MOVE21 TECHNOLOGIES: UPSCALING AND TRANSFERABILITY ASSESSMENT

Project deliverable D5.3

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Project Executive Summary

The main objective of MOVE21 is to transform European cities and functional urban areas into climate neutral, connected multimodal urban nodes for smart and clean mobility and logistics. MOVE21 will do this through an integrated approach in which all urban systems are connected, and which addresses both goods and passenger transport together. As a result, MOVE21 will improve efficiency, capacity utilisation, accessibility and innovation capacity in urban nodes and functional urban areas.

The integrated approach in MOVE21 ensures that potential negative effects from applying zero emission solutions in one domain are not transferred to other domains but are instead mitigated. It also ensures that European transport systems will become more resilient. Central to the integrated approach of MOVE21 are three Living Labs in Oslo, Gothenburg, and Hamburg and three replicator cities Munich, Bologna and Rome. In these, different types of mobility hubs and associated innovations are tested and means to overcome barriers for clean and smart mobility are deployed. The Living Labs are based on an open innovation model with quadruple helix partners. The co creation processes are supported by coherent policy measures and by increasing innovation capacity in city governments and local ecosystems. The proposed solutions deliver new, close to market ready solutions that have been proven to work in different regulatory and governance settings. The Living Labs are designed to outlast MOVE21 by applying a self-sustaining partnership model.

MOVE21 partners

The MOVE21 consortium consists of 24 partners from seven different European countries, representing local city authorities, regional authorities, technology and service providers, public transport companies, SMEs, research institutions, universities and network organisations.

- **Norway**: City of Oslo, Akershus County, Ruter, Urban Sharing, Mixmove, Institute of Transport Economics, IKT-Norge
- **Sweden**: City of Gothenburg, Rise Research Institutes of Sweden, Business Region Gothenburg, Volvo Technology, Renova, Parkering Göteborg
- **Germany**: City of Hamburg, City of Munich, Hafencity University Hamburg, Deutsche Bahn Station & Service
- **Italy**: Metropolitan City of Bologna, Roma Servizi per la Mobilità, Roma Tre University
- **Belgium**: Eurocities, Polis
- **The Netherlands**: TNO
- **Greece**: Hellas Centre for Technology and Research

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Deliverable Executive Summary

Key words

Seamless transport, public transport and micro-mobility, combining passengers and freight.

Executive Summary

A key ambition in MOVE21 is to maintain the collaboration and implemented measures in the Living Labs in Oslo, Gothenburg and Hamburg after the completion of the project. In this context, transferability and capability for upscaling are important attributes.

Three work packages (WP3 - Urban Social Layer, WP4 – Governance Innovation, and WP5 – Technological Solutions and Integration) all have the obligation to analyse the implemented measures in the Living Labs in Oslo, Gothenburg, and Hamburg to assess the transferability and upscaling potential from the viewpoint attributed to each Work Package.

To improve quality and save time and effort, the three work packages conducted a series of joint workshops, one in each LL city. In these, city and LL representatives identified positive aspects (rose), negative aspects or risks (thorn), and opportunity to grow and/or develop (bud) of measures. Using back casting methods, they were also asked to describe the ultimate state of each measure and identify a series of steps regarding how to get there. This information together with experience and knowledge gained throughout the MOVE21 project, led to assessments of transferability and upscaling potential – or what it would take to transfer and scale up all or parts of each measure.

This deliverable addresses transferability and upscaling from a technological point of view. The following measures have been analysed:

- Hamburg
  - Multifunctional neighbourhood hub Holstenstrasse – combining logistic offerings with social services
  - Multifunctional neighbourhood hub Kaltenkircher Platz – combining micro-hub with mobility uses (both regular public transport and micro-mobility) and recycling services
  - Combining transport of goods and people with a regular bus line
  - Combining transport of goods and people with an on-demand service
- Gothenburg
  - Mobility hotel in Nordstan
  - Park and bike node Klippan/Jaegerdorff
  - Cargo-waste co-freight Lindholmen
- Oslo
  - Integration of Micro-Mobility with Public Transport
  - Emission-Free Goods Transport
  - Mobility-on-Demand for People and Freight
  - Mobility hub network Groruddalen
  - Kaia Mobility Hotel

Most of these measures are without any specific use of technology or integration of these. The exceptions are:

- Park and bike node Klippan/Jaegerdorff in Gothenburg and Integration of Micro-Mobility with Public Transport in Oslo combined public transport, parking (Gothenburg only) and micro-mobility using the public transport/parking App as the single interface for travellers.
- Emission-Free Goods Transport implemented a consolidation software/as/a/service solution for consolidation and last-mile transport booking.
- Mobility-on-Demand for People and Freight in Oslo applied a logistics management system for organising transport within a shopping centre to book last-mile transport. The last-mile transport was performed by a mobility on-demand service for seniors. Hence, the project integrated a logistics management system with a fleet management system used for the on-demand transport of people.

All other measures may be transferred without any technological considerations.

The App development in “Park and bike node Klippan/Jaegerdorff” and “Integration of Micro-Mobility with Public Transport” used a generic API developed in MOVE21 to integrate public transport/parking with micro-mobility. The API can be used anywhere in situations where public/scheduled transport and micro-mobility should be combined.

Both the principles and solutions for the pilots Emission-Free Goods Transport and Mobility-on-Demand for People and Freight can be transferred to any relevant location and operation.

Measures like the Multifunctional Neighbourhood Hub Kaltenkircher Platz and the Mobility Hub Network in Groruddalen have that in common that they have co-located several mobility services, both public transport and shared mobility. In order to scale up, these measures should adopt the principles and technologies used in the Park and bike node Klippan/Jaegerdorff and Integration of Micro-Mobility with Public Transport measures. The same is true for mobility hotels. Without technology to keep track of inventory and equipment, the potential for upscaling is limited. For the freight services located in mobility hotels, the principles of Emission-Free Goods Transport and Mobility-on-Demand for People and Freight apply.

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1 List of Abbreviations and Acronyms

Acronym	**Meaning**
B2B	Business-to-business
TEN-T	Trans-European Transport Network
WP	Work Package
API	Application Programming Interface

2 Purpose of the Deliverable

The Living Labs in Oslo, Gothenburg and Hamburg in the MOVE21 project have developed and tested various measures that aim to meet the projects overall ambitions of improving mobility while reducing emissions and traffic and increasing seamless and multimodal transport options in urban areas.

This deliverable, D5.3, prepared as part of Work Package (WP) 5, is titled MOVE21 Technologies: Upscaling and transferability assessment and is prepared together with two related deliverables, D3.3 and D4.3, in other work packages.

The purpose of these three deliverables is to analyse the MOVE21 measures and assess their potential for being transferred for implementation elsewhere (replicated). Upscaling of measures is to be done by those responsible for the LLs: Oslo, Gothenburg, and Hamburg. Hence, the purpose of this deliverable and the similar ones from the other work packages are recommendations related to the scaling up of the implemented measures. WP 5 is about technologies and integration of these. Hence, this deliverable will analyse and assess transferability and scalability from a technological perspective

2.1 Attainment of the Objectives and Explanation of Deviations

The objectives related to this deliverable have been achieved in full and as scheduled.

2.2 Intended Audience

In addition to all MOVE21 project partners, this deliverable is aimed at all those that would like to make use of the results from the MOVE21 project. The readers should get a better understanding of how the different measures could potentially be transferred and/or scaled up and factors that need to be considered in the process. In addition, it should help the readers reflect on transferability and upscaling - and the challenges, barriers, strategies, and lessons learned regarding such activities in MOVE21.

2.3 Structure of the Deliverable and Links with Other Work Packages/Deliverables

The deliverable starts with a description of the methodology used, including a description of a workshop series. This section also defines key terms such as replication, transferability and upscaling. The ensuing chapters are organised per Living Lab. Each of these chapters describe the development and content of MOVE21 measures, upon which transferability potential and upscaling recommendations are made. The final chapter draws some overall conclusions and recommendations from a technology integration perspective.

This deliverable is connected to WP3, WP4, WP6, WP7, WP8, WP9 and WP10 in MOVE21. The primary link is to WP3 and WP4 through the integrated approach in methodology and data collection, common set up, and the description of the relevant measures in the three LL cities that are shared among WP3, 4, 5 (see 3.1 Methodology section for details). Another strong link of this deliverable is to WP6, where all the Living Lab activities take place.

There is further a link to WP8 through data collected in Living Lab logbooks that document relevant aspects of social layer, governance innovation and use of technologies. The work on exploitation management in WP9 has benefited the understanding of upscaling and transferability. Finally, the fact sheets developed in WP10 has been used as basis for the measure descriptions, to provide clear and concise explanations. These links are illustrated in Figure 1.

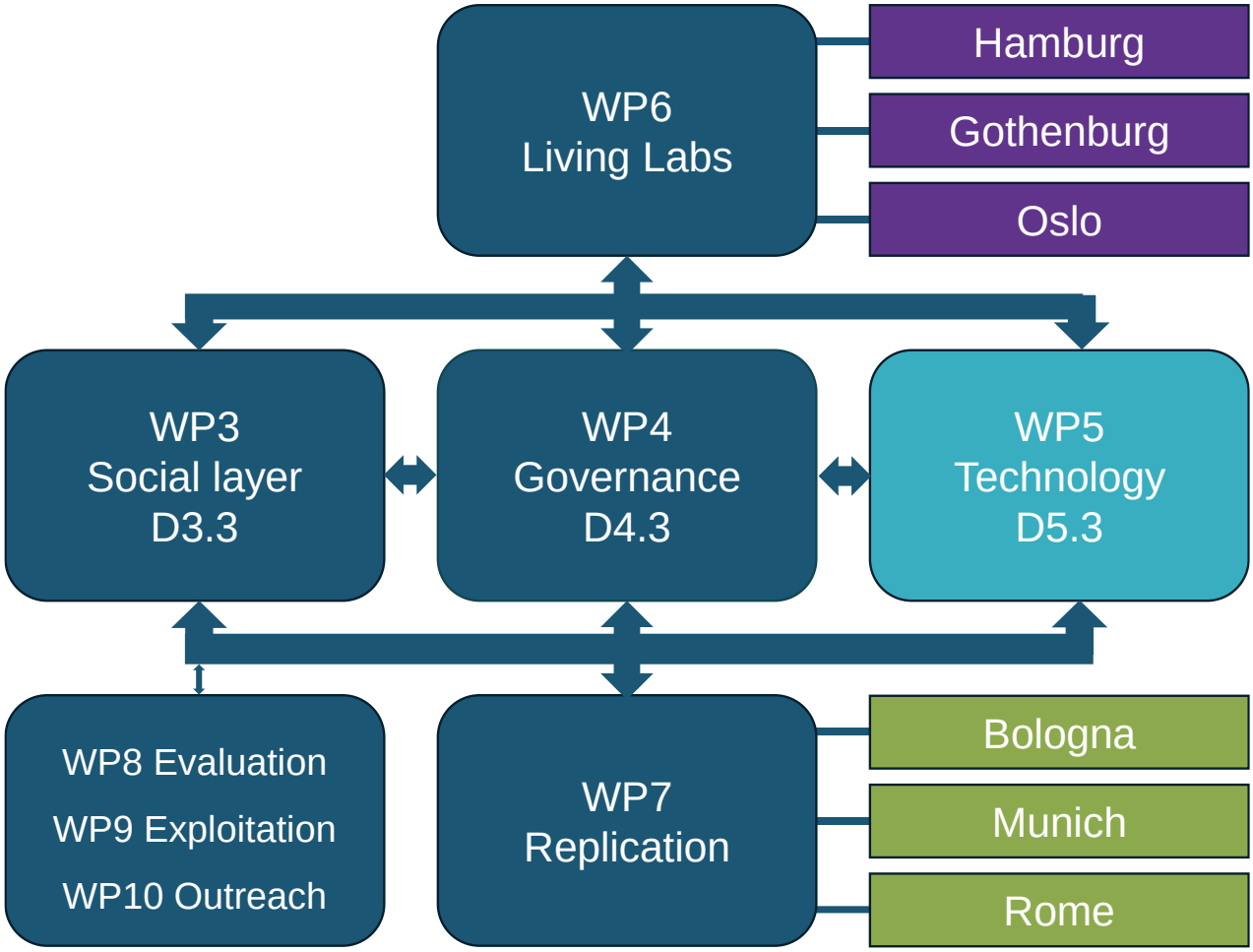

Figure 1 Links between work packages

3 Method and Definitions

3.1 Method

3.1.1 Introduction

This deliverable builds on D5.1 and D5.2 which introduced possible use of technologies and a framework for integration. The current D5.3 recaps the activities the LLs have made until October 2024 and focuses on the upscaling and transferability of the measures deployed.

The method part for D5.3 has been developed collaboratively between WP3, 4 and 5. There are two reasons for this. First, WP3,4,5 all have a common theme of *upscaling and* transferability of the implemented measures. In the analysis, WP3 addresses social innovation, solutions and sustainability, WP4 addresses governance innovation, and WP5 addresses technological solutions and integration. Second, all three WPs base their analysis on the most relevant and up-to-date data collected from the LLs in Oslo, Gothenburg, and Hamburg. To make empirical data collection concise for the LL cities, a series of workshops (WS), jointly owned and led by the WP3,4, and 5, was conducted. This collaboration between the three WPs avoided redundancies and unnecessary repetitions for all the involved parties and facilitated timely analyses in all three collaborating WPs.

3.1.2 Workshop Series

In September 2024, WP3, 4, 5 convened one physical workshop with each LL Task Force. The three workshops gathered between 8-14 participants each, in addition to the three WP leads present in the room facilitating the discussion. The allocated time was for a full business day, with an hour lunch break included. The discussion focused on the three thematic areas relevant for the WPs: social innovation, governance innovation and solutions, and technological solutions and their potential to be upscaled and transferred to other contexts and physical locations.

The WS were built around two methodological tools that were used in combination to facilitate the discussion about every measure for every test-site in each LL:

- Rose, Thorn, Bud method – for each measure, participants write Post-its of three different colours: one colour for „rose” – summarize positive aspects of a measure, one colour for „thorn” – negative aspects of a measure or risks to watch out for when implementing a measure, and one colour for „bud” – participants list opportunities to grow and develop this measure (upscaling). The post-its are then put on one chart and discussed in the group. This method allows the participants to reflect on both positive and negative aspects and experiences connected to the implementation, and possible upscaling and replication, of a measure. The WS participants were asked to reflect broadly, while it was up to the WP leads to interpret the answers trough their respective lenses (social, governance, and technology).
- Sticky Steps method, is a version of back-casting method – for each measure, on the far-right side of a large paper or board, the workshop conveners, together with the participants describe the desired end-state of a transfer or upscaling of a measure. Just left of it, the conveners pose the question "what (one step) would have to happen for this to succeed"? Participants answer on Post-its. The conveners collect them and, left of those Post-its, ask the same question again. Participants answer, and the cycle repeats until we've reached the beginning of upscaling or transfer process, which ideally is close to the current state. This method allows the participants to articulate enabling and hindering factors for each measure to be implemented, upscaled or transferred, and is applicable for identification of necessary steps to be taken in relation to any

desired state to be achieved. Again, the WP leads were responsible for making sure that WP specific elements were highlighted.

The two methods were applied sequentially for each measure in each LL.

3.2 Definitions

To ensure coherent use of terminology across the three sister deliverables (D3.3, D4.3, D5.3), this subchapter sets the common understanding of three key concepts.

3.2.1 Replication

Replication is the activity of duplicating, copying, reproducing, or repeating innovations or good practices that have been successfully tested in other places or cities and regions. It involves the use of lessons learned from pilots and demonstrations and applying them elsewhere.

MOVE21 has reserved the term “replication” to its partner Replicator Cities and the dedicated Work Package (WP 7). For this reason, deliverables D3.3, D4.3 and D5.3 apply transfer to denote replication between cities and upscaling to denote replicating within the same city.

3.2.2 Transferability

In the simplest understanding, this term describes the presumed readiness, meaningfulness, and success chance of something to another setting. It is a spectrum and can therefore be evaluated with adjectives such as low, high or others.

In the concrete context of the MOVE21 project, and in the even narrower context of deliverables D3.3, D4.3, and D5.3, the objects of each transferability consideration are elements of solutions that together form the MOVE21 measures. The three Work Packages assess, each with its thematic lens, the afore-mentioned readiness or meaningfulness or success chance of a given element of a given measure to another city (=other than the city where the measure is hosted).

In theory, an element of a measure is the more transferable the more successful it has proven to be within the MOVE21 project already; the more clearly defined it is; and the easier it is to define the conditions in which it was or could be successful. Importantly, transferability stands for a potential. If transferability is acted upon, a transfer process is taking place.

3.2.3 Upscaling

Deliverables D3.3, D4.3 and D5.3 understand upscaling as multiplication of a given measure or its elements within the same city; it may also mean increasing the size of an existing measure.

With such a set-up of the analysis, the three deliverables follow the CIVITAS method of estimating the effects of a measure (or elements) if it/they were applied throughout the city in more copies or instances. This way, the analysis may support the MOVE21-measure host city about the potential for further deployment.

The term could in MOVE21 theoretically also encompass upscaling of a measure beyond a city, to regional, national, or international scale. That is, however, not within the scope of these three deliverables.

4 Introduction and Overview

4.1 The Measures at a glance

All the measures implemented and tested in the Living Labs are presented in Figure 2. All amenities and capabilities available in these measures and directly linked to the MOVE21 project are also indicated.. As can be seen, some Living Labs offer only a few amenities, but others are quite plentiful. This demonstrates the diversity and individual complexities of the MOVE21 activities.

	GOT			HAM					OSL				
	Mobility hotel Nordstan	Park&Bike Klippan/Jaegerdorff	Cargo Waste Lindholmen	Neighbourhood hub Holtenstrasse	Hub Kaltenkirkcher Platz	Hub Harkortstrasse	Combined transport Rissen	Combined on-demand transport (MOIA)	Integration of public transport and city bikes	Hub network Gorudalen	Zero emission distribution of freight	Combined transport of people and goods	Mobility hotel Filipstad (KAIA)
Bus		X		X	X		X		X	X			
Tram/subway		X			X								
Ferry		X											
Train										X			
Bike Parking					X					X			
Bikeshare	X	X							X				
Bike workshop and store	X												X
Cargo bike share													X
Walkways		X			X					X			
Electric bike and scooter share	X	X			X	X				X			
Carshare					X					X			
On Demand Rideshare								X				X	
Rideables charging					X								
Rideables parking					X	X							
E-bike charging	X			X									
Smart Parking		X								X			
Wayfinding		X			X					X			
Package Pickeup-Delivery/lockers			X							X			
Urban consolidation centre/depot	X		X	X	X						X	X	
Social Services				X				X					
Office/working space	X			X									X
Freight Transport	X		X	X	X		X	X			X	X	X
Garbage Handling			X		X								

Figure 2 MOVE21 Living Labs and amenities involved

5 Hamburg

5.1 Multifunctional Neighbourhood Hub Holstenstrasse – Combining Logistics with Social Services

5.1.1 Measure Description

The multifunctional neighbourhood hub (*multifunktionaler Quartiers-Hub)* Holstenstrasse is located in Altona, the westernmost district of the city-state of Hamburg. Altona houses some 280,000 inhabitants, standing for around 15% of the city population. The hub is located at the district's eastern edge, very close to the city centre and its famous leisure activity neighbourhood of Reeperbahn, in an area of mixed housing and services use. The official opening of the hub took place in mid-February 2023 and consisted of a formal event for press and political representatives as well as an Open House event for all interested citizens and local residents.

The neighbourhood hub Holstenstrasse reduces logistics traffic and introduces climate-friendly solutions; moreover, it provides support and consultations for local residents and the homeless. The hub addresses shortage of space with a multi-functional concept that can be adapted and scaled in potential further neighbourhood hubs in Hamburg and beyond.

Operation of the logistics services (deliveries of packages and other materials via electric cargo bikes) and social services (consultation kiosk; food and basic supplies distribution to the needy) have continued uninterrupted since the opening in 2023. The logistics services are performed by three companies: Hermes and GLS for package deliveries and CityLog, which makes direct deliveries to businesses (mainly builders). The goods arrive in the early morning via transporter (conventional vehicle) at the hub and are sorted for out-going delivery via cargo bike. The logistics users are thus present at the hub, in varying constellations depending on who is in-taking or delivering their goods, from around midnight until completion of final deliveries and return of bikes to the hub during the day.

The social offers at the hub have two components. The consultation kiosk, in the smaller office space, accommodates both an open consultation session for any interested persons once per week, as well as provides a location for other social service meetings or groups, scheduled at other times. The food and basic supply distribution, using the kitchen, food prep area, and basement, operates Fridays through Sundays. Deliveries of food and supplies are also scheduled during the week, to allow time to sort and prepare the goods for distribution.

5.1.2 Transferability Assessment

A key factor for the hub in Holstenstrasse is co-location, with little or no interaction between the services offered in the hub. No common technology was involved and no integration of information technology across value chains. As such, there are no technological implications if the measure is to be transferred as it is or in parts.

However, any transfer activities should carefully consider the potential for integration of information technology and/or data across value chains in the development of multifunctional hubs similar to the one in Holstenstrasse. In this, there is great potential for collaboration between the public and private sector as is demonstrated in MOVE21. The implemented consolidation software-as-a-service solution for consolidation and last-mile transport booking developed as part of MOVE21 Oslo LL activities can be used for the purpose of integration.

5.1.3 Upscaling Recommendation

Since no integration of information technology is involved in in this hub, decisions regarding upscaling may be taken without regard to technology (or lack there-of) as a limitation. The current cargo distribution activity comprises three different companies occupying the same space at different times of the day. The cargo volumes are small.

To facilitate much larger volumes of cargo, there is an argument for reorganising the operation, perform consolidation across the operation of these companies, introduce state-of-the-art management system for the hub (like X-Dock from MIXMOVE) and attract more cargo to create critical mass so that the operation is financially sustainable.

5.2 Multifunctional Neighbourhood Hub Kaltenkircher Platz – Combining Micro-Depot with Mobility Uses and Recycling Services

5.2.1 Measure Description

The test site is situated at the parking lot across the Kaltenkircher Street in the north-eastern part of Altona. The location is at a major traffic junction with frequent high congestion, overlooked by several railway viaducts, and walled by residential and service buildings. Previously it was a singularly used site, a parking lot, but now offers the improved sustainable mobility solutions for people, new modular micro-depot system to reduce the emissions and traffic at last mile deliveries in the neighborhood and spot for recycling diverse materials and goods (EcoHHub station). Designed to serve multiple purposes, the development of this multifunctional hub was a process completed with the successful inauguration of the site in October 2024.

To facilitate the utilisation of the site for logistical purposes, the individual modules of the micro-depot were built from light-weight containers, so that they fit into regular parking spaces. The primary use for logistic purposes is just one of many potential applications of the system of containers, which can be adapted to suit different requirements (e.g. charging for micromobility, e-bikes, and/or smart locker system). The modular micro-depot receives goods via established logistics networks and distributes them from this location on the logistical last mile, using emission-free cargo bikes. The micro-depot also has the potential to serve as a start and end point for inter-hub traffic owing to its proximity to the commercial and industrial areas and the A7 motorway.

The incorporation of new mobility infrastructure served to enhance the existing bus stop. In addition, protected bicycle racks and a parking zone for e-scooters have been implemented. In result, the hub now offers a car-sharing station (hvv switch), the micromobility parking zone. Plans for pop-up bike sharing station in the near future, are in discussion. . The new pathways facilitate improved connections to the neighbourhood, the bus stop, and the other mobility services. These improvements encourage the use of active and combined sustainable mobility solutions.

Furthermore, a novel model of a recycling station (EcoHHub) for the collection of recyclable and reusable materials has been installed at the site (a successful cooperation with the local project partners of the Interreg North Sea project MoLo Hubs with regards to people-centric Mobility and Logistics). This illustrates the adaptability of the multifunctional concept to accommodate additional models and services.

5.2.2 Transferability Assessment

This is a hub where location is the common denominator. Since no integration of information technology is involved in this measure, there are no technological implications if the measure is to be transferred as it is or in parts.

However, if any transfer activities should seek to integrate some or all different transport offers such as e-scooters and shared bikes, they can be made using the principles and technology developed in the Oslo LL (integration of public transport and shared bikes; API) and the Gothenburg LL (integration of parking and shared bikes).

5.2.3 Upscaling Recommendations

Currently, no integration of information technology is involved in this measure. This limits the attractiveness of the hub. To scale the operation properly, two actions should be taken:

- Integration of public transport and micro-mobility and mobility-on-demand services should be made using the principles that has been tested and demonstrated in Oslo (bus and city bikes) and Gothenburg (car parking and shared bikes).
- For freight transport, the comments regarding freight transport in Holstenstrasse are equally relevant here.

5.3 Combining Transport of Goods and People on a Regular Bus Line

5.3.1 Measure Description

During eight weeks in late 2023, the Hamburg LL tested combined transport of passengers and goods shipments by regular bus in the neighbourhood Rissen, an area located in the western part of Altona and consists of urban as well as rural structures. Residents could buy goods in local stores in Rissen and have it delivered to their nearest bus stop by the regular passenger village coach transport service (bus route 388). The aim of the new service was to use resources and capacities of buses more efficiently, reduce climate and traffic pollution, and promote the network of local stakeholders. The initiative focused primarily on senior citizens, offering them a convenient delivery option without the need for additional travel. It was also available to people with reduced mobility, ensuring inclusive access for those with limited mobility. The participated local stores offered various goods like books, bakery products, limited groceries, clothing, shoe repair services, locksmith services, and tailoring for delivery.

Interested parties selected their goods in a local store or ordered them by telephone or e-mail if this is offered by the store. Payment was made directly on site or on account. During the purchase process, buyers entered their telephone number so that they could be contacted during the subsequent delivery process. After the purchase, the goods were packed in the store. The respective store then informed the bus operator VHH employees who would collect the items from the stores, sort the items and discuss the collection time at the desired stop with the customer. The employees also handed over the order at the stop.

One delivery was made by bus during the test. Nevertheless, interesting lessons were learned. For example, the Hamburg LL was able to set up such a service with greater involvement of stakeholders such as the public transport company and retailers, as well as including the delivery service during regular business hours. In addition, liability issues relating to the goods transported were clarified.

5.3.2 Transferability Assessment

Buses offered transport of goods, but there was no technology involved. The principle of combining people and freight in the same transport service has been in use since the beginning of transport. It is only during the last decades that passenger and freight transport parted. Hence, the idea of using public transport resources for also transporting goods when capacity allows is most definitely transferable.

The operation in Rissen used buses providing regular schedules. They were dependent upon people bringing cargo to and from the bus. The transferability of the measure would improve if the measure was complemented with the following elements:

- Organise first mile services to pick up cargo and bring cargo items to micro-hubs and /or establish cargo lockers at micro-hubs for senders to leave cargo.
- Consolidate cargo at the micro-hub and book transport on the regular bus.
- Using regular bus services to transport consolidated goods between micro-hubs.
- Cargo lockers at the micro-hubs may also be used for cargo to be received. In this case arriving cargo needs to be deconsolidated before being placed in cargo lockers. Last mile services may also be organised to bring goods from micro-hub to receiver.

Such an operations would be quite inefficient without the use of information systems. Information systems enable:

- Senders of goods to be able to describe the cargo, the receiver and requested delivery time, label the goods items providing a unique ID for each package and book end-to-end transport (may be from cargo locker to cargo locker).
- Micro-hub operators sending goods to be able to consolidate and possibly repackage goods, label the new consignments and book transport with the bus company.
- Micro-hub operators receiving goods to deconsolidate cargo, possibly reconsolidate and book last mile services, or place cargo in cargo lockers.

Technologies exist commercially for performing such operations, and in addition provide information about the status of the transport of each cargo item to all stakeholders.

5.3.3 Upscaling Recommendations

This operation is only scalable if it is included in a wider logistics network and have taken onboard technology as indicated in Section 5.3.2.

5.4 Combining transport of goods and people with an on-demand service

5.4.1 Measure Description

Hamburg's second pilot study on the feasibility of integrating the transportation of both people and goods was conducted from March to May 2024 and has built on the lessons learned from the first pilot, this time primarily using the on-demand shuttle service, MOIA. Approx. 10% of the deliveries were made by public transport and another on-demand taxi service. The objective was to evaluate the potential benefits of more flexible transport services in terms of travel times and routes, and their impact on the quality of the delivery service. City couriers in Hamburg are usually responsible for single transport orders within the city, and another key objective was to see a reduction in empty runs and increase the use of the on-demand shuttles during midday hours. The goods offered for delivery where smaller shipments of up to 20 kg within the inner-city (Ruohonen et al 2024, p. 13).

The measure addressed the challenges of implementing a combined transport system with a ride-sharing provider in an urban environment, focusing on service availability, reliability, costs and environmental impact. By testing the system in a real-world environment, the aim was to identify problems and develop efficient solutions to resolve them.

To ensure the viability of the proposed solution, the pilot project transported city courier shipments in addition to sample consignments to test additional scenarios. This was done in addition to real consignments, for which two voluntary social welfare organisations, Hanseatic Help and Der Hafen Hilft, which distribute donated clothing and household goods to other social welfare organisations, agreed to participate. All test consignments were conducted within the MOIA operating area of Hamburg, with the use of emission-free vehicles, this contributing to emissions reduction.

The implementation of a combined transport system with a ride-sharing provider in a city presents a number of challenges, including those related to the availability and reliability of services, as well as costs and financing. Furthermore, potential environmental impacts must be considered. A test run in an urban environment enables the identification of these issues and the development of efficient solutions. The combination of passenger mobility and goods transportation offers an innovative solution to reduce costs and emissions. Cooperation with social institutions and aid organisations also promotes the common good and strengthens solidarity within the community. In the test run, goods were transported free of charge for the customer

5.4.2 Transferability Assessment

Like in Rissen, an on-demand transport service was used also to transport goods. A courier with cargo used the MOIA App to book a ticket like normal passengers and was picked up on MOIA pick-up points. The essential difference between using a regular scheduled bus service and MOIA is that the MOIA provides on demand services.

Both use designated stops. MOIA was essentially used as an on-demand transport for a courier.

Transferring the MOIA measure is in principle straightforward and does not involve any technological activities other than implementing the management service of MOIA or similar operations. If, however, the operation should be able to move goods without the courier carrying it, operations and technology with capabilities as is described in Section 5.3.2 will be required.

5.4.3 Upscaling Recommendations

Expanding the MOIA service may at one stage require information systems, at least to keep stakeholders informed about the status of the transport and give proof of delivery. When the MOIA service goes beyond the two consignors currently participating and if there is a desire to have MOIA operations or similar impacting the flow of goods on a bigger scale, then technologies will have to be applied, and the principle of a courier bringing cargo will have to be abandoned.

6 Gothenburg

6.1 Mobility Hotel in Nordstan

6.1.1 Measure Description

The mobility hotel in Nordstan is a zero-emission micro mobility hub in the Nordstan business and shopping centre in the city centre of Gothenburg. It has multiple functions: shared fleet of vehicles and bikes for service providers (window cleaners, electricians, cleaning companies, etc); mobility companies sharing space, providing services and sales; a battery swap for micro-mobility operators; an unmanned warehouse store for a technical trading company and cargo bike hub with consolidation of goods and last mile delivery and a co-working space.

The Mobility hotel in Nordstan was inaugurated in May of 2024 and aims to:

- Facilitate the quiet and emission-free transport of goods and people in the inner city,
- Reduce motorised transport for deliveries, personal mobility, and service providers,
- Provide active and sustainable mobility services to promote clean and green travel behaviour,
- Facilitate creation of a cleaner, safer, and more sustainable environment in and around central city, and,
- Develop new business models with shared risks and rewards.

The Gothenburg LL has piloted a scalable concept, which in November 2024 has the following solutions and services implemented:

Front-end

- Public store with micromobility service and sales – serving both individual customers and businesses
- Battery swap for micromobility users – such as food delivering companies
- Cargo-bike hub - doing last mile deliveries by bike

Back-end

- A pool of micromobility vehicles offered to handymen and facility providers
- Unmanned warehouse store professional wholesaler open 24/7
- Co-work areas and shared facilities
- Back-end areas to consolidate and reloading goods for last mile deliveries

The Gothenburg LL has established a close cooperation with stakeholders within the test site Nordstan and this cooperation is planned to be sustained beyond the lifetime of the project. The Gothenburg LL developed a zero emission micromobility hub, conceptualized as a mobility hotel. A large number of partners are involved, also beyond the project consortium. The project partners involved include the City of Gothenburg, the Business Region Gothenburg and Volvo, and these collaborate with the property owners' association Nordstan samfällighet, which consists of five property owners. Seven actors have signed contracts and are collaborating within the mobility hotel operations and are users of the different services. The contracts that are signed, allow for multiple-year cooperation beyond the lifetime of the project. Furthermore, efforts are being made to further expand the cooperation to more users.

The operational business model consists of shared costs and risks for facilities, services already developed in collaboration with various stakeholders, as well as an active exploration of opportunities

for new services and value propositions targeting both business to customers and business to business. The development of the Mobility Hotel in Nordstan continues to be a priority, supported by three dedicated groups. One group consists of the stakeholders participating in the mobility hotel to collaborate on new services, joint offers and operational issues. One communications group are collaborating on shared communications efforts, including study visits and packaging of offers. Finally, the strategy group consists of the founding partners and focuses on the long-term strategy and upscaling possibilities.

6.1.2 Transferability Assessment

A key factor here is co-location with many activities taking place in the same location. There is no coordination between activities and/or integration of services using information technology at this stage. The basic mobility hotel concept realised in Nordstan can be transferred without any technological implications. The Kaia mobility hotel in Oslo may be seen as a transfer of the concept from Gothenburg.

6.1.3 Upscaling Recommendations

When the number of companies involved at the Mobility hotel and the volume of goods to be kept or handled reaches a certain point, state-of-the-art information system to keep track of goods in the terminal and organising transport of them will be required.

Furthermore, information systems may be required for coordinating activities, particularly regarding the use of shared resources (of all kinds) across value chains. The need for information systems and the integration of different information systems should be a consideration for the City of Gothenburg and its executive partners when discussing scalability and permanence of the mobility hotel in Nordstan.

6.2 Park and bike node Klippan/Jaegerdorff

6.2.1 Measure Description

Several different mobility services already existed at the test site Klippan/Jaegerdorff area but were perceived as fragmented. The measures implemented in the project focused on enhancing the area as a mobility hub, promoting existing mobility services and adding more services, with a focus on bicycles. The aim of these measures was to make the already existing shared mobility solutions more attractive, by using tools such as visualization, guidance and nudging.

The Park and bike node contributes to enabling sustainable and emission-free travel behaviours while acknowledging future changes in the surrounding area, making use of the existing shared mobility solutions and collecting knowledge to develop mobility hubs.

The pilot includes improvements on bicycle infrastructure qualities in the test site area, micromobility hub area, shared bike station and wayfinding measure. At major stops, real-time signs display information about shared bikes, including availability and distance to the bikes. The Park and bike-pilot offers a reduced price for public rental bikes when parking at test site Klippan/Jaegerdorff to further increase use of the shared bike system.

The node provides visualization, guidance and orientation for the users, and has been used by the LL to pilot minor interventions like mobility hub signs, wayfinding from the tram to the PT ferry stop, a new communications manner for carpooling and at major PT-stops, real-time signs display information about shared bikes, including availability and distance to the bikes. The node also offers a new public shared

bike-station – based on the public's expressed need. There was already an existing station at the ferry stop but none at the tram stop, 200 meters down the road.

One important part of the work with test-site Klippan/Jaegerdorff was a third-party integration of the shared bike system and car parking app. This has developed beyond MOVE21 and is now spread all over the city of Gothenburg. Developed throughout 2023, the system was ready for launch at the end of December 2023. The potential to replicate and scale this measure is significant, providing a valuable template for other cities across Europe looking to reduce car use and promote sustainable transport.

Since the end of December 2023, users of the Gothenburg parking app can access the shared bike system directly from the app. Before, public transport tickets were already accessible in the car parking app. This integration is an important step in promoting multimodal transport in the city. By using the same app for parking and accessing shared bikes, users can easily continue their journey using environmentally friendly transport options.

This integration aims to encourage traditional car drivers to try alternative modes of transport for the first time. By embedding sustainable transport options within the parking app, traditional car users are encouraged to make more sustainable travel choices and are given more seamless and convenient access to the sustainable services. A feasibility study for the integration of e-scooters was also conducted.

6.2.2 Transferability Assessment

This is a hub where several transport modes connect such as public transport (bus and ferry), micromobility (bicycles and e-scooters), and private cars. The location is also characterised by being a node that connects both TEN-T corridors (port and European road part of the core TEN-T corridor network) and urban transport systems.

The app used for reserving and paying for parking was integrated to a bike sharing service, so that bikes could be rented using the parking app. This is an initial initiative to integrate bikes and e-scooters into the public transport app so that multimodal journeys may be planned and purchased, with offers for reduced rental prices through the public transport app.

From a technological viewpoint, the most interesting aspect of this measure is the integration between the parking app and micro-mobility services. The Gothenburg parking app can only be used in the Gothenburg region. Hence, scalability may be more relevant than transferability. However, the principle and architecture used to integrate parking and micro-mobility are transferable.

6.2.3 Upscaling Recommendations

The principles and solutions developed and applied at Klippan/Jaegerdorff are already being scaled up. The current activities and plans in the Gothenburg LL aim to enable travellers to use the same app for parking and public and private passenger transport services in the whole Gothenburg functional urban area.

6.3 Cargo-waste co-freight Lindholmen

6.3.1 Measure Description

This measure provides improved freight services, augmenting the existing consolidated transport service for goods and waste to the business companies in the area of Lindholmen. It aims to reduce motorised traffic, emissions, and congestion by using the already consolidated cargo and waste-vehicles for additional purposes. The measure promotes reversed logistics (cargo/waste co-freight) at Lindholmen by extending the existing cargo/waste co-freight system, the so called Lindholmsleveransen, to make use of parcel boxes for both inbound and outbound deliveries.

The service is offered to the business tenants in the area of Lindholmen to receive and send letters and parcels through parcel boxes in the buildings, served by the same vehicles already handling the cargo/waste. This is to redirect more transport to the Lindholmsleveransen terminal, and from there incorporate the deliveries of the parcels with existing consolidated waste-freight circuit and in this way reducing the need for a multitude of companies and their vehicles entering the area of Lindholmen multiple times.

6.3.2 Transferability Assessment

This is a cargo-orientated hub handling cargo and clean waste materials. No solutions for receiving information about incoming goods, consolidation, and optimisation of last mile operations were used. Transferring the operation at Lindholmen to other relevant areas has no technological implications regarding integrating services.

6.3.3 Upscaling Recommendations

Upscaling at Lindholmen will require implementation of logistics management solutions with capabilities like those described in Section 5.3.2. Any kind of upscaling of reverse logistics would require the implementation of information technology solutions.

7 Oslo

7.1 Integration of Micro-Mobility with Public Transport

7.1.1 Measure Description

The aim of the pilot was to integrate micro-mobility services with public transport offer provided by Ruter. Oslo City Bike services were integrated with Ruter's public transport offer, making the bike services visible, bookable and payable through Ruter's App for public transport route times and ticketing. This integration is designed to create a seamless journey for users, making public transport more accessible and user-friendly. This enables travellers to:

- Plan a trip from origin to destination combining the use of public transport and the shared bike service.
- Rent a bike at the appropriate location.
- Pay for the whole trip.

The Ruter App collects information about available bicycles and starts unlocking them using the REST API provided by Urban Sharing. All events related to the bicycle renting period are communicated asynchronously to the Ruter App using an API provided by Ruter. All incoming events cause updating of information about the bicycle rental in the Ruter App. When a bicycle is parked, the rental is automatically ended, and the rental is paid automatically without any actions from the user.

Urban Sharing used the opportunity to develop an innovative API. This API aims to seamlessly integrate micro-mobility offerings into Mobility as a Service (MaaS) applications, thereby enhancing the accessibility and efficiency of urban transportation systems.
Key features of the API are:

- GBFS Integration: The API utilises the GBFS Feed to gather real-time data on micro-mobility services, ensuring accurate and up-to-date information for users.
- Seamless Integration: Enables easy integration of micro-mobility options into MaaS applications, promoting multimodal transportation solutions.
- Consistent User Experience: The micro-mobility provider maintains control of the user experience ensuring timely customer query handling and consistent branding.
- Data Privacy: Implements a bespoke ID system to protect user privacy while facilitating data exchange between systems.
- Operator Agnostic: Any micro-mobility operator that supports the GBFS feed can be easily integrated into a local or regional MaaS application.

The API provides access to the following services:

- Initiating vehicle trips using a vehicle ID, QR code or station ID.
- Trip status event stream - each time the status of a trip changes an event will be sent to your webhook.
- Trip state information
- Updating of an ongoing trip state - pause, resume, cancel, end.
  Vehicle damage reporting

7.1.2 Transferability Assessment

Here the public transport (Ruter) App was extended to show the availability of rental bikes in the city so that they may be booked and paid for. In this process, a now generally available API for linking

scheduled and non-scheduled transport was developed. The measure enabled users of the Ruter App for booking public transport services in Oslo to also reserve and pay for the use of Oslo City Bikes.

The limiting factor for transfer is the geography in which the Ruter App can be used. However, the principle of integrating public transport services with micromobility is most definitely transferable, meaning the architecture used in the implementation in Oslo, the standards supported, and the open API supported by Urban Sharing. This MaaS API can utilise the standards GBFS , MDS , GTFS , etc. depending on what information is needed. The API exists and is commercially available today. It is up to local authorities, public transport authorities and mobility providers across Europe to determine the use of the API tool to integrate and bundle public transport offers with active and shared modes of transport such as micromobility.

7.1.3 Upscaling Recommendations

The measure was limited to connect the Ruter App to also reserve and pay for the use of Oslo City Bikes. Proper upscaling will require that the Ruter App is integrated with all other passenger mobility services in Oslo, using the same architecture and principles applied in the original measure. This includes using the API developed in the MOVE21 project.

Oslo has of November 2024 adopted a new micromobility regulation. This regulation will require micromobility (e-scooter) providers to share operational data with Ruter with the aim to integrate further micromobility offers into Oslo's public transport offer. This will mean an upscaling in Oslo and potentially in the Oslo functional urban area in the medium term. When other micromobility services are properly integrated into the Ruter App, the providers of the micromobility services should also be prepared to communicate information about such services to the regulating authority using an API that supports the MDS standard.

7.2 Emission-Free Goods Transport

7.2.1 Measure Description

The City of Oslo sees the need to further focus on urban logistics. There is a growing understanding in the City of Oslo that there is a need to have better policy tools and regulation for the urban logistics sector. Key aspects and priorities for urban logistics will be set forth in the Oslo SUMP (Green Mobility Plan) currently under development.

One pilot in the Oslo LL was called Emission Free Goods Transport. After failed dialogues with transport companies, the city decided to focus on shippers, inspired by the approach that has been successful in the CULT operation in Antwerp, Belgium. Discussions with several shippers were conducted, among them IKEA, Oda, Maske, and OneMed. A key challenge is to create an environment where shippers can collaborate efficiently and where they feel that key aspects related to performance, economy, and strategic integrity are taken care of. A contractual framework may be the solution.

During the discussions it became clear that, even in a pilot operation within MOVE21, it would be difficult for the shippers to bypass the already established contracts between the shippers and their current logistics providers. This has hindered any physical demonstrations in the Oslo LL.

Fornebu Hub is an existing hub for local distribution of goods already in operation established as part of the Norwegian project Varer i vestkorridoren. The hub is currently operated manually but as part of

MOVE21 Oslo LL activities the hub will be used to test MIXMOVE information systems for transport and cargo consolidation in an attempt to ensure digital solutions and increase interoperability between operators.

7.2.2 Transferability Assessment

A system for receiving information about incoming cargo, consolidating it and booking last mile transport services is being tested at Fornebu Hub. Urban hubs for distributing freight have been around for many years. However, few of them have been financially sustainable. During the deliberation in Oslo, it became clear that critical volumes of cargo need to be in place if such operations can continue without project support or other forms of subsidies.

To handle large cargo volumes, technology is required in such hubs. Key functions are:

- Scanning incoming cargo
- Deconsolidate
- Potentially store cargo in the hub
- Consolidate outgoing cargo and select and book transport services (last mile or movement to another hub).
- Monitor transport operations and provide appropriate status information to all relevant stakeholders.

Such a solution, MIXMOVE X-Dock, is being tested at the Fornebu Hub. This is well-proven, standard software-as-a-service solution and it can be transferred to all hubs dealing with urban consolidation.

7.2.3 Upscaling Recommendations

In logistics, there is a saying that cargo is king. This means, in the context of this deliverable, that to achieve a financially sustainable urban distribution activity, the following conditions must be in place:

- The transport cost to shippers must be equal to or lower that the current cost (taking into account the cost of having large vehicles stuck in traffic in cities)
- Cargo must be delivered as agreed between sender and receiver.
- The right transport service must be used for the right task (a bicycle is not always the solution).

Like in the example from Antwerp (CULT), cargo from multiple shippers must be consolidated before it is moved in the city. This requires technologies like the ones being tested at Fornebu Hub, and the operations must be electronically connected to shippers.

7.3 Mobility-on-Demand for People and Freight

7.3.1 Measure Description

Ruter, the Oslo public transport operator, already operates a mobility-on-demand service for seniors (people above the age of 67). The service is provided using small buses. Shopping centres are favourite destination for the users of this service.

CC Vest is among the largest shopping centres in Oslo. The centre aims to increase the number of visitors, while, at the same time, reduce traffic.

This measure uses spare capacity in the buses transporting seniors to also transport goods. Stores in CC Vest offered customers home transport of purchased goods, to reduce the temptation for customers to use private cars to and from the centre.

The stores used a MIXMOVE web application to record information about the goods (and label it), receiver, and time for deliveries. A consolidation point was established at CC Vest, where goods from all stores were collected. Consolidation was made when customers had purchased goods in several stores so that one cargo item only were to be delivered to the same receiver at a given address. The MIXMOVE X-Dock solution was used to reconstruct and label the reconstructed cargo before booking the transport in an already existing on-demand service for passengers.

After consolidation, X-Dock sent booking information to the solution being used to organise the transport of passengers (TripVia) electronically. TripVia returned a confirmation (or cancellation). Integration of TripVia and the MIXMOVE solution was seamless, adapted to TripVia standard.

Customers received SMS when the transport was booked, when the transport started and when the goods had been delivered. The stores received the same information.

7.3.2 Transferability Assessment

This combines consolidation of goods with booking of last mile transport using on-demand transport services. Information systems were used to book transport and consolidate cargo to be transported with buses transporting people. Integration of the logistics management system and the on-demand passenger transport system was implemented and tested.

In this measure, a small consolidation hub was established at the shopping centre CC Vest. A mobility-on-demand service for people was used to perform last mile transport. The software used for consolidation at CC Vest is the same as the solution being used at the Fornebu hub (MIXMOVE X-Dock.

A web-based application was used to identify goods and receiver in the stores at CC Vest and inform the consolidation hub that cargo needed to be transported.

Integration between MIXMOVE X-Dock and TripVia was done by connecting X-Dock to TripVia through an API provided by TripVia. When X-Dock booked a space for a cargo item, this was understood by TripVia that a seat was booked (by a person).

To facilitate transfer of the concept, the following actions should be taken:

- The web application used in the storeswas a generic solution developed for B2B transport. In the case of a transfer (and scaleup), the user interface of the application must be tailored to suit the specific needs of stores.
- A new connector between MIXMOV X-Dock (or any other terminal management system) and the management system for passenger transport (last mile transport) should be made so that response to X-Dock is in the terms of logistics and not the terms of passenger transport (traveller vs cargo item).

7.3.3 Upscaling Recommendations

When combining people and freight in the same transport service, at least if the passenger transport already is an on-going activity, the passengers' expectations regarding service levels *must* be met. This means that there must be spare capacity so that cargo may be moved without impacting the service level of passengers. In the current mobility-on-demand service is Oslo that was used in the measure, that is no longer the case. However, as the mobility-on-demand services are being expanded in Oslo, both geographically and in capacity, this situation may change.

Should the situation occur the types of combined transport of people and freight offered from CC Vest in the measure could be widened and implemented in all shopping centres in the greater Oslo area served by Ruter.

7.4 Mobility hub network in Groruddalen

7.4.1 Measure Description

The mobility hub network in Groruddalen was developed by the City of Oslo in collaboration with Ruter, Bane NOR Eiendom, Voi, Ryde, Bolt, Bikely, Hyre and Getaround. The mobility hub network offers services at public transport sites, such as e-scooters, car sharing and parcel lockers. The modes vary at each location based on local needs.

An upscaling of the pilot is necessary to offer more comprehensive seamless options for citizens of Oslo. This involves expanding the network to multiple locations and offering a variety of transport and adjacent services that will enhance first- and last-mile connectivity and ensure a seamless travel experience.

The precondition to success is attractive locations with suitable density and distance between each of them. Higher density and multiple locations with variety of modes strengthens the whole transport network. Another precondition to success is to engage the correct stakeholders, to make sure land use policy and transport are interconnected.

Each location had visible signages and markings, available near public transport hubs or switches. Each location offers a combination of modes such as e-scooter, train, bus, car-sharing. Various experiences have been drawn from these locations with diversity of usage by location and services. However, some services might have been better positioned, and the pilot phase should have been longer notwithstanding the winter hiatus in Oslo.

Due to long distances and lack of public transport connections across the Grorud valley; e-scooters have been seen as a feeder to public transport in the outer city. Compared to the city centre, travel time per unit made by e-scooters were much higher in Grorud. Even though experience from the pilot shows that the younger population comprises most of the users, increased access to mobility hubs can be beneficial overall at the local level.

The aim with the mobility hub network is to provide more travel and transfer options for residents outside the city centre. In turn, the network can help achieve reductions in climate emissions and in the use of private cars by providing seamless public transport combined with last-mile options. The network concept was tested in three different locations in Groruddalen in 2023 and 2024, with discussions taking place of how to best upscale similar hubs in Oslo.

7.4.2 Transferability Assessment

The common denominator in this measure was co-location of mobility services, but with a potential for linking services using technology. Like in the other measures several mobility services were located in an area close to a rail station and a bus stop. No technologies were used to integrate the operations of these services. Hence, a mobility hub network like the one established in Groruddalen can be transferred without any technological considerations.

7.4.3 Upscaling Recommendations

Upscaling of the Mobility Hub Network will require:

- Integration of public transport and micro-mobility and mobility-on-demand services, using the principles that has been tested and demonstrated in Oslo (bus and city bikes) and Gothenburg (park and bike), see Sections 6.2.3 and 7.1.3.
- If freight transport consolidation and distribution were to be added to the hub, a solution line the one used in the Fornebu Hub will be required, see Section 7.2.3.

To the extent the City of Oslo wants to systematise its efforts to establish mobility hubs, the requirements and expectations for technological integration should be made clear and transparent with possibilities for service providers to link transport services and offers to existing offers and infrastructure.

7.5 Kaia Mobility Hotel

7.5.1 Measure Description

About half of the vans that circulate in the city centre of Oslo deliver urban logistics services such as deliveries, collections, servicing and transport of equipment. There is great potential to transfer more of these trips to more sustainable modes, in particular bikes and cargo bikes. The Kaia Mobility Hotel will contribute to traffic and climate emissions reductions.

The Kaia Mobility Hotel was launched in September 2024 and is a collaboration between the City of Oslo, Mobility Solutions, Posten Bring, Wolt and Nordic FM Group. More businesses are invited to participate on an ongoing basis. The Kaia Mobility Hotel provides cargo bike leasing and storage, office space, a workshop, and the leasing and renting of additional light electric vehicles. Plans include expanding services to offer a mini warehouse for electricians, equipment storage, small transshipments, and battery swapping. Additional amenities under discussion are dedicated repair days for Wolt drivers' bikes and a break room accessible outside office hours, complete with charging facilities for batteries. The purpose is to facilitate more bicycle-based transport in the centre of Oslo and especially in the area intended as a future zero emissions zone. Central to the collaboration is the question: how many van trips can we replace in the city centre through active facilitation through mobility hotels and other similar measures?

The solution can be a business model where private business partners and public stakeholders together gain mutual benefits. An important precondition to succeed can be financial support from authorities to help small businesses get a kick-start and build a solid business case. It is also important for companies to identify optimal locations to offer their services, enabling delivery and logistics companies to achieve more environmentally and climate-friendly urban logistics transport. In addition to direct financial support, identifying and securing central locations to establish mobility hotels is another challenge that cities can help solve. The city benefits from having emission free and smaller vehicles, especially in densely populated or built areas thus allowing more urban space to be used for people rather than large

vehicles. The companies can improve their urban logistics flow with fewer legal violations such as parking fines and quicker, more reliable trips unaffected by congestion. An identified barrier to the adoption of cargo bikes has been their high maintenance need. This problem is solved in the mobility hotel with extensive repair and maintenance facilities and tailored programmes, such as cargo bike leasing with guarantees against prolonged downtime for users, as well as customization of bikes to fit company needs and specifications.

7.5.2 Transferability Assessment

Like in the mobility hotel in Nordstan, co-location of various services is offered here. There is no information system implemented to support coordination and collaboration. The mobility hotel concept was essentially transferred from Gothenburg and may be transferred to other similar locations. The services provided can be tailored to the specific needs and contexts of city/neighborhood in which the hotel is transferred. Workshop services are essential to support the use of cargo bikes commercially to remove concerns about reliability and downtime.

7.5.3 Upscaling Recommendations

When the number of companies involved at the mobility hotel and the volume of goods to be kept or handled reaches a certain point, state-of-the-art information system to keep track of goods in the terminal and organising transport of them will be required. Furthermore, information systems may be required for coordinating activities, particularly regarding the use of shared resources (of all kinds) across value chains. The need for information systems and the integration of different information systems should be a consideration for the City of Oslo and its executive partners when discussing scalability and permanence of the mobility hotel.

8 Conclusions

Transferability of the measures implemented in MOVE21 is essentially straightforward from a technology point of view. However, by just transferring the measures as they are, many of them will not be exploited to their full potential.

One example being the Mobility Hub Network in Oslo. By simply using the principles and architecture that was developed and tested in Oslo, combining public transport and city bikes, all public transport (train, bus, tram, metro) and mobility-on-demand services (shared bikes, e-scooters, shared cars, etc.) can be integrated, thus enabling travellers to find emission-free transport from end-to-end in the greater Oslo area.

The API for integrating public transport and (shared) micromobility developed and tested in the project should be taken up by others cities, service providers and public transport companies to make smooth end-to-end mobility available for many.

Technology exists to support all types of measures that have been implemented and tested in the MOVE21 project. Hence, technology is not a limiting factor and can be a facilitator to make sure the full potential of such measures is utilised.

One of the expectations at the onset of MOVE21 was that the cities involved would use the project to implement and test how technology might support governance innovation. This has only happened to a certain degree and with more untapped potential in each city to use technology and technology integration to build measures that scale. During the project and the writing of this deliverable, the participants in WP5 have pondered why this is the case. Key reflections include:

- Generally, the cities were not prepared for making what by many was perceived as “leaps” in the use of technologies. Statements like “We must be seen as inclusive. Therefore, we will implement measures that and be used by or appreciated by all – including those who do not even use a smartphone or internet”. In other words, many Living Labs took care not to push any technological barriers. The opportunity to push barriers regarding how state-of-the-art technology best could be used was not exploited to its full potential.
- Integration of technologies is not straightforward. Despite the successful MOVE21 development and demonstration of the API linking public transport and micromobility, the maturity of such integration for passenger transport has much to learn from the efforts to ensure interoperability in freight transport. By better collaboration between the communities working with passenger- and freight transport, both passenger transport interoperability and the ability to combine people and freight transport would benefit.
- The passenger transport community seems not to be aware of the capabilities and availability of the CEF building blocks. It is appreciated that these building blocks were developed in other domains (procurement, freight transport, etc.), but integration in passenger transport (all modes, all types of services) would significantly benefit from applying these and the freight interoperability principles using it.

9 References

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