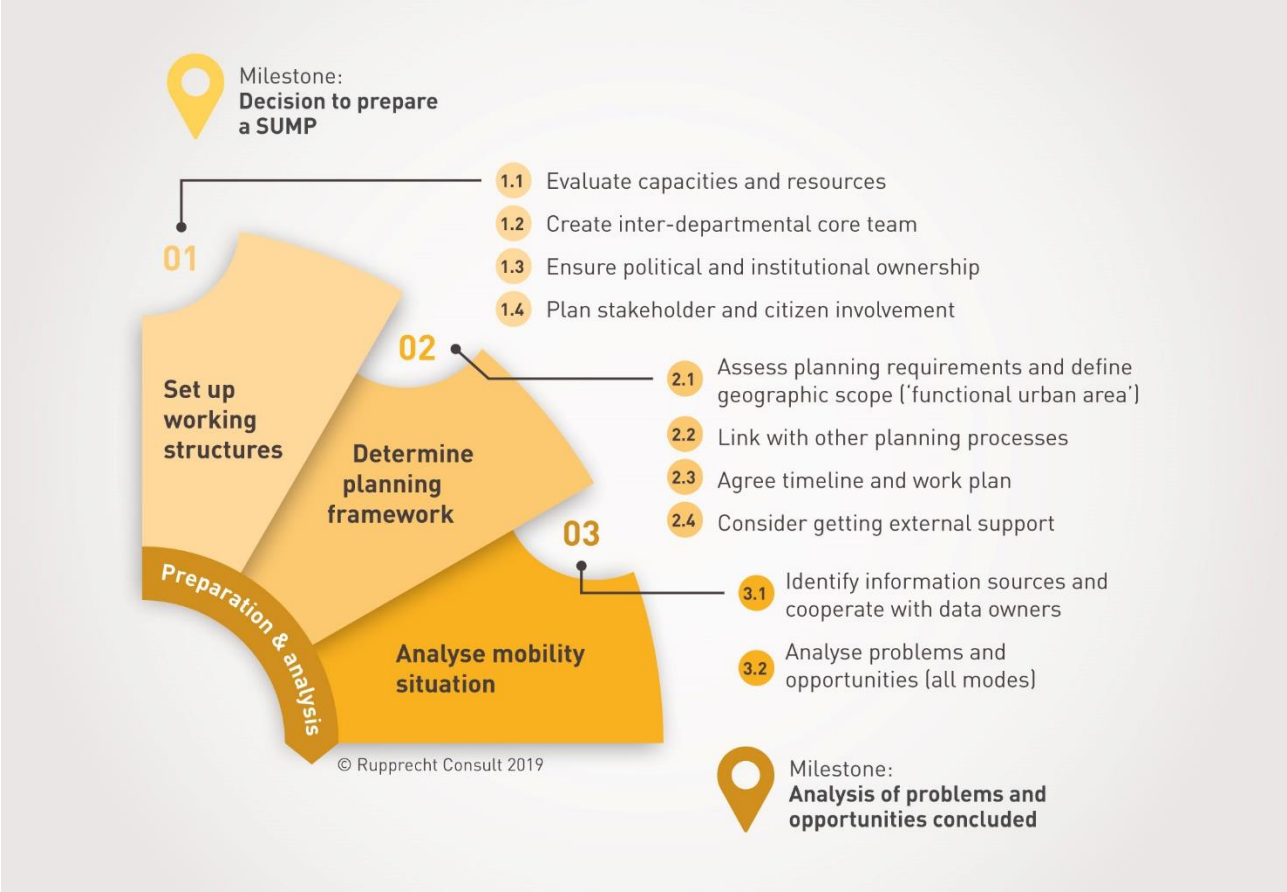


Figure 1: Phase 1 SUMP cycle (Rupprecht Consult, 2019)

In the first phase, the groundwork for the planning process is established, through an analysis of all available resources for planning (incl., human, institutional, financial) and an appropriate set up of working and participation structures to get started. At this stage, decision-makers need to ensure that the key institutions and policymakers support the SUMP's development and contribute to setting up a core planning team.

Besides, key factors and context conditions for the planning process are identified, such as existing plans or legal requirements. The geographic scope of the plan is defined, following an analysis of traffic flows to coverage of the entire Functional Urban Area. Also, the planning timeline needs to be agreed upon and external support recruited, if necessary.

A comprehensive analysis of the major problems and opportunities related to mobility is then achieved, through a diagnosis of current conditions and challenges from the perspective of all transport modes and relevant sustainability factors. This process requires an appropriate set of current data sources, identification of gaps and data collection/integration efforts. Further considerations and recommendations on data utilisation during Phase 1 of the SUMP process as described in this section.

3.1.1. Planning framework and cooperation structures

Evaluate capacities and resources

A self-assessment of planning practices, capacities and resources at the beginning is needed to tailor the process to the local context. This also allows for the identification of strengths and weaknesses, as well as barriers and drivers, that might influence the development of a successful Sustainable Urban Mobility Plan. This includes all capacities and resources for developing and implementing the plan, such as human (i.e. available staff and skills), institutional and financial resources, but also knowledge, data, technical capacities and tools. Among these key requirements for a successful mobility planning process, counting with wide-spread and good quality data is of particular importance. It enables informed-decision making and effective action towards the achievement of policy goals. And, only through regular data collection, processing and analysis, can the success of such efforts be measured in time.

The identification of existent (and potential) data sources should include a characterisation of its applicable regulation and ownership. As data is increasingly becoming more regulated, it is key to consider its strategic value and conditions of usage (e.g., privacy concerns, management, commercial value, etc.). In Figure 2, UITP provides helpful guidance, by describing how data can be categorised (by its owner), per its strategic value and level of confidentiality.

POSSIBLE CORPORATE GOVERNANCE OF DATA WITH RESPECT OF THE VALUE OF DATA			
DATA USERS / CATEGORY OF DATA	STRATEGIC PARTNERS	COMMERCIAL VENTURES	PUBLIC INTEREST OR NON-PROFIT ORGANISATIONS
PRIVATE DATA	(If within strategy) Reciprocally exchanged under privacy restraints	(If within strategy) Reciprocally exchanged under privacy restraints	Not openable
STRATEGIC DATA	(If within strategy) Reciprocally shared	(If within strategy) Reciprocally exchanged	Not openable
COMMERCIAL DATA	Reciprocally shared, exchanged or sold	Reciprocally exchanged or sold	Not openable for commercial use
OPENABLE DATA	Shared	Shared	Open

Figure 2: Categories ofdata governance per its strategic value (UITP, 2018)

Furthermore, the costs of data need to be considered, when assessing resources for SUMP development and implementation. The process of collection, storage, analytics, security and privacy and elimination needs permanent attention, budgeting expenses and investments. All activities around data concur expenses to the operator and authority, such as infrastructure and network development, technological innovation, and strengthening operating capabilities.

Assessing the availability of data and capacities in Leipzig

Within the LOW-CARB project, the City of Leipzig has advanced efforts to enhance its transport data management system, developing data-sharing and -integrating strategies towards a more transparent and efficient usage of information in mobility planning and operation. Moreover, this open-data strategy is also meant to support Leipzig's planning efforts towards a low-carbon mobility system.

To this end, the city started by analysing the strengths and weaknesses of its current transport information system and identifying opportunities for its enhancement. Most transport information in Leipzig was being managed in an offline environment. Yet, in 2015, an open data portal was initiated by the city (www.opendata.leipzig.de), where separate data sets are published regarding mobility and traffic. This includes key information such as vehicle-counting, traffic accidents, public transport data (concerning the vehicles, route length, number of passengers), road network and air transportation. All data are provided as annual figures, while information on traffic accidents and air transportation is also provided on a quarterly basis. Besides, the portal recently includes information on buses and trams operated by Leipzig transport company (although it refers to planned service schedules and routes, not real-time data), in a machine-readable GTFS format.

In addition, the city considered the regulatory conditions and strategic value of data to determine privacy limitations towards an open-data strategy. The goal of such a strategy in Leipzig is to achieve a comprehensive and well-integrated database that can be used by the public (e.g., within a digital city map) and for internal use by the Leipzig partners, allowing for a more efficient public administration and operation of mobility services. Yet, the sensitivity and privacy of the data need to be considered when identifying which to make publicly available.

The city of Leipzig also performed a self-assessment of its organisational structures and capacities, identifying key stakeholders and reflecting on the allocation of roles and responsibilities of the people involved. A need was identified to further define functions and tasks concerning the management structures and team coordination, and to consolidate the specific contents of the activities concerning open data mobility planning in Leipzig.

Open-data Strategy, City of Leipzig (2020)

It is essential that the described assessment of available capacities and resources considers the entire Functional Urban Area (FUA). The planning process should address mobility dynamics as functionally defined by traffic flows in the area. It might be that the geographic scope of the plan should go beyond administrative boundaries. In such cases, the participation of neighbouring authorities and stakeholders should be ensured.

The planning framework and conditions are then further defined by the applicable regulations, existing plans and initiatives, and availability of human, institutional and financial resources throughout the FUA, and not just for the urban centre. The existent data for (and between) neighbouring localities should be evaluated.

Set up cooperation structures for stakeholder and citizen involvement.

Developing and implementing a Sustainable Urban Mobility Plan is a complex process that requires working across boundaries and sectors, and coordinating between related institutions and organisations. At this stage, decision-makers need to ensure that the key institutions and policymakers support the SUMP's development and contribute to the process, by setting up effective and inclusive working structures.

Creating a sound basis for durable cooperation between all stakeholder groups starts with the identification of all relevant actors, but also the consideration of possible synergies or conflicts between stakeholders. Subsequently, a dedicated strategy is needed for the involvement of stakeholders, drawing on different formats and techniques when dealing with authorities, private businesses, civil society organisations, or all of them together. Besides, public involvement is fundamental to ensure the legitimacy and quality of decision making, and should also be planned for.

Also, local authorities should aim to cover immediate skill requirements by involving external experts, if needed, while developing and maintaining expertise within the public organisations. Cooperating with experts that contribute new approaches or technical knowledge on key issues, brings significant added value to the planning process. For a highly technical and complex field, such as data management and information technology, it is essential to count on such expertise to support decision-making and implementation.

Stakeholder engagement process on open data-based mobility planning in Szeged

As part of its activities to plan and create an open-data concept for the management of transport information, the City of Szeged conducted a consultation and engagement process with local stakeholders. These efforts aimed to steer cooperation and find agreements towards data-sharing strategies among data owners and users. Following this discussions, an open data concept would be developed by the City of Szeged and SZKT, and integrated with the action planning and governance strategies developed in the LOW-CARB project, towards the decarbonisation of urban mobility. As a part of the planning actions, inhabitants will also be consulted via conventional/on-line polls.

The cooperation involved politicians, scientific partners (e.g., University of Szeged), public transport authorities (SZKT) and service providers (e.g., DAKK Zrt), IT and traffic specialists, and legal advisors. Also, the local IT company of Szeged, RITEK Zrt, as a developer for the database, participated. And other entities, such as New Line Systems Kft, who has the exclusive right of ownership of the firmware functioning in data-collecting devices in SZKT's fleet.

In this way, Szeged ensured the participation of key actors concerning transportation data, planning and operation. The stakeholder mapping and engagement efforts considered the roles and interests of each actor, and their relation to data (e.g., owner, user, beneficiary, etc.).

The advanced discussions allowed Szeged to identify challenges and opportunities regarding the storage and handling of big data collected. The negotiation involved addressing uncertainties on how the open-data mobility planner should be constructed and what type of data can be stored, referring to legal constraints to comply with data management- and privacy-related decrees.

Source: Szeged Transport Ltd.(SZKT), D.T1.3.2 Report on stakeholder meeting and common vision for open-data strategy, 2020

Figure 3: (City of Szeged, 2020)

Optimising governance structures in Leipzig

In Leipzig, a fast-growing industrial area near the airport, difficult travel-to-work flows, and complex mobility dynamics, have resulted in high-pressures on the transport and economic systems, at the regional level.

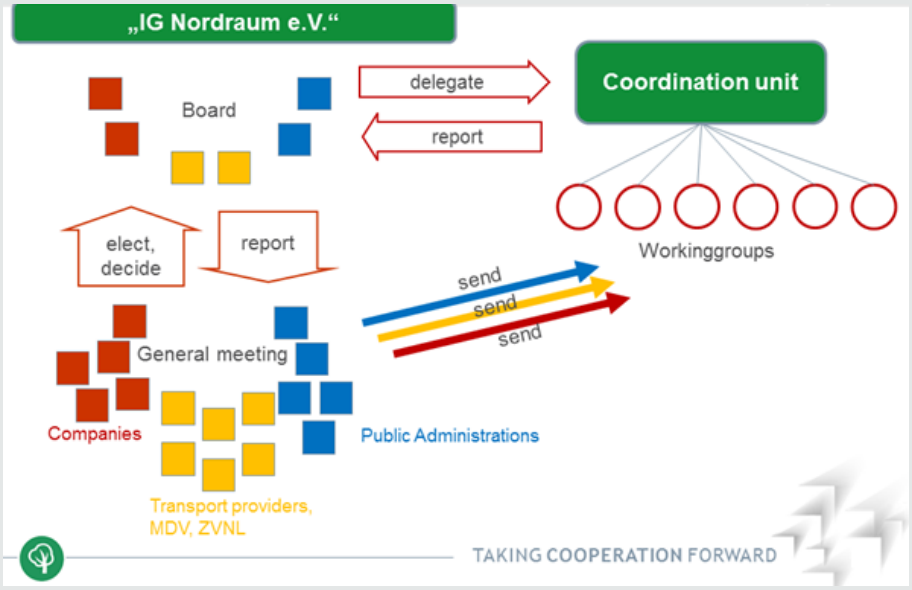


Figure 4: Governance structure for FUA Leipzig (City of Leipzig, 2020)

Consequently, the City of Leipzig, Leipzig Transport Authority (LVB) and the regional public transport association (MDV), have identified a need to develop a mobility Action Plan for the entire Functional Urban Area (FUA), which can align both city and regional strategic goals.

Moreover, cooperation structures should be strengthened, enabling continuous communication, and finding synergies and beneficial collaboration strategies among public and private entities. In this was, all perspectives in the planning and implementation of mobility solutions for the FUA.

The proposed governance model focuses on dialogue with private stakeholders and key target groups (companies), through the set-up of different cooperative working levels (seeFigure 4) and establishment of a long-term collaboration, with regular communication and meetings. The jointly developed three governance levels for Action Plan development are:

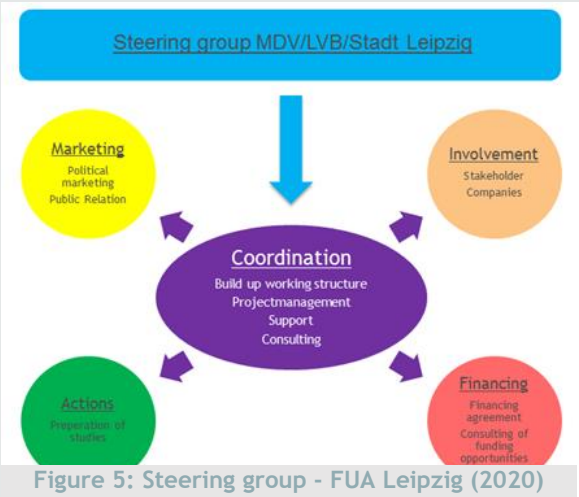


Figure 5: Steering group - FUA Leipzig (2020)

1.Steering group: decision making level, where the heads of units of the three institutions meet every three months together with project leaders and team. Their role is to take the final decision on milestones, content and framework of actions.

2.Project leader: It was decided to name a project leader in each institution to prepare the decisions and consult the practical work of the Team. The project leader takes part in the regular meetings of the Steering Group organised every 3 months, but also in the weekly team meetings (see below).

3.Team: new staff was hired for developing the masterplan. All team members are working in the public transport departments. The team worked in close cooperation with specific but not fixed roles during the

process. One person was specialized in data-driven analysis, one in networking and communication and one in strategic planning. The team meets every week and communicates daily in the process.

3.1.2. Data-based analyses of problems and opportunities

Identify information sources and cooperate with data owners

The final step in this preparatory phase to develop a SUMP is to analyse the mobility situation of your city. This is a major milestone that provides the basis for rational and transparent strategy development. Before analysing the problems and opportunities in the field of urban mobility as well as including citizens in the analysis, information and data sources need to be identified and cooperation with data owners should be set up. The aim is to have target-oriented and focused data collection and analysis, which includes all transport modes and important mobility-related aims and trends for the entire functional urban area.

Before deciding on future policies, it is essential to know what problems you are currently facing. In urban transport and mobility, this knowledge is often very fragmented and incomplete. Like pieces of a puzzle, data and information need to be put together to describe the current situation.

To conduct a good analysis, you first should identify which data is needed (to analyse all mobility aspects and the political priorities of the process), what information is available, and what is still lacking. Beginner cities with no or only a few data available should not be discouraged and rather see it as an opportunity to improve data collection as part of the SUMP process.

To fill important remaining gaps in your data, you should check the availability of default values, such as those provided e.g., by the national level, or collect additional data that is not accessible from internal or external data owners. Data can be collected by a variety of means. For example, trends in the number of pedestrians can be determined by carrying out manual counts annually at key points in the city, such as by installing counting machines or conducting a household survey. The choice of method depends on the resources available, the size of the city and the level of reliability required. The following general types of data could be distinguished:

- Quantitative data from automatic measurements (e.g., counting machines, infrared and other sensors, cameras, satellites) or georreferrenced data (e.g., GPS data from vehicle tracking, mobile phone locations collected via apps or by mobile providers),
- Quantitative and qualitative data from surveys (household, on-street, in-vehicle) or on-street observations (e.g., manual traffic counts, site visits, inventory of curb space assignments),
- Qualitative data from interviews or focus groups,
- Qualitative data from journals, blogs, social media,
- Modelling data to fill data gaps

Data in Public Transport can also be categorised in relation to its source. In its report on *The Value of Data for the Public Transport Sector* 2018), UITP presents the following types of data:

Different types of data in Public Transport	
Customer data	All data on the customer itself, as well as passenger preferences and their use of the system
Operational data	Data produced by operators' assets for the delivery of public transport services
Mobility data	Data which provides information on urban mobility patterns
Exogenous data	Data from third parties which can have an impact on mobility

Figure 6: Types of data in public transport (Source: UITP, 2018)

A challenge most cities face is that their data is not harmonised in terms of timescales or spatial coverage, and that data is often distributed between different data owners, holders or storage systems. As a result, access can become a problem due to a lack of information on existing databases and because of reluctance to share the information - in particular when commercial operators, are involved who might also demand high payments for their data or cite commercial confidentiality. A thorough data audit, excellent communication with data owners and mutual data sharing with them can help to overcome this. Experience has shown that the early involvement of internal and external data owners and clear agreements can contribute to a higher willingness to cooperate.

Innovative data collection and integration strategies in Szeged

After analysing current data availability and usage, and identifying knowledge gaps, the city of Szeged set to develop strategies to enhance its data collection and integration capabilities. Various data sources were considered, as shown in Figure 7, yet consideration of data governance set limitations due to high-costs of commercial data (e.g., mobile phone data) and GDPR concerns. So, the city decided to follow an approach by exploiting innovative data collection and management solutions.

Szeged follows a holistic approach towards data integration and utilisation, where aggregated traffic flows are derived from both public transport data and road traffic measurements. In this process, various types of sources are considered, such as on-board diagnostics from public transport, sensor nodes and data from custom mobile apps.

Traffic flow information is derived from optical counting, Wi-Fi detection, and weight measurements. In this way, the city evaluates the level of occupancy of given lines and can optimise routes and frequencies according to the needs. This includes passenger counting through Wi-Fi connectivity, through the free connection provided at public transport vehicles and stations, where passenger voluntarily provides information about their travel. The system counts the number of devices connecting to the network. GDPR restrictions were considered, and thus the system ensures that only the number of passengers/phones is registered and no personal info. Also, sensor nodes are located on-vehicle, at bridges/intersections, which include cameras and sensors that monitor both the vehicles passing and detect smart devices. Data safety and privacy are ensured through P2P data aggregation, onboard data processing and the employment of a US/EU patented P2P Wi-Fi-based data management facility.

Such capabilities allow transport systems to become more resilient, identify promptly issues, optimise traffic flow and facilitate management.

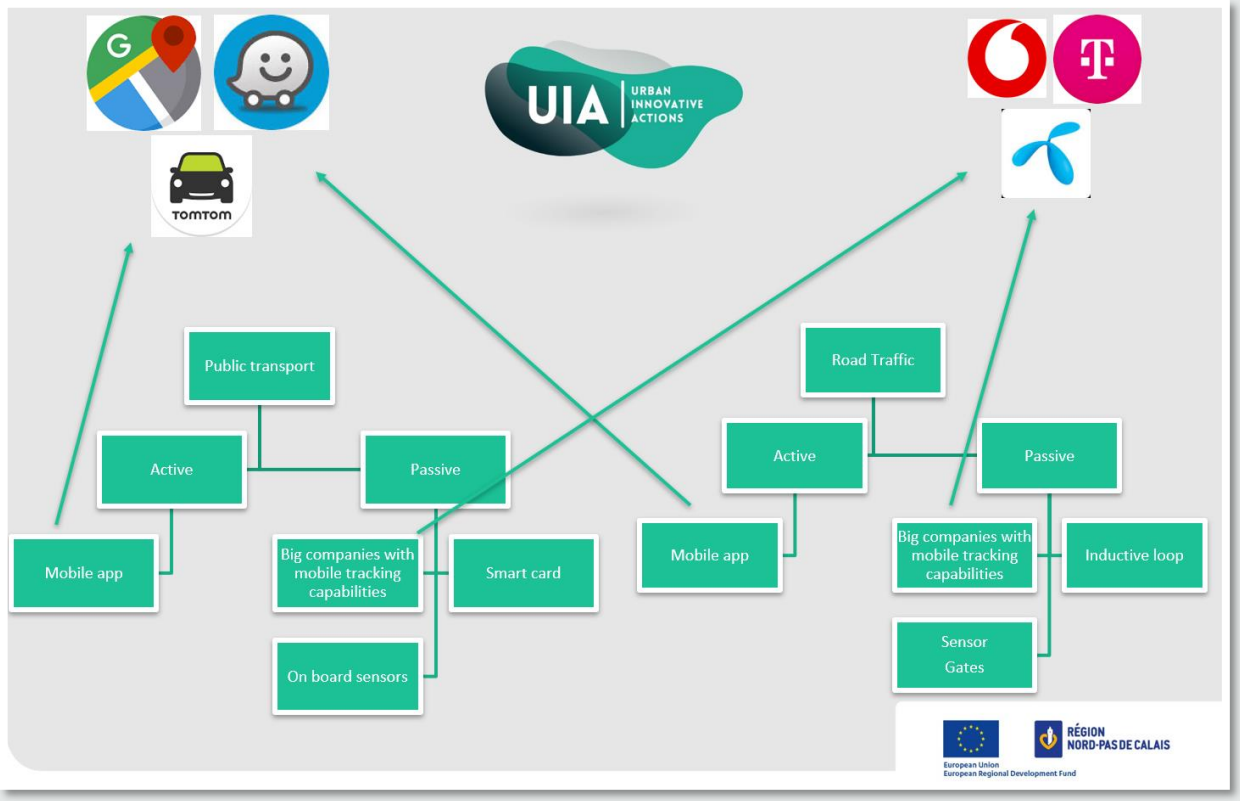


Figure 7: Sources of data collection and their governance (Source: University of Szeged, 2020)

Analyse problems and opportunities

A comprehensive analysis of current mobility conditions is crucial to guide the definition of effective policies. It also provides a necessary baseline against which progress can be measured. This assessment should identify problems and opportunities that relate to urban mobility (e.g. accessibility to services, pollution, social inequity, road safety, climate protection, land-use patterns and resilience of the network), allowing the prioritisation of issues to be addressed in the plan. Besides, it should review the current status of important mobility and transport developments in the entire functional urban area, based on data and relevant planning documents both for passenger mobility and freight transport.

Although a proper analysis of all transport networks, modes and key aspects of sustainable urban mobility should be achieved, it is important to limit the resources and energy allocated to this task. Having a continuous and well-integrated data collection and analysis system put in place constitutes a valuable asset for any planning and implementation initiative. In this way, delays in the planning process and utilisation of low-quality data can be avoided, as well as costly efforts to collect data in an accelerated manner.

Accordingly, the analysis of challenges and opportunities for urban mobility should consider the availability of data and tools to support informed decision-making and planning efforts. Local authorities should consider the benefits and requirements of modern data management systems, innovative collection methodologies and open-data approaches.

Requirements, benefits and risks of open-data usage in the public transport sector

UITP's publication on the 'Value of data for the public transport sector' (UITP, 2018) constitutes a valuable reference. It underlines the importance of developing a **"data strategy for the transport sector based, on the cost and value and focusing on the strategic benefits of data".**

A differentiated view on data governances and related regulations is suggested, as public transport is becoming a data-enabled or -driven business and must answer to different local conditions. The publication reflects on the different interests and concerns from public transport users, authorities, and operators, towards the usage of data.

UITP provides a series of recommendations on **"how transport companies should adjust and strengthen their capacities to effectively exploit the added-value of data-based planning and operations"**. Among these, they highlight the need to raise awareness and develop the know-how to optimise the use of data. Besides, UITP calls for the development of cooperative strategies for data-sharing and integration, in addition to a transparent approach for its regular collection, storage, analysis and employment.

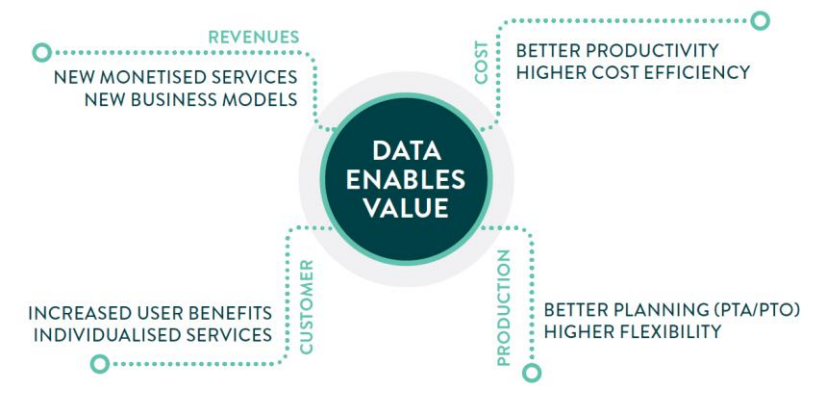
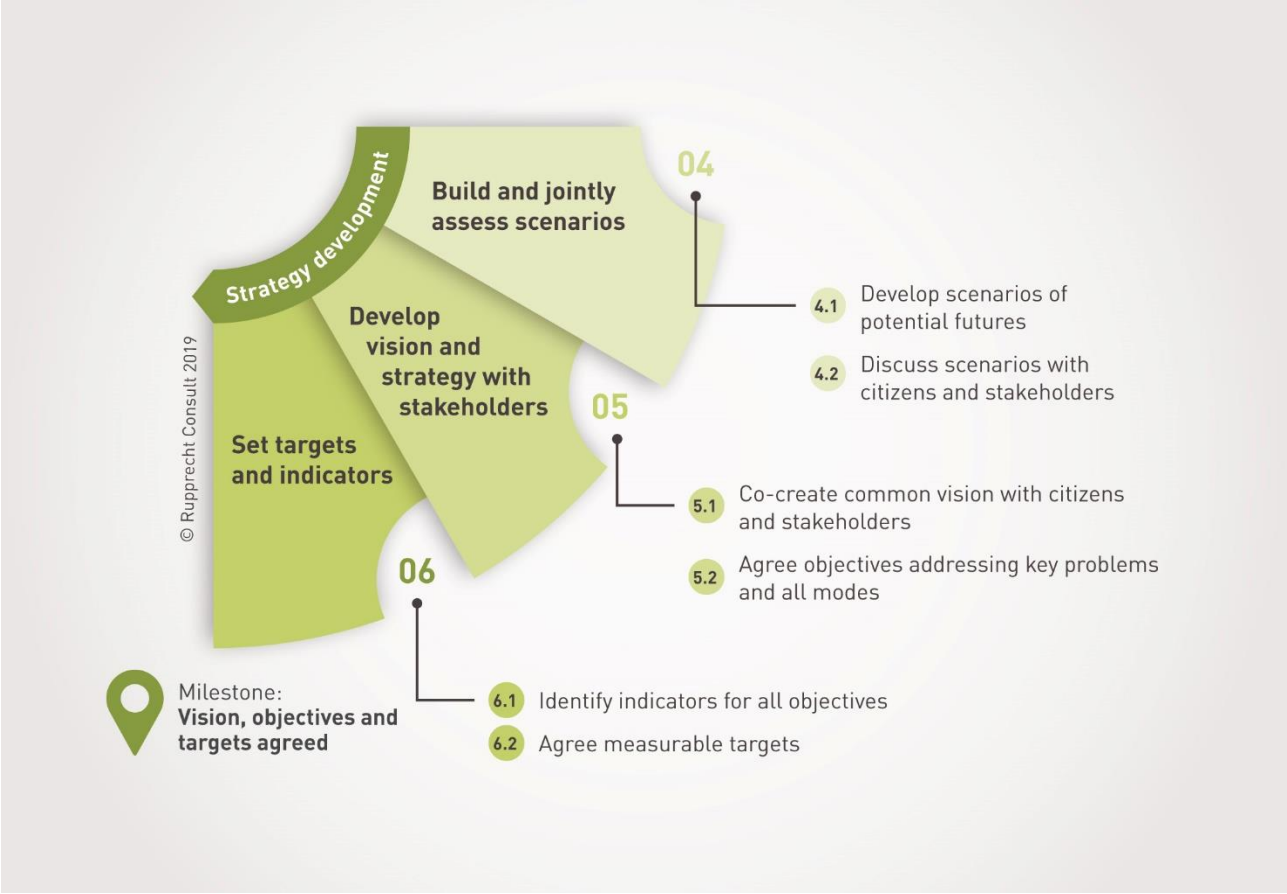


Figure 8: Value of data for the public transport sector (Source: UITP, 2018)

Among the key opportunities that can be unlocked through strategic and efficient data utilisaiton in transport planning and operation, the publication emphasizes the significant increases in productivity and more efficient use of resources that can come from avoiding internal data silos. Moreover, improving data analytics can enhance decision-making and guide actions towards more efficient mobility services and innovative business models, which can benefit both users and service providers.

Besides recongising the significant value of data usage, it is also fundamental to understand the potential risk derived from its publication. Potential risks and issues are identified in relation to assurance of privacy and data stewardship, cyber-security and steering a faster competition dynamic. Thus, authorities should carefully consider which instances allow for open-data approaches, and which should be shared or sold, and under what conditions.

3.2. Strategy development



The second phase of a SUMP process aims to define the strategic direction of the plan, that is, the desired future scenario and objectives that characterise it. Such a strategic framework should be agreed upon in cooperation with citizens and stakeholders, to ensure public support and acceptance. Creating a sense of ownership on the plan can also contribute to its successful implementation and the alignment of policies across different public administrations.

A common vision is the cornerstone of every SUMP, and it can be defined as "a qualitative description of the desired mobility future for the city, which is then specified by concrete objectives that indicate the type of change aimed for" (Rupprecht Consult, 2019).

The utilisation of visioning exercises with stakeholders and citizens to develop a shared understanding of desirable futures, based on the results of the mobility analysis and scenario impacts, helps to ensure that objectives effectively address key problems and user-needs. Furthermore, a set of strategic indicators and targets should be defined, allowing monitoring of the measure implementation, and the assessment of progress towards the objectives established.

3.2.1. Scenario-based discussion towards a common vision for mobility development

Discussing the different development scenarios, and their impacts, together with citizens and stakeholders is the first step towards a widely accepted mobility vision. These scenarios should describe forecasted developments from alternative sustainable policy priorities and their impacts on a strategic level. A

'business as usual' case should also be considered, setting a baseline for comparison and allowing for a common understanding of the effects of inaction.

Scenario building requires the implementation of appropriate techniques such as modelling and qualitative assessment, and should be based on the results fo the status quo analysis in Phase 1. A precise understanding of current issues and the potential challenges and opportunities ahead, requires a comprehensive basis of information and descriptive data.

Building upon a common knowledge basis can facilitate cooperative discussion and help resolve potential conflicts among stakeholder priorities. In this way, an agreement can be reached on objectives to address key problems and guide the road to fulfil the defined vision.

Such strategic objective setting should also consider how mobility planning and operation should be strengthened, and opportunities generated by the implementation of innovative technologies and services. Among these, cities are encouraged to reflect upon their utilisation of mobility data and define a vision for the exploitation of their strategic value.

A common vision towards open-data implementation in Leipzig (Germany)

As described previously, the City of Leipzig set to develop a strategy for the improvement of their transport data management system and to implement open-data concepts. Following the analysis of current conditions and the available data and resources, the city conducted a collaboration process with local stakeholders, aiming to define a common vision for the open-data strategy, analysing and complementing the network of involved entities, and developing a high-level action plan.

The process included stakeholders from different sections of the city administration, such as transport planning, data handling, statistics and the digital city unit, as well as NGO partners from Open Knowledge Foundation and Leipzig transport. The goal was to benefit from expertise from different viewpoints, with transport planning on the one side and data security and privacy issues as well as data science and visualisation on the other.

There were two workshops held to start the development process for the open data strategy.

The stakeholders were involved by two workshops (25th March 2019 and 17th May 2019), defining the basis for the open-data strategy development. This included achieving a common understanding of current challenges and opportunities around data utilisation and management and defining a vision and strategic objectives for the open-data approach.

The results of the kick-off workshop included the following steps for the open data strategy:

- Description of technical solutions to publish and visualize more administration data as open data
- Illustrate further applications for the City of Leipzig (e.g. including parking garage capacities and public transport stops
- Possible actions to ensure data quality and competitive advantages
- Recommendations for political decision-makers

Also, the context and baseline conditions were discussed, including technical solutions for transport planning and modelling, geodata infrastructure, harmonisation of data as well as new applications for use of open data and added value e.g. (parking data, P&R, E-roller etc.).

The Hackathon workshop with local actors also helped identify the needs of each sector: what data is produced and needed, how do they use the data and how it should be presented and visualised.

As seen in Figure #, urban planners, for example, stated their preference to "analyse data visually before downloading it and integrating it into their own systems". On the other hand, data scientist are more inclined to download raw information.

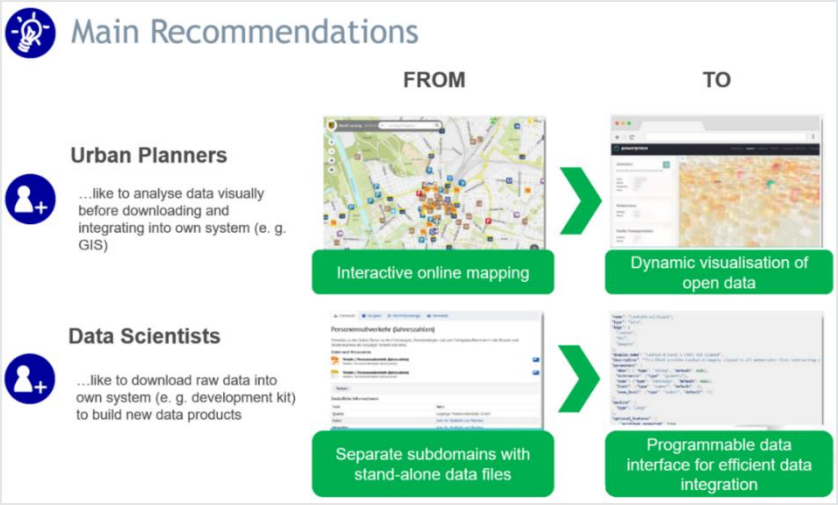


Figure 9: Recommendations Leipzig Hackathon on its Open-Data Strategy (Leipzig Transport Company, 2020)

The agreed upon vision of Leipzig's open-data strategy includes the following aspects:

- Digital infrastructure & data collection and management: the city administration is responsible for the digital infrastructure and data. It understands that through open-data implementation, the potential exists for data-services to also enable further data collection (e.g. real-time data and service information), and so, it recognises its importance for innovations such as Mobility as a Service (MaaS), which can be significantly strengthened by additional information generated by user sites.
- Building up networks: open data can allow for better networking through joint processes and result in more effective coordination of efforts and optimal user of resources.
- Main principle: Data should be 'Open by default', which means should be generally opened, except in duly justified cases.

And this vision is to be realised by following this set of strategic goals:

- Creation of interest and understanding for administrative action as the data on which these are based are open and public
- Modernisation and innovation, as new business cases can be developed using open data and new solutions can be taken over by the city administration
- Discrimination free access to data to empower even non-profit or low-profit use of data for the common good
- Democratisation of data collection and information
- Cultural change towards collaboration of stakeholders by sharing information instead of separate data storages and data handling systems

The city also understands that this vision will only be successful with more stakeholder collaboration between administration, enterprises and citizens. This requires a boost in digital competences in the administration and broad political support. Consequently, continuous participation was ensured throughout the Open-Data Strategy development process, with multiple rounds of review and consultation.

Source: Leipzig Transport Company (LVB), D.T1.3.2 Report on stakeholder meeting and common vision for open-data strategy, 2020

3.2.2. Set targets and indicators

The vision and objectives provide an important qualitative description of the desired future and intended type of change. However, this alone is not sufficient. To make these changes measurable, a suitable set of strategic indicators and targets needs to be selected.

Moreover, this definition of strategic indicators for all objectives is an essential step to enable the effective monitoring of the plan's implementation. The main aim is to define a set that is feasible, ambitious and mutually consistent, allowing those involved to monitor progress towards the achievement of all objectives without requiring unrealistic amounts of new data collection.

To this end, it is essential to develop a clear definition for each indicator, the reporting format, and an outline of how data is measured, and the indicator calculated from the data. Besides, the already available data and identified sources need to be assessed, allowing the detection of knowledge gaps, and, if necessary, the development or identification of new data sources (e.g., data-sharing partnerships, surveys, quantitative data from automatic measurements). Cities with limited resources, data or experience when developing a SUMP, may find it more effective to work with just a few indicators on the strategic level.

Sustainable Urban Mobility Indicators (SUMI)

Indicators play a vital role in a city's efforts to make and monitor progress towards a more sustainable mobility system. To support cities in this important activity, the European Commission (DG MOVE) funded the SUMI (Sustainable Urban Mobility Indicators) project to review and contextualise the existing indicator set SMP2.0 of the World Business Council for Sustainable Development[1] to make the indicators more suitable for European cities, more compatible with the availability of existing data sets and with the institutional context of data owners.

Between 2018 and 2020, the SUMI consortium worked with nearly 50 urban areas in almost all EU Member States to apply this resulting indicator set and thus to test, validate and improve it. The overall goal was to have a methodologically rigorous, yet practical tool with concrete benefits for cities and with the potential to become the European standard of sustainable urban mobility indicators. The project also resulted in an online tool for cross-city comparison and benchmarking which is available from the SUMI page on the DG MOVE website[2].

No.	Indicator	Level of data availability as signalled by participating cities
1	Affordability of public transport for the poorest group	High
2	Accessibility for mobility-impaired groups	Medium
3	Air pollutant emissions	Medium
4	Noise hindrance	High
5	Fatalities	High
6	Access to mobility services	Medium
7	Quality of public spaces	Medium
8	Urban functional diversity	Low
9	Commuting travel time	Medium
12	Mobility space usage	Medium
13	Emissions of greenhouse gases	Medium
14	Congestion and delays	Medium
15	Energy efficiency	Low
16	Opportunity for active mobility	Medium
17	Multimodal integration	High
18	Satisfaction with public transport	Medium
19	Security	Low
20	Traffic safety active modes	High
	Modal Split	Medium

Figure 10: SUMI Indicators Set (Rupprecht Consult, 2020)

The idea behind the project is that sustainable urban mobility indicators are a useful tool for cities to identify the strengths and weaknesses of their mobility

[1] www.wbcsd.org/Programs/Cities-and-Mobility/Transforming-Mobility/Transforming-Urban-Mobility/SiMPlify/Resources/Sustainable-Mobility-Indicators-SMP2.0

[2] ec.europa.eu/transport/themes/urban/urban_mobility/sumi_en

system and to focus on areas for improvement. As cities continue to develop Sustainable Urban Mobility Plans (SUMPs) and work towards EU policy goals, it is important that this progress is being assessed to ensure that solutions to mobility challenges are tailored to respond to local needs. The SUMI indicator set helps cities to perform a standardised evaluation of their mobility system and measure the improvements resulting from the implementation of new mobility measures, practices or policies. These indicators provide a practical and reliable indicator set that can track progress towards policy goals and identify the potential for improvement in order to make their mobility system more sustainable.

Data from a broad range of stakeholders were typically required as input to most indicators, primarily various city departments, public transport operators and national statistics offices. Also, data collection support for urban areas was required for almost all indicators, which has a bearing on the long-term use of the indicator set. Support can and should take various forms: Assistance from statistics offices, through specific funds and -mainly so -through hands-on tailored advice, tips and guidance from experts such as Indicator Mentors or Urban Area Coaches.

Some common obstacles and difficulties that cities face in their data collection efforts, could be identified. Figure # shows for which indicator measurements, cities encountered barriers in their data collection process.

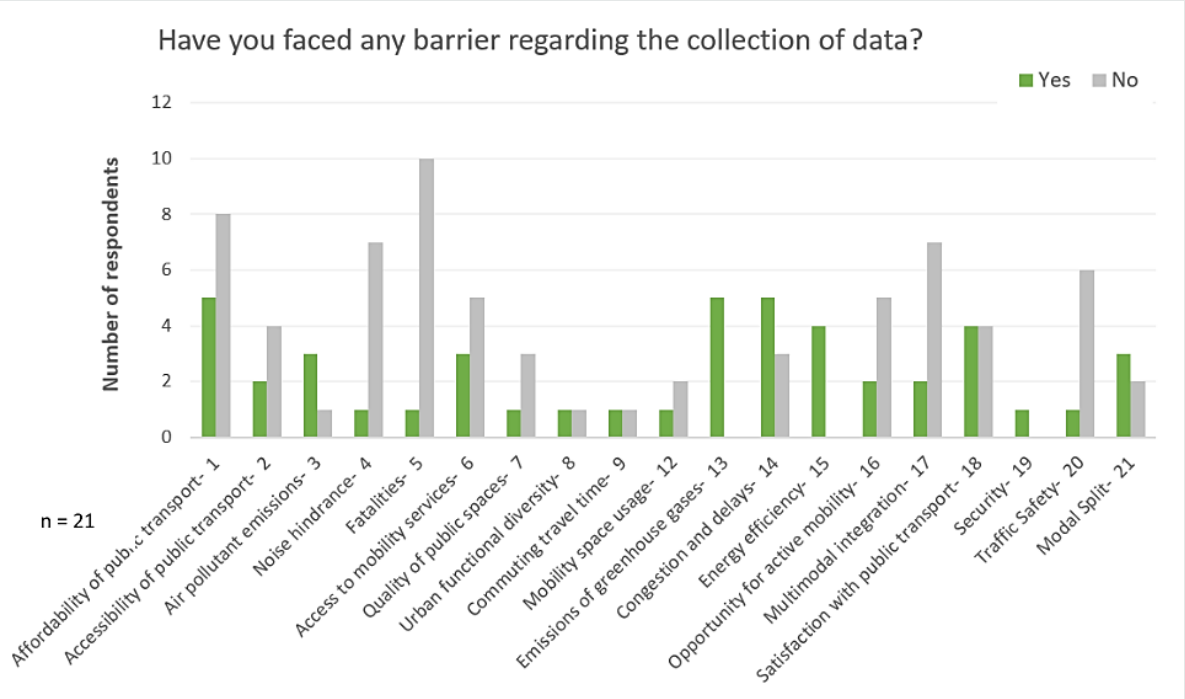
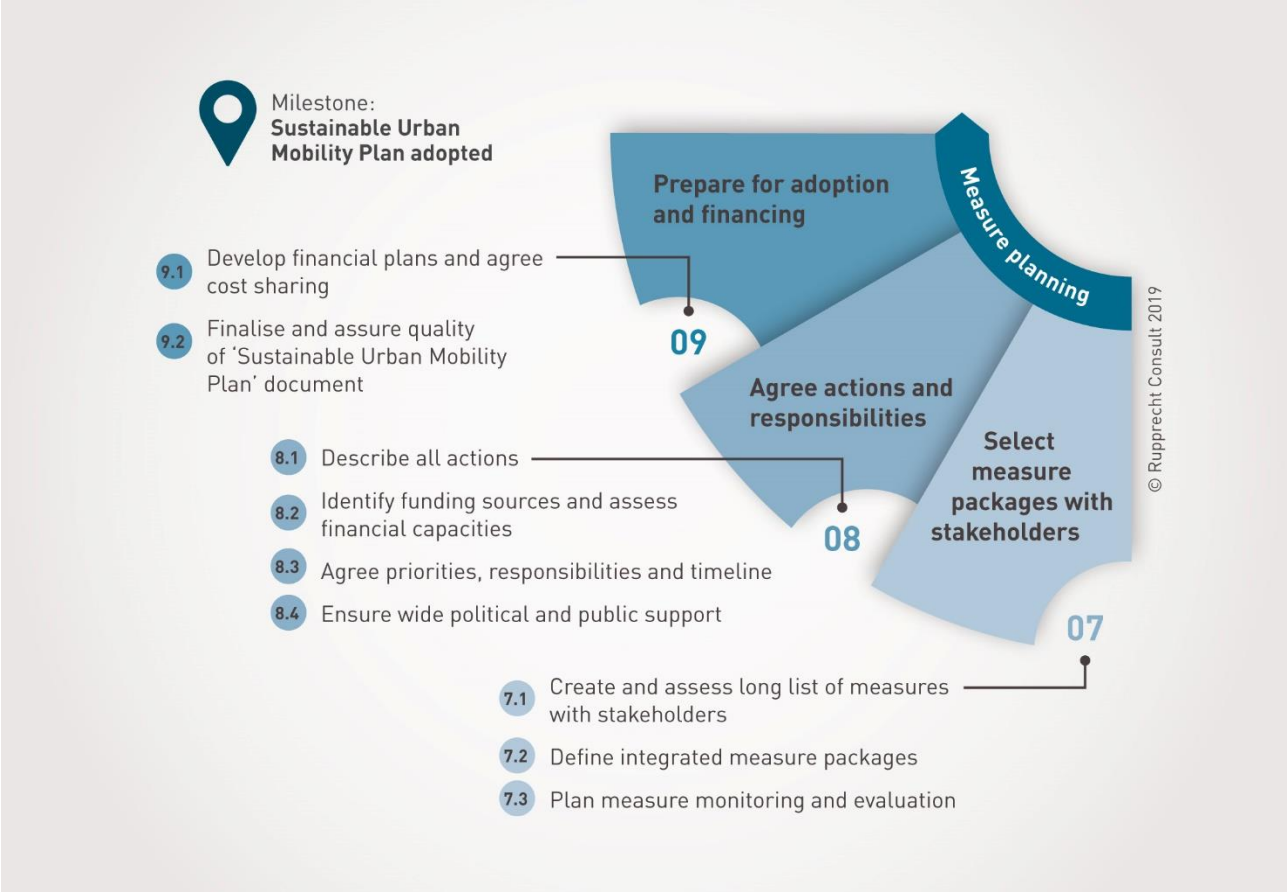


Figure 11: Survey results on barriers to data collection (Rupprecht Consult, 2020)

Most data collection issues are related to aspects such as the lack of data availability, procurement of data, ensuring its quality and comparability and alignment with data protection regulations. Cities also faced challenges when measuring certain parameters (such as GHG emissions or energy efficiency), as such efforts could be new or uncommon for small urban centres. Furthermore, the importance of an adequate and unambiguous definition of indicators and support in their calculation methodology, was highlighted.

To support cities with the application of this sustainable mobility indicator set, an e-course is available free of charge. Besides, the entire indicator set is available in the project's website, and further general guidelines for calculating the indicators are included in the "Harmonisation Guidelines" document.

3.3. Measure planning



At this stage, the planning process moves from the strategic to the operational level. Efforts focus on the definition of measures to achieve the agreed objectives and target, the finalisation of the Sustainable Urban Mobility Plan, and preparation for effective implementation.

3.3.1. Select integrated measures and plan for their implementation

The creation of a long list of measures and assessment of their effectiveness and feasibility set the basis for selecting those that best contribute to meeting the objectives and targets. This process should involve discussions with citizens and stakeholders, both for the identification of key actions needed and to validate the final selection. Similarly, the plan's implementation requires strong communication between political stakeholders and the public. For instance, concrete building projects can be controversial even if their related objectives and measures are supported by a majority. Sharing key information publicly, for example through an open-data portal, can facilitate such discussions and encourage participation.

The assessment of measures, based on their forecasted impacts, and the further specification of actions, requires a comprehensive knowledge basis. For instance, the precision and certainty of calculated impacts by modelling measure implementation, are highly-dependant on the existence of reliable data to build and calibrated the models. On the basis of such analyses, the estimated costs, interdependencies and risks of each measure can be assessed. And, in turn, internal and external financing instruments can be identified to ensure adequate funding sources for all actions.

Planning for effective implementation and monitoring, through open-data deployment in Leipzig (Germany)

Advancing towards the decarbonisation of urban mobility, the City of Leipzig has developed an action plan which aims to increase the modal participation of public transport from 15% to 23%, by the year 2030. The plan, developed as part of the LOW-CARB project, proposes strategic measures with a short, middle and long-time perspective to improve the public transport services in the area. Through the involvement of stakeholders and authorities at different governance levels, as described before, the political support and engagement of relevant decision-makers were ensured.

The Action Plan includes a set of 86 actions, distributed among four categories. As shown on Figure #, it comprises:

- Global actions (e.g. company-based mobility management);
- Measure to strengthen train services (e.g. new train stops and rail infrastructure to increase capacity and flexibility);
- Actions towards the improvement of public transport (e.g. on-demand services, bus and tramsway service extensions).
- Active mobility: e.g. new walking and cycling infrastructure, intermodal mobility hubs, Park/bike and Ride.

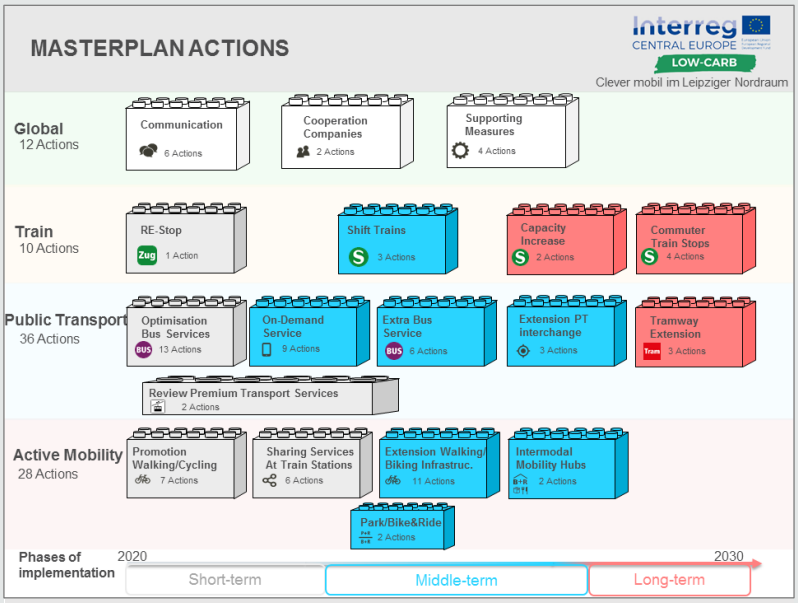


Figure 12: Action Plan - FUA Leipzig (LVB, 2020)

Moreover, the plan identifyies data and indicators s to monitor progress and results of each action, specifying the methods for data gathering and schedule for collection efforts. Both the implementation and monitoring of the proposed actions requires a broad base of information, as well as close cooperation between involved authorities and stakeholders, taking into consideration all potential data sources and tools.

With this in mind, the city has developed an ‘Open-Data Strategy’, contributing to the provision and integration of the necessary information to digitally support it’s intermodal urban transport system. The strategy studies the different potential cooperation models and the advantages emerging through the effective use of open-data. And it reflects upon the challenges and opportunities of its usage in the city, based on an analysis of current data availability, traffic volume data and the potential scenarios for mobility.

The document presents an extended vision for data-based transport planning, aiming to harness its potential as tool for the implementation of strategic policy goals. In doing so, the strategy takes into account potential barriers to implementation and to achieve political support, and provides concrete guidance on key actions to enhance data collection. Furthermore, it takes a strategic outlook towards the deployment of innovative mobility solutions, following major trends such as vehicle-sharing services and the transformation of urban mobility through decarbonisation, automated driving and "Mobility as a Service".

Locally available traffic data is essential to enable the optimal deployment of these innovative solutions. Thus, Leipzig aims to create a ‘conductive’ ecosystem of open data, nourished by the public sector as well

as by private businesses, the academic community and civil society, thus facilitating the further research and development of new mobility services. This strategic approach is illustrated in Figure #, presenting the relationship between internal 'Urban Data Platform' (data collection, integration and analysis) and the 'Open-Data Portal', which provides open access to data to the all users and stakeholders.

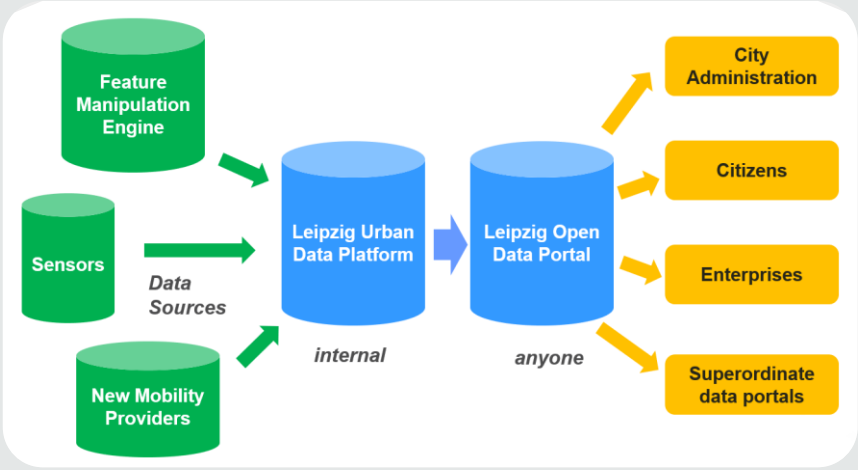


Figure 13: Leipzig's Open-Data concept (LVB, 2020)

The main recommendations provided in the Open-Data Strategy include:

- An 'Open-by-default' approach, where Leipzig will publish all data, documents and data services free of charge and machine readable – unless confidentiality requirements state otherwise.
- Establishing "Mobility Data as a Service", by publishing data from traffic count systems to facilitate cooperation and steering the development of new services.
- Establishing an "open-data culture" and "culture of experiments" by providing creative space for citizen science.

3.3.2. Prepare procurement processes and ensure financing

Following the cost estimations for measure implementation made earlier, it is now necessary to develop concrete financial plans for all actions. A detailed financial scheme can be included in the plan. At this stage, it is important to consider all required investments and resources for an effective implementation of the SUMP. Beyond the common major elements, such infrastructure development or fleet provision, aspects like data collection, capacity development and IT capabilities, should not be overlooked.

Data has a cost. The processes of collection, storage, processing and analysis of the information, as well as ensuring its security and privacy, require investments. Besides, the development of the necessary infrastructures and IT-systems, and strengthening of the capabilities of the personnel involved, need to be considered.

This type of elements constitue the basis not only for a strengthened mobility planning process, but also play a key role in supporting the implementation and operation of mobility services. The box below looks into a few examples on the value of data for the development of innovative mobility services.

As seen in these cases, data can facilitate the diffusion and promotion of new sustainable technologies and services. Open-data empowers sustainable mobility for all by strengthening planning practices and informing decision-making. Besides, it can empower crowd-sourcing efforts towards innovation, communication and knowledge sharing.

Furthermore, as key factor to steer innovation open-data can generate a significant economic return, in the form of new jobs, reductions in costs of public efforts, among others. For example, London presents an interesting experinence in this field. After publishing timetables, service status, disruptions, and other data

– in open format, and free of charge, the development of over 600 integrated apps was triggered. These are are used by 42% of Londoners and over 17,000 developers are registered on the open-data platform[3].

The role of data in mobility innovation: MaaS, on-demand and shared-services (GECKO)

The Horizon2020 GECKO project, has set to study business models and governance structures of innovative mobility solutions. In doing so, it has conducted an extensive stakeholder consultation process with experts across Europe. Beside, it has anlysed the specific case studies, identifying their target audience, value-proposition, key success factors and challenges, for various fields of mobility innovation. These areas included, among other, Mobility as a Service, on-demand services, and sharing models (such as car-sharing, ride-sharing and micro-mobility services).

For many of these new mobility solutions, the collection, analysis, and transformation of big data is critical to all the elements of their business models. A comprehensive knowledge basis and analysis of current data are essential to guide development of custom-made mobility packages that effectively address user-needs and that are financially sustainable. Although the main focus for firms deploying innovative services might be on R&D activities, "the constant improvement of data acquisition and analysis in order to optimize the real-time decision of customers is critical to maintain their competitive advantages"[4]. Establishing cooperation strategies with key stekeholders and institutions, is thus key to strengthen data collection efforts and maintain daily the operation. A few examples of the business models analysed within GECKO are presented below, with a focus on role and value of data for each mobility solution.

Transdev develops technological solutions for MaaS implementation in cities across the world and operates mobility services, including 17 different modes, MaaS and zero emission mobility solutions. The analysis of their service-model evidenced the key importance of data analysis to improve transport organisation and the mobility service offer. Yet, compliane with GDPR rules needs to be carefully considered in MaaS data-sharing and -management models, respecting the users' privacy and safety. Thus, data used by Transdev, often from public sources, has befoen gone through an anonymization process.

Another example is **Urbi**, which aggregates shared-mobility services in a city, to simplifying their use and allowing users to plan their travel in real-time. This solutions in based in a MaaS platform, where third parties sharing mobility services are integrated. Through an online application, users can access a map with real time information on the available shared-mobility available. Data-sharing and -integration is, thus, a core element of Urbi's functioning, as realtime information need to be available to to provide the users suitable solutions for their travel.

The development of a regulatory framework for such cooperation models between public and private entities, is important to guide mutually beneficial partnerships, where polify objetvices are guaranteed while preserving interests of private sector, and ensuring adequate treatment of the enormous amounts of data that can be collected in such platforms.

Similarly, the business models of shared and on-demand mobility were analysed. For instance, **Taxistop**, which which provides sharing mobility services, such as carsharing and carpooling, for individual travellers as well as companies. The analysis showed the vital importance of their IT-platform, marketing strategies

[3] Transport for London, Open data policy. https://tfl.gov.uk/info-for/open-data-users/open-data-policy

[4] Kao et al. (GECKO), 2019

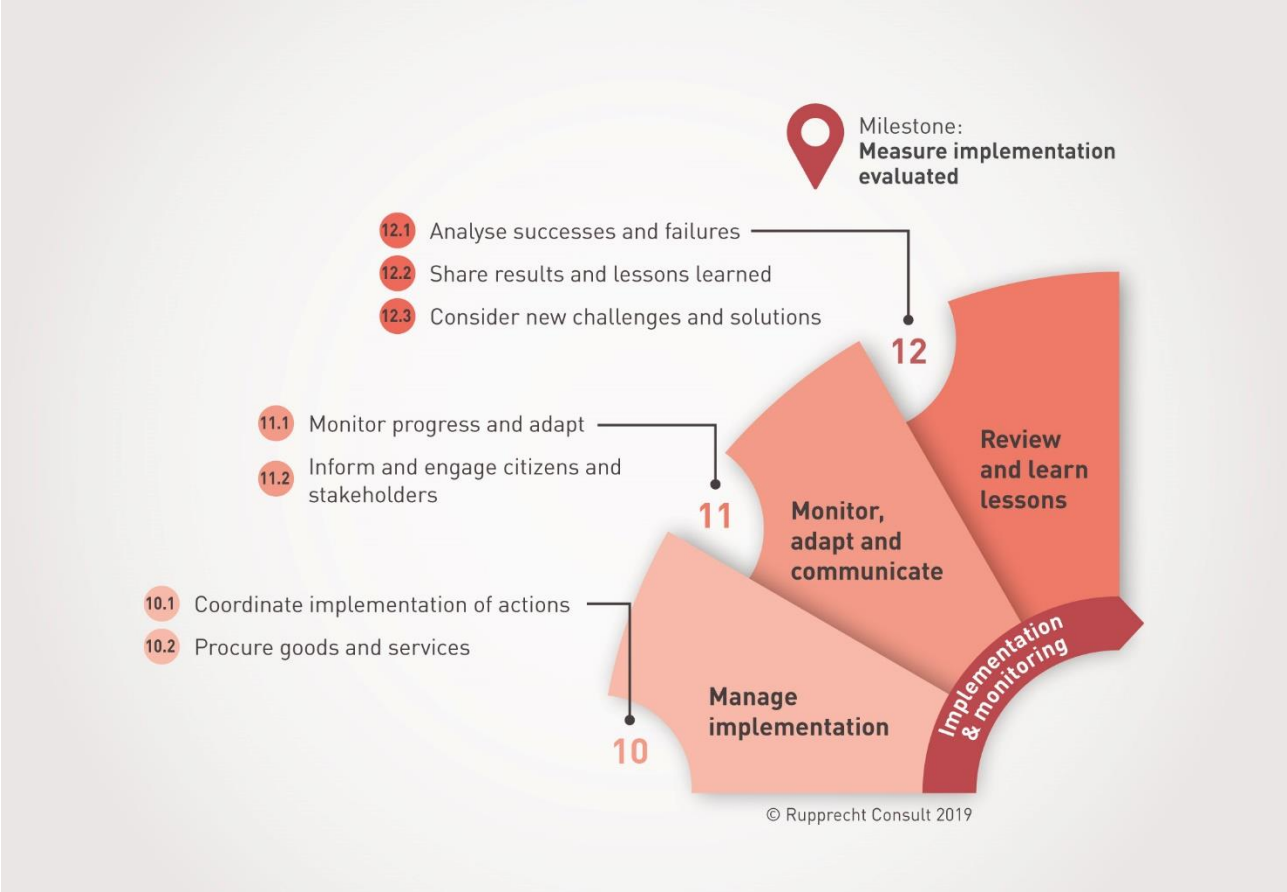
and engagement with mobility experts, as key elements to further steer innovation and ensure their services are effectively addressing users' needs. Among their main data sources, some common players could be highlighted, such as Google (geodata and maps) or Oracle (databases), yet there were no direct relationships with data suppliers.

Another exampla is **Helbiz,** a carsharing platform and micromobility provider. It offers different modal-focused services, such as HelbizGo for shared-scooters, HelbizCar as a peer-to-peer car-sharing services, and HelbizAir, an autonomous drone taxi service. The Helbiz platform for fleet management, which includes artificial intelligence and environmental mapping system, optimizes operations and guarantees profitability. This system is enabled by the information collected anonymously by the platform on the trips, drivers, vehicles and personnel.These data are thoroughly analiysed and used to, for instance, monitor and reposition the fleet so as to satisfy demand in different areas and maximize the number of trips.

As seen, offering on-demand and sharing mobility services requires various data-based resources, such as plaftorms powered by geolocation data, integrating knowledge on travel demand (through the GPS-enabled application accessed by the user) and on the mobility service supply (via GPS tracker systems and maps). As the technology advances, more accurate data will be available and smartphones will have a greater capacity to process it. This, in addition to key developments, such as the spread of 5G, has the potential to enable increasingly more efficient on-demand services.

However, sharing-services often operate under unprofitable conditions, due to the huge initial investments (for platform development and and purchase of vehicle fleets). Public authorities should consider the funding and financial requirements of these type of services, and develop cooperation strategies to steer innovation and enterprenourship in alignment with local policy goals.

3.4. Implementation and monitoring



The fourth phase of the SUMP focuses on the implementation of proposed actions, accompanied by systematic monitoring, evaluation, and communication. The authorities and organisations responsible for the implementation will need to plan the technical details of their actions, and closely coordinate the procurement of good and services, if needed. Finally, the successes and failures of the SUMP process are reviewed and communicated with stakeholders and the public.

3.4.1. Coordinate and monitor the SUMP implementation

A good Sustainable Urban Mobility Plan does not automatically lead to good results, only the successful implementation of the identified measure packages and actions does. To deliver the objectives effectively, appropriate management needs to be applied to oversee the implementation and to manage risks. This requires agreements with all actors involved in action implementation as well as a handover from the SUMP core team to the technical staff and regular communication with them throughout the implementation of actions.

Both the implementation and monitoring processes often involves a large number of parties, thus setting effective cooperation structures and the overall coordination of the implementation process require particular attention.

Communication with the civil society should also be taken into account. Innovative mobility schemes can be a great disruption (as well as a great benefit) for daily travellers. In this sense, understanding public opinion, based on an active two-way dialogue, is crucial for a successful implementation process and to ensure acceptance and an effective usage of new services.

SUMP Monitoring tool for action implementation in Brno, Czech Republic:

The SUMP monitoring tool is a spatial database (GIS) application for both experts and citizens. It contains information about all investments from the Action plan (budget, year of realization, etc.) and allows detailed analysis of this data. Experts (mostly stakeholders) use the tool for managing the SUMP implementation. The tool allows cooperation for all the stakeholders over one platform simultaneously, so there is significant time saving and improved coordination of the implementation. Citizens can use the application as a source of information about the SUMP implementation. The utilisation as a public participation tool is currently under development.

Author: Lukáš Báča , City of Brno, collected by Rupprecht Consult
Image: Kateřina Nedvědová, City of Brno
Source: Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan (Rupprecht Consult, 2020)

A comprehensive basis of knowledge is fundamental to facilitate the implementation of the SUMP. Transparency and understandability of the proposed actions and strategies should be ensured. To this end, not only data and resources should be publicaly available, but the manner in which these data are presented should be considered. Attractive and user-friendy visualisation functionalities can be very valuable. Also, communication strategies should be developed to reach out to all citizen groups and convey key messages of the SUMP.

Besides, an effective monitoring of the implementation process requires continued efforts of data collection and analysis. It is important to identify such need early on and consider the resources to allow for such efforts. Moreover, data-sharing agreements can be established to mutually beneficial cooperation with stakeholders involved

Interactive monitoring platform for SUMP in San Sebastian, Spain

San Sebastian uses a mobility monitoring platform to track the progress of SUMP measures. The digital tool is based on data provided by existing data collection systems, obtaining very precise and reliable estimations. Managers and decision-makers can get an easy overview of the general status, while the application also allows them to go into more detail if they are interested.

Progress is visualised in a simple form using traffic light colours to show whether or not the city is on track towards achieving the objectives of the SUMP, or even other municipal strategies, in the respective area.

Author: Municipality of Donostia/San Sebastian, collected by UBC

Image: Municipality of Donostia/San Sebastian

Source: Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan (Rupprecht Consult, 2020)

3.4.2. Review the process and take stock of key lessons learnt

The SUMP process is a cycle because it presents a continuous development. As the process comes to an end, it is important to look back at what went well and what did not, and to share and exchange experiences with citizens. Besides, this is a moment to consider the new issues and challenges to be faced as well as possible new solutions to them. The evaluation of the planning process, the Sustainable Urban Mobility Plan and its implementation, should aso involve citizens and stakeholders. This can be achieved through, for example, participatory observation, focus groups or interviews. The SUMP Self-Assessment tool can guide these efforts.

SUMP Self-Assessment: Methods for assessment of planning practices

A self-assessment can be as simple as a group of people who are involved in the planning process sitting down together to discuss the strengths and weaknesses of current processes and how to improve them. To guide the discussion, it is recommended to use the online SUMP Self-Assessment available on Eltis. Following the completion of the SUMP Self-Assessment, a results page will show how well your planning activities already fulfill the principles of a SUMP and will provide tailored advice for further improvement. By having all meeting participants complete the questions on their own, and then discuss the similarities and differences in responses as a group, highly relevant insights can be gained.

SUMP Self-Assessment: www.sump-assessment.eu

Source: Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan (Rupprecht Consult, 2020)

Greater Manchester's (UK) continually updated online evidence base

The Greater Manchester transport strategy 2040 and the new Greater Manchester Delivery Plan (2020-2025) are supported by a comprehensive evidence base structured around six societal trends and issues which drive transport demand in Greater Manchester. The evidence base is being continually updated to capture future challenges and trends, but also to ensure that the intentions and aspirations featured within the SUMP are grounded in trends and data that are locally and time relevant. It is important for a

city to have enough resources to ensure regular, systematic updates of the data/ information, and thus the lasting significance of the evidence gathered.

Author: Ben Brisbourne, Traffic for Greater Manchester Authority, collected by EUROCITIES | Image: Greater Manchester
Source: Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan (Rupprecht Consult, 2020)

An analysis of the entire SUMP process should be performed, aiming to understand what led to the successes and failures, and critically review of the effectiveness of stakeholder and citizen involvement so as to enhance participation activities in later stages and in future plans. Lessons learned should be gathered and communicated, in preparation of the next SUMP generation.

Cities have different strengths and weaknesses, which can guide each other to effectively address the various aspects of the SUMP process. Engaging in knowledge exchange helps cities across Europe to move forward and improve together, and encourgaes cities to reflect on their own experience and consider other approaches.

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