SCALE-UP

User-Centric & Data Driven Solutions for Connected Urban Poles

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SCALE-UP D3.1 Intermediate Report on Design of multimodal hubs and network optimization

Version V.1

SCALE-UP
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D3.1 – Intermediate Report on Design of multimodal hubs and network optimization			
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1.0	30.11.2022	Final document and ready for the submission	

SCALE-UP
User-Centric & Data Driven Solutions for Connected Urban Poles

List of Acronyms	
Acronym	Meaning
ATR	Antwerp Transport Region
CRTM	Consorcio Regional de Transportes de Madrid
DMOW	Department of Mobility and Public Works
EC	European Commission
EMT	Empresa Municipal de Transportes de Madrid
MaaS	Mobility as a Service
WP	Work Package

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1. Executive Summary

Scale Up User-Centric and Data-Driven Solutions for Connected Urban Poles (SCALE-UP) is a four-year Horizon 2020 Innovation Action that started in June 2021. It brings together 23 partners from five different European countries. As part of SCALE-UP, three advanced urban nodes – Antwerp, Madrid, and Turku – team up around one main goal: developing data-driven and user-centric strategies to accelerate the take-up of smart, clean, and inclusive mobility, by means of well-connected and multi-usage urban nodes, and to the level needed to meet EU climate and transport objectives.

The three advanced urban nodes implemented several measures grouped into the five pillars of interventions: (i) governance, (ii) multimodality, (iii) digitalization of the data, (iv) clean, safe and inclusive transport system and (v) behavioural change. This deliverable aims to describe the current status of the measures focused in the second pillar to achieve a multimodal transport system for passengers and also for freights in each of the three urban nodes, by focusing on the context, status, risks identified and corrective actions, preliminary results, and next steps.

In addition to the implementation of the measures themselves, knowledge exchange webinars were held among the 3 cities with the aim to learn from the other's experiences and build up capacity towards a more user- centric transport system.

This document also considers the following the main objectives of the WP3 in its development:

- Design multimodal hubs in the urban areas considering the interaction of multiple transport modes with a special emphasis on Park&Ride solutions and their connectivity with public transport, the integration of shared e-vehicles and the promotion of active mobility options (cycling and walking areas).
- Analyse and implement network optimisations, in the understanding that multimodal hubs are not independent elements in the mobility ecosystem but are part of a network in which nodes have to perform jointly.

2. Introduction

2.1.   **Content and aim of the deliverable**

This deliverable aims to show the advance in the development of designing of multimodal hubs and network optimization by the three urban nodes, Antwerp, Turku and Madrid. These three urban nodes have very different challenges, but several common goals for their efforts are to promote sustainable urban mobility.

To achieve more user-centric cities with less private cars and less pollutant, the multimodality plays an important role and the public transport system should be boosted. Having facilities in the outskirts of the cities where to leave the private cars and commute them for the public transport services will contribute to achieve the aims of this document and so the WP3.

2.2.   **Relation to other Work Packages & project activities**

WP3, as one of the Work Packages among WP2-WP6, is focused on the implementation of the different measures proposed in the different pillars of intervention at each urban node. The relation between WP3 and WP1 is quite clear since one of the main objectives of the project is to upscale the measures beyond boundaries and governance level (vertical axe) but also considering all the layers of the multi-layered mobility system. So, this deliverable is directly linked with the work done in WP1 for the vertical and horizontal upscaling.

WP7 evaluates and monitors the implementation and the impact of the SCALE-UP measures, so, there is also a continuous link between the implementation work packages (WPs 2-6) and WP7 which provide a baseline to serve as a starting point and a methodology for process of evaluation and a defined process for the monitoring phase itself.

Moreover, another WP with bidirectional relation with WP3 is WP8. The dedicated knowledge exchange webinars in which partners share their expertise and point of view with regard to a particular topic/measure let other partners/urban nodes to know the difficulties faced by the others and how they had overcome them.

2.3. **Thematic cooperation**

To serve as inputs for this deliverable, several workshops were organised in March 2022 as bilateral meeting between the thematic cooperation of the WP3 (ETRA) and each of the urban nodes partners (Turku, Madrid and Antwerp)During the but also one knowledge exchange webinar carried out the 5th May 2022 to change information and experiences among the 3 urban nodes.

During 2023 additional knowledge exchange webinars will be held to continue collaborating between the partners and to progress in the development of the project.

3. Context & status of the interventions

3.1. **A3 – Multi modal mobility hubs and network optimisations in Antwerp Transport Region**

3.1.1. Context

Within the Antwerp Transport Region a network of multimodal mobility hubs is defined in the Roadmap 2030[1], the regional mobility plan. The network of multimodal hubs for passengers will function as the backbone for the regions (public) transport system and the hubs will be central points where different (levels of) networks come together and where travellers can change smoothly and comfortably from one transport mode to another. Their operation, accessibility and service level will be the cornerstone of a more sustainable way of transport, supporting the modal shift to 50% sustainable travel.

This measure especially focusses on three facets of the network of multimodal hubs: (i) the design and implementation of the hubs, (ii) the digital presence of the hubs and (iii) the connection of the cycle highway network to the multimodal hubs (including an analysis of the cycle network itself).

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[1] https://www.slimnaarantwerpen.be/en/about-us/antwerp-transport-region-2030-roadmap

This measure is a collaboration of the Antwerp Transport Region (ATR), the City of Antwerp, the Department of Mobility and Public Works (DMOW) (all three mainly involved in the design and implementation of multimodal mobility hubs and the digital presence), the Province of Antwerp (mainly responsible for the bike network), Be-Mobile (mainly responsible for the P&R use case/digital presence) and the Port of Antwerp (stakeholder for all facets),

3.1.2. Status

For the Transport Region of Antwerp, a network of multimodal mobility hubs has been defined based on workshops with municipalities.
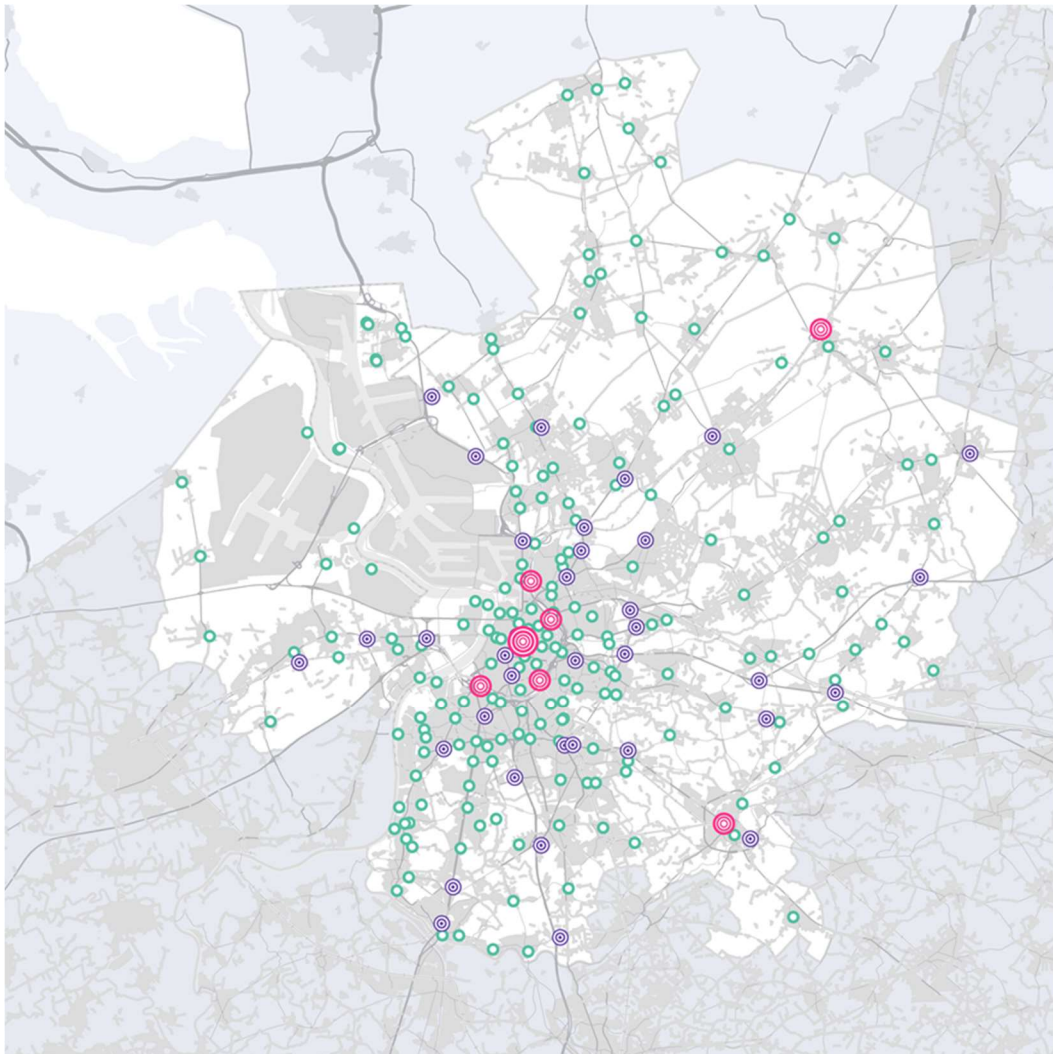

Figure 1. Multimodal mobility hubs of the Antwerp Transport Region

In this network, multimodal mobility hubs are defined as inter-regional hubs, regional hubs, local hubs or neighbourhood hubs according to the functions they serve and based on the "Hoppin" methodology[2] of the Flemish region. Furthermore, service levels for the hubs in the Antwerp Transport Region / Flanders have been defined for each of those hub categories. The city of Antwerp even goes a step further in their service levels and adds the layer of context and identity of the user to its scheme. For instance, a smaller, residential located hub will have a different kind of user than a hub located in a city center where different modes of transport come together and therefore different needs.

Based on the proposal for multimodal hubs in the transport region, they will be implemented by the different stakeholders (e.g. municipalities, Flemish Agency for Roads and Traffic), depending on the location of the hub. In order to be able to monitor the implementation of the hubs, a good view on the responsible stakeholder is necessary as well as the expected implementation time. For this, information has been collected from municipalities as well as the Flemish Agency for Roads and Traffic. As the Antwerp Transport Region does not have a budget on its own for the realisation of the multimodal mobility hubs and they will be implemented by other government organisations, ATR focused on informing the municipalities about the requirements and subsidies for the multimodal mobility hubs as well as encouraging them to start with the implementation of the multimodal mobility hubs.

As one of the stakeholders responsible for implementing multimodal hubs, the city of Antwerp has been preparing the implementation of hubs in 13 locations in the city. For those locations the research and design proposals were discussed with and approved by all stakeholders. Furthermore, the concept designs for the first 13 locations were approved by the city council and are being discussed with the councils on district level. Also, a cooperation agreement with the Flemish Agency for Roads and Traffic for the design process of multimodal mobility hubs located on regional roads is set up. The city has been spending quite some effort to organize the operational design of the hubs and providing them with different equipment: the development of wayfinding signs for the hubs, a design competition for shelters to place at public transport stops, preparation of locked bike racks, preparation of

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[2] https://hoppin.be/

public lockers where users can charge their electric bike battery, provider of public bike pumps and further implementation of drop zones for shared mobility.

Digital presence

Concerning the digital presence of multimodal mobility hubs, different actions have been carried out.

At the moment there is already data on how many people take the bus at a multimodal mobility hub. However, there is no data yet on the user satisfaction/experience or the actual use of multimodal mobility hubs. In order to get a better view of the user experience and satisfaction on multimodal mobility hubs, the city of Antwerp has will roll out a digital questionnaire for 30 locations. This questionnaire will form the basis of a survey that will be rolled out at different multimodal mobility hubs in the Antwerp Transport Region. To improve the survey and to get feedback from stakeholders in the region, a workshop on the topic of monitoring of multimodal mobility hubs has also been organised by the Antwerp Transport Region in September 2022.

Concerning the collection of data for the use of the mobility hubs, a market scouting has been done in order to have an overview of the different possibilities to capture the use of the multimodal mobility hubs. The next step is to analyse which tool/methodology ATR will use best in order to map the use of the multimodal mobility points.

For the use-case concerning the P&R's an extension of an app will be developed that will nudge drivers that pass a P&R in the direction of Antwerp to leave their car at the P&R and take public transport to continue their journey. So far, a functional design has been developed and the different paths for development have been discussed.

The Bike Network

A first analysis for a 'bikeability index' has been concluded by the Antwerp Transport Region, mainly based on data from the measuring bike (Fietsersbond). The results of the analysis show where bicycle infrastructure is too narrow, relative to the speeds of motorized traffic and where surface flatness is inadequate. Additionally, data from traffic accidents was used to identify high-risk intersections. Parts of the network where you cannot cycle today were classified as 'a missing link'.

The province of Antwerp builds further on this first analysis during the duration of the SCALE-UP project. For that analysis, ATR is looking at other types of data sources that are available on a larger scale and could point us to today's blind spots.

The first step of the analysis consisted of a brainstorm session with a multidisciplinary team (traffic engineers, mobility planners and site managers with expertise on bicycle highways). This resulted in a broad overview of situations that may indicate a potential dangerous location and on the other hand factors that increase the accident risk at these locations. The input from this session is incorporated into a scheme that identifies risk situations and influencing risk factors, and translates them into the data needed for analysis. This task is ongoing and will be supplemented by literature review and input from similar analyses.

Basic data such as the road network and intersections have already been collected and visualized in a web tool (ArcGIS Online Experience Builder[3]) that makes it easy to share interim results with colleagues for further discussion and refinement.

The province has also taken the first steps in building a network model that includes the road network and attraction poles (school, work, residential, etc.). With this model ATR wants to investigate missing links in the cycling network, the connection to multi modal hubs. And ATR wants to use this to try to detect sharp corners or curves in the bicycle network.

In order to be able to perform an in-depth analyses of at least 4 areas or points in the cycle network that need to be upgraded, preparatory work has been done. For example, the province has delivered a 'framework contract for traffic research'. In this framework agreement, different providers of near-accident analysis were already compared and selected based on the data quality and service that they offer. This makes it easier to tender a contract once ATR arrives at that stage of the project. In addition, the framework contract enables other governments to order similar technology tot asses their own bottlenecks and upscale their findings.

The goal is also to write a script on applying near-accident technology. So that other governments or regions can use it when they want to work on this themselves. An important chapter in this script is 'Handling GDPR'. ATR gathered the knowledge on this subject that they gained in the BITS- project (INTERREG North Sea Region).

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[3] https://www.esri.com/en-us/arcgis/products/arcgis-experience-builder/overview

Within the SCALE-UP project ATR will also deal with other types of technology, that can analyse near accidents, and they will apply them on a larger scale. The resulting new insights will build on the foundations and knowledge ATR already has today.

3.1.3. Risks found and corrective actions performed

Multimodal mobility hubs

One of the larger risks/challenges concerning the overall implementation of the multimodal mobility hubs is the involvement of and coordination with a large number of stakeholders (City of Antwerp, Agency for Roads and Traffic, Antwerp Transport Region, Department of Mobility and Works, NMBS, De Lijn, Lantis, providers of shared mobility…). Furthermore, ATR cannot implement the hubs themselves; other partners as municipalities and the Agency for Roads and Traffic are responsible for the actual implementation. To remedy both challenges, the team of the transport region tries to coordinate between the different stakeholders and especially support and motivate the municipalities as much as possible with the implementation. Furthermore, all multimodal hubs are unique and the implementation as well as the needed service levels have to be analysed on a case-by-case basis.

Concerning the operational implementation one of the largest difficulties is to find room for all the infrastructure/services at the locations of multimodal hubs as often the space at the location is limited. Therefore, for some services (such as lockers for packages) a collaboration with private partners are set up

Digital presence

Concerning the P&R use case, the following potential risks have been detected:

- To convince the user to effectively use the P&R route. A possible remedy would be to offer a free (or reduced) ticket for public transport. However, for this additional financing would be needed to cover the costs of the tickets.
- To obtain occupancy rates to all P&Rs. The remedy this risk, a selection of P&Rs has been made to be included in the use-case. Only P&Rs will be included where ATR has the occupancy rates or where the risk that car users are lead to the P&R and does not find a space is limited.

- Extra difficulties if the P&R is not free (new P&Rs). If the costs of the P&R is integrated as an incentive, an extra feature will have to be integrated in the app (scanning of barcode to access the P&R)

For both the P&R use case as well as the survey about the user experience at multimodal hubs, there is the risk of reaching too few people in order to perform a meaningful user analysis. Therefore, the communication will be planned carefully with different stakeholders. ATR hopes to reach enough people to test the app/fill out the survey.

Bike network

The list of risk situations and factors that influence the accident risk is large, some factors are difficult to relate to data. The risk here is that we lack focus and put too much effort in being as complete as possible and the search for very specific data. Therefore, the plan was abandoned to be as complete and detailed as possible but ATR chooses a more pragmatic step-by-step approach, starting first with basic parameters that are readily available (and therefore easier to scale up to other regions) and from there gradually adding more detail.

This also means that the theoretical framework the city uses to design mobility hubs cannot always be implanted 100%. Sometimes the context doesn't allow for certain objects or facilities to have its place in the public space.

Taking all this in account means that so far there have not been any infrastructural realisations within the mobility hubs project on the different locations itself. An adjustment of the initial timing was necessary.

Participation of certain user groups is key to really make a difference. A recent site visit with a group of disabled persons in wheelchairs provided a different image on the definition of accessibility. Their input is crucial if the ambition is to make mobility hubs accessible for everyone. This knowledge is currently being implemented in the design process for different locations. It makes the design process more complex but definitely has an added value.

3.1.4. Preliminary results

Digital Presence

On the Flemish level, a data standard for the multimodal mobility hubs was defined in order to be able to share data more easily. In order to define this data standard, sessions with different stakeholders have been carried out. Furthermore, different initiatives concerning the digitalization of information were set up.

In order to obtain information on the user experience of multimodal mobility hubs, the city of Antwerp carried out a questionnaire.

The first results of the questionnaire gave decent feedback that can be used in the further design process. The capacity to engage citizens was limited but 300 people filled in the questionnaire. The focus answer wise was mostly on things the city can control like placing more benches and trash cans or providing more safe options for storing a bike. Other aspects like how public transport is organised the city has less control over.

It has been quite the exercise to communicate in a way the average person understands the goal of the mobility hubs project. Travelers are not yet accustomed with terms like multimodal mobility hubs. It is a barrier for a high percentage of engagement.

Bike Network

The results for the part of the bike network include a first analysis on the correlation between accidents, the amount of car traffic, car speed and the quality of bike infrastructure. Furthermore, the province concluded a framework contract for traffic research, a chapter concerning 'Handling GDPR' of the Script for Near Accident Analysis, a first (not final) overview 'risk situations on bicycle highways and influencing factors for the accident risk, with a translation to data needs'.

In order to develop the questionnaire further and to apply it to more hubs in the transport region, a workshop has been organised. For this workshop, also citizens have been invited.

3.1.5. Next steps

Multimodal mobility hubs

On the level of the Antwerp Transport Region, the most focus will be on further stimulate and support municipalities to start implementing multimodal mobility points. For this, we think about defining test regions in which ATR will work especially close together with municipalities. Furthermore, there is more work needed to get a good view on how the roll out of multimodal mobility hubs is progressing.

Concerning the operational implementation of the hubs in the city of Antwerp, the focus will be on finishing the design of the first 13 locations, as well as designing the first mobility hub locations together with the Agency of Roads and Works (on regional roads). Furthermore, the plan is to make the first bus stops accessible, to implement the first wayfinding signage (on the location), public bicycle pumps as well as drop zone and public lockers (for charging an electric bike battery).

Digital presence

In Q2 of 2023, development will be performed to extend the Flitsmeister[4] app with the P&R-feature. Following that (during Q3 of 2023), a first phase of live testing will run, during which ATR will collect user experience information through surveys. Feedback from this test phase will be used to improve the service and include incentives if needed. Following that, a second testing phase will be planned.

Focus will also be on the survey for the user experience of multimodal mobility hubs. First, the survey will be evaluated and improved and finally carried out at different multimodal mobility hubs. Also, a selection of hubs will be done for the survey as there are too many potential hubs in the transport region. The next step to get a better understanding of the use of multimodal hubs is to analyse which tool/methodology we will use best in order to map the use of the multimodal mobility points.

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[4] https://www.flitsmeister.com/en/

Bike network

The overview 'risk situations on bicycle highways and influencing factors for the accident risk, with a translation to data needs ' will be finished. ATR also schedules an interview with a study firm that has conducted a similar analysis, they can help select the parameters that may or may not be worth investigating. Afterward, a consultation with the different partners will be scheduled to discuss intermediate results and to agree on the focus for the following analyses.

Last but not least, the implementation of the data analysis to arrive at the overview of bottlenecks on the Cycle Highways in the Antwerp Transport Region and Province of Antwerp is carried out step-by-step. ATR described all the steps in a report 'assessment method for bottlenecks on cycle highways' as an starting point.

3.2. M2 – Improving multimodal hubs with Park & Ride + public transport at regional level

3.2.1. Context

Every day, in the region of Madrid a 15.8 million trips happen on all means of transport. In Madrid city centre, public transport and walking accounts for up to 75% of the trips, these drop considerably in the metropolitan area (50%) and beyond (41%). To ease the transition towards more rational use of the private car and to enhance the multimodality concept among commuters, both the region and the city are promoting public transport by combining it with a "Park & Ride" approach.

The main challenge is the commuting flow between the city and the neighbouring municipalities located in a 40-50 km radius. In this regard:

- CRTM is developing the "Park & Ride" plan in the Madrid Region called "Aparca-T". This plan aims to improve the intermodality and ease the modal shift within multimodal hubs where parking facilities are linked with public transport. There are incentives in the public transport tickets if the car is left at these multimodal hubs and public transport is taken.
- The city of Madrid is working on its own "Park & Ride Program" which includes 12 facilities between the two ring roads of the city, the M30 and M40 (and beyond the M40). The targeted users are residents of Madrid or neighbouring suburbs. These facilities allow commuters and other people travelling to the

city centre to leave their private vehicle next to a rapid transit system that will take them fast, comfortably and cost-effectively to their destination. Up today, 3 of these 12 facilities are operating: Puente de la Mora, Aviación Española and Pitis.

- At local level EMT is also currently managing 3 "Park & Ride" facilities: Avenida de Portugal, Nuestra Señora del Recuerdo and Wanda Metropolitano Stadium (with more than 4,000 parking slots) in which free public parking is offered to public transport users. However, their usage is still limited.

3.2.2. Status

Right now, there are currently 9 P&R facilities (at local level – EMT - and regional level - CRTM) already in service:

- Aviación Española (managed by EMT)
- Fuente la Mora (managed by EMT)
- Pitis (managed by EMT)
- Isla Azul (managed by EMT)
- El Recuerdo (managed by EMT)
- Wanda Metropolitano (managed by EMT)
- Portugal Avenue (managed by EMT)
- Ciudad Universitaria (managed by CRTM)
- Colmenar Viejo (managed by CRTM)

Those P&R managed by EMT offers the following services:

- Parking:
  - o Dissuasive use.
  - o Rotative use.
  - o Multiday parking pass.
  - o Parking by rotation pass.
- Electric recharging.
- Bicycle parking - BICIMAD.
- Micrologistic (e-commerce shipment collection services).
- Carsharing.

The occupancy levels for the "Park & Ride" facilities in 2021 were shown in Table 1.

Table 1 – Occupancy level of the P&R in 2021

Name of the parking	In service since	Users of the parking as P&R	Number of monthly subscribers	Users of the parking (not connecting with PT)
Avenida Portugal	December 2017	7556	88	53186
Recuerdo	December 2017	9589	88	35409
Fuente de la Mora	May 2021	77	1	6045
Pitis	June 2021	-	1	920
Aviación Española	July 2021	15812	127	17458
Wanda Metropolitano	October 2021	2008	5	3622
TOTAL		35042	310	116640

3.2.3. Risks found and corrective actions performed

Table 2 – Risks and corrective actions

Potential barriers	Potential Drivers	Activities to be taken to achieve the goals	Risk level
Behaviour: Citizen's hesitation to use P&R and PT	Involvement/Communication: Raising public awareness to encourage the use of more PT (health, time).	Financial: Public-private partnerships	
Technical: Additional technological requirements in P&R facilities	Technological: Innovation offered by technology (i.e. apps)	Cultural: Public awareness campaigns	Low risk

Infrastructural/physical: Lack of space for parking in some Municipalities	Financial: Offering discounts in P&R if use of PT	Technical & Financial: Investment in new technologies related to P&R and PT	

3.2.4. Preliminary results

9 (out of 12) "Park & Ride" (P&R) facilities (at local and regional level) have been already built (Spaces adapted and services integrated) and in service (7 managed by EMT and 2 managed by CRTM). The location of the P&R in the city of Madrid could be seen in Figure 2.

EMT has already carried out the IT works for the integration of its P&R facilities within "Aparca-T" app, and has implemented different services in its P&R facilities:

- Parking (dissuasive use, rotative use, multiday parking pass, parking by rotation pass)
- Electric charging stations
- Bike parking (BiciMAD)
- Micrologistics (lockers for e-commerce collection service).
- Car sharing
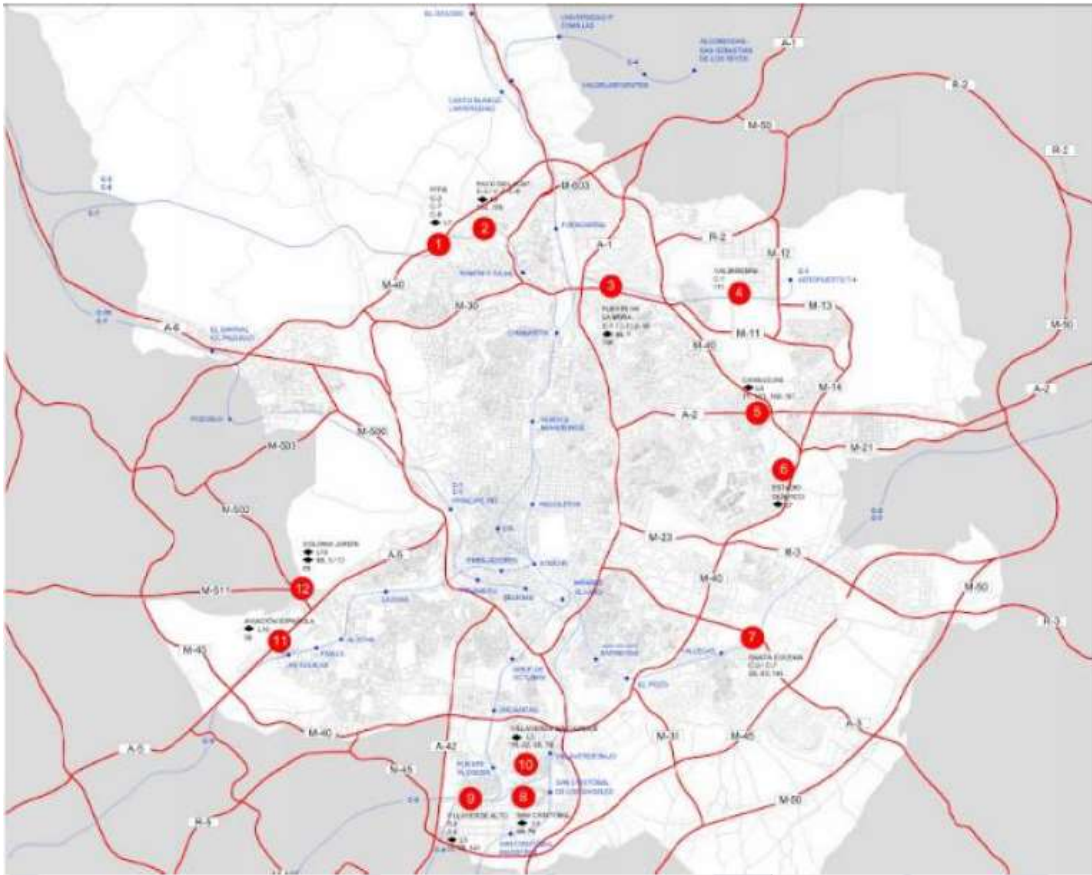
Figure 2. P&R locations in Madrid

3.2.5. Next steps

In the measure M2 the next steps are following:

- Have at least 3 new CRTM managed Park & Ride (P&R) facilities in the region.
- Integrate under "Aparca-T" tool those EMT existing "Park & Ride" facilities to foster their usage by giving users some facilities like booking a slot in advance.
- Assess the deployment of other P&R within the Madrid metropolitan area and consider possible new locations.
- Evaluate the P&R with lower use rates to determine the reasons and to implement the pertinent actions to reach to more users.

3.3. M3 – Fostering sustainable first and last mile logistics by mobility hubs

3.3.1. Context

Madrid City considers mobility hubs as the setup of a clear idea of improving air quality in Madrid through the transformation of mobility. Mobility hubs and microhubs are key strategic cornerstones in Madrid 360 strategy and the new city SUMP.

Additionally, EMT manages parking facilities that potentially could play a key role in urban logistics, acting as consolidation centres or cross-docking stations, and providing additional services such as charging infrastructure for electric vehicles. In this regard, EMT new Strategic Plan 2021-2025 includes also mobility hubs as a fundamental service to promote in the upcoming years.

It is within the general framework that, under the framework of SCALE-UP, a new and avantgarde "Sustainable Mobility Hub of services" has been planned and fostered in the city centre.

The so-called "Canalejas 360" hub is located under Sevilla street and Canalejas Square, very close to Puerta del Sol, in an emblematic area in Madrid city center.
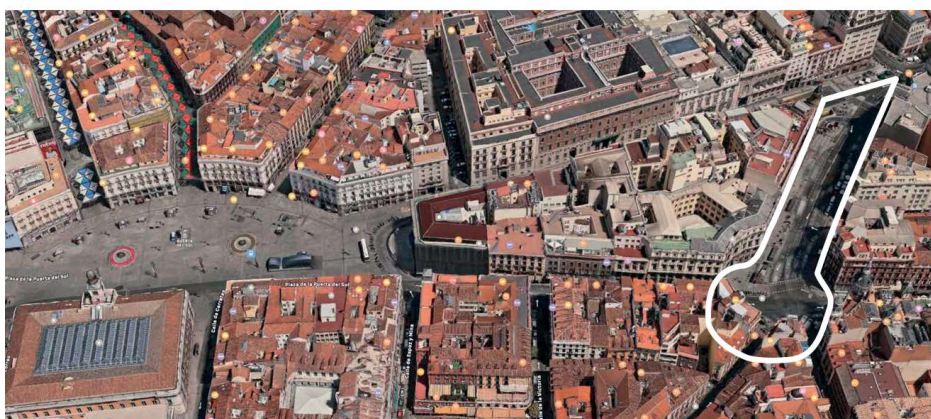

Figure 3 location of the mobility hub "Canalejas 360"

The access and exit ramp for vehicles is located at number 20 Calle Alcalá, opposite the Alcázar Theatre. This access is also shared by the public car park under Calle Sevilla and the private car park belonging to the Canalejas Complex.

Figure 4 Access to the mobility hub "Canalejas 360"

3.3.2. Status

The "Canalejas 360" mobility hub was launched last August 30th, 2022, with the presence of Madrid Mayor, Mr. José Luis Martínez Almeida, and Madrid Councillor on Mobility and Environment, Mr. Borja Carabante.

Therefore, the measure has entered the demonstration and monitoring phase with two months delay (initially scheduled by June 2022).

Figure 5 Madrid Mayor and Mobility and Environment councillor the day of the launching

The development of this hub of Canalejas has converted the -1 floor of an existing underground infrastructure into a reference living lab for sustainable mobility in general and electro mobility in particular, occupying an area of 5,500 m2. The ownership of this entire floor -1 is entirely in the hands of the Madrid City Council, and its management is done by EMT Madrid.

This hub, which involves the integration of all mobility and last-mile distribution services in the capital, integrates many different uses orientated to improve sustainable mobility in the city:

- • The largest charging station for EV in Spain
- • A zero-emission shared mobility area
- • Bike parking and storage
- • Logistics: Last mile distribution point, lockers, and a pick-up hub

Figure 6 Floor plan of the mobility hub "Canalejas 360"

There is no record of similar initiatives at the national level, not even at the European level, that contemplate the level of integration of services proposed by these solutions and with this size.

Description of the spaces and associated uses:

Charging station

It includes the largest charging station in Spain, with a total of 12 charging points and a maximum power supply of 2.4 MW. 4 out of these 12 points, are last generation ultra-fast chargers with a maximum power of 400 KW, 4 additional ones are ultra-fast charging points with 150 KW power, and another 4 points with 50 KW. If technology allows it, an EV will be charged in a time close to 5 minutes. As a traditional gas station, it also has washing and vacuuming services, refuelling and tire inflation.

Figure 7 EV chargers at the hub "Canalejas 360"

Another point to be taken into account is that this charging station presents a gauge that allows the access to semi-industrial vans and it's equipped with a loading and unloading dock with direct exit to Canalejas Square, which allows battery charging times to be made compatible with activities of urban distribution of goods.

Urban freight/logistics

The hub includes different specific areas to facilitate last mile distribution of goods through environmentally sustainable vehicles that allow reducing the impact of the urban traffic correspondent to this activity (crossdocking/consolidation centre), as well as lockers for the citizens' collection of small and medium e-commerce shipments, including a pick-up point for bigger items. The logistic operator has already been awarded (SEUR company).
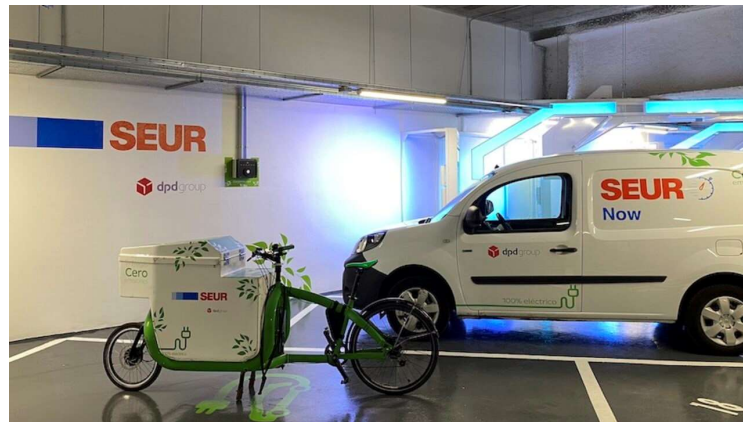
Figure 8 Logistic area managed by SEUR company

Zero emissions shared mobility area

Clean shared mobility also has a place in this sustainable mobility hub, with dedicated parking lots for shared mobility services, including charging infrastructure, open to the carsharing and motosharing companies that operate in the city of Madrid. In total, these are the carsharing operators with allocated parking lots: Free2Move (4 lots), Sharenow (5), Zity (5) and Wible (5); for the motosharing companies Acciona (2 lots), Silence (1) and Iberdrola (2) operated by Cooltra.

Figure 9 carsharing area at the mobility hub "Canalejas 360"

Bicycle parking

Cycling also plays an important role in the hub; it includes a service of both rotation and permanent cycling parking lots for residents with the possibility of plugging the bike in case it is electrically assisted. The EMT BiciPark bicycle parking system (safe parking for private bicycle users) allows the storage of up to 14 bikes in another delimited perimeter. In addition, there is a secure parking and charging station for e-scooters (also for private users) with capacity to house and recharge 8 e-scooters (charging service provided by Iberdrola).
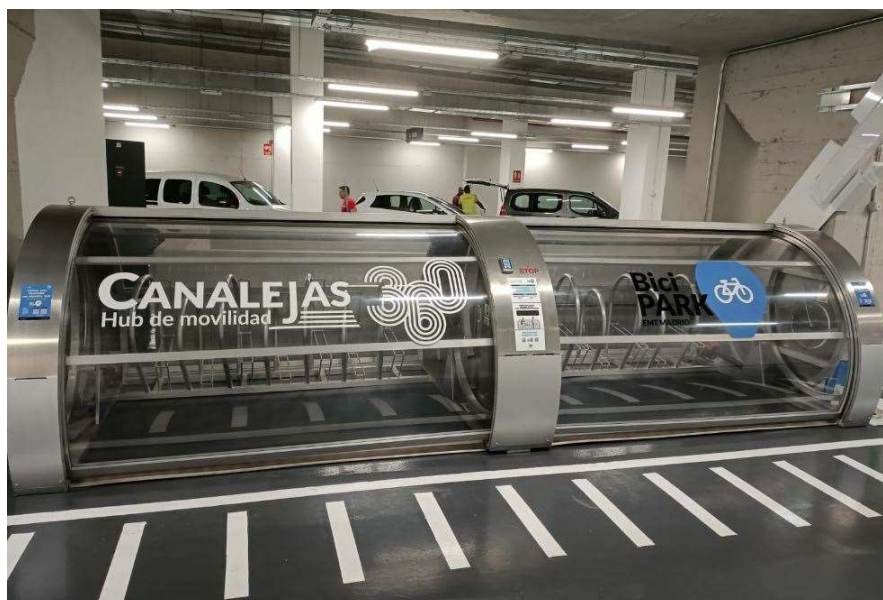
Figure 10 BiciPARK service at the mobility hub "Canalejas 360"

Customer Support

Finally, the hub includes also a customer centre open to public for any matter that may apply regarding the uses included in this infrastructure.

3.3.3. Risks found and corrective actions performed

The main risk during the planning and deployment phase has been the obtention of all permits and administrative paperwork, as well as the grid supply arrangements due to the high power requested; these have been the reasons for the delay in starting operations.

Once on duty, the main risk perceived is the potential lack of users (specially for the charging services for electric vehicles) and the main corrective action has been the setting of very advantageous fees for charging.

3.3.4. Preliminary results

Due to the recent launch, there are not preliminary results to report yet.

3.3.5. Next steps

Though the measure has been already accomplished, both Madrid City Council and EMT are working on possible new locations to deploy additional mobility hubs in the city. The Canalejas 360 hub is a benchmark for public-private partnerships, paving the way to further deployments in other areas of the city.

3.4. T2 – Implementing Mobility hubs in the Turku region

3.4.1. Context

Currently the city of Turku and the Region of Southwest Finland do not have any small or large scale mobility hubs. There is a decision to develop a larger Travel and Service centre that would serve as the main mobility hub in the city of Turku and in the Region of Southwest Finland. This new travel centre is to combine the services of the current train and bus stations, at the same time enabling a wide array of different mobility services. The estimated time of construction of the Travel Centre is 2024-2029.

In this measure, the focus is on creating new mobility services to the region together with companies and developing the preconditions for successful services in the multimodality mobility hub. The services are first piloted at the regional level in the Loimaa and Uusikaupunki station areas and in the city of Turku at the current long-distance bus station, which is situated in the proximity of the future Travel and Service centre location. The services to be tested at these station areas include at least the following: shared mobility, last mile logistic delivery, repair services, parking services and information services.

The mobility service operations will be evaluated and scaled up accordingly. In Turku, the mobility hub operator outcomes are then multiplied in two key mobility nodes (the harbour area and the Kupittaa business area) and the lessons learnt from the measure are incorporated into the planning and procurement documents of the Travel and Service centre. In the region of Southwest Finland, the outcomes are incorporated into the future regional development plans.

The measure is realized in synergy with measure T1, T3, T4 and visible on the T5 regional mobility data platform. The mobility services tested in the measure will contribute to the promotion of the regional train (T1) at the regional train hubs, as well as the MaaS services and adaptive parking solutions developed in T3.

3.4.2. Status

City of Turku with cooperation of Regional Council of Southwest Finland has carried out baseline analyses of the mobility hubs and identified terminology challenges in connection with the mobility hubs. The city of Turku rented a bus station lobby since September 2021 for open use and started a pilot with battery charging for e-bikes on the lobby. A Regional bike brand was designed and launched in Spring 2022 to support the visibility of actions. A student work on the travel chains has been carried out to provide ideas for the pilots. One project workshop on the travel chains was carried out in June 2022.

The Regional Council of Southwest Finland carried out a survey in June 2022 on the desired service level of regional train services. The questionnaire also collected ideas from residents for the pilots to be executed in Loimaa, Uusikaupunki and Turku. The SCALE-UP evaluation baseline City level mobility survey, carried out by TUAS during summer 2022, together with the earlier surveys also have accumulated wishes for the pilots. All the materials have been accumulated as a baseline material for the next steps

3.4.3. Risks found and corrective actions performed

Table 3 – Risks and corrective actions for T2 measure

Risks found	Corrective actions performed
The concept of mobility hub is not understood.	Discussion on the terminology has been initiated on the regional and national level.
Lack of economic sustainability of short-term pilots after the pilots are over.	Identification of different tendering options and possible continuation options for the pilots.
Some permits for the infrastructure work is probably needed for the pilots.	Preparations to showcase the win-wins for all the stakeholders.

3.4.4. Preliminary results

Participating the inhabitants for the developing of the future sustainable mobility solutions is essential for gaining the acceptance of the new services. It is also vital to get the feedback from the end users and hear what services are most important to them.

The survey carried out in June 2022 of the desired service level of regional train services received huge number of responses, 6062 people all together. The attitude towards local train traffic seems very positive based on the results and developing a sustainable travel chains in Southwest Finland interests people.
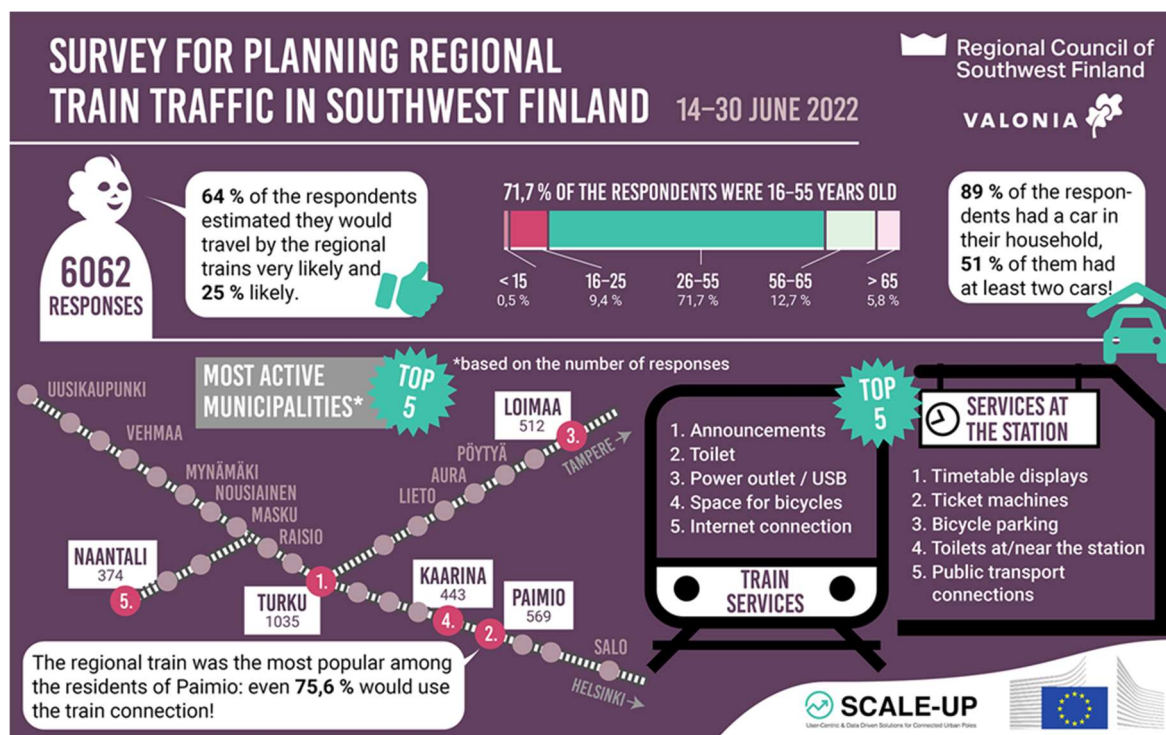
Figure 11 survey for planning regional train traffic in southwest Finland

The questionnaire collected ideas of residents for the pilots to be executed in Loimaa and Uusikaupunki. 1,259 suggestions were received. The most popular of the options given were city bikes, but open responses highlighted in particular the need for connection options from the stations and secure storage facilities for e-bikes and scooters.

Regional council has written blog texts, news articles etc. about the goals of getting regional trains back to Southwest Finland. All together 34 news items about the Scale Up – project and regional train issues have been published in 27 different medias, social media included based on Regional Councils media releases and newsletters. Most of these media hits are due to the survey about the service level of the regional train stations.

3.4.5. Next steps

In the measure T2 the next steps are following:

- Decisions on what kind of pilots will be tendered out, preparations for the tendering process and launch of the tender.

- Negotiations on the possible infrastructure needs for the pilots.
- Preparations for the communication and evaluation efforts of the travel chain pilots.

3.5. T3 – Introducing MaaS ticket combos and adaptive parking in Turku region

3.5.1. Context

Mobility as a Service (MaaS) has been identified as one of the key areas to develop in the field of mobility and transport of the city of Turku. This is indicated in the Climate Plan 2029[5], in the Finnish state agreement concerning land use, housing and transport (MAL), and in the city's spearhead projects. So far, the Turku Regional Public transport has developed a MaaS platform that is technically able to integrate different operations together. This does not include a sales platform. Ticket integrations have also been tailor made for each individual case and are not generic. In addition, all negotiations have been carried out separately with each operator.

During 2020, the city of Turku has digitalized its parking management and thereby created an opportunity to combine data sets for introducing new innovative parking services with MaaS operations.

This measure is divided into two sub-measures. In T3.1. this measure, an open interface for event tickets combinations to the public ticket system is created, tested, and marketed towards different event actors. A platform enabling different mobility ticket combinations is created and tested with the combinations of park and ride tickets with public transport tickets as part of the TEN-T network, event guidance and interurban travel chains.

An important part of the measure is to create a systematic MaaS ecosystem with stakeholder engagement. This would bring up synergies especially regarding the data and marketing. As part of the development, MaaS business cases are identified, tested and evaluated in the city of Turku.

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[5] https://www.turku.fi/sites/default/files/atoms/files/turku_climate_plan_2029.pdf

In T3.2, this measure the city of Turku will also develop the parking hub platform by integrating new data sets and testing 3 adaptive parking solutions in different locations, including park and ride tests in connection with events. The pilots exploit AI, the parking hub platform and mobility data platform (T5) which indicates the current, real-time status of the pilot parking spaces.

This measure relates to T2, T5, T8 and T9. MaaS services can be piloted at the hubs (T2), and they will be integrated to the mobility data platform (T5). In T8, mobility services will be incentivized. In T9, mobility guidance in connection with events and exceptional circumstances is developed, thereby also facilitating the usage of mobility services in the city.

3.5.2. Status

In the measure T3 there are several processes that need to be finished. The parking hub platform environment redesign and updates have been done and those are going into testing to bring them into the production environment. The open API for real-time parking availability has been connected to the city's service map (T5) to provide the needed MaaS information. Currently the parking hub has been running full paid parking information for 10 months now and during the summer it was evaluated that there is enough data for the first parking analysis measures. Parking analysis tools were then developed and are now being ran and improved as there is need for additional information. The data from the analysis is being used to provide better understanding of the MaaS environment as well as park and ride -system base. The measures to improve the open API data quality with AI procedures is still waiting for work calculations and offer from the company in charge of the parking hub development.

For the city's Public Transport (PT) several ticket combination solutions have been considered and plans for further development has been indicated for a few of the possibilities. There is still need for the PT mobile application integrations to provide the users with park and ride possibility for commute, events, and other needs without the need to drive a car to the city centre where congestions, air quality and lack of space are major issues. There has been suggestion for several areas from 3-6 km from the city centre for suitable spots for piloting the park and ride ticket combo system. These areas will be realised in co-operation with local supermarket chains thus creating mobility hubs with various services connected to the park and ride location. Data from the evaluated and suggested areas has been collected to find the most

prominent and most suitable locations that people are currently already using unofficially. There are also a few official PT park and ride locations in the neighbouring municipalities. These will be included in the system as a whole, but since Turku has no jurisdiction in these areas, they are only for collecting data on the usage instead of actually being warded areas.

The general ticket combo API as well as park and ride integration for the PT mobile application are still waiting for the approval of the PT personnel.

3.5.3. Risks found and corrective actions performed

With the measure the Finnish social and health care renewal is causing resource reallocations in the city's IT department which has causes problems with server building, updates and testing. There is very little that SCALE-UP can affect this and the situation will be clearer after the transition on next 1st January 2023.

The PT mobile application development has been known to have big delays and thus is being pushed forward from the SCALE-UP side, but this is in the hands of PT authorities.

There has been attempts to previously get agreements with supermarket chains about park and ride type of solutions with quite negative feedback. Some of the planned areas may thus not come to happen. As a corrective measure there are still several city owned areas as well as municipal areas that can be piloted, but with these the integration to people's everyday lives will be far less and thus they don't work as mobility hubs but rather just a park and ride area.

3.5.4. Preliminary results

The data from the parking hub platform is visible in T5 mobility map showcasing the current online status of parking spaces in the city centre.

The parking hub API is working as it is and with the new version getting to production server even more parking permit types can be implemented for various MaaS

combinations. The parking hub is available as open-source code in Github [6]. Parking hub has risen some interest among other Finnish cities looking for data-oriented parking solutions, and further development plans has been discussed with both Helsinki and Stockholm that are currently using the same base code for their parking hubs.

The parking data collected by the hub has been proven useful and will be further analysed to provide more information for the whole mobility environment.

There has been 3 MaaS-ecosystem discussions with interested stakeholders. Especially companies have been very interested and happy with these.

3.5.5. Next steps

Parking hub server update will be taken into the real production server and all the new digitalised parking databases will be imported into the server providing a much wider scope to the city's parking scheme.

Park and ride areas will be decided and discussions with private supermarket chains will begin in order to get piloting areas and creating mobility hubs on those locations.

The Public Transport mobile application development will be started as the preparations for the park and ride has been finalised. This will provide users of the PT app with capability to use the park and ride parking free of charge for now with combination of paying your PT trip.

On the public relations side there will be press and social media releases on parking hub as soon as the new version with updated databases is in production. This will be later this year. Next year, preliminary in the early summer, there will be campaign for park and ride pilots for event and commute parking. It is also considered that with the Tall Ships Race in 2024 park and ride could be used to solve the massive parking problem that this big sail ship event has caused in previous years.

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[6] https://github.com/City-of-Turku/parkkihubi

4. Conclusions

This deliverable describes context, status, risks identified and corrective actions, preliminary results, and next steps of the 5 SCALE-UP measures framed in the multimodality WP3: A3, M2, M3, T2 and T3.

Attending to the multimodal hubs, Antwerp and Madrid are pushing the use of this facilities (called as P&R in the city of Madrid). For this purpose, they are inquiring the reasons why people do not use these services to further improve them according to the needs and the user's satisfaction surveys and workshops. Even though Turku do not have any mobility hubs, they are planning to develop a larger Travel and Service centre that would serve as the main mobility hub in the city of Turku and in the Region of Southwest Finland.

Despite Turku still does not have any hub in service, they are working very hard on the multimodality by integrating the different services into a MaaS. An open interface for event tickets combinations to the public ticket system is created, tested, and marketed towards different event actors. A platform enabling different mobility ticket combinations is created and tested with the combinations of park and ride tickets with public transport tickets

One important difference among the hubs in Madrid and Antwerp is that in Madrid, the main aim of the P&R is to use the public transport system, but the hubs in the city of Antwerp are dedicated to any kind of transport modes and any multimodal trip could be done. For this reason Antwerp is inquiring about the risk and drawback the cyclists face.

The cities well know that facilitating services for the multimodality that allows citizens to combine the use of private vehicles with other modes of public transport such as the buses or trains will potentially become into a big change for them.

To share the experience each city has and looking for support in the weak points, knowledge exchange webinars had been very useful and productive. As the implementation of the measures advances, it is also to be expected that these exchanges, with more experience, will produce more relevant outcomes for WP3 and for the project.

In In general, all the measures are progressing properly. Except M3, which is in the demonstration and monitoring phase, the others are still being implemented. The evolution is adequate and according to the Grant Agreement schedule.