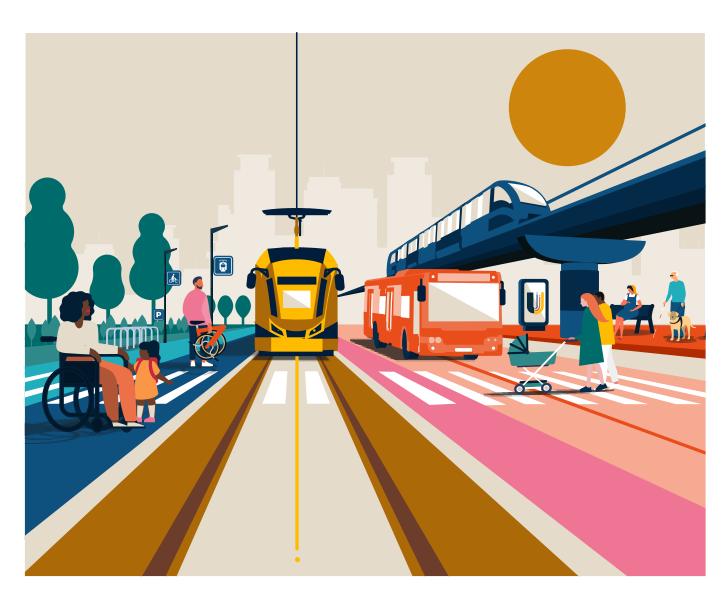# D6.1 Roadmap of the use of the UPPER tools in the measures life cycle

WP6 Measures and tools integration and large-scale demonstration in the living labs

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Deliverable details

Project number	Project acronym	Project title
101095904	UPPER	Unleashing the potential of public transport in Europe

Title	WP	Version
D6.1 Roadmap of the use of the UPPER tools in the measures life cycle	6	1.0

Contractual delivery date	Actual delivery date	Delivery type*
31/08/2024	31/08/2024	R

*Delivery type: **R**: Document, report;
DEM: Demonstrator, pilot, prototype;
DEC: Websites, patent fillings, videos, etc;
OTHER;
ETHICS: Ethics requirement;
ORDP: Open Research Data Pilot.

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Document history

Version	Date	Person	Action	Status*	Dissemination level**
V0.1	01/04/2024	ETRA I+D	Table of contents	Draft	CO
V0.2	30/06/2024	ETRA I+D	Contents and draft	Draft	CO
V0.3	05/08/2024	U-tool developers and demo sites	Contents and review	Draft	CO

V0.4	09/08/2024	ETRA I+D	Updated draft	Draft	CO
V0.5	19/08/2024	RNV, LEU	Peer-review	Draft	CO
V0.6	29/08/2024	UITP	Final review	Draft	CO
V1.0	31/08/2024	ETRA I+D	Final version	Final	PU

*Status: Draft, Final, Approved, Submitted (to European Commission).

Dissemination Level: **PU: Public;
CO: Confidential, only for members of the consortium (including the Commission Services);
EU-RES: Classified Information - restraint UE;
EU-CON: Classified Information - confidential UE;
EU-SEC: Classified Information - secret UE

Contents

Abstract

This deliverable outlines the approach for utilizing the UPPER Measure Support toolkit (U-tools) to maximize the effectiveness and impact of the local push and pull measures proposed by the 10 demonstration cities involved in the project. The leaders of these demonstration sites, along with the U-tool developers, have detailed specific scenarios for how the U-tools will be tested and applied to each of the proposed measures.

The roadmaps included in this deliverable are the outcome of a meticulous iterative process. This process involved plenary meetings and workshops with all participating cities to present updates on the tools, conduct demonstrations, and showcase their interfaces and functionalities. Additionally, there were numerous bilateral meetings aimed at understanding each city's specific interests in the U-tools, defining tailored use cases, and detailing the prerequisites necessary for effective implementation, particularly concerning data provision.

It is important to highlight that the development of the U-tools has been an ongoing process, running concurrently with the bilateral meetings. This parallel process allowed for the integration of tailored functionalities into the U-tools, ensuring that they effectively address the specific needs of the measures proposed by the cities.

Keywords

Roadmap, Measures Support Toolkit, U-tools, Use Cases

1. Introduction

1.1. Scope of the Document

UPPER aims to support research and innovation in cities, transport authorities, and operators by developing a Measures Support Toolkit. This toolkit is designed to assist cities in co-designing, simulating, implementing, monitoring, evaluating, scaling up, and replicating the 'push and pull' measures defined by the demonstration sites to strengthen the role of Public Transport as the cornerstone of sustainable mobility and innovation in cities.

This deliverable is part of work package WP6, which focuses on the integration of measures and support tools and the large-scale demonstrations in living labs. Specifically, it is developed within task T6.1, which involves creating a roadmap for using the UPPER tools (U-tools) throughout the 'push and pull' measures life cycle.

The objective of this deliverable is to report the results of the iterative process used to determine which cities will utilize the different tools developed during the project's duration. It specifies the measures each tool will be used for and at which point in the measure's life cycle it will be implemented.

Throughout a measure's life cycle, cities have the option to use multiple tools or none at all. These tools are provided as opportunities, not obligations, to support cities to manage the complex processes of preparing, deploying, evaluating, replicating, scaling-up their measures to other governance levels or replicate them in other areas of the city.

The procedure for aligning the tools with the measures followed an iterative process that began in the early months of the project. The goal was to ensure that the tools effectively met the needs of the cities and their expectations for supporting their measures. The results of this process are presented in this deliverable as specific roadmaps for each of the project's measures. These results are valuable not only for the cities using the tools but also for anyone interested in understanding the tools' capabilities and potential benefits, based on the use cases for nearly 80 measures.

This deliverable builds on previous work carried out in work packages WP2, WP3, WP4, and WP5. It draws from the detailed definition of measures and their requirements (D2.2 and D2.4), as well as their development (D3.4, D3.5, D4.2, D4.3, D4.4, D4.5, D5.2, D5.3, D5.4). It also builds on the work done in the definition of the toolkit requirements (D2.4) and the development of the tools themselves (D3.1, D3.2, D3.3, D4.1, D5.1, D8.2).

1.2. Intended audience

This deliverable addresses multiple target groups:

- Firstly, it addresses the **U-tool developers** themselves. This document establishes the framework for deploying and demonstrating the U-tools developed across different pilot cities. It defines specific use cases for each U-tool, outlining not only when and for what precise objectives the tools will be utilized but also the prerequisites necessary for their on-site deployment.

- Secondly, it benefits the **demonstration sites** participating in the project, by having a clear mapping of when they will use the U-tools, which challenges in their measure's lifecycle will be addressed, and what information they need to collect and provide to the U-tool developers to make use of them.

- Lastly, it is aimed at the general public, particularly **other cities and regions in Europe** interested in understanding how these tools can address a wide range of challenges during development, deployment,

monitoring, scalability, and replication of their initiatives. This deliverable offers a comprehensive view of the potential benefits of the U-tools, demonstrating their versatility across various measures and contexts—from urban redesign to the development of new services and the execution of campaigns, applicable to cities of all sizes.

1.3. Structure of the document

This deliverable begins by presenting the background information to provide the reader with a better understanding of the objectives behind the measures defined by the cities, along with a general description of the seven tools designed to support the implementation of these measures.

Next, the methodology followed to map the use of the tools throughout the lifecycle of the measures is described. This methodology is based on executing several cycles of interaction with the cities, starting from the early days of the project, when the tools and the measures were not yet clearly defined, up to the present day, when the measures are nearly ready for implementation and the tools have reached a much more advanced state of maturity.

Finally, the results of this iterative process is presented, including one roadmap per measure that describes which and how the UPPER support tools will be used to maximize the impact of each local measure. The displayed roadmaps represent the city's statement of intent to utilizing and demonstrating the UPPER tools. However, these roadmaps also outline the prerequisites that must be met for the city to effectively use a tool for specific objectives. In most cases, these prerequisites are limited to the provision of data and/or information, without which the tool cannot be used. Nevertheless, in other instances, the prerequisites may not be purely technical and might involve the user's knowledge and the need for training to effectively use the tool.

2. Background

UPPER aims to strengthen the role of public transportation as a cornerstone of sustainable and innovative mobility. To do so, the project is implementing a combination of about **80 measures** designed to discourage private car usage (**'push' measures**) and encourage people to use public transport in cities across Europe (**'pull' measures**). They encompass strategies such as reallocating urban space to prioritize sustainable modes of transport, improving public transport stops and facilities for accessibility and safety, integrating multimodal transportation options both physically and digitally, implementing low emission zones and congestion charging schemes, optimizing traffic flow to prioritize public transport, and enhancing overall mobility planning and governance. Additionally, the project focuses on enhancing user perception of service quality, incentivizing public transport usage, engaging stakeholders through democratic governance practices, and conducting awareness campaigns to promote sustainable travel behaviours. Further information of the measures can be found in the following deliverables: D2.2, D2.4, D3.4, D3.5, D4.2, D4.3, D4.4, D4.5, D5.2, D5.3, D5.4.

To give support to the demonstration sites in the implementation of their measures, 7 tools have been developed in the context of UPPER. It is called the 'Measures Support Toolkit'. These tools are designed to complement the "push and pull" measures throughout their lifecycle—from design through implementation to evaluation—maximizing impact and ensuring citizen participation, understanding of behaviours, knowledge transfer, scalability, and uptake of replicable public transport solutions.

The U-tools developed are the following:

- **U-TWIN:** Integrates real-time urban mobility data into a comprehensive, visual representation for cities and mobility authorities, facilitating proactive monitoring and management of public transport (PT) operations.

- **U-SIM:** <u>U-SIM.plan</u>: A versatile software for transportation planning and multimodal analysis, aiding in strategic and operational decision-making by simulating transport networks and demand; <u>U-SIM.live</u>: Real-time simulation platform leveraging live PT data to support PT operators with decision-making through continuous analytics and scenario simulations.

- **U-SUMP:** Data-driven platform for Sustainable Urban Mobility Plans (SUMPs), tracking climate-neutral goals and providing decision support for city authorities and transport agencies.

- **U-NEED:** Data analytics and visualization tool that supports PT services optimization based on multimodal transport demand analysis and geographic flow mapping.

- **U-GOV:** Community engagement platform fostering citizen participation in urban mobility decision-making through social innovation and collaboration.

- **U-KNOW:** Online portal promoting knowledge exchange and innovation in public transport, facilitating best practices and sustainable urban transport solutions.

- **U-TRANSFER:** Interactive platform guiding cities in adopting solutions demonstrated in UPPER, facilitating knowledge exchange and replication of successful measures across diverse urban contexts.

More detailed information of each of the U-tools can be found in the deliverables D2.4, D3.1, D3.2, D3.3, D4.1, D5.1 and D8.2.

3. Methodology

To define the interaction between UPPER tools and the measures throughout their life cycle, an iterative process has been conducted. This process primarily involved two cycles:

3.1. Cycle 1: Measures Gaps and U-Tools Support

Once the detailed description of the demo sites' measures (D2.2) and their requirements (D2.4) were defined, the U-tool developers began a thorough analysis of the nearly 80 measures to identify those that could potentially benefit from the use of the U- tools to facilitate their implementation and maximize impact. This initiative was led by the U-tool developers, as they had the most in-depth knowledge of the tools and their capabilities.

After this preliminary mapping, bilateral meetings were arranged between each U-tool developer and each city. The objectives of this first round of meetings were:

1. Resolve any doubts regarding the objective or capabilities of the U-tool.

2. Understand the city's interests in the tool, determine if they intended to use the tool for any specific measures, and identify which functionalities might be of particular interest to them.

3. Confirm with the city if the potential additional use cases identified by the U-tool developer for some of the city's measures were indeed of interest.

4. If the city confirmed their interest in the tool, establish the minimum requirements (in terms of data provision, information, etc.) to be met by the city for using the tool and the functionalities of particular interest.

This initial cycle served to refine the mapping between measures and tools. Some of the potential use cases identified by the U-tool developers were accepted, others rejected, and new potential use cases were directly proposed by the cities themselves. Additionally, since the tools were in the early development phase, this cycle facilitated the

identification of new functionalities or specific adaptations to meet needs raised by the cities, which had not been identified during the requirements phase. It also enabled cities to understand the information they needed to provide, allowing them to start identifying data sources and facilitating their provision.

3.2. Cycle 2: Usage Scenarios for Solutions

During the second iteration, bilateral meetings were again held with the cities that had shown interest in the tools during the first iteration. The objective of this second iteration was to refine the use cases. Specifically, the aims were to:

1. Address any remaining questions about the U-tools. By the time of the second iteration, the tools had advanced significantly, and in some cases, semi-functional versions or mock-ups were available. The 3rd UPPER General Assembly meeting in Rome was utilized to present the interface or sketches of the tool to the cities, helping them visualize the tool, facilitating their understanding, and thus resolving any remaining questions.

2. Describe the usage scenarios of the tools, specifying "when" (stage of the measure life cycle), "how" (tool functionalities to be used), and "under what circumstances" (prerequisites) the tool would be used for the target measures. The goal was to understand in detail how the interaction between the measure and the U-tool would occur, including the required input data or information, the data/information flow, the entities involved, etc.

The final result of this second iteration is a detailed roadmap for each measure that illustrates the planned use of the U-tools throughout the life cycle of the supported measures.

4. Results

After conducting bilateral meetings between U-tool developers and the 10 cities and regions participating in the project, it has been possible to create a set of roadmaps detailing how the various U-tools will be used by the demo sites in their respective measures.

It is worth noting in advance that the use of the U-tools is not mandatory but an opportunity for the cities and regions. Therefore, it is possible that some of the project measures may not utilize any particular U-tool, especially those tools of a more purely technical nature.

Furthermore, it should be noted that some tools (particularly U-KNOW and U-TRANSFER) are cross-cutting tools, and therefore all measures will benefit to some extent from their use. Following this, a description is provided of how cities will benefit specifically from these two tools. Subsequently, detailed roadmaps will be presented for each city on how they will employ the remaining more technical tools (U-TWIN, U-NEED, U-GOV, U-SIM, U-SUMP).

4.1. Transversal tools: U-KNOW and U-TRANSFER

4.1.1. U-KNOW

How U-KNOW will be used in the UPPER measure lifecycle

U-KNOW is a web-based platform for sharing knowledge about public transport. Scheduled to launch publicly in September 2024 (M21), it will start with about 50 entries on various topics and following diverse formats (e.g. best practices, tools, case studies, evaluation methodologies, policy briefs, etc). As the UPPER project progresses, the content on U-KNOW will grow, especially during the final year when we focus on sharing UPPER measures, best practices, and results.

- **Initial use and development:** When U-KNOW launches, it will provide a foundation of knowledge created and curated by UPPER partners. Although its use might be limited at first, it will gradually become more valuable as more content is added. By the project's end, U-KNOW will be a key tool for sharing what we have learned and accomplished.

- **Future impact:** While U-KNOW might not be immediately useful for every measure's implementation and completion, all measures will benefit from it during the scale-up and replication phases. The platform will offer structured, consolidated, and up-to-date information on various aspects of public transport. UPPER partners and measure leaders will find best practices, case studies, policy brief, tools, and guidance frameworks useful for expanding and replicating their efforts.

- **Knowledge access and exchange:** U-KNOW will also allow partners to access and share a wide range of public transport knowledge. This exchange will help partners build on existing knowledge and incorporate new insights from both within and outside the consortium to their work.

Specific Measures Benefiting from U-KNOW

Certain measures, due to their nature, might benefit more directly from U-KNOW. These include:

- **Development/Updating of Frameworks** (e.g., IDF_01): Measures involving the creation or revision of frameworks could leverage U-KNOW to access existing guidance frameworks, best practices, and case studies. This will guide and improve the quality and effectiveness of the frameworks being developed.

- **Implementation of Campaigns and Partnerships** (e.g., LIS_08): For measures focused on campaigns and partnerships, U-KNOW will give access to successful examples and strategies that can be adapted and implemented. This resource can streamline the planning process and enhance the impact of these initiatives.

- **Development of Public Awareness Campaigns** (e.g., LEU_06): Public awareness campaigns can benefit from the tools and guidance available on U-KNOW. Access to examples of effective messaging, outreach strategies, and evaluation techniques will help in designing more impactful campaigns.

These less technical measures can greatly benefit from the collective knowledge and experiences shared on U-KNOW, ensuring proven practices and innovative ideas inform them. While these types of measures have a higher initial potential for U-KNOW's usability, this potential might not be fully realized at first due to the platform's limits regarding content generation and the different timelines between the development of the measures and the tool. Additionally, U-KNOW focuses on consolidating existing content, so if specific guidance does not already exist, the platform cannot create it.

Prerequisites for using U-KNOW

U-KNOW will be a web-based, publicly accessible tool. The only prerequisites for using the tool are having access to an internet-enabled device and a good understanding of the English language. Although automatic translation might be included in the future, this feature is not yet implemented. To facilitate knowledge access, U-KNOW will include user-friendly features such as in-text search, and filters for topics and content types.

4.1.2. U-TRANSFER

How U-TRANSFER will be used in the UPPER measure lifecycle

U-TRANSFER will offer a dynamic and interactive platform to guide the cities and public transport users through the implementation of knowledge and solutions demonstrated in UPPER and deposited in U-KNOW repository. It will also provide space for knowledge exchange and discussion on the enablers and barriers that govern the implementation and replication of successful solutions. U-TRANSFER will provide tailored workshops, courses and

implementation roadmaps based on the mapping of needs of the visitors of the platform. Relationship with ambassador cities and city visits could be established through the platform based on a matchmaking process that can facilitate relationships based on similar challenges, cultural and governance background. U-TRANSFER will provide transferability guidelines that will facilitate the transferability of UPPER solutions to a broader range of cities.

Use of U-TRANSFER beyond the UPPER consortium

U-TRANSFER is mainly aimed at cities and stakeholders not directly involved in the project, but who would be interested in replicating the project findings and applying the push-pull measures described in the cities.

Even though they are still in a development phase several project measures have been already highlighted as possible future transferability solutions following their implementation. A few examples would be: OSL_04, OSL_05, LIS_01, MAN_06, IDF_03, VAL_01, ROM_01, ROM_08, TES_04, HAN_02, BUD_04, LEU_02.

4.2. Valencia

4.2.1. VAL_01 Redistribution of urban space with a focus on Mobility as a Right

Measure category: Redistribution of Urban Space

Brief description: This measure is part of the major construction project aimed at redistributing urban space in Av. Blasco Ibañez with a focus on MaaR, which involves widening public transport routes, creating a dedicated bus lane (BRT), and improving accessibility for pedestrians and cyclists. This measure will specifically support the implementation of the BRT lane in the avenue's intermediate section, from Aragón Avenue to Doctor Manuel Candela Street. The measure specifically involves carrying out a detailed operations study to determine optimal bus stop locations ensuring good accessibility, signage improvements, and traffic light priorities. It also includes a public contract for the installation of segregation elements, which will incorporate R&D components and be validated post-installation. Civil works are funded separately (Next Generation funds).

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to monitor the measure impact on congestion of PT and air pollution to meet the targets set. The overall impact on modal share and the accessibility to PT in the area will also be visualized.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Replication	U-SIM.plan	If the measure is successful (from the city, the PTO, but also the end user perspective), U-SIM.plan could be used in order to evaluate the potential creation of new BRTs in other corridors of the city.	Calibrated and validated VISUM transport model and the necessary input data. *The final use of the tool is conditioned by the experience of this measure.*

4.2.2. VAL_02 Creation of a network of multimodal hubs

Measure category: Multimodality (Physical Integration of mobility services and Hub Creation)

Brief description: This measure aims to establish a network of multimodal hubs in Blasco Ibáñez avenue, one of the main arteries of the city. The goal is to facilitate the seamless and efficient transitions between different transport modes in the hubs created both, along the avenue and in the main connection points to the same. This effort is part of the broader Blasco Ibáñez redesign project, aimed at enhancing sustainable mobility along this route. The initiative includes an evaluation of the corridor's current transportation services, identifying needs and barriers to encourage modal shift. Building on the gathered insights, the hubs' transportation services will be enhanced, focusing on improving intermodal connections. Particularly, the measure includes the installation of real-time multimodal information panels, ensuring travellers have up-to-date information on available transportation options at each hub.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to display the PT ridership of the hub and the multi modal integration index, as well as the air pollution.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-GOV	This tool will be essential for collecting citizens' feedback, monitoring pre-post situation, after the implementation of the measure. It can also be used to identify and select the most convenient services for the hub (surveys to different user groups, VRUs, …).	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship.
Replication	U-TWIN	Once U-TWIN is deployed in the city of Valencia, this tool could be used to gather static and real-time information regarding Public Transport and micromobility services (including those operating in the area of the multimodal hubs). This information will be then published via API to the multimodal panels.	Mandatory: - GTFS of different Public Transport services (EMT, Metrovalencia, MetroBus, RENFE cercanías, ...). - GTFS-RT of different Public Transport services (EMT, Metrovalencia, MetroBus, RENFE cercanías, ...). - Bike-sharing static information about stops and real-time counting by stop about available bikes / free parking slots (Valenbisi).

4.2.3. VAL_03 To optimise public transport offer based on advanced technology

Measure category: Mobility planning

Brief description: This measure utilizes geospatial analysis of passenger and traveller flows to determine the optimal transport offer for specific city situations. With support from U-NEED, public transport passenger flows and underlying trends in mobility will be evaluated. Inefficiencies in the current transport offer will be identified, and potential solutions such as increasing bus line frequency or adding/moving bus stops will be proposed. U-SIM.plan will simulate corrective actions. As a result of this process, the PTO will be able to define a roadmap for future improvements in the network and, if feasible in the project lifetime, some of the improvements will be implemented.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-NEED	U-NEED will give support in the advanced analysis of the PT network. U-NEED will be able to integrate data from different PT modes and detect inefficiencies.	Mandatory: - GTFS of EMT Public Transport service. - Ticketing or O/D matrix to identify inefficiencies. Optional: - O/D of private vehicle (under agreement between TomTom and the city) - Calendar with special dates and working days. - Historical weather data is optional but recommended.
Deployment	U-SIM.plan	Once the inefficiencies identified, U-SIM.plan could be used to simulate different corrective strategies (upon the PTO). Final use to be further discussed.	Calibrated and validated VISUM transport model and the necessary input data.
Monitoring	U-NEED	U-NEED will be used to monitor the modal share evolution and the impact of the changes done in the PT service.	U-NEED deployed
Monitoring	U-SUMP	U-SUMP can be used to monitor the effect of the potential interventions on the performance of PT and its impact on modal share.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Scale-up	U-NEED	The use of U-NEED will be upscaled to other PT operators and authorities of the city. The different operators will be given access to the tool and will be able to evaluate the service offered and identify inefficiencies, to afterwards solve them.	Mandatory: - GTFS of EMT Public Transport service. - Ticketing or O/D matrix to identify inefficiencies. Optional: - Calendar with special dates and working days. - Historical weather data is optional but recommended.

4.2.4. VAL_04 To reduce travel times through the implementation of dedicated bus lanes

Measure category: Traffic Management and PT Prioritization

Brief description: This measure will assess, plan, and test a dedicated bus lane (BRT) connecting the Maritime District with the city centre via Blasco Ibañez Avenue. The analysis of mobility needs in the area will inform adjustments to the PT offer such as increased bus frequency. Traffic light priority for public transport fleets will ensure

efficient BRT lane performance. Findings from this first dedicated lane assessment will guide the identification and planning of BRT lanes in other districts of the city.

Stage	U-tool	Purpose	Prerequisite
Deployment	U-SIM. live	U-SIM.live could provide live estimation of the number of passengers on busses and at stops. These can be used by adaptive signals, to prioritize high-occupancy busses against lower-occupancy ones, and private cars. Final use to be further discussed. Note: U-SIM.live provides useful data for the optimization process, but cannot simulate the impact of traffic light plans, as this falls outside its scope (it is a PTO decision support tool, not for traffic centres).	Mandatory: - GTFS file (single, or URL where it is periodically published) Optional (improve quality of evaluations): - GTFS-RT (Vehicle Positions) feed - GTFS-RT (Trip Updates) feed - PT passenger demand matrices (covering all the desired time period, or alternatively a subset, to be expanded to it) - PT passenger count live feed"
Monitoring	U-SIM. live	U-SIM.live can intersect the travel times and waiting times of PT passengers with the volumes of those, to monitor and report about the effectiveness of interventions over time, on the number of users benefitting of the improvements, or impacted by delays.	U-SIM.live deployed
Monitoring	U-SUMP	U-SUMP will be used to monitor the performance of PT after implementation and its effects on modal share and air pollution.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Replication	U-SIM.live	If the measure is successful (from the city, the PTO, but also the end user perspective), U-SIM.live will already be available to be used on other lines/corridors of the city.	As per Deployment

4.2.5. VAL_05 New Multimodal Digital Mobility Services (MDMS) with a focus on accessibility and inclusion

Measure category: Multimodality (Operational and Digital Integration of mobility services)

Brief description: Valencia is working on a new MaaS solution (called "Ciudades Conectadas") in coordination with 5 other cities in Spain. This will be the first integrated MaaS application for Valencia. So far, the main technical features of the application have already been defined. This measure will focus on the definition and integration of new accessibility related features into the MaaS, with the aim of properly integrating the MaaR concept. The new features will focus on physical accessibility for people with mobility impairments, universal accessibility for people with intellectual impairments and gender perspectives to meet the needs of all.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to monitor the number of App users and PT ridership among vulnerable groups.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.2.6. VAL_06 To improve the Public Transport offer in peri urban area

Measure category: On-Demand Mobility Services

Brief description: This measure aims to improve the accessibility to public transport in peri-urban areas of Valencia, which are currently poorly served by traditional bus services. The measure proposes the creation of an automated Demand-Responsive Transport (DRT) system (mobile application/web service for booking and tracking DRT services) to cater to the needs of people living in these areas with currently low access levels to public transport. This measure aims to promote social inclusion by ensuring equitable access to essential services and opportunities for all Valencia residents, regardless of their location.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to monitor the impact of the measure on PT ridership in peri-urban areas and among vulnerable groups.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.2.7. VAL_07 To provide the citizens with clear and accessible information before and during the trip

Measure category: Mobility planning

Brief description: This measure will develop a real-time information service for public transport, providing updates on factors that impact performance and travel time (traffic, road works, events, accidents, etc.). This measure will benefit from the use of U-TWIN to deliver this information to transport operators, enabling them to manage the service and take corrective actions when necessary (route adjustments, frequency changes, etc.). Additionally, real-time performance information will be provided to public transport users through screens, apps, and other channels to enhance transparency and build trust in the service.

Stage	U-tool	Purpose	Prerequisite
Deployment	U-TWIN	U-TWIN will be deployed in the city of Valencia. This tool will be able to gather and display real-time and static information from public transport and other elements impacting on its operation. This will include information from PT vehicles position, delays, incidents, traffic level of service,	Mandatory: - GTFS of different Public Transport services (EMT, Metrovalencia, MetroBus, RENFE cercanías, ...).

		road works...). EMT will then publish this information via API to third systems (TBC which ones).	- GTFS-RT of different Public Transport services (EMT, Metrovalencia, MetroBus, RENFE cercanías, ...). - Bike-sharing static information about stops and real-time countings by stop about available bikes / free parking slots (Valenbisi).
Monitoring	U-TWIN	U-TWIN is able to store in a data base historical data (about PT delays and so on).	U-TWIN deployed
Monitoring	U-SIM.live	Estimate passenger volume & Forecast passenger volumes for journey planner, assess station and line congestion. Final use to be further discussed.	U-SIM.live deployed
Monitoring	U-SUMP	U-SUMP will be used to monitor the performance of PT and overall user satisfaction.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.2.8. VAL_08 To design and develop an innovative, inclusive and convenient stop for buses

Measure category: PT stop and facilities

Brief description: This measure aims to develop and test a smart and inclusive bus stop design that enhances user satisfaction and improves public perception of public transport. The design process will involve co-creation with citizens to ensure it meets their needs in terms of accessibility, attractiveness, safety, and inclusiveness. The new bus stop will incorporate services and features to ensure accessibility for all users. The focus will be placed on the deployment of IoT systems, the provision of real-time information, the climate resilience of the stop, the accessibility and the safety in and around the stop.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to display citizen engagement and user satisfaction compared to the baseline situation.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-GOV	To support the validation of the measure. U-GOV could be used to collect citizen's feedback about the innovative elements introduced in the bus stop.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted.

4.2.9. VAL_09 Improving the efficiency of the bus service and comfort of PT users

Measure category: Mobility planning

Brief description: This measure aims to introduce a system that allows for accurate passenger counting within buses and tracks boarding and disembarking stops for each passenger, facilitating the calculation of transport Origin/Destination matrices. The measure involves developing and deploying an advanced camera-based passenger counting system with artificial intelligence on buses. The objectives of this measure include providing real-time bus occupancy data to EMT for responsive service adjustments and to third-party applications to enhance the overall passenger experience. Furthermore, the system will analyze patterns of passenger entry and exit to enhance the precision of detailed origin-destination matrices.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to monitor the measure impact on user satisfaction.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-GOV	To support the validation of the measure. Acceptance of the measure and its promotion.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship.
Deployment	U-NEED	VAL_09 will facilitate the calculation of OD matrices for the bus transport service. This data will feed U-NEED to improve the analysis of travel demand.	U-NEED deployed in the city.

4.3. Rome

4.3.1. ROM_01 To reduce private vehicles by implementing a "pollution charge" scheme in the core part of Rome Zone 2

Measure category: Low Emission Zone (LEZ) / Congestion and Pollution Charging Scheme / Smart Parking Management

Brief description: Within the project timeframe, the implementation of electronic access gates will be completed, adding 53 missing points to reach a total of 74 access points. A "congestion charge" policy will be introduced in the VAM zone to restrict vehicle access based on emissions. The pilot will define the policy, compare it to similar European measures, facilitate participatory discussions, and conduct evaluations on a regular basis. Communication packages will be developed to ensure ongoing adaptation and promote a modal shift towards public transport.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to monitor levels or air pollution and CO2 emission, and traffic levels in different parts of the intervened area and based on the baseline and targets defined.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-GOV	U-GOV will be employed as a channel to facilitate the participatory discussions (forum-community activities), conducting evaluations periodically (online surveys). These activities are aimed to facilitate the measure acceptance and the community engagement.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.3.2. ROM_02 Promoting modal shift towards PT with the implementation of a LEZ in Rome Zone 3

Measure category: Low Emission Zone (LEZ) / Congestion and Pollution Charging Scheme / Smart Parking Management

Brief description: In November 2022 a municipal deliberation was issued defining the LEZ "Green Area" and the roadmap to ban the pre-EURO 5 vehicles circulating within. The measure combines policies and ITS to implement restrictions according to a Roadmap indicated by the City Administration. The measure includes the implementation of a total of 154 electronic access gates over the "Green Area" perimeter. The capacity to verify the accessing vehicles membership to a specific Euro classification – divided by category (car, motorcycle, PT, taxi, etc.) will permit the control of the LEZ decided by the Administration and to verify the modal shift towards PT.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to monitor levels or air pollution and CO2 emission, and traffic levels in different parts of the intervened area and based on the baseline and targets defined.	Baseline and targets defined, and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-GOV	U-GOV will be employed as a channel to facilitate the periodical evaluation of the measure (online surveys). This activity is aimed to facilitate the measure acceptance and the community engagement.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.3.3. ROM_03 To adapt the PT offer and include new mobility services in multimodal interchange nodes

Measure category: Multimodality (Physical Integration of mobility services and Hub Creation)

Brief description: Rome aims to enhance sustainable mobility through various measures outlined in the SUMP. This measure aims to upgrade and make more accessible, both in terms of parking space and in the efficiency of the inter-modality, the PT infrastructure. In particular, this measure will add or expand park and rides making them more efficient, accessible and sustainable. Moreover, it will improve multi-modality offer near park and ride areas, increasing accessibility and inclusion in the MaaS ecosystem.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-NEED	It will provide an Accessibility Analysis, displaying scorings about the accessibility indexes between the different sharing mobility stations and P&R locations with respect to different amenities of the city.	Mandatory: - GTFS of Public Transport service. - P&R locations. - Location of micro-mobility stations. Optional: - Calendar with special dates and working days. - Historical weather data is optional but recommended. - As Rome can't provide ticketing nor O/D information, they can provide the output of the counting system - counts IN and OUT- together with the GPS positioning, to build the OD matrix).
Monitoring	U-SUMP	U-SUMP will be used to monitor the number of provided infrastructure for cars, motorcycles and bicycles present at multimodal hubs (aka., areas facilitating intermodality with PT and other modes).	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-GOV	U-GOV to be employed as a channel to exchange ideas and proposals among the different stakeholders involved in multimodal solutions. Interventions will be focused on the Ideation phase, through the Share ideas activity.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.3.4. ROM_04 To design the new high frequency and high-capacity PT infrastructure

Measure category: Traffic Management and PT Prioritization

Brief description: This measure aligns with the SUMP objectives and with the investment expected in PT infrastructures of over €9 billion within a 10-year period to extend and modernize the metro (38.5 km and 27 new stations) and tramway lines (58 km). The measure's activities will support the implementation of the new tramway

lines and of the Metro lines extension. In this framework the measure will assess the scenarios before the new opening of new PT infrastructures and communicate the new PT services supply also during the works. In addition to new tramway lines and additional metro stops, vehicles procurement will increase PT capacity in Rome within this measure.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-SIM.plan	Assess the impact of the new line and metro stop on the network (accessibility, veh-km, …)	Calibrated and validated VISUM transport model and the necessary input data (granularity of the area, demand & supply model, route of the new lines, stops, ...).
Deployment	U-SIM.live	U-SIM.live will be deployed for the site. The tool can provide live estimation of the number of passengers on busses and at stops. These can be used by adaptive signals, to prioritize high-occupancy busses against lower-occupancy ones, and private cars. **Note:** U-SIM.live provides useful data for the optimization process, but cannot simulate the impact of traffic light plans, as this falls outside its scope (it is a PTO decision support tool, not for traffic centres).	Mandatory: - GTFS file (single, or URL where it is periodically published) Optional (improve evaluations' quality): - GTFS-RT (Vehicle Positions) feed - GTFS-RT (Trip Updates) feed - PT passenger demand matrices (covering all the desired time period, or alternatively a subset, to be expanded to it) - PT passengers count live feed"
Monitoring	U-SIM.live	U-SIM.live can intersect the travel times and waiting times of PT passengers with the volumes of those, to monitor and report about the effectiveness of interventions over time, on the number of users benefitting of the improvements, or impacted by delays.	U-SIM.live deployed
Monitoring	U-SUMP	U-SUMP will be used to monitor the expansion of mass transport infrastructure in terms of added lines and/or kilometres to the existing network and based on the baseline and targets predefined	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Scale-up	U-GOV	U-GOV to be employed as a participatory platform to prioritize future interventions with the citizenship, through Validation activities (surveys-concept testing). The tool can support the community engagement and the acceptance and knowledge of the new services.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship
Replication	U-SIM.live	If the measure is successful (from the city, the PTO, but also the end user perspective), U-SIM.live will already be available to be used on other lines/corridors of the city.	As per Deployment

4.3.5. ROM_05 New LEV and ZEV bus fleet – network adaptation

Measure category: Mobility planning

Brief description: To meet the SUMP goals, Rome plans to invest in the renewal of the PT surface fleet with Low Emission Vehicles (LEV) and Zero Emission Vehicles (ZEV) buses by 2030. ATAC, the main PT operator, has identified the need for 1057 new buses between 2023 and 2026. This measure involves integrating LEV and ZEV buses into the PT surface fleet, which requires re-designing low-emission lines and carefully planning routes, bus depots, and lines to ensure efficient operation across a large area.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-SIM.plan	Assess the impact of an increase of the PT fleet on the network (accessibility, veh-km, emissions) The scenarios to be investigated include: renew the PT fleet (reduce the average age and increase the efficiency), Increase the share of LEV and ZEV in the PT fleet to reduce the environmental impact of PT, increase the PT supply (bus fleet).	Calibrated and validated VISUM transport model and the necessary input data (granularity of the area, demand & supply model, ...).
Monitoring	U-SUMP	U-SUMP can be used to monitor the PM levels in different city areas, compare across locations and assess progress based on baselines, interim data reported and target.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-GOV	U-GOV to be employed as a participatory platform to monitor the implementation of new routes Validation activities (surveys following a MoSCoW scale: Must_Should_Could_Would). The tool will foster the public consultation, support the community engagement and the acceptance and knowledge of the new services.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.3.6. ROM_06 Innovative features into the MDMS system according to the mobility patterns and needs of users' groups

Measure category: Multimodality (Operational and Digital Integration of mobility services)

Brief description: Building on MaaS4Italy Project, this measure foresees the integration of the main services into the MaaS platform, integration of all the sharing and information services on LPT in the Data Lake of the new RSM MMC, making them available through standard APIs and interfaces with simple Urban Mobility App. The goal is to offer accessible and convenient mobility services for both residents and tourists in Rome.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to monitor number of multi modal trips booked through the app and user satisfaction index. If the data is available, indicators could be disaggregated by transport modes for the firmer and on gender, age and other socio-economic factors for the latter.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-GOV	U-GOV to be employed as a participatory platform to validate the new urban mobility app, and the fulfilment level of citizens expectations. Validation activities (surveys) will support the engagement and communication with users.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.3.7. ROM_07 Use of advanced technology to increase the efficiency and reliability of PT

Measure category: Mobility planning

Brief description: The upgraded Traffic Management Centre (TMC) in Rome oversees and manages various aspects of mobility services and traffic control. The TMC utilizes advanced technology to monitor, regulate, and provide real-time information on traffic conditions, as well as forecast future traffic patterns using AI and machine learning. The enhanced TMC aims to unify and leverage data from different actors and ITS systems in the metropolitan area, offering comprehensive management, regulation, forecasting, and info-mobility services to users.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-TWIN	It will collect static and real-time data of different PT services and sharing mobility services. In addition, it will be able to be fed with traffic real-time information provided by new sensors.	Mandatory: - GTFS of different Public Transport services. - GTFS-RT of different Public Transport services. - Micro-mobility static information about stops and real-time counting by stop about available bikes / free parking slots. - Traffic alerts and incidents.
Monitoring	U-SIM.live	Estimate passenger volume & Forecast passenger volumes: For journey planner, assess station and line congestion; for PT operators, anticipate issues and assess impacts, to increase the efficiency and reliability of PT. It also allows simulating corrective actions when an alert is shown in U-TWIN.	U-SIM.live deployed Mandatory: - GTFS file (single, or URL where it is periodically published) Optional (improve quality of evaluations):

			- GTFS-RT (Vehicle Positions) feed - GTFS-RT (Trip Updates) feed - PT passenger demand matrices (covering all the desired time period, or alternatively a subset, to be expanded to it) PT passenger count live feed"
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.3.8. ROM_08 Designing the urban space to promote active travel modes, PT and environmental 30 km/h zones

Measure category: Redistribution of Urban Space

Brief description: The Local Authority plans to introduce local 30 km/h zones, impacting motorized traffic congestion and promoting active mobility (walking and cycling) and multimodality. Stakeholders will analyse and plan these road system changes to prevent congestion and ensure road safety. Initial projects include street reorganization, pedestrianization, and bus stop improvements and accessibility, with similar measures to be implemented in different boroughs as recommended by the SUMP.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to track progress on average traffic levels based on data, target and interim data reported. If available, data could be further disaggregated and displayed in the dashboard. U-SUMP will be also used to monitor number of collisions disaggregated by severity and track reduction progress based on baseline, interim values and target reported. If available data could be further disaggregated in victim-perpetrator type/mode	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-GOV	U-GOV to be employed as a participatory platform to validate the new infrastructure to foster the active mobility. Validation activities (surveys) will support the acceptance of the measure, and the engagement and communication with users.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.3.9. ROM_09 Incentive packages to support multimodality

Measure category: Incentivization

Brief description: This measure aims to encourage sustainable travel behaviour and establish local public transport as the preferred mode of transportation. This is achieved by engaging local mobility managers in institutions, companies, and schools to promote sustainable mobility practices within their organizations. It also aims to contributing to mitigate the social impact of the PUSH Measures in Rome (ROM_01 and ROM_02), The activities include promoting multi-modality and integrating public transport in the travel journey, encouraging car-pooling through ride-sharing platforms, promoting cycling as a mode of transportation to work or school, and utilizing welfare legislation to provide incentives such as reduced fares for public transport subscriptions.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-GOV	U-GOV to be employed as a channel to exchange ideas and proposals among the different users employing active and multimodal solutions. Interventions will be focused on the Ideation phase, trough the Share ideas activity, and Community forum to share experiences. The tool will facilitate the acceptance and community engagement.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.4. Ile de France

4.4.1. IDF_01 Declination and adaptation of a Regional SUMP at a local scale and to local needs

Measure category: Democratic governance

Brief description: In Ile-de-France Region, the SUMP is regional, and each territory is due to decline it into local SUMPs and VGP has yet to do it. In this context we propose to realize a detailed study to shape the implementation of a local SUMP in VGP to accompany a better development of urban transport at a local scale.

The objective of this pre-study is to make an initial diagnostic of technical framing elements that make up a local SUMP and to propose some examples of action (1 or 2 for each theme) to be carried out. It is a question of making a diagnostic of the situation and visualizing how, with the help of Île-de-France's SUMP, the territory of Versailles Grand Parc can carry out all or part of the actions at the local scale with the aim of strengthening the attractiveness of active modes and public transport.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.4.2. IDF_02 Setting-up of a dynamic Digital Twin of the territory

Measure category: Mobility planning

Brief description: The work will consist in restricting this simulator to the scale of the territory and setting up modules allowing to calibrate the model in a dynamic way with the help of the available data. This digital twin will allow to obtain a more complete observation of mobility on the territory with the PT interactions with the other mobilities, to follow the impact of the implementation of the actions and also to provide estimates of the non-measured information (carbon footprint and local emissions, ...).

Stage	U-tool	Purpose	Prerequisite
Preparation	U-SIM.plan	In order to validate the possibility of replicating the methodology with a U-tool, it would be necessary to compare the results obtained by integrating U-SIM plan into the current methodology (replacing the simulation stage via the ABM (Activity Based Modelling) with U-SIM plan) and thus benefit from the 'common' graphical output of the U-SIM plan results.	The ABM model needs to be successfully migrated into a VISUM model. The necessary data for the study should be available.
Replication	U-SIM.plan	Once the ability to integrate U-SIM plan into the assessment workflow has been validated (development stage), U-SIM plan could be used to replicate the methodology implemented in other cities.	
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.4.3. IDF_03 Impact evaluation and future design of low emission zones and restricted traffic zones

Measure category: Low Emission Zone (LEZ) / Congestion and Pollution Charging Scheme / Smart Parking Management

Brief description: Scenarios evaluation is crucial to understand the impact of low-emission zones (ZFE) on vehicle fleet and modal shift in Versailles Grand Parc. Simulating scenarios helps policymakers make informed decisions on financial aid and assess the implications of implementing vehicle restrictions. This measure utilizes a digital twin (IDF_02) and data analysis to observe the impact of low emission zones and study the implementation of future policies. Attention will be given to enhancing public transport accessibility to the low-emission zones through simulations and analysis.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-SIM.plan	In order to validate the possibility of replicating the methodology with a U-tool, it would be necessary to compare the results obtained by integrating U-SIM plan into the current methodology (replacing the simulation stage via the ABM with U-SIM plan) and thus benefit from the 'common' graphical output of the U-SIM plan results.	The ABM model needs to be successfully migrated into a VISUM model. The necessary data for the study should be available.
Replication	U-SIM.plan	Once the ability to integrate U-SIM plan into the assessment workflow has been validated (development stage), U-SIM plan could be used to replicate the methodology implemented in other cities.	
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.4.4. IDF_04 Added-value services in multimodal nodes to integrate active modes with PT

Measure category: Multimodality (Operational and Digital Integration of mobility services)

Brief description: This measure aims to increase the visibility of new micro-mobility services and promote active modes like walking and biking. A shared-mobility service will be integrated into the MaaS application developed by Instant System, providing the users with a comprehensive understanding of the mobility options available and increasing visibility and usage of the service. Personalized suggestions based on the user's pollution impact will incentivize their use.

Stage	U-tool	Purpose	Prerequisite
By the submission of this deliverable, IDF cluster has decided not to use the support from U_TWIN, U-SIM, U-SUMP, U-NEED or U-GOV for this measure. However, all the measures will benefit from the use of the transversal tools U-KNOW and U-TRANSFER, as already described in section 4.1.			

4.4.5. IDF_05 Promote the use of the PT service by visitors in large events

Measure category: Multimodality (Operational and Digital Integration of mobility services)

Brief description: This measure aims at promoting multimodal trips (combining PT with demand responsive transport) during the Olympic Games. The main objective of this measure is to help cities involved in the Olympic games to regulate the traffic and ease the transfer of participants from/to events locations. To that aim, the major outcome will contribute to measure the impact of a dedicated MaaS application offering a multimodal journey planner (with PT and other active modes), as well as accessibility services, especially in the area of Versailles Grand Parc where are located three Olympic Games sites.

Stage	U-tool	Purpose	Prerequisite
By the submission of this deliverable, IDF cluster has decided not to use the support from U_TWIN, U-SIM, U-SUMP, U-NEED or U-GOV for this measure. However, all the measures will benefit from the use of the transversal tools U-KNOW and U-TRANSFER, as already described in section 4.1.			

4.4.6. IDF_06 Advanced technology to optimize the PT offer in line with users' needs

Measure category: Mobility planning

Brief description: This measure involves developing an "Observatory of Mobility" tool that utilizes artificial intelligence and big data analysis. It will integrate various data sources, such as video-protection networks, air quality stations, traffic data, public transport data, and cycling infrastructure, enabling cross-analysis. This tool will provide valuable insights into current mobility patterns and identify actionable possibilities tailored to local realities. A dashboard will be created to inform and support cities in city planning and mobility, focusing on themes like mobility, air quality, and traffic conditions, by correlating observations from different data sources.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.4.7. IDF_07 To incentivize the use of Public Transport for commuters

Measure category: Incentivization

Brief description: This measure aims to facilitate the use of mobility credits as a payment method for public transport and micro-mobility services. Private companies in Versailles Grand Parc can provide their employees with mobility credits to pay for sustainable mobility modes. This encourages the use of these modes and promotes a healthier lifestyle. Mobility challenges will be implemented to incentivize users to travel in a more sustainable manner. A dedicated B2B application will be provided to identified private companies for the allocation of mobility credits.

Stage	U-tool	Purpose	Prerequisite
By the submission of this deliverable, IDF cluster has decided not to use the support from U_TWIN, U-SIM, U-SUMP, U-NEED or U-GOV for this measure. However, all the measures will benefit from the use of the transversal tools U-KNOW and U-TRANSFER, as already described in section 4.1.			

4.4.8. IDF_08 Improve public perception of PT

Measure category: Public perception of quality of service

Brief description: This measure aims to bridge the gap between perceived and actual quality of public transport (PT) service. To evaluate communication and educational efforts from 2023 to 2026, qualitative surveys will be conducted to assess the perception of PT quality. Surveys include a quality-of-service survey (punctuality, regularity, cleanliness, passenger information…) and a modal split survey (baseline in 2023/2024 and a comparative questionnaire in 2026 in both cases), and the use of serious games. The goal is to understand user expectations, enhance PT perception, and improve overall quality of service.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.5. Oslo

4.5.1. OSL_02 Consistent visual identity for PT and mobility hubs

Measure category: Multimodality (Physical Integration of mobility services and Hub Creation)

Brief description: Ruter has recently launched a new visual identity which is used in their official communication, branding material and digital user interface. This visual identity (applied to screens at stops and inside vehicles, apps and websites, interior and exterior of vehicles, directions to and from stations, landmarks and signs, timetables, maps and marketing) ensures consistent communication across channels and a better user experience. The aim of this measure is to expand Ruter's visual identity to also include mobility hubs and belonging (new) services such as bike lockers, car sharing, etc. In doing so, we will increase the visibility and uniformity of mobility services and build on Ruter's ambitions to provide mobility rather than public transportation only.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-GOV	U-GOV: This tool could help gain a better understanding of the customers' expectations for future improvements and/or adaptations, serving as a platform/facilitator for interaction, involvement, and discussions.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.5.2. OSL_03 Improve use and accessibility of public transport in conjunction with alternative mobility to reduce private car ownership

Measure category: Mobility planning

Brief description: This measure will use a bus route that has been improved, where all possible physical improvement has been made or a new bus route which is under improvement to test how we can further improve the mobility offer beyond traditional activities. Part of this measure will be to test/implement the function distribution model in context with mobility services and function of the area. Through this approach we can both work at system and street level to understand actual impact of implemented measures or lack of them. The idea is to create a basis for a framework for further improvement of bus routes with connection to different mobility services. Through this work we want to shed light on how existing regulations and framework affects each other both creates challenges opportunities.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-GOV	U-GOV: Our objective for utilizing U-GOV is to establish a survey and communication platform to engage with various stakeholders impacted by the measure. It is important to assess the measure's effectiveness to determine whether the pilot and the implemented solution are adequate or if further improvements are necessary. We envisage U-GOV functioning as an interactive survey and information platform, facilitating easy outreach and involvement of affected stakeholders, including bus drivers, taxi drivers, and goods delivery services - key functions within the designated area. Ideally, the platform should feature a dashboard with survey capabilities to gauge user satisfaction, along with an interactive map enabling participants to highlight issues or propose solutions.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.5.3. OSL_04 Reduce dependency on car ownership

Measure category: Incentivization

Brief description: This measure aims to create cooperation models between Ruter, landowners and mobility service operators. It involves developing an administrative backend system and scalable combined mobility offers for residents. Through different business, pricing and service models, the use of public transportation and shared modes will be incentivized. The goal is to make combined mobility agreements easily accessible to housing associations and residents, offering discounted PT tickets and various shared modes. Landowners have economic incentives to cooperate, while mobility service operators benefit from exposure to Ruter's customer base.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-GOV	U-GOV: will enable us to get feedback from residents and facilitate for a short feedback loop during piloting of new business/pricing models.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.5.4. OSL_05 Solutions for adapting segmented DRT solution to a broader service.

Measure category: On-Demand Mobility Services

Brief description: This measure focuses on integrating an existing age-friendly service with a projected new Demand-Responsive Transportation (DRT) service no longer limited to a particular age group, aiming to reduce costs and create synergies. Key issues to address include designing an "open to all" service that considers the needs of the elderly while supporting them in transitioning to a fully digital service. Collaboration with the ULTIMO project is planned to prepare and assist the elderly in utilizing future autonomous DRT vehicles.

Stage	U-tool	Purpose	Prerequisite
Deployment	U-GOV	U-GOV: This tool could help gain a better understanding of our target group's expectations, serving as a platform/facilitator for interaction, involvement, and discussions.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship.

4.5.5. OSL_06 More inclusive micromobility

Measure category: Multimodality (Physical Integration of mobility services and Hub Creation)

Brief description: This measure focuses on testing an inclusive shared micromobility scheme to provide more user groups with greater freedom of movement. By integrating various forms of micromobility into the existing mobility offer, space on public transport can be freed for other user groups, such as wheelchair users. The aim is to increase the adoption of e-scooters and e-bikes for first and last-mile travel and involve members from different interest groups and geographical areas. Pilot schemes will be designed based on identified adoption barriers.

Stage	U-tool	Purpose	Prerequisite
Deployment	U-GOV	U-GOV could be used to collect needs and expectations from different users' groups with respect to shared micromobility offer. Information about barriers for the use of shared micromobility services can also be collected, to afterwards define solutions to overcome them. could be used to take account to the user's needs.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.5.6. OSL_07 Pilot V2X to prioritize public transport

Measure category: Traffic Management and PT Prioritization

Brief description: This measure aims to enhance traffic safety by implementing in certain corridors a V2X smart speed bump system (Actibump). This solution provides benefits for pedestrians, bicycles, traffic planning, and public transport. It offers continuous vehicle counting, classification, weighing, and environmental measurements. The V2X system can communicate with other roadside equipment and its data is monitored and presented through a software platform. The V2X Actibump system, along with the software, collects and stores data, enables remote monitoring, and presents real-time and historical data to assess its impact on driver behaviour and collect additional vehicle classification information.

Stage	U-tool	Purpose	Prerequisite
Deployment	U-TWIN	The U-TWIN tool will be able to display real-time information about delays, incidents, PT vehicle positions, traffic level of service and so on. This information could be retrieved via API to other applications or displayed in the U-TWIN tool	Mandatory: - GTFS of different PT services. - GTFS-RT of different PT services. Optional: - Micro-mobility static information and real-time counting by stop.
Monitoring	U-TWIN	U-TWIN can be used to calculate the KPI "Travel speed for PT"	Mandatory: - Vehicle positions from GTFS-RT to allow speed vehicle calculations
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.5.7. OSL_08 Shifting DRT reservations from pre-booking to on-demand as a means to increase capacity

Measure category: On-Demand Mobility Services

Brief description: This measure aims to explore methods for enhancing and gaining experience in same-day and on-demand ordering for Ruter age-friendly transport (RAT). We will attempt to acquire the necessary skills and experience to operate on-demand DRT systems, whilst also taking into account the unique needs of RAT users. Key issues to investigate include (1) the impact of reserving vehicles for on-demand/same day on productivity, (2) the effect of on-demand/same day on trip aggregation, and (3) determining the number of vehicles needed for on-demand/same day to observe systemic effects, among other considerations.

Stage	U-tool	Purpose	Prerequisite
Deployment	U-GOV	U-GOV: This tool could help gain a better understanding of our target group's expectations, serving as a platform/facilitator for interaction, involvement, and discussions.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship.

4.6. Mannheim

4.6.1. MAN_01 Establish participative governance and dialogue formats to address the citizens with a focus on the (special) needs of user groups

Measure category: Democratic governance

Brief description: RNV aims to better understand the mobility needs of different target groups and use-cases. This measure proposes different formats of data collection, such as surveys, dialogue formats, and on-site service counters. Based on insights, they plan to develop a modular information package for specific needs. The goal is to create concept of a mobility advisory service that supports the modal shift by easing transition from cars to sustainable transport modes and further test it. Specific use-cases, like mobility advisory services during events, or commuter needs, will be identified to provide tailored information and services.

Stage	U-tool	Purpose	Prerequisite
Deployment	U-GOV	U-GOV: Testing the U-GOV platform to improve user communication, generate feedback on activities and actively involved citizens and stakeholders in the design of the modular and location-independent mobility advisory service.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.6.2. MAN_02 Campaigning for sustainable forms of transport, such as PT, walking and cycling. Establishing a PT culture with PT as a green, safe, inclusive, and social space

Measure category: Campaigns

Brief description: The communication campaign focuses on three main areas: promoting public transportation as a sustainable and inclusive service for climate change, promoting PT services enhancing suburban connectivity for seamless commuter journeys, and positively influencing community perceptions of public transportation. The campaign aims to strengthen the local public transportation culture and address the changing needs of customers, particularly older age groups. Targeted marketing measures will highlight the advantages of public transport for specific user groups and promote them as part of mobility management.

Stage	U-tool	Purpose	Prerequisite
By the submission of this deliverable, MAN cluster has decided not to use the support from U_TWIN, U-SIM, U-SUMP, U-NEED or U-GOV for this measure. However, all the measures will benefit from the use of the transversal tools U-KNOW and U-TRANSFER, as already described in section 4.1.			

4.6.3. MAN_03 Data-driven platform for supporting PT planning and operations based on the concept of Mobility as a Right

Measure category: Mobility planning

Brief description: RNV aims to utilize available data more effectively and improve data quality, processing and storage, emphasizing the importance of accurate data and the recognition of mobility as a basic right. Improvements include data governance, integration of relevant data sources into their cloud environment and developing solutions for various use-cases. Statistical models will be used initially, followed by more advanced machine learning approaches. Additionally, gender-specific gaps in data collection will be addressed during the analysis.

Stage	U-tool	Purpose	Prerequisite
By the submission of this deliverable, MAN cluster has decided not to use the support from U_TWIN, U-SIM, U-SUMP, U-NEED or U-GOV for this measure. However, all the measures will benefit from the use of the transversal tools U-KNOW and U-TRANSFER, as already described in section 4.1.			

4.6.4. MAN_04 An attractive, accessible, secure, comfortable, multifunctional and clean PT stop

Measure category: PT stop and facilities

Brief description: The aim of this measure is to draft, discuss and pilot additional components/ elements at PT stops to improve the overall attractivity and functionality. This includes, on one hand, the introduction of additional digital services at the stops and, on the other hand, the climate-change adaptation of PT stops and infrastructure (such as greening and shading to reduce heat in summer to manage heavy rainfall). This measure will also develop a platform building standard for efficient, accessible, and multifunctional construction planning and execution.

Stage	U-tool	Purpose	Prerequisite
By the submission of this deliverable, MAN cluster has decided not to use the support from U_TWIN, U-SIM, U-SUMP, U-NEED or U-GOV for this measure. However, all the measures will benefit from the use of the transversal tools U-KNOW and U-TRANSFER, as already described in section 4.1.			

4.6.5. MAN_05 Modernize and increase the attractiveness of digital sales channels and private sector partnerships

Measure category: Multimodality (Operational and Digital Integration of mobility services)

Brief description: To enhance features, functions and interoperability, RNV will upgrade and extend existing sales, billing and settlement systems. The D-Ticket, based on the VDV-KA standard, will be implemented with chip cards and smartphone applications. Secure keys and certificates will prevent fraud. This upgrade enables full interoperability of all D-Tickets sold by RNV and ensures a digital and secure ticket inspection process. The measure aims to transition more customer groups to a future-proof, interoperable and fully digital ticketing system.

Stage	U-tool	Purpose	Prerequisite
By the submission of this deliverable, MAN cluster has decided not to use the support from U_TWIN, U-SIM, U-SUMP, U-NEED or U-GOV for this measure. However, all the measures will benefit from the use of the transversal tools U-KNOW and U-TRANSFER, as already described in section 4.1.			

4.6.6. MAN_06 Defining concepts and test instruments to improve mobility in peri-urban areas for different user groups

Measure category: On-Demand Mobility Services

Brief description: This measure aims at the development of concepts and the testing of instruments to improve mobility in those peri-urban areas for various user groups. The overall objective is to improve the availability and quality of mobility services in peri-urban areas through improved PT services and an additional focus of connecting PT services with additional mobility options.

Stage	U-tool	Purpose	Prerequisite
By the submission of this deliverable, MAN cluster has decided not to use the support from U_TWIN, U-SIM, U-SUMP, U-NEED or U-GOV for this measure. However, all the measures will benefit from the use of the transversal tools U-KNOW and U-TRANSFER, as already described in section 4.1.			

4.6.7. MAN_07 Create a network of mobility hubs in cooperation with the regional transport association, open for multi mobility providers

Measure category: Multimodality (Physical Integration of mobility services and Hub Creation)

Brief description: This measure will develop and implement a connected mobility concept to consider shared mobility options as standard in the planning, construction and operations of PT stops. The goal of the concept is to provide people with a seamless transition between sustainable mobility modes (PT, car sharing, bike sharing, e-Scooters, walking, and cycling), by bringing them physically together, increasing visibility and improving accessibility. The scope of this measure is to develop and implement the concept and realize at least one pilot mobility hub.

Stage	U-tool	Purpose	Prerequisite
By the submission of this deliverable, MAN cluster has decided not to use the support from U_TWIN, U-SIM, U-SUMP, U-NEED or U-GOV for this measure. However, all the measures will benefit from the use of the transversal tools U-KNOW and U-TRANSFER, as already described in section 4.1.			

4.6.8. MAN_08 Redesign urban space and test alternatives of using it for social purposes

Measure category: Redistribution of Urban Space

Brief description: This measure focuses on reorganizing parking spaces in urban areas to optimize public space utilization. By reducing the number of parking spaces available, the aim is to create opportunities for alternative uses, such as neighbourhood garages, parklets, and mobility hubs. Additionally, efforts will be made to raise awareness about alternative mobility options, like public transport, and involve citizens in the decision-making process to increase acceptance. Pilot projects and evaluations will be conducted to test and refine these new approaches to parking and public space management.

Stage	U-tool	Purpose	Prerequisite
By the submission of this deliverable, MAN cluster has decided not to use the support from U_TWIN, U-SIM, U-SUMP, U-NEED or U-GOV for this measure. However, all the measures will benefit from the use of the transversal tools U-KNOW and U-TRANSFER, as already described in section 4.1.			

4.7. Lisbon

Lisbon aims to embed the map and visualizations of the U-TWIN tool on a public webpage, to make the real-time information available for the general public. To that aim, U-TWIN will give access to non-logged users, but just with read-only permissions. This use case for U-TWIN is not related to a particular measure.

4.7.1. LIS_01 Restrict car access in the city

Measure category: Low Emission Zone (LEZ) / Congestion and Pollution Charging Scheme / Smart Parking Management

Brief description: This measure proposes traffic restrictions around schools and other facilities to promote safer and more active modes of transportation. Blocking the school perimeter for non-resident cars creates a safe environment for students, frees sidewalks from illegal parking, and encourages biking or public transportation. The UPPER tools can help analyse and compare flow changes before and after the restrictions, helping decision-makers anticipate challenges. The annual 'Hands Up' Survey will monitor modal changes in schools where the measure is implemented. Trialling this measure alongside Amarelo and Navegante Escola card measures will further support modal change adoption.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-NEED	Monitor: - The modal share evolution - Use of Public Transport in terms of quantity of users	U-NEED deployed
Monitoring	U-GOV	U-GOV could be used for carrying out a survey at the end of the school year. The eventual use of this tool is being evaluated.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted

| Replication | U-NEED | U-NEED might be helpful in the future for identical type of actions. U-NEED will help to identify the areas where traffic restrictions need to be applied.
To that aim, U-NEED will implement an accessibility analysis of walking and bike commuting between PT stops and schools. | Mandatory:
- GTFS of Public Transport services.
- Micro-mobility static information such as stops location.

Optional:
- School location should be offered to be analysed.
- Traffic service level historical data. |

4.7.2. LIS_02 Promote, extend services and prioritise PT

Measure category: Traffic Management and PT Prioritization

Brief description: This measure will analyse the PT network using advanced tools and big data analytics to identify factors affecting commercial speed. Audits will be conducted on bus stops, road structure, bus services, and intersections to find areas for improvement. Recommendations will be created based on this information to implement PT prioritization measures at bottlenecks, reducing delays and increasing commercial speeds. Furthermore, cameras will be installed on CARRIS buses to automatically detect non-compliant vehicles in bus lanes, enabling law enforcement actions.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-NEED	U-NEED will give support in the advanced analysis of the PT network and will analyse factors with higher negative impacts on commercial speed. U-NEED will be able to display both historical traffic level of service and Public Transport delays per stop.	Mandatory: - GTFS of Public Transport services. - GTFS-RT of Public Transport, to calculate delays by stop. - Historical delays per stop (can be calculated). Optional: - Historical traffic data.
Preparation	U-SIM.plan	Evaluation of different strategies of PT prioritization	Calibrated and validated VISUM transport model and the necessary input data (granularity of the area, demand & supply model including PT, ...).
Deployment	U-TWIN	Display Public Transport delays in real-time and traffic level of service information in real-time. Display alerts and incidents that affect PT.	Mandatory: - GTFS of different Public Transport services. - GTFS-RT of different Public Transport services. Optional: - Alerts or incidents could be retrieved from other services.

Deployment	U-SIM.live	U-SIM.live will be deployed for the site. Operation Control Center (OCC) operators can use U-SIM.live to evaluate potential courses of action to mitigate the impacts of incidents and disruptions. Note: U-SIM.live provides useful data for the optimization process, but cannot simulate the impact of traffic light plans, as this falls outside its scope (it is a PTO decision support tool, not for traffic centers).	Mandatory: - GTFS file (single, or URL where it is periodically published) Optional (improve quality of evaluations): - GTFS-RT (Vehicle Positions) feed - GTFS-RT (Trip Updates) feed - PT passenger demand matrices (covering all the desired time period, or alternatively a subset, to be expanded to it) - PT passenger count live feed
Monitoring	U-TWIN	Store historical data about service delays and display them in real-time.	U-TWIN deployed
Monitoring	U-SIM.live	U-SIM.live can intersect the travel times and waiting times of PT passengers with the volumes of those, to monitor and report about the effectiveness of interventions over time, on the number of users benefitting of the improvements, or impacted by delays. OCC operators can use U-SIM.live to evaluate potential courses of action to mitigate the impacts of incidents and disruptions.	U-SIM.live deployed
Scale-up	U-NEED	U-NEED will give support in the advanced analysis of the PT network and will analyse factors with higher negative impacts on commercial speed. U-NEED will be able to display Public Transport delays by stop, emphasizing those stops where accumulative delays are recurrent. This information could be calculated if it is possible to store the real-time information related to PT delays.	Mandatory: - GTFS of Public Transport services. - Historical delays by stop from real-time delays stored (can be calculated).
Scale-up	U-SIM.plan	Evaluation of different strategies of PT prioritization	Calibrated and validated VISUM transport model and the necessary input data (granularity of the area, demand & supply model including PT, ...).
Replication	U-SIM.live	If the measure is successful (from the city, the PTO, but also the end user perspective), U-SIM.live will already be available to be used on other lines/corridors of the city.	As per Deployment

4.7.3. LIS_03 To improve the mobility planning

Measure category: Democratic governance

Brief description: Lisbon and TML are launching public tenders for the development of the 3rd generation of the metropolitan and municipal SUMP. These SUMPs will directly align with the UPPER measures, as they are being developed around the same time frame (expected completion by the end of 2023 for Lisbon and 2024 for TML). Additionally, studies will be conducted to complement the defined measures in the SUMPs. This includes the development of a Municipal Road Safety Plan in Lisbon, adjustments to the PT offer by TML, and network reviews by CARRIS.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-NEED	U-NEED will give support in the advanced analysis of the PT network. U-NEED will be able to integrate data from different PT modes and detect inefficiencies. Furthermore, U-NEED will potentially be utilized to assess the accessibility from various points within the city to essential services, such as pharmacies and educational institutions. This will facilitate the planning and enhancement of the city's basic services network.	Mandatory: - GTFS of Public Transport Services. - Location of micro-mobility static information such as stops. Optional: - Location of essential services, feasible to be analysed through an Accessibility Analysis.
Monitoring	U-SUMP	Besides and beyond the monitoring of the UPPER indicators, further versions of the U-SUMP tool could be potentially used to monitor indicators at the geographical scale and scope of the updated metropolitan SUMP.	Baseline and targets defined, and data values reported on a regular basis in the UPPER indicators database

4.7.4. LIS_04 To improve PT offer, adapted to school students

Measure category: Mobility planning

Brief description: This measure aims to increase student bus transportation through two initiatives. The 'Amarelo' pilot project provides free on-board PT monitors on selected routes, ensuring children's safe arrival at school. Parents enrol their children online, specifying the school, bus stop, and week days. Monitors register the child's entry, and upon reaching the school stop, guide them (excluding older students). This collaboration with CARRIS, the transport operator, and parish councils (the monitors) enhances safety. The measure also expands the 'Navegante Escola' PT Ticket Card to kindergartens and high schools, promoting PT use. Parents request the personalized PT card, which covers all metropolitan area PT and free monthly tickets for resident students.

Stage	U-tool	Purpose	Prerequisite
Replication	U-NEED	U-NEED might be helpful in the future for identical type of actions. U-NEED will give support in the advanced analysis of the PT network.	Mandatory: - GTFS of different Public Transport services. - GBFS of micro-mobility services.

| | | U-NEED will be able to detect inefficiencies of Public Transport network regarding the schools' surroundings.
Also, it could contribute to the analysis of the historical PT delays in the time slots where children go to school. | Optional:
School location should be offered to be analysed. |

4.7.5. LIS_05 To enhance multimodal interconnection with the peri-urban municipalities

Measure category: Redistribution of Urban Space

Brief description: This measure aims to enhance the city's cycle path network, improving security, connectivity, comfort, and coherence. The expansion of the shared bicycle network is expected to attract more users. Firstly, it involves reviewing cycling infrastructure plans to integrate with neighbouring municipalities, identifying issues, and prioritizing interventions for network improvements. Secondly, it entails developing a plan to expand the bike sharing system to (in direction) the city's outskirts (where viable) or major interfaces connecting with neighbouring municipalities, increasing accessibility and coverage.

Stage	U-tool	Purpose	Prerequisite
By the submission of this deliverable, LIS cluster has decided not to use the support from U_TWIN, U-SIM, U-SUMP, U-NEED or U-GOV for this measure. However, all the measures will benefit from the use of the transversal tools U-KNOW and U-TRANSFER, as already described in section 4.1.			

4.7.6. LIS_06 To improve comfort, convenience and safety of PT interfaces

Measure category: PT stop and facilities

Brief description: This measure aims to carry out a characterization and diagnostic of the conditions of key metropolitan PT interfaces and stations. The focus will be on universal accessibility, identifying obstacles for people with mobility issues, as well as improving comfort, convenience, safety, and security. Based on this analysis, improvement measures will be identified and categorized. Discussions with stakeholders will determine how these measures can be implemented to enhance the overall situation.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SIM.live	U-SIM.live can intersect the travel times and waiting times of PT passengers with the volumes of those, to generate a measurable metric of user perception and satisfaction about the service, to be compared to the reported feedback from surveys. Moreover, OCC operators can use U-SIM.live to evaluate potential courses of action to mitigate	U-SIM.live deployed: Mandatory: - GTFS file (single, or URL where it is periodically published) Optional (improve quality of evaluations): - GTFS-RT (Vehicle Positions) feed

		the impacts of incidents and disruptions, with the aim to improve the user satisfaction about the service.	- GTFS-RT (Trip Updates) feed - PT passenger demand matrices (covering all the desired time period, or alternatively a subset, to be expanded to it) - PT passenger count live feed
Monitoring	U-SUMP	U-SUMP will be used to track a decline in the number reported stations and stops reported with PT interface problems based on baseline and target defined. It will also use to track number of PT users who reported to be positively affected by the improvement.	Baseline and targets defined, and data values reported on a regular basis in the UPPER indicators database

4.7.7. LIS_07 To create a new Multimodal Digital Mobility Services (MDMS)

Measure category: Multimodality (Operational and Digital Integration of mobility services)

Brief description: This measure will define the desired MDMS/MaaS platforms for the Lisbon metropolitan area, focusing on user-friendly trip planning, ticket purchasing, and potentially vehicle and platform access validation. It includes an analysis of existing platforms to ensure quality and transparency for transport users. A study will identify improvements for local MDMS/MaaS platforms and define necessary features. Finally, the measure involves designing and implementing these features in the MDMS/MaaS platforms.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to count the number of active users and number of trips planned by using the MDMS/MaaS platforms. Performance will be tracked based on predefined baselines and targets.	Baseline and targets defined, and data values reported on a regular basis in the UPPER indicators database

4.7.8. LIS_08 To implement campaigns and partnership initiatives

Measure category: Campaigns

Brief description: This measure will create a comprehensive marketing campaign to promote the advantages of public transportation (PT). It aims to emphasize the seamless integration of different modes and the extensive coverage of existing services, targeting non-PT and car users. A study will also be conducted to identify strategies for attracting car users and improving PT services. Based on twinning activities, new features will be designed to rebrand the bus service, enhancing its appeal, and enhancing user perception of comfort and safety.

Stage	U-tool	Purpose	Prerequisite
By the submission of this deliverable, LIS cluster has decided not to use the support from U_TWIN, U-SIM, U-SUMP, U-NEED or U-GOV for this measure. However, all the measures will benefit from the use of the transversal tools U-KNOW and U-TRANSFER, as already described in section 4.1.			

4.7.9. LIS_09 To improve the integration of PT and active travel modes

Measure category: Multimodality (Physical Integration of mobility services and Hub Creation)

Brief description: The UPPER local partners will strategically discuss and promote the integration of PT and active modes at the local level, focusing on improving cycle parking infrastructure at interfaces and integrating PT with public bike sharing services at the ticketing level. The implementation of cycling infrastructure on PT interfaces will follow SmartHub methodologies, involving defining a hierarchy of interfaces, creating bike parking and monitoring their use. TML and the City of Lisbon will collaborate on integrating the GIRA public bike sharing system into the Lisbon PT ticketing system 'navegante'.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-NEED	U-NEED will help to increase the quality cycle parking infrastructure at interfaces. U-NEED will display an accessibility analysis to analyse the number of micro-mobility services that are near of each Public Transport stop, pointing out which stops are better served in terms of micro-mobility connection.	Mandatory: - GTFS of different Public Transport services. - GBFS of micro-mobility services. Current locations of the existing micro-mobility stations and infrastructure.
Monitoring	U-SUMP	U-SUMP can be used to monitor the number of bike boxes installed, as well as number of users, and bikes parked. Performance will be tracked based on predefined baselines and targets. The tool would also allow the comparison across bike boxes in order to detect overuse or underuse.	Baseline and targets defined, and data values reported on a regular basis in the UPPER indicators database

4.7.10.   LIS_10 To improve the quality and efficiency of the bus service

Measure category: Public perception of quality of service

Brief description: This measure aims to enhance the quality and efficiency of bus services in Lisbon by addressing perceived quality effective communication, and system improvement. It focuses on improving the management of perceived quality coordinating analysis among different operators, bridging the gap between customer and non-user opinions, and attracting new users through better communication and experimentation. Data sharing with stakeholders will be explored to identify measures for overall improvement. The measure emphasizes three key areas: understanding perceived quality, utilizing large-scale events for service experimentation, and enhancing attractiveness through service quality and speed.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-NEED	U-NEED will help to detect inefficiencies in the offer when big events are happening. U-NEED will display the O/D information of the big event happened in August 2023 in Lisbon, showing the information filtered by date and time ranges.	Mandatory: - GTFS of Public Transport services. - Ticketing or O/D matrix to identify inefficiencies. Optional: - Calendar with special dates and working days. - Weather data is optional but recommended.
Preparation	U-SIM.plan	The simulation of different measures and strategies relating to PT service changes and improvements, like for example scenarios to tackle the inefficiencies detected by U-NEED	Calibrated and validated VISUM transport model and the necessary input data (granularity of the area, demand & supply model including PT, ...).
Monitoring	U-SUMP	U-SUMP will be used to monitor changes in user perception related to the quality and efficiency of the service. Data could be further analysed not only by bus lanes across time, but also by gender, age, or any other kind of socio-economic category if the data collected includes these nuances.	Baseline and targets defined, and data values reported on a regular basis in the UPPER indicators database

4.8. Budapest

4.8.1. BUD_01 To improve the efficiency and convenience of PT service

Measure category: Mobility planning

Brief description: The BKK operates the Unified Transport Model of Budapest, which is a macroscopic model for the city and its surroundings. The Model contains public transport services as well, but it is capable only for headway-based assignment. In this pilot the BKK will investigate the possible development solution of the model, which can strengthen the reliability of the model in the aspect of operational public transport planning.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-NEED	U-NEED will provide visualizations and reports where inefficiencies detected could be reviewed, in order to help the user in take decisions.	Mandatory: - GTFS of Public Transport services. - Ticketing or O/D matrix to identify inefficiencies.

			Optional: - Calendar with special dates and working days. - Weather data is optional but recommended.
Deployment	U-NEED	U-NEED will give support in the advanced analysis of the PT network and will help to detect inefficiencies as areas not well served and amenities with poor access to PT stops.	Mandatory: - GTFS of Public Transport services. - Ticketing or O/D matrix to identify inefficiencies. Optional: - Calendar with special dates and working days. - Weather data is optional but recommended.
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined, and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-NEED	KPI - Share of population with access to transport services. KPI - Number of public transport users in dedicated areas.	For calculating the "Share of population with access to transport services", population distribution should be provided. For calculating the "Number of public transport users in dedicated areas" the dedicated area in geo format and ticketing should be provided

4.8.2. BUD_02 To promote more sustainable choice of transport for students based on their modal split patterns

Measure category: Campaigns

Brief description: This measure targets young people as they reach a crucial age of independence, aiming to shape sustainable transportation habits. By analysing school-specific parameters like geography and demographics, BKK seeks to understand and influence students' mode choices. The approach considers factors such as weather and inherited travel behaviours, intending to shift towards more sustainable modes. BKK plans to implement a modal split study across diverse school settings, focusing on age groups pivotal in forming transportation opinions. Educational campaigns will accompany these efforts, aiming to replace short car trips with sustainable alternatives. Results will refine data collection methods and educational materials, supporting safer and healthier school environments.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined, and data values reported on a regular basis in the UPPER indicators database

4.8.3. BUD_03 Understanding on a deeper level the connection between the service level and passenger satisfaction

Measure category: Public perception of quality of service

Brief description: The main objective of this measure will aim for the deeper qualitative assessment and understanding of the patterns that are shaping the mobility mode choices. The planned activities include carrying out surveys and data analysis of the mobility flows to understand the mobility patters and to identify the main problems about the PT level of service.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-NEED	U-NEED will help to detect inefficiencies as identifying missing public transport network connections or underserved areas in the suburban areas. U-NEED will provide visualizations and reports where inefficiencies detected could be reviewed, in order to help the user in take decisions.	Mandatory: - GTFS of Public Transport services. - Ticketing or O/D matrix to identify inefficiencies. Optional: - Calendar with special dates and working days. - Weather data is optional but recommended. - Use of surveys as O/D matrixes.
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined, and data values reported on a regular basis in the UPPER indicators database

4.8.4. BUD_04 To improve the route planner to increase user satisfaction

Measure category: Multimodality (Operational and Digital Integration of mobility services)

Brief description: The OTP travel planning engine, integrated into Budapest's FUTÁR system since 2014, uses real-time data to create travel plans based on individual parameters. However, feedback indicates the BKK travel planner sometimes provides inappropriate itineraries due to map errors, traffic disruptions, schedule inaccuracies, and parameter issues. This measure will analyze these issues and enhance the planning engine. The goal is to identify deficiencies, modify parameters, and develop solutions to optimize travel plans, potentially saving commuters time by improving transfer connections and reducing excessive walking in favour of more realistic public transport options.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.8.5. BUD_05 New services to increase accessibility and convenience of PT

Measure category: Multimodality (Operational and Digital Integration of mobility services)

Brief description: BKK aims to enhance BudapestGO by displaying specialized service features pertinent to different transport scenarios. Integrated into the travel planning engine, this frontend development initiative will highlight unique traffic conditions and vehicle-specific rules on the map layer. Categories include conditions with individual fee regulations, rules for bicycle transportation on specific vehicle types, and varying rules on routes connecting Budapest with its agglomeration. Other features cover local bus, suburban railway, and intercity coach conditions, as well as amenities like air conditioning and Wi-Fi availability, and distinguishing electric buses for sustainability awareness.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.8.6. BUD_06 To improve the existing PT prioritizing tools in Budapest

Measure category: Traffic Management and PT Prioritization

Brief description: The measure will focus on the possible introduction of further interventions in brand new locations with the aim to prioritize public transport services (establishment of dedicated bus lanes, new traffic light programmes and other similar transport measures). The process will feature the complex examination of the particular locations, including the traffic and travel patterns, infrastructural specifications, journey times and possible intervention options.

Stage	U-tool	Purpose	Prerequisite
Deployment	U-SIM.live	U-SIM.live will be deployed for the site. The tool can provide live estimation of the number of passengers on busses and at stops. These can be used by adaptive signals, to prioritize high-occupancy busses against lower-occupancy ones, and private cars.	Mandatory: - GTFS file (single, or URL where it is periodically published) Optional (improve evaluations' quality): - GTFS-RT (Vehicle Positions) feed - GTFS-RT (Trip Updates) feed

			- PT passenger demand matrices (covering all the desired time period, or alternatively a subset, to be expanded to it) - PT passenger count live feed
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-SIM.live	U-SIM.live can intersect the travel times and waiting times of PT passengers with the volumes of those, to monitor and report about the effectiveness of interventions over time, on the number of users benefitting of the improvements, or impacted by delays.	U-SIM.live deployed
Replication	U-SIM.live	If the measure is successful (from the city, the PTO, but also the end user perspective), U-SIM.live will already be available to be used on other lines/corridors of the city.	As per Deployment

4.9. Leuven

4.9.1. LEU_01 To exploit the existing mobility data to enhance the evolution of public transport policies

Measure category: Mobility planning

Brief description: Research will be conducted in Leuven to study the current use of public transport, focusing on peripheral parking lots and mobility hubs. The aim is to gather data on social patterns, obstacles, and opportunities, identify target groups and develop strategies to enhance public transport usage. Existing datasets and surveys will be used, while new qualitative data will be collected through surveys and a participatory approach. The project also involves improving data management, reporting, visualization and conducting in-depth analyses and simulations.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-SIM.plan	Study of modal shift by modelling different type of scenarios	Calibrated and validated VISUM transport model and the necessary input data (granularity of the area, demand & supply model including PT, ...).

| Deployment | U-SIM.plan | Integration of the relevant collected data into U-SIM.plan | Calibrated and validated VISUM transport model and the necessary input data (granularity of the area, demand & supply model including PT, ...). |
| Monitoring | U-SUMP | U-SUMP will be used to monitor the reach of the survey as well as its results, once it is conducted. | Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database |

4.9.2. LEU_02 To study the needs of parking and public transport in different areas of the city

Measure category: Low Emission Zone (LEZ) / Congestion and Pollution Charging Scheme / Smart Parking Management

Brief description: This measure aims to analyse the current use of P&Rs and hubs in conjunction with PT. The goal is to identify social patterns, obstacles and opportunities in these locations. Simulation tools will be used to study the impact of increased P&Rs usage on modal shift. This analysis forms the foundation for the parking policy plan to be adopted in the current SUMP. The study may lead to the implementation of new small-scale parking lots and improvements to the existing offerings.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-SIM.plan	Study impact of new P&Rs, under different pricing and parking policy scenarios. Test different parking locations and study expected impact on the modal shift	Calibrated and validated VISUM transport model and the necessary input data (granularity of the area, demand & supply model including PT, location of the possible new P&R, ...).
Deployment	U-NEED	It will be able to display accessibility and inefficiencies to access the city from the P&R locations available, using the different transport modes available (walking, driving, biking and Public Transport).	Mandatory: - GTFS of Public Transport services. - Ticketing or O/D matrix to identify inefficiencies. - P&R locations. - Micro-mobility static information (stops, stations...).
Monitoring	U-SIM.plan	Impact of the new P&R on the modal shift	Calibrated and validated VISUM transport model and the necessary input data (granularity of the area, demand & supply model including PT, ...).

Monitoring	U-SUMP	U-SUMP will be used to visualize the study results on modal share, air pollution, and user satisfaction.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.9.3. LEU_03+04 To increase visibility and ease of use of public transport by offering improved information on public transport, parking and shared mobility options

Measure category: Multimodality (Operational and Digital Integration of mobility services)

Brief description: The measure focuses on two main challenges: what information is actually needed or relevant for end users, and what are efficient ways to get this information to the end user. Citizen engagement will be crucial to formulate an answer to these questions. Consequently, a framework for accessibility and mobility information will be drafted. Based on this framework, relevant information will be streamlined into datasets that can be onboarded in the city data-infrastructure and shared across platforms, which can also benefit internal users (city advisors and planners). Existing channels and platforms will be evaluated and redesigned when necessary.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-TWIN	It will be able to publish real-time Public Transport information, as well as delays, traffic incidents and level of service… It can also offer information about scheduled public transport times and frequencies	Mandatory: - GTFS of different Public Transport services. - GTFS-RT of different Public Transport services. Optional: - Parking spaces information in real-time from sensors (if provided).
Monitoring	U-SUMP	U-SUMP will be used to display the number of website visitors and data sources, as well as user satisfaction internally and externally.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.9.4. LEU_05 Mobility for all by optimizing the use of financial incentives to increase the share of PT

Measure category: Incentivization

Brief description: This measure aims to optimize technological advancements like integrated ticketing and Mobility as a Service (MaaS) to pilot more accessible incentives for targeted social groups. By refining and aligning financial incentives for public transport and parking, the goal is to boost public transport use among specific demographics. Currently, Leuven's incentives are fragmented and lack integration with ticketing systems, leading to low awareness and transparency. The project will evaluate existing incentives, draw on partner expertise and MaaS pilot results, and develop a cohesive policy plan. It includes implementing and assessing at least one provider-neutral financial incentive integrated with MaaS systems.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to monitor the measure impact on access to mobility services and modal share, as well as the yearly cost of incentives.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.9.5. LEU_06 To launch communication campaigns and digital tools to increase the uptake of PT

Measure category: Campaigns

Brief description: This measure focuses on increasing PT and P&Rs utilization through targeted communication and nudging campaigns. Strategies for behavioural change will be identified and evaluated through participatory processes. Social media campaigns, influencer marketing and traditional marketing methods will be employed to enhance the public perception of public transport. The measure also aims to implement strategies to improve the perception of city centre routes, specifically for the one going through one of the main shopping streets (Bondgenotenlaan).

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to track the number of user reached and user satisfaction of the campaigns.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.9.6. LEU_07 Increase the quality of the PT services through traffic management and dedicated lanes for PT

Measure category: Traffic Management and PT Prioritization

Brief description: The city of Leuven, the regional public transport operator and the regional authorities are currently working on redesigning the public bus system as to create high quality public transport in several dimensions. Within this context, Leuven aims to redesign the different transport axes throughout the city in order to facilitate the creation of separate bus lanes and prioritise traffic signals for the main PT axes. This measure will contribute to the planning, monitoring and evaluation of this redesign process.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-NEED	U-NEED will provide visualizations and reports where inefficiencies detected could be reviewed, in order to help the user in take decisions or perform specific simulations through U-SIM.plan.	Mandatory: - GTFS of Public Transport services. - Ticketing or O/D matrix to identify inefficiencies. - Historical traffic service level or traffic in real-time in order to be able to generate historical data.

Stage	U-tool	Purpose	Prerequisite
			- Historical Public Transport delays (can be generated from real-time). Optional: - Calendar with special dates and working days. - Weather data is optional but recommended.
Preparation	U-SIM.plan	Test the impact of scenarios of dedicated PT lanes and study their impact on the modal shift	Calibrated and validated VISUM transport model and the necessary input data (granularity of the area, demand & supply model including PT, PT routes, ...).
Monitoring	U-SUMP	U-SUMP will be used to monitor the PT performance in speed and reliability, as well as ridership along the corridor.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.10. Thessaloniki

4.10.1.   TES_01 Optimum transfers on P&R areas based on real-time data

Measure category: Multimodality (Operational and Digital Integration of mobility services)

Brief description: Thessaloniki's measure 01 aims to increase intermodal trips that include PT and reduce trips made by car to the city centre. Towards this, a multimodal hub around a metro station is created and also, a digital service is developed that provides real-time information to travellers. The real-time information is about i) parking space availability in the designated area, ii) PT scheduling and iii) shared modes availability. The digital service has been integrated in an already operating MaaS app.

Stage	U-tool	Purpose	Prerequisite
Deployment	U-TWIN	It will provide an API to supply a Mobility as a Service (MaaS) application with demand predictions retrieved from U-SIM.live, in case it is possible to calculate them.	Mandatory: - GTFS of different Public Transport services. - U-SIM.live deployed in the city.
Scale-Up	U-NEED	U-NEED will be able to display through scores, an Accessibility Analysis from the Nea Elvetia P&R location to the different amenities of the city, using the different transport modes available (walking, driving, biking and Public Transport).	Mandatory: - P&R location (Nea Elvetia). - GTFS of Public Transport services. Optional: - Amenities and services location and types.

Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.10.2. TES_02 Simulation and analysis of PT needs for LEZ demand fulfilment

Measure category: Multimodality (Physical Integration of mobility services and Hub Creation)

Brief description: Thessaloniki's measure 02 aims to investigate the impact of different spatial forms of a Low Emission Zone (LEZ) in the city on the public transport accessibility, as well as to identify how public transport services should be rearranged for providing sufficient levels of accessibility in the case of implementing a LEZ (assuming that public buses will not be allowed to circulate within the LEZ). This measure aims to support the implementation of Thessaloniki's Sustainable Urban Mobility Plan (SUMP), which proposes the implementation of a LEZ in a relatively small area of the city centre.

Stage	U-tool	Purpose	Prerequisite
Preparation	U-NEED	It will help to detect inefficiencies in PT regarding the Low Emission Zone (LEZ) area access (Rotonda area). It will facilitate an isochrones map representation that visually will depict areas that are accessible within specific time intervals from a given location. This kind of accessibility analysis helps to improve the connectivity and accessibility of the LEZ area.	Mandatory: - GTFS of Public Transport services. - Micro-mobility static information to generate the isochrones map and detect inefficiencies. - LEZ Areas. - POI's location and description.
Scale-up	U-SIM.plan	Estimate the traffic and environmental impacts of the proposed LEZ and PT rearrangements for communicating the results to the local stakeholders and scaling-up the measure	Calibrated and validated VISUM transport model and the necessary input data (granularity of the area, demand & supply model including PT, location of the LEZ and its rules, for environmental impact data on fleet composition might be necessary, ...).
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.10.3. TES_03 To improve transit services through dynamic multimodal management of PT corridor

Measure category: Traffic Management and PT Prioritization

Brief description: Measure 03 aims to develop and evaluate alternative plans with respect to the reallocation of public space along a major signalized urban arterial corridor (i.e. Egnatia Street) in the city of Thessaloniki. To this end, a microscopic traffic simulation model is developed to examine the impacts of the alternative plans on vehicular and pedestrian traffic. This measure is expected to increase the level of service (LoS) for public transport (PT) and pedestrians, to improve accessibility to/from metro stations, facilitate multimodal trip making, shift travel demand towards sustainable transport modes, and enhance the commercial character of the city center. Additionally, this measure will be combined with measure "TES_06: Social optimum-based traffic management to reduce PT travel times and increase user satisfaction" to assess the introduction of transit signal priority (TSP) in each public space reallocation plan.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.10.4. TES_04 To influence modal shift through congestion-sensitive parking pricing

Measure category: Low Emission Zone (LEZ) / Congestion and Pollution Charging Scheme / Smart Parking Management

Brief description: Thessaloniki's measure 04 investigates the possible effects of modifying the cost of city's controlled parking system on modal shifts and consequently on traffic and environment. Also, under TES_04, users' willingness to pay (WtP) for parking in the city centre is being investigated. To achieve this, a questionnaire survey was carried out, following the stated preference (SP) approach. The responses were analyzed using discrete choice modelling techniques for estimating the modal share (between public transport and private car) in each of the pricing scenarios. The estimated modal shares were utilized for estimating the traffic impacts of the different parking pricing scenarios and also the CO_2 emissions. As such, the outcome of TES_04 acts a comprehensive analysis that can significantly guide Thessaloniki's policy-makers, with regards to the operation of the controlled parking system.

Stage	U-tool	Purpose	Prerequisite
Deployment	U-GOV	U-GOV: Assist in the implementation of participatory processes for the definition of parking pricing scenarios.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

| Scale-up | U-SIM.plan | Estimate the traffic and environmental impacts of the different parking pricing scenarios for communicating the results to the local stakeholders and scaling-up the measure | Calibrated and validated VISUM transport model and the necessary input data (granularity of the area, demand & supply model including PT, for environmental impacts data on fleet composition might be necessary, ...). |
| Monitoring | U-SUMP | U-SUMP can be used to monitor the measure based on its related UPPER indicators | Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database |

4.10.5. TES_05 To enhance the information provided through adapted services for different groups of passengers

Measure category: Multimodality (Operational and Digital Integration of mobility services)

Brief description: Thessaloniki's measure 05 builds on a previously existing multimodal trip planner, which was integrating information for car-sharing, bike-sharing, scooter-sharing and walking. A generic utility function was used for route planning. Under this measure, public transport information is being integrated as well and the route planning is being based on user preferences (instead of a generic utility function). The updated multimodal trip planner has also been integrated into the existing MaaS application (eMaaS), with the aim to increase intermodal trips that include public transport and minimize user's travel disutility when combining different modes.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.10.6. TES_06 Social optimum-based traffic management to reduce PT travel times and increase user satisfaction

Measure category: Traffic Management and PT Prioritization

Brief description: Measure 06 aims to advance transit signal priority (TSP) along a major signalized urban arterial corridor in the city of Thessaloniki via the adoption of a multi-agent reinforcement learning (MARL) framework. To this end, a microscopic traffic simulation model is developed to examine the performance of the MARL framework compared to a conventional traffic signal control scenario where traffic lights are regulated based on pretimed signal control plans. The service is expected to reduce public transport (PT) delay during rush hours, improve user satisfaction, without adversely impacting environmental indexes and efficiency of the overall vehicular traffic flow.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.10.7.   TES_07 Increase the accessibility to PT in low demanded areas of the city

Measure category: On-Demand Mobility Services

Brief description: Thessaloniki's measure 07 designs and develops a physical and a digital DRT service that will operate in the framework of the UPPER project within the city of Thessaloniki, for serving a peri-urban area, called Panorama. The service will be deployed through co-operation with the largest taxi company of Thessaloniki, i.e. Taxiway. The aim of the measure is to improve public transport accessibility in low density areas, and to increase public transport ridership.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-GOV	U-GOV: Formulation of a community including the users of the demo, in order for them to be able to send feedback in case of disruptions and to assist in general in the evaluation process.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship
Scale-up	U-NEED	This functionality enables the identification of optimal schedules, routes, and frequencies for DRT vehicles. It will be able to depict the O/D data collected from travellers. PTO's will have the capability to filter data based on various parameters including date and time ranges, weekdays, types of days (working days or holidays), and weather conditions.	Mandatory: - Origins and destinations zones. - O/D information from trip requests of a DRT app. In case of GDPR issues, the information can be retrieved from surveys conducted with parents and educational/sport centres.
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.10.8. TES_08 To create new incentive-based services in the MDMS system to increase the use of PT

Measure category: Multimodality (Physical Integration of mobility services and Hub Creation)

Brief description: Thessaloniki's measure 08 aims to identify accessibility gaps, identify potential synergies between PT and shared mobility services and provide guidance about where shared mobility services should operate. TES_08 has two outputs: a) an accessibility analysis focused in the city of Thessaloniki, b) a neutral platform that is demonstrated for the city of Thessaloniki but it can be adopted also by other cities (if the required data are available). The purpose of the analysis was to to identify areas in Thessaloniki with high travel demand where public transport provides inadequate services and micromobility can improve travel time and have commercial potential. The neutral platform aims to assist in evidence-based decision-making of local authorities and micromobility operators. More specifically, its goal is to demonstrate the potential that micromobility services have for attracting a reasonable modal share for specific Origin-Destination pairs.

Stage	U-tool	Purpose	Prerequisite
Deployment	U-NEED	It will be able to perform an Accessibility Analysis of the metropolitan area and an isochrones map representation. It really helpful to visualize and understand potential inefficiencies concerning multimodal connections or the possible underserved areas regarding the different transportation services.	Mandatory: - GTFS of Public Transport services. - Micro-mobility static information. Optional: - Calendar with special dates and working days. - Weather data is optional but recommended.
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.10.9. TES_09 To raise environmental awareness and trigger behavioural change towards PT

Measure category: Mobility planning

Brief description: The scope of TES_09 is to provide a robustness analysis, regarding the operation of the Yutong E-12 battery electric bus in the public transport system of Thessaloniki. For this purpose, the energy consumption and the autonomy of the studied vehicle was thoroughly analysed under a broad range of operating conditions, employing mathematical modelling and simulation. The simulation results were then used to assess the feasibility of circulating the bus in Thessaloniki's bus lines, which are planned to be electrified and eventually suggest measures to mitigate potential vehicle's downtime. Additionally, an analysis is being performed for estimating the CO_2 savings due to the electrification of the studied bus lines, in order to define, at a later stage, mechanisms for communicating effectively this new (electrified) era for city's PT and raising awareness of sustainable transport options in favour of public buses.

Stage	U-tool	Purpose	Prerequisite
Deployment	U-GOV	U-GOV: It can be used in the definition and implementation of appropriate mechanisms for raising environmental awareness.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.10.10.   TES_10 Incentivize the use of PT in combination with active modes

Measure category: Incentivization

Brief description: TES_10 aims to incentivize the use of Public Transportation (PT) in combination with active modes such as walking, bicycling, and e-scootering through a user-friendly application. The app will track and validate users' trips using smartphone sensors to accurately identify transport modes. Users will accumulate points based on the distance traveled, with extra points awarded for incorporating multiple modes of transport. These points can be redeemed for coupons that provide discounts or gifts from registered businesses. The expected outcomes include increased adoption of public transportation, enhanced integration of active modes, reduced traffic congestion, lower carbon emissions, and improved public health through increased physical activity. Additionally, local businesses may benefit from increased customer engagement.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP can be used to monitor the measure based on its related UPPER indicators	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

4.11. Hannover Region

4.11.1.   HAN_01 Digital tariff piloting

Measure category: Multimodality (Operational and Digital Integration of mobility services)

Brief description: This measure aims to simplify public transport access in the Hannover Region through a new check-in/be-out system and digital fare billing. Passengers simply need to board the chosen transport and log in to the app, with the system automatically recognizing their exit and calculating the distance from start to destination. This eliminates the complexity of fare zones and ticket options, making access easier for occasional customers and simplifying the overall public transport experience.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to track the access to mobility services, as well as user satisfaction based on ticket sales and surveys. Greenhouse gas emissions and modal share will be monitored to ensure the targets are met.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-GOV	The Use of U-GOV could help in collecting user feedback about the App and the usability of the new tariff system from different target users.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.11.2.   HAN_02 Sustainable Transport Chains – on-demand service Sprinti

Measure category: On-Demand Mobility Services

Brief description: Under the national funding for the "Model Region for Public Transport" (2021-2024), the Sprinti service will be extended to the entire tariff zone C in the Region Hannover. As part of this measure, we aim to create a "lessons learned" brochure based on the Sprinti expansion. By collecting and evaluating project experiences, the brochure will provide a blueprint for other cities, particularly those in UPPER, to implement their own on-demand systems.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to monitor the performance of the service based on user satisfaction and its multi-purpose activities. Modal share will be visualized to assess the impact of the service on the overall mobility system.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-GOV	U-GOV can be used to collect experiences, lessons and developments, but also mistakes or risks from the project.	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship

4.11.3.   HAN_03 Added-value services in multimodal nodes to integrate PT with active modes

Measure category: Multimodality (Physical Integration of mobility services and Hub Creation)

Brief description: We aim to improve the passenger experience and promote multimodal transportation at stations by implementing Bike+Ride facilities. This includes secure bicycle parking, on-site bike sharing services, and bicycle repair options. As part of the project, the bicycle tower in Wunstorf will be established, funded through other sources.

Its usage and possibly the opening of another Bike+Ride station will be evaluated within the UPPER program. The objective is to create a comprehensive report on enhancing user satisfaction and convenience at Bike+Ride stations.

Stage	U-tool	Purpose	Prerequisite
Deployment	U-GOV	U-GOV could be used to collect users' feedback and to identify needs not well covered (in terms of usability, accessibility, safety, …). This feedback can be used to generate the report on how to enhance user satisfaction and convenience at B&R stations	A community of COLLABORATORS (citizens, stakeholders, transport operators, ...) must be constituted to perform collaboration projects with the citizenship
Monitoring	U-SUMP	U-SUMP could be used to monitor the number of bikes parked permanently and per day. Modal share could be tracked based on the availability of shared mobility services during peak hours (not sure yet).	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Monitoring	U-TWIN	U-TWIN can be used to monitor in real-time and store historic data since the opening of the use of the bike tower. The following KPI could be calculated in that way: Nº of bicycles parked per day .	Mandatory: - Need to have access to real-time data of the bike tower usage. The data should be facilitated by the service provider of the bike tower.

4.11.4. HAN_04 Mobility dashboard solution

Measure category: Multimodality (Operational and Digital Integration of mobility services)

Brief description: This measure aims to enhance traffic flow and improve access to public transport through an expanded mobility dashboard solution. Building upon the existing mobility dashboard in Hannover Region, we will add new features. This measure will improve the dashboard by providing, among others, real-time public transport information or sensor-based availability updates for P+R parking spaces, making it easier for users to plan their journeys and utilize public transport effectively.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to track the integration of data categories as well as the public engagement of the dashboard.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database
Deployment	U-TWIN	It will be able to publish real-time Public Transport information, as well as delays, traffic incidents and level of service… It can also offer information about scheduled public transport times and frequencies. *Hannover cannot confirm yet they will be able to provide the mandatory information needed.*	Mandatory: - Access to GTFS/SIRI data of the Hannover region to be able to offer the information. - Access to real time data, GTFS-RT/SIRI-RT should be available.

4.11.5.　　HAN_05 Exploring monitoring options of the cities performance towards achieving the goals of the SUMP

Measure category: Mobility planning

Brief description: The upcoming adoption of Hannover Region's new mobility development plan prompts the need to monitor SUMP goals effectively. This measure involves exploring the utilization of the U-SUMP tool, providing suggestions from a city authority and planning perspective, implementing the tool, and potentially enhancing it for internal use. These actions will ensure effective tracking and assessment of the plan's objectives and progress.

Stage	U-tool	Purpose	Prerequisite
Monitoring	U-SUMP	U-SUMP will be used to monitor the use of the tool within the Region. Furthermore the SUMP measures will be integrated to evaluate their impact and further develop actions to meet the targets set.	Baseline and targets defined and data values reported on a regular basis in the UPPER indicators database

5. Conclusions

This deliverable details how each of the demonstrator sites, and for each of their push and pull measures, will make use of the different U-tools to facilitate the implementation of their measures, to monitor and maximise their impact and to scale or replicate such measures in the future.

One of the main difficulties encountered during this process is that the development of the U-tools has been carried out in parallel with the definition and preparation of the measures themselves. On the one hand, this has been positive, as it has allowed certain adaptations and improvements of the U-tools to meet the particular needs of certain measures. However, it has also been a limitation, as in many cases cities have not been prepared to make a decision on the use of the U-tools until their measures were well advanced and the U-tools were available in a semi-functional or mock-up version, suitable for doing short demos, even with dummy data. Dividing the definition of these roadmaps into two cycles overcame many of these limitations, as the second cycle of interaction started when both the U-tools and the measures had made good progress.

As mentioned at the start of the document, in case a city later identifies the need or interest in using a specific U-tool that wasn't initially included, it will be allowed to do so, provided it is feasible. UPPER partners will keep a record of any such changes and report them in the deliverable "D6.3 Implementation Report and Demonstration outcome".