INTEGRATED CITY ASSESSMENT: HAMBURG

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MOVE21 – Multimodal and interconnected hubs for freight and passenger transport contributing to a zero emission 21st century

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Project Executive Summary

The main objective of MOVE 21 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, Viken 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

This deliverable describes the up to date development of the Hamburg Living Lab in the project MOVE21. Firstly, it summarizes the context assessment that describes the social and special considerations, governance, and potential for technological integration. Secondly, it detects and describes the main priority topics and fields of action. Finally, the deliverable presents an action plan of development in each of the priority topics, along with a tentative time plan.

Key words

Living Lab Hamburg, knowledge brokerage process, contextual factors, innovation capacity

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1 List of abbreviations and acronyms

Acronym	Meaning
BUKEA	Behörde für Umwelt, Klima, Energie und Agrarwirtschaft
BVM	Behörde für Verkehr und Mobilitätswende
BWI	Behörde für Wirtschaft und Innovation
D	Deliverable
FBA	Federal Trunk Road Authority
HVV	Hamburger Verkehrsverbund
ICA	Integrated City Assessment
ICCP	Innovation Co-Creation Partnership
ITS	Intelligent Transport Systems
KPI	Key Performance Indicator
LBV	Landesbetrieb Verkehr
LI-HH	Logistik-Initiative Hamburg
LL	Living Lab
LSBG	Landesbetrieb Straßen, Brücken und Gewässer
ÖPNV	Öffentlicher Personennahverkehr
TF	Task Force
UMMS	Urban Mobility Monitoring System
VHH	Verkehrsbetriebe Hamburg-Holstein

2 Purpose of the deliverable

The Integrated City Assessment (ICA) is based on deliverables D3.1, D4.1, and D5.1 and provides first insights into the contextual factors that need to be considered or altered for the development and deployment of the MOVE21 solutions. Special attention is devoted to the urban social layer (WP3), governance (WP4), and technological solutions and integration (WP5). They are relevant for the current and future socio-technical contexts in the Living Lab (LL) test sites and for improving the innovation capacity in the cities. Thus, the LL processes of co-creation, implementation, and upscaling activities should be supported with a continuous knowledge brokerage process related to these three topics. Based on the input from WP3, WP4, and WP5 and the co-creation process so far, the Hamburg LL has identified priority topics and crossovers involving WP3-6 as well as other WPs. An innovation agenda is developed on how these topics and crossovers will be taken up in the knowledge brokerage process.

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

The intended audience of this deliverable are:

- Task Force of the Hamburg LL, informed by the report summaries and incorporating the outcomes of this deliverable into their internal decision-making process.
- Knowledge transfer with stakeholders within the Innovation Co-Creation Partnerships (ICCPs), which contain a wide spectrum of stakeholders who might be interested in the information of this deliverable.
- WP-Leaders as an up-to-date version of the activities and plans of the LLs.
- The general public and the academic community in particular, as this deliverable constitutes a body of knowledge that will be shared and replicated.

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

The deliverable D6.4 is structured in the following way: First, the purpose of the deliverable, intended audience and its structure as well as related WPs are explained in chapter 2. An introduction to the test sites, in the Hamburg LL follows in chapter 3. Chapter 4 summarizes the first findings from D3.1, D4.1 and D5.1 on, respectively, the urban social layer, governance, and draft technology solutions. Based on the discussions in the Hamburg LL and the context analysis from WP3, WP4 and WP5, the identified priority topics are explained, also considering the social layer, governance and technological solutions and integration (chapter 5). Potential crossovers between WP3, WP4, WP5 as well as other WPs are elaborated. In chapter 6, the innovation agenda with the knowledge brokerage needs for the LL Hamburg is described to make expert input and discussions as specific as possible at this stage of the project. The timing of the knowledge brokerage process is linked to the timeline of the Hamburg LL. Chapter 7 presents final conclusions of the Integrated City Assessment for Gothenburg and next steps.

This deliverable is connected to other work packages and deliverables as follows: WP6 coordinates and facilitates learning, testing, deployment and upscaling activities in the LL. An initial context analysis was performed in WP3, WP4 and WP5 which delivered input to D6.4 of WP6. Therefore, deliverable 6.4 is connected with Deliverables 3.1, 4.1, and 5.1 as they provide the main input for chapter 4 about the context description and situational analysis. Deliverable 6.4 is also aligned with 6.2 and 6.3, as they have a shared structure and methodological framework, each of them applied in one specific living lab. WP6 again will provide solutions, data and insights for WP7 replication & take-up as well as for WP8

impact assessment. Deliverable 6.4 will be used as an input for 8.2 by incorporating specific strategic indicators to the KPIs in the UMMS. Lastly, D6.4 will be used as reference in D10.3, which will outline some measures for local end user and stakeholder involvement and buy-.in.

In relation to task 6.1.2, the Integrated City Assessment D6.4 describes how on-demand knowledge and information on identified priority topics will be included in the knowledge brokerage process in Hamburg.

3 Introduction

The city of Hamburg is the second-largest city in Germany and it is also one of the sixteen federal states in the country. Hamburg is divided into seven districts governed by an elected government that is dependent on the Senate of Hamburg.

Hamburg participates in MOVE21 by establishing a Living Lab in the district of Altona. The Hamburg Living Lab is led by the municipality of Hamburg and it involves the Senate Chancellery, the Ministry for Economy and Innovation (BWI), the District Authority of Altona, Deutsche Bahn SmartCity, and the HafenCity University of Hamburg.

Within the MOVE21 project, the Hamburg LL is planning the implementation of actions in several test sites as well as inter-hub traffic routes (traffic between hubs) in Altona.

The District of Altona is located in the northwest part of the city and is delimited by the river Elbe to the south, the districts of Hamburg Mitte and Eimsbüttel to the east, and the state of Schleswig-Holstein to the north and west. The district includes a diverse range of urban fabrics types. Altona has a dense city center including traditional urban landmarks e.g., a town hall, a central station, and a main shopping street, as it used to be an independent town until 1937. Altona also has extensive areas of a suburban character: single-family residential, modern-era *Punkthäuser* towers, low-rise multi-family residential *Siedlungen* blocks, industrial areas, and green spaces. These types of urban fabrics are characteristic of the German urban development context and can be found in multiple areas of Hamburg. A description of the initial contextual condition that frame the Living Lab in Hamburg is presented in Section 4: Summary of Context Analysis Living Lab.

The Hamburg LL envisions the implementation of mixed-use micro-hubs for passengers and freight. The Hamburg LL formed a Task Force that is in charge of the executive and strategic planning of LL implementation activities. During the first period of the project (May 2021 to January 2022), the implementation activities focused mainly on (1) the discussion about candidate locations (see section 6.1.1) for deploying the micro-hub or micro-hubs, and (2) the pre-definition of a mixed-use use-case that would include logistics, mobility, a social-use, and inter-hub traffic operations. The current progress and upcoming short- and mid-term actions are discussed in Section 5: Priority Topics and Crossovers and planned in Section 6: Innovation Agenda.

3.1 Introduction to test sites

As of March 2022, the Hamburg LL plans on developing pilot actions on several test sites in Altona. One of the main characteristics of the hubs is the integration of several uses. The Hamburg LL plans establishing mixed-use micro-hubs for passenger and freight, meaning that (1) the hubs will have a small (micro) scale serving short distances within the district, and (2) the hubs are intended to integrate more than one single use. They will be able to combine passenger transportation and mobility services with logistic and parcel delivery, and spaces for social and cultural activities in some cases.

Four test sites have a fixed location in the eastern part of the district (Altona Old Town), and additional hubs are planned to be built in areas with specific location still to define. A hub in Hoslstenstraße is planned to deliver logistics, mobility, and socio-cultural services to the area. The Hamburg LL also plans to enhance the existing use services of a second hub in Harkortstraße, and a third hub in Altona Train Station. A third hub in Kaltenkirchener Platz will propose the reutilization of empty outdoor spaces currently used for parking. Subsequently, locations in the area of Schnackenburgallee, and western

neighborhoods of Altona (e.g. Lurup, Osdorf and Sülldorf-Iserbrook) will also be integrated in the network of hubs through inter-hub traffic. A detailed list of locations and actions can be found in Section 6.1.1.

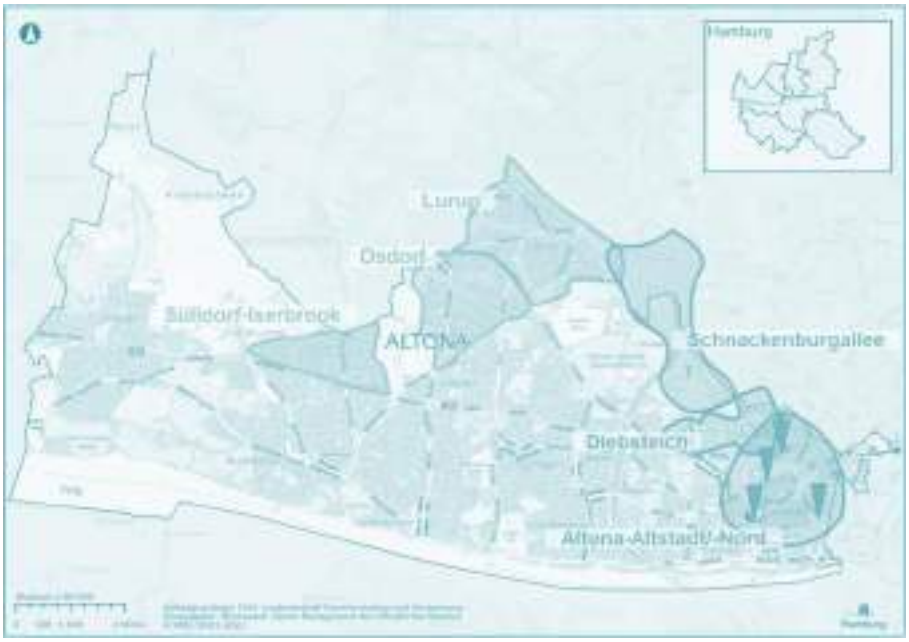

Figure 1. District of Altona and intervention areas. Source: District of Altona

4 Summary of Context Analysis Living Lab

4.1 Urban Social Layer

An initial spatial context assessment was established in Deliverable D3.1. Against the background of behavioral change towards door-to-door and shop-to-door consumption and mobility tendencies in society in recent years, MOVE21 includes an assessment methodology to guide the design and deployment of solutions to offer citizens a structural adaptation that matches the social, consumption, and mobility practices involving neighborhood-scale hubs for passenger and freight. In detail, the Urban Social Layer of MOVE21 is dedicated to public space vitality by emphasizing the pedestrian flow in public space. To do so, mobility hubs are assessed (1) considering the social and spatial characteristics of the specific locations in which they are deployed and (2) outlining potential services that could be added to the hubs.

The ultimate goal of D3.1 for the Hamburg LL is to help the Hamburg Task Force achieve and maintain high social qualities in urban space, by enhancing walkability in order to increase the diversity of people (Bartzokas-Tsiompras & Photis, 2020), social cohesion, and collective engagement (van den Berg et al., 2017; Amin, 2008), quality of life (Rogers et al., 2011), and other positive aspects related to the potential encounter of people in the streets (Amin, 2008), randomized social interaction (Kashdan & Farmer, 2014), and serendipity and capacity of spontaneous action (Gumpert & Drucker, 2000).

WP3 performs a Spatial Context Analysis (D3.1) that offers an exploratory methodology to evaluate the candidate locations to host mobility hubs. It studies the way different data sources[1] can be analyzed and combined to extract valuable insights about the performance of small-scale public open urban spaces from a social and spatial approach.

4.1.1 The Urban Social Layer in Hamburg

In the case of Hamburg, the analysis performed by D3.1 detected an inverse correlation between spatial network relevance and socio-economic relevance in several areas of Altona, which identifies the social phenomenon of people choosing to visit places that gather people, regardless of the pure spatial configuration of those. It is observed that the main social activity is concentrated in the areas with lower connectivity (understanding connectivity as urban integration, higher near complex intersections, and longer streets), which are potentially linked to historical values, pedestrian-scale design with smaller streets, and places of socio-economic attraction (such as landmarks, neighborhood centers, and main commercial axes).

A distinct distribution of places is also observed, depending on the nature of their main function. Activities tend to concentrate around neighborhood centres resulting in a polycentric city structure. Neighborhood centers emerge in the intersection of axes that gather optional activities along with them, and necessary activities tend to cluster around transport hubs. In contrast, suburban areas are characterized by low building density with open multi-family blocks in organic street patterns with multiple turns and a low number of intersections, which results in a low walkability index, and multiple small walkable units disconnected from each other.

4.1.2 Types of hub locations

The analysis method of D3.1 included a hub location type classification based on the automatic clustering of several analytic indicators. This classification differentiated four distinct types of hub locations, in the three Living Lab cities part of MOVE21. The candidate locations for hosting a hub in the city of Hamburg fell within the types 2 and 3 of this classification. It must be mentioned that the list of locations includes those being considered by the Hamburg TF at the time of the analysis (November 2021). The updated list of candidate locations (as of March 2022) can be found in Section 6.1.1.

Type 2 Disperse fabric: Holstenstraße, Achtern Born, Harkortstraße, and Kaltenkirchener Platz

This type of hubs refers to those hubs located in areas with a low density of services and multiple relative levels of activity. They tend to have a mid-low level of walkability, and a good connection to the rest of the city through main streets. This type of hub is uncommon in the other Living Labs, while it is the most common type in Hamburg. Despite the diversity of urban fabric types in the district of Altona, the relation between street morphology, building types, and level of activity remains similar in the hub candidate locations. Observing the performance of each hub location across all of the indexes, some distinct tendencies are noticed: The location in Holstenstraße is surrounded by a higher density of activities with a higher popularity than the other locations; The location in Achtern Born has the poorest conditions to access other services, while it has the highest walkability index; The location in Harkortstraße is representative as the average performance across all the indexes among the other candidate locations of this type; The location in Kaltenkirchener Platz is surrounded by exceptionally large buildings due to its proximity to an industrial fabric type, and it also presents an exceptionally high relative level of popularity (popularity concentrated on a low number of locations).

[1] Street networks from OSMnx, buildings from Hamburg ALKIS, social media data from Foursquare.

Type 3 Industrial fabric: Schackenburgallee

This type of hubs refers to those hubs located in areas of a well-defined functional clustering. In the case of Hamburg, the location of Schackenburgallee is an industrial area that is clearly delimited from the neighboring areas by major urban infrastructures (railways and highways) and has a distinct urban fabric type of large buildings with diverse setbacks to allocate open-air parking lots. The characteristic of this type of hub location is high connectivity to the rest of the city and TEN-T corridors that allow easy access to motorized traffic while offering a low level of walkability (accessibility, comfort, reachability) and poor socio-economic relevance caused by lack of services, amenities, and social activity.

4.1.3 Guidelines for potential social use cases

Type 2 Disperse fabric: Holstenstraße, Achtern Born, Harkortstraße, and Kaltenkirchener Platz

Potential uses of a hub could provide these areas with services that are missing, in the direction of social justice and equal access to basic services. Adding services would intend to create a new flow of pedestrians towards the use of this one service in the area driven by necessity and potentially activate inactive public spaces with single-purpose trips. The result of implementing hubs with social activities in these areas is expected to be more noticeable than in dense, well-functioning popular areas.

Type 3 Industrial fabric: Schackenburgallee

Since these hubs are located in industrial areas, they could provide services that are complementary to the existing functions in the area, being mainly workplaces. The most popular location is a fitness center. A critical customer base of the workplaces and the fitness center could be used, and the multi-purpose mobility scheme could also be applied, meaning that the people working in the area could stop by the hub on the way home, or on the lunch break, or regular users of the fitness center could pick-up a package before or after exercising. It is likely that the comfort at pedestrian level is low due to the size of the buildings and built infrastructure, therefore other transport modes could also be considered.

Considering that the list of locations is likely to change in the future, D3.1 also describes typologies that are present in Oslo and Gothenburg. An assessment to determine the characteristics of the locations of additional test sites is recommended.

- Type 1 Dense fabric/city center: Those hubs located in places with a critical mass of urban vitality are within city centres and areas that cluster high levels of all types of activities, and high levels of walkability. Hubs in these locations could consider their use within a multi-purpose mobility scheme.
- Type 4 Segregated fabric/isolated clusters: Those hubs located in areas that constitute “walkable units”. Their performance as “walkable units” could favor multipurpose trips in synergy with the activities found in them, aiming for a catalytic effect attracting additional functions and services.

Further discussions about the hub classification within the Hamburg Task Force established a Hamburg-context adaptation of the aforementioned classification. While Oslo and Gothenburg have test sites in the city centres, Hamburg has three locations in Altona's old town. Since Altona used to be an independent city until recently, one could argue that those hubs could be classified as Type 1 in the specific context of Hamburg, considering Altona's old town as a city centre. The size of Altona (excl. the rest of Hamburg) is not comparable to the size of Oslo and Gothenburg, and therefore, our indicators measured in Altona depict a similar urban environment as in disperse and suburban areas of Oslo and Gothenburg. Still, there is a noticeable difference in density, activity levels, and building types, between

Altona's old town and suburban areas of Altona. Furthermore, D3.1 describes Hamburg as a polycentric city integrated with separate areas with their own center of activity. If we were to consider Altona as a unit of study, it would make sense to consider Altona's old town not as “Type 2: Disperse and suburban” are, but as “Type 1: Dense city center”.

By implementing this classification, the urban types of Altona would mirror the different phases of the implementation plan designed by the Hamburg Task Force, (See section 6.1.1.).

Task Force Phase	Hub Locations	Classification in D3.1	Amendment to D3.1
Phase 1 A	Holstenstraße	Type 2	Type 1
Phase 1 B	Harkhortstraße	Type 2	Type 1
Phase 1 C	Kaltenkirchener Platz	Type 2	Type 1
Phase 2	Inter-hub trips	-	-
Phase 3	Schakenburgallee	Type 3	Type 3
Phase 4	Western suburban areas (e.g., Achtern Born, Osdorfer Born, Lurup)	Type 2	Type 2

Table 1. Proposed classification of hub locations by urban fabric type, considering Altona

This classification would need to be taken as a reference, always to be completed with local knowledge, on-site observations, and in-field measurements.

4.2 Governance Innovation

An initial governance context assessment is established in Deliverable D4.1, which implements a set of parameters derived from the Technological Innovation Systems framework. These parameters reflect governance issues relevant to the Living Labs and are (1) policy and regulations; (2) stakeholders; (3) legitimacy; and (4) resources.

Deliverable D4.1 implements a parametrized evaluation extracted from a set of questions in the format of interviews with key persons involved in the Living Labs, with the intention of gaining a detailed overview of the governance context of the city and the locations where hubs would be potentially deployed. These interviews took place in October-November 2021.

4.2.1 Governance in Hamburg

D4.1 offers an overview of the governance structure of Hamburg. Particularly relevant for MOVE21 are those governance structures dealing with topics of mobility or infrastructures of transportation. Among those, the Ministry for Transport and Mobility Transition (Behörde für Verkehr und Mobilitätswende; BVM) is one of eleven authorities of the Senate of Hamburg. BVM manages the general transport situation and includes social participation with a special focus on individual mobility. Secondly, the Ministry for Economy and Innovation (Behörde für Wirtschaft und Innovation; BWI) is focused on managing economic growth and technical progress as its primary objective. Since the Hamburger economic environment encompasses a large number of logistics companies with a wide range of competencies, the BWI includes a Logistics Department with this special focus. BWI is also responsible for the process of green transformation of the economy. Regarding the green transition widely, The Ministry for Environment, Climate, Energy, and Agriculture (Behörde für Umwelt, Klima, Energie und Agrarwirtschaft; BUKEA) is responsible for the development of Hamburg’s overall climate policy strategy (Hamburg Climate Plan) and its operationalization into specifics measures, including the distribution of funding. Lastly, the State Office for Roads, Bridges, and Waterways (Landesbetrieb Straßen, Brücken

und Gewässer; LSBG) is a public company of the City of Hamburg assigned to the Ministry for Transport and Mobility Transition (BVM). It is a service provider for the city's administration and plans, designs builds, and maintains structural facilities and technical infrastructure.

With a particular focus on transport, D4.1 provides a general overview of the agencies that operate at different scales. The City of Hamburg governs and manages the local road network. However, the federal motorways are governed by the Federal Trunk Road Authority (FBA), and highways are governed by the states. The railway infrastructure is governed by the Federal Railway Authority and includes all railway infrastructure and stations. Deutsche Bahn operates national train lines as well as commuter trains in Hamburg (S-Bahn). The City of Hamburg operates the four subway lines (U-Bahn), as well as 119 bus routes through the municipal company Hamburger Hochbahn. Public transport is coordinated in Hamburg and the surrounding area by the Hamburger Verkehrsverbund, HVV. This association regulates the ticketing systems and transport schedules and ensures harmonization between several modes of transport and operators. 85,5% of HVV is owned by the City of Hamburg.

4.2.2 Hamburg policy context

The Technological Innovation Systems framework establishes a series of parameters that are implemented by D4.1 to describe the policy context of the Living Labs. In particular, the case of Hamburg is described as follows.

4.2.2.1 Policy and regulations

The City of Hamburg published several important regulations and policies that are aligned with some of the overall objectives of the pilot activities of the Living Lab Hamburg in MOVE21. These policies include the Hamburg Climate Action Plan (Klocke, 2011), the city's overall climate policy strategy; the ITS strategy (City of Hamburg, 2021), and the city's concept for sustainable urban logistics in Hamburg (LI-HH, 2021). A strategy for urban logistics in Hamburg is currently in the process of being approved, and is aimed at reducing CO_2 emissions and improving the overall traffic situation.

4.2.2.2 Stakeholders

D4.1 identifies the main stakeholders in Hamburg that are relevant for MOVE21 concluding that "*The task force includes some of the relevant public stakeholders to ensure that there is an understanding of policies and regulations and assess whether the project can contribute to potential improvements of the policy landscape*" (Deliverable 4.1: 26).

Within the city administration, the BWI and the District of Altona are directly involved in the project. Contacts to the BVM have been established and it is planned to involve the BVM in the further process. The central Ministry for Urban Development and Housing (Behörde für Stadtentwicklung und Wohnen, BSW) has been involved to a lesser extent in the first project months, but it is planned to establish contacts in the further process as well. Additionally, LBV (Landesbetrieb Verkehr) was identified as a subordinate of the BVM and responsible for the management of roads that are relevant for the city-scale road network. In the private sector, the Deutsche Bahn is identified as an important stakeholder, also a MOVE21 project partner.

Cooperation has been initiated with additional stakeholders, including SAGA, the largest public housing company in Hamburg, as well as with public transport providers, such as the Hochbahn.

Additionally, the Hamburg Task Force carried out a stakeholder mapping process, which identified more relevant stakeholders while D4.1 was in development. As of this moment (March 2022), an Innovation

and Co-Creation Partnership (ICCP) is to be established with the most relevant stakeholders identified in the process: Logistik-Initiative Hamburg. Further location-specific stakeholder mapping is planned to identify relevant local stakeholders of each candidate location, including the end users (citizens). As it is explained below, the list of locations is still not secured (see Section 6.1.1) and therefore, public announcements necessary to involve citizens have not been made yet. In this regard, actions involving citizens are being planned at a strategic and methodological level.

	Mobility	Logistic	Social and other
Private companies	Carsharing operators Micro-mobility operators On-demand shuttle “Bike” driving schools Cargo bike rental (sigo) Manufacturers of cargo bikes, charging infrastructure, software, etc.	Global Parcel Service Providers (DP-DHL, Hermes, DPD, GLS, UPS, Amazon) Local courier services (Tricargo, Bringbock, Velocarrier) Startups e.g. Recylehero Suppliers of organic food (Frischepost) Provider of package-lockers (Hamburg Box) Press of the logistic sector (DVZ, Logistra) IT/software developer for logistics applications (e.g. Avarto Systems)	Housing cooperatives (SAGA, Altoba) Local retailers Local Trading platforms: Unser Altona, Altona bringts
Public sector	BVM (Behörde für Verkehr und Mobilitätswende) ÖPNV (Öffentlicher Personennahverkehr): HVV (Hamburger Verkehrsverbund), Hochbahn, VHH (Verkehrsbetriebe Hamburg-Holstein), Deutsche Bahn/S-Bahn (Cargo) Bike rental (StadtRAD, Stromnetz Hamburg (charging infrastructure) Municipal waste disposal	BWI Altonaer Wirtschaftsförderung Logistik-Initiative Hamburg	BSW (Behörde für Stadtentwicklung und Wohnen) BUKEA (Behörde für Umwelt, Klima, Energie und Agrarwirtschaft), Climate Protection Office Hamburg Invest
Research	Hamburg University of Technology – Institute for mobility planning Katholische Universität Eichstätt-Ingolstadt (charging)	Hamburg School of Business Administration Kühne Logistics University	HafenCity University Hamburg

	Mobility	Logistic	Social and other
	RWTH Aachen (Rheinisch-Westfälische Technische Hochschule) (Duck train) Bergische Universität Wuppertal (emissions)		
Civil society	Neus Amt		HausDrei Kebap Social Aid Organizations Advocacy groups on inclusion and diversity Fridays4Future
Interest groups	Chamber of Commerce	Chamber of Commerce	Neighborhood Associations Nature conservation associations

Table 2. Result of the stakeholder mapping activities

4.2.2.3 Legitimacy

The objectives of MOVE21 and the local and national policy ambitions are aligned. This alignment is facilitated by the inclusion of public partners within the Hamburg Task Force, and enhancing the general legitimacy of the demonstration activities of MOVE21.

At a local level, the involvement of citizens is planned to be included in the design and implementation of actions in what is called the “social use-case”, which aims at providing the test sites with social and cultural values. Similar experiences were successfully implemented in other Horizon 2020 projects in Altona (e.g. Cities4People), and lessons have been learnt from experiences that showed the existing tensions between mobility stakeholders and citizens (e.g. Ottensen Macht Platz). This highlights the need to include citizens to enhance the feeling of ownership and appropriation of the project activities and demonstrations.

4.2.2.4 Resources and constraints

The project partners have adequate resources in place, especially regarding expertise and human resources. Regarding economic resources, the Task Force started to explore the options for additional funding sources. For instance, already in the summer of 2021, the BWI applied for national funding for a complementary logistic project – with a positive response received in November 2021. The ambition is that demonstrations have commercial viability, and not rely on public funding in the long run in order to enhance opportunities for upscaling and establishing viable and replicable business cases.

4.2.3 Future resources and constraints

The Living Labs enunciated several physical resource constraints and competition over space in different forms and for different reasons. D4.1 is aware that this could lead to conflicts and tensions in

the future, especially between the public and the private sectors, creating a risk to impede the implementation of demonstration activities and their long-term feasibility.

Particularly in the case of Hamburg, one thing that was identified as a constraint is the availability of suitable and affordable space/land. While the use of public space for hubs is an option for temporary use, commercial operational hubs should rather be set on private land. This aspect becomes more relevant when a comprehensive network of hubs is to be established as a part of an upscaling plan because the pressure on the availability of public space is high in Hamburg.

Regarding economic resources, emphasis is placed on the long-term economic viability to be defined by business models that the Living Labs and MOVE21 partners will develop.

4.3 Technology Solutions and Integration

Deliverable D5.1 establishes a comprehensive overview of the technological needs of the solutions to be implemented in the Living Labs. In particular, D5.1 focuses on the potential for integration among these technological solutions.

4.3.1 Hamburg set-up

D5.1 defines the Hamburg case by its main ambition to develop multi-functional hubs *"that integrate solutions for freight and passenger transport and offers additional services*" (Deliverable 5.1: 34). In practice, this ambition is to be achieved by a plan defined in three phases: (1) implementation of one or more hubs in the Eastern side of the District of Altona (Holstenstraße, and/or Kaltenkircher Platz), (2) connection of several hubs via real or simulated inter-hub traffic, and (3) integration of wholesale in the industrial area of Schnackenburgallee and additional services, as well as potentially an additional test site in a suburban area in the Western side of Altona (Lurup, Osdorf) along with the inter-hub traffic and real or simulated connection of passenger and freight transport. The realization of the three stated phases, however, is not to be understood in a strict chronological order. Instead, already from the beginning of the project, planning and discussions and negotiations with stakeholders have started for all areas. Yet, it is likely that these processes will be more time intensive in the areas named in phases 2 and 3 than in the other named areas. Further investigations in areas named in phases 2 and 3 are still ongoing and learnings from the first location will benefit the development of the other areas.

From this three-phase plan, it is understandable from D5.1 (although not mentioned explicitly) that the main technological integration potential of each phase lies on (1) space management and logistic operations –storage, delivery, and pick-up– in each hub individually, (2) alignment of operations of the individual hubs with inter-hub routing and exchange of packages, and (3) proper integration of a passenger-mobility model and freight-mobility model using the same fleet of vehicles on a demand-based time-share model.

4.3.2 Conclusions on technological solutions

The main points of D5.1 are about interconnectivity and interoperability. The Hamburg LL proposes case studies that plan on building and consolidating a network of hubs in the district, including transport between hubs and consolidation of cargo.

Additionally, D5.1 defines two key issues that are identified as central pathways for the development of demonstration activities in the three Living Labs, on the topic of technology solutions: (1) The integration between the ticketing (booking) systems used in public transportation with systems being used to book the used of on-demand transportation services (use of bicycles, e-scooters, taxis, and appropriate

amenities in the Mobility Hubs) and (2) the establishment of a coherent infrastructure for urban distribution of freight, with special focus on the capabilities for cargo consolidation/reconstruction, including information systems to manage such operations. It is not clear, however, on the applicability of these pathways to the case of the Hamburg LL, as it does not envision further integration of public transport and private on-demand services as a part of MOVE21 (it is implemented on a functioning service available as the Switchh app). Consolidation and reconstruction of freight is planned to be included as one of the main use cases, the “intra-hub” traffic.

D5.1 also mentions a potential integration pathway relevant for the Hamburg LL in Phase 3. This applies to the utilization of passenger shuttle vehicles for the movement of cargo and identifies the requirement of an adaptation for the ticketing system, as well as “in-vehicle” (driver) solutions so that the status of movements and proof of delivery of goods can be recorded and reported electronically.

5 Priority topics and Crossovers

One of the main characteristics of the Hamburg LL development is a methodological and an action-focus, which is focused on the definition of action plans and use-cases. This condition is given by the fact that all locations hosting demonstration activities are not fully settled (as of March 2022). In consequence, the Hamburg LL is planning actions of different nature, involving a different set of stakeholders each. These action types are referred to as “use-cases”, and have a planned implementation that is described in Section 6: Action Plan. The “use-case” is designed as a deployment methodology to be further adapted to each specific test site, considering potential combination of different use-cases (i.e., mixed-use). These “use-cases” are designed with one topic focus and under a general umbrella of inter-connectedness.

5.1 Priority topics

In the context of “use-cases” described above, the priority topics are set as (1) those actions needed in order for the use-cases to succeed, (2) each of the use-cases themselves, and (3) the actions depending on the direct use-case implementation. Additionally, each priority topic has it emphasis on specific Work Packages.

Test Sites	The settlement of a list of locations and the definitions of the demonstration activities to implement in each of them, following a dynamic and iterative approach. For those that are privately owned, property rental contracts are to be signed. For those that are publicly owned, use agreements are to be signed. Connection with WP4 is found in the governance agreements to settle the property and usage contracts.
Mobility Use-Case	Small-scale mobility measures are to be implemented in some of the locations that are candidates for hosting pilot demonstration activities. These measures are addressed, for instance, to passenger micro-mobility, on-demand solutions, or complementary to transportation measures, such as bike workshops or service points. Connection with WP5 is found in the integration of mobility services in multi-use infrastructure that also offers freight transportation services, and with WP10 to ensure the use of the solutions by the end users.
In-Hub Logistic Use-Case	Neighborhood-scale logistic operations of storage, delivery, and pick-up are considered to be implemented in the locations. Connection with WP5 is found in the integration of logistic services at the levels of (1) multiple operators, (2)

	multiple hubs in a network, (3) multiple logistic uses in a hub, and (4) multiple use-cases in each hub.
Combined Transport	Combined transport of goods and people. This can take place at the same time or at different times, with the same vehicle, in the same vehicle or in a trailer, carried by that vehicle. The use of on-demand shuttles, is one option, but also taxis or other services are being considered. Connection with WP5 is found in the integration of passenger and freight mobility using a single infrastructure, with WP7 learning from the implementation in other cities, with WP4 in the regulatory framework that needs to be created, and WP10 to maximize stakeholder and end-user buy-in.
Inter-Hub Logistic Traffic	Logistic traffic between the hubs considering consolidation of cargo (Deliverable 5.1 Annex B). To reduce the traffic of the individual carriers, the incoming cargo is unloaded by the carriers at one hub, and then collected by an "inter-hub"-carrier who distributes it to other hubs. Possibilities of using additional hubs beyond the ones implemented under the MOVE21 framework are being considered. The main connection is found with WP5 in the establishment and consolidation of a network of multiple hubs, and WP4 in the regulatory framework to manage several operators.
Social Use-Case	Specific uses involving social and cultural actions are planned to be implemented in hubs with available space for actions of this type. These uses aim at adding social value enhancing the social buy-in connected to the feeling of ownership. The main connection is found with WP3 to maximize positive social impact, WP10 for the engagement of citizens, and WP2 to the correct treatment of people and their data.

Table 3. Definition of key priority topics in the Hamburg Living Lab.

Additionally to the connections to the work packages mentioned above, all of the use-cases need to be aligned with WP7 to lean from other cities and to replicate successful in other cases, WP8 to monitor the process and results, WP9 to establish and consolidate sustainable business cases.

5.2 Cross-overs

5.2.1 To the different priority topics

The detection of a potential technological integration pathway at the end of D5.1 describes the need to establish solutions for the in-vehicle systems when sharing vehicles for cargo and passengers, as one particular action planned by the Hamburg LL. The Hamburg case is planning to test inter-hub logistic operations using passenger vehicles outside peak-hours. In order to plan for a definition of a use case that connects hub locations, hub locations need to be secured. Similarly, the proper definition of in-hub logistic operations is subject to the spatial conditions of the site (e.g., parking spaces, sizes of rooms, personnel and public access, etc.) as well as the feasibility of operators operating in each area. The areas also determine the mobility needs of the people living and visiting them, which defines the mobility solutions that might need to be in place. Due to the high diversity of socio-economic and spatial urban types in the District of Altona different social needs may arise at different locations i.e., determined by the type of urban fabric. In sum, the interlinkages across priority topics are connected to the selections and establishment of sites and property contracts.

5.2.2 To the different work packages

The Social Use-Case is strongly connected to WP3 and establishes an action framework on several levels of citizen participation. The role of citizens in the project is developed in WP3 and WP10, and the open civil society is planned as an active partner of the Social Use-Case. More specifically, D10.3 will

not only focus on local communication but also local end user and stakeholder involvement and buy-in, citizens being one category of end user/stakeholder. Tools and surveys developed in WP3 therefore need to be mentioned in D10.3 and vice versa.

WP4 envisioned a preliminary stakeholder mapping that is relevant to all of the use cases. For example, the stakeholders detected in the field of logistics are relevant to both the In-Hub and the Inter-Hub Logistic Use-Cases. It is also the case for the stakeholders identified in the other fields as well as the other uses. At the moment, a connection has been established with the Logistic Initiative of Hamburg in this regard. WP4 also includes a policy description that is relevant to keep an overview of the ways of sub-contracting an operator for inter-hub traffic and combined transport.

WP5 and the technological integration needs are directly related to the In-hub and Inter-hub logistic use-cases.

6 Innovation Agenda

In order to implement the mixed-use operation in the test sites, the envisioned priority topics are treated as separate use case plans that converge on a common action plan and a common time schedule. An inter-dependence of tasks from each use case plan within the common action plan framework is detected (Figure 2) and reflects the priorities detected in the section above. The figure represents the interdependencies between these use cases. Each location has different specific steps and timing.

Special emphasis is to be put on the Property Contract, as the establishment of fixed and final locations for the demonstration activities determines the operators and actions of the Social Use-Case. The spatial adaptations of the properties determine the operational capabilities and the time restrictions of the Logistics Use-Case. The spatial resources and the location of the properties are connected to specific mobility needs, which result in the design of an individualized context-based Mobility Use-Case. Finally, the establishment of a list of locations in which hubs are to be implemented establishes the specific routes of Inter-Hub Traffic operations and therefore determines the feasibility of specific operational plans i.e., the shared use of shuttle vehicles.

The Innovation Agenda establishes procedures to develop these Priority Topics, with awareness of these interconnections.

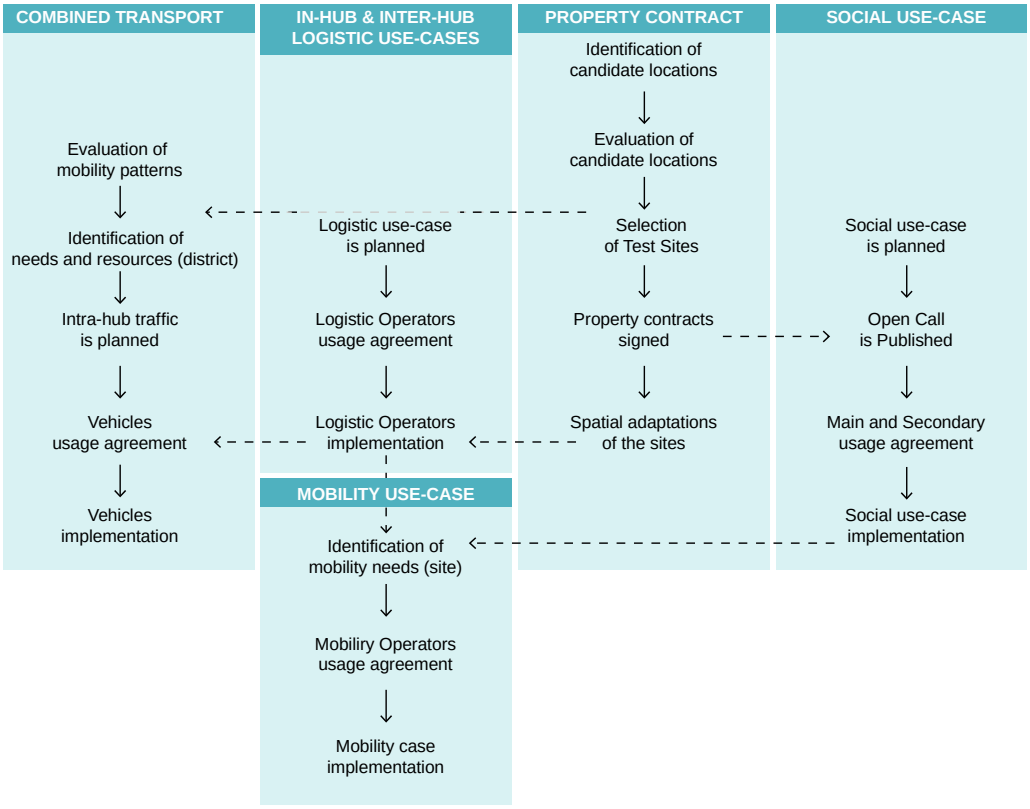

Figure 2. Scheme of the common action plan and interdependence of use-cases

6.1 Action plan

The Hamburg LL envisions implementation planning at several levels that are designed by following a scientific approach. A common methodological framework is established horizontally for all of the priority topics. A topical division in the different priority topics allows the parallel development, which is subject to the interdependencies described in the section above.

		Pilot Sites	*Mobility Use-case*	*In-Hub Use-case*	*Inter-Hub Use-case*	*Combined Transport*	*Social Use-case*
Initial conditions	*Opportunity funnel* In this phase, the Task Force explores and selects concrete (local and regional) actors that are already active in the city, and potential partners with whom to implement “solution modules”.	*Done*	*Done*	*Done*	*Done*	*Done*	*Done*
	Area search The Task Force lists the areas that have already been identified in the past, and can be utilized in partial solutions or offer available space for implementing “solution modules”.	*Done*	*In progress*	*Done*	*Done*	*Done*	*Done*

Hypothesis	*Hypothesis formation* In this process, matchmaking of "solution modules" and areas is performed to decide in which areas which solution should/could be implemented in the context of MOVE21. In this phase, a hypothesis is built where special attention is put to the concept of intersectionality (e.g. logistics and mobility): *Which solutions can be implemented, work well, and bring results.*	*Done*		*Done*	*In progress*	*In progress*	*Done*
Methodology	*Verification* Dialogues with partners on their experiences and readiness for implementation, including data-driven analyses. In this phase, the details of the implementation planning are defined and agreed upon with the third-party actors.	*Done*	*In progress*	*In progress*	*In progress*	*In progress*	*In progress*
	Implementation planning Formalization of deployment details involving third parties via the signature of contracts, assignments, and usage agreements.	*In progress*		*In progress*			
Experiment	*Realization* Implementation of the "solution modules" in the locations.						
Results	First experiences and follow-up of the implementation (4-6 weeks after start)						
Discussion	Hypothesis testing and knowledge transfer (Hamburg, MOVE21 consortium)						
Conclusion	Stabilization and replication plan filling the possibility funnel again and again						

Table 4. Description of the action plan in the LL Hamburg.

6.1.1 Test Sites

The Hamburg LL envisions phase-based planning of the property set-up and implementation of measures. They consider several candidate locations, whose settings and contextual factors have been analyzed in Deliverables D3.1, D4.1, and D5.1. The phase-based plan results, again, in the possibility of parallel development for each of the test sites and allows the inclusion of iterative processes, while keeping some common aspects for horizontal negotiation. For example, each property contract can be negotiated and signed independently, while the Inter-Hub logistic transportation needs to be planned across several hub locations. The phase-based planning envisions four phases (Figure 1):

- **Phase 1**: Establishment of hubs on the eastern side of the Altona district.
  - *Phase 1A*: Establishment of the first hub in Holsternstrasse for mobility, in-hub logistics, and social use cases.
  - *Phase 1B*: Enhancement of the depo at Harkortstrasse and establishment of a second hub at Kaltenkircher Platz.

  - o *Phase 1C*: Reorganize the area of Altona Train Station for enhancing mobility and in-hub logistic services.
- **Phase 2**: Start operations of Inter-hub traffic between the three hubs mentioned in 1a, 1b, and 1c, with the start / end-station in 1b (Kaltenkircher Platz).
- **Phase 3**: Extension of the inter-hub traffic operations to the area of Schackenburgallee (site to be defined).
- **Phase 4**: Extension of the inter-hub model to external locations in the west of Altona, with additional functions for mobility, in-hub, and social use-cases to be defined.

Holstenstraße (Phase 1A)
The first and main test site is located in a building in Holstenstraße 20. The building has several rooms that are planned to be designated for several use-cases. At the moment, at least one of the rooms will host a social use-case, while the other rooms will host mobility and logistic uses. At the moment (March 2022) a contract with SAGA is being negotiated. Due to the planned demolition of the building, the maximum duration of the contract is 2 years, meaning that the deployment will end while the MOVE21 project is still running.

In the contract with SAGA, the rental costs are agreed upon, and other essential points are in discussion. The building adaptation, rental period, and possibilities for subletting have been fully understood and accepted by all parts. Dependent on the contract signature, the hub in Holstenstraße is planning to implement the following use cases:

Mobility Use-Case	In-hub Logistic Use-Case	Inter-hub Logistic Use-Case	Social Use-Case
A tailored mobility use-case will be planned. SAGA conducted a survey on mobility patterns and needs, which will be used as the main input.	Micro depot (storage and consolidation) for parcel services Open package station is in discussion	Include the hub as a stop in the first inter-hub traffic phase (triangulation) and in the subsequent routes	One main social use established by social proxy Secondary social uses from bottom-up public participation Increase the quality of stay with seating and green spaces.

Table 5. Actions planned in Holstenstraße

Harkorstraße (Phase 1B)
The project envisions the enhancement of a hub in Harkortstraße. The BWI has received national funding from the BWVI to build up and establish a micro-hub for logistic use. The implementation is expected for Fall 2022 and has a running time of four years. The Hamburg LL aims at extending the services of the hub to include additional mobility, inter-hub logistic, and social solutions.

Mobility Use-Case (MOVE21)	In-hub Logistic Use-Case (part of BMVI)	Inter-hub Logistic Use-Case (MOVE21)	Social Use-Case (MOVE21)
Passenger mobility in discussion **Bike and cargo-bike rental** **Battery exchange stations**	**Parcel Service** **Other Courier Services** **Parcel station including pickup to be discussed**	**Include the hub as a stop in the first inter-hub traffic phase (triangulation) and in the subsequent routes**	**Possibility to use the hall for social and cultural events, potentially connected to the Quartierspark** **Increase the quality of space by adding seating and greenery**

Table 6. Actions planned in Harkorstraße

Kaltenkircher Platz (Phases 1B and 2)

A hub is planned at the corner intersection between Plöner Str and Kaltenkircher Platz. The main importance of this hub is the connection between the commercial and industrial areas of Schnackenburgallee and Diebsteich. This applies to the transport of goods within the foreseen inter-hub traffic as a supplement to the hub network. At the same time, the Kaltenkircher Platz serves as a node for passenger transport between residential areas, especially in the south and east of Klatenkircherplatz, and the named commercial and industrial areas in the north and west.

Mobility Use-Case	In-hub Logistic Use-Case	Inter-hub Logistic Use-Case	Social Use-Case
Car sharing station (based on Switchh) Battery exchange stations Charging points for carsharing and vans, to be discussed	Parcel station including pickup to be discussed	Include the hub as a stop in the first inter-hub traffic phase (triangulation) and in the subsequent routes	Increase the quality of space by adding seating and greenery Consider climate aspects.

Table 7. Actions planned in Kaltenkircher Platz

Altona Train Station (Phase 1C)

The Hamburg LL plans several actions at the central station of Altona, at Präsident-Krahn-Strasse. These actions are understood within the framework of the (1) spatial reorganization of further passenger mobility services at the station, (2) consolidation of the existing logistics hub in the basement of the station, (3) integration of the retail in Ottenser Hauptstraße and Große Bergstraße into the MOVE21 network[2], (4) the creation of additional mobility offers for retail, service companies, customers, commuters, and residents, and (5) the integration of the train station in the analyses for the expansion of the use of ioki shuttles. In the particular case of the Altona Train Station, no specific social use-case is defined yet. The remaining use-cases are planned with a vision in three different time horizons: short, medium, and long terms.

[2] In a boarder sense, as users of the logistic services, beneficiaries of sustainable people mobility, and multipliers for the overall idea of connecting mobility of people and goods in urban areas e.g. cargo bikes that can be used by customers, be at the shops for deliveries, or parcel pick-up points in shopping areas.

	Mobility use-case	In and Inter Logistic use-case	e-charging solutions
Short-term	Analysis for the reorganization of mobility offers Installation of additional rental cargo bikes (StadtRAD or e.g., Klara) Altona Station as a node in ioki analysis	Installation Hamburg Box 2.0 Resumption of freight handling in the station basement	Use of the freeloading lane for charging points or flexible service points for cargo bikes Installation of charging locker for commercial/private cargo bikes/pedelecs
Medium-term	Development of FABIRA (bicycle library)	Include the hub as a stop in the first inter-hub traffic	Reservable e-charging spaces
Long-term	Spatial reorganization of mobility services Depending on the result of the ioki analysis, expansion of the ioki business area to operate in Altona Station	Establishment of a cargo bike delivery service for local retailers Integration of the station into combined passenger and freight transport (possibly via ioki)	

Table 8. Actions planned in Altona Train Station

Schackenburgallee (Phase 3)

The industrial area of Schackenburgallee has strong potential to host a node in a cargo distribution network, as the inter-hub traffic scheme is envisioned. The area is well connected with major arteries, and it already hosts logistic functions for private industrial actors. Therefore, a cargo consolidation center is planned as part of MOVE21 in the third Phase. However, no specific use case or location is in place yet, as a development program of the area (the Reallabor "Standortbezogenes Mobilitätsmanagement" an der Schnackenburgallee) that is aiming at the implementation of site-based mobility management has started in early 2022. First analyses will be started mid-2022. As this program is developed by the district of Altona, results from the analyses can be used already at the early stages of MOVE21, and vice versa, the concepts developed in MOVE21 in Hamburg will be directly brought into the processes and dialogues with the local companies and other relevant stakeholders. In addition to the logistic aspects, also the mobility of people will be considered in MOVE21 and the mentioned development program. The goal is to develop mobility services together with the local companies that allow the employees to move sustainably through the commercial and industrial areas. This includes among others the improvement of public transport services and increasing the attractiveness of active forms of mobility.

Osdorfer Born / Lurup (Phase 4)

The location of hubs in suburban areas in the context of MOVE21 takes place in the western district with a very defined residential fabric and lower diversity of amenities and services. In these locations, a hub could function as a necessary service within a walkable distance for neighbors, and possibilities of the combination of use-cases can be explored in cooperation with RISE (Framework Program Integrated Urban District Development). Additionally, western districts (Iserbrook, Sülldorf, and Rissen) are also being considered for the fourth phase. However, no specific use case or location is in place yet.

6.1.2 Mobility Use-Case

The mobility use case of the hubs planned by the Hamburg LL is designed as “urban acupuncture actions” (small actions with low intervention impact and high outcome) on the mobility conditions of the areas around the test sites. At the moment, the following passenger mobility possibilities are being considered, conditioned by the availability of properties:

- HVV switchh: To include station-based and free floating car-sharing and as link to the multi-modal platform
- StadtRAD: As station-based bike sharing operator (incl. cargo-pedelecs)
- Private cargo bike sharing services that can be considered when private property is available.
- Improvements with regards to public transport should be considered, such as enhancing the attractiveness of the surrounding of stops that are close to some hubs by offering urban furniture, additional information etc.
- On-demand shuttle services. It could be possible to have not only virtual, but fixed stops for MOIA or ioki at the MOVE21 hubs
- Exchange battery stations. In this regard, micro-mobility operators TIER and Felyx are being considered.

The inclusion of services to private micro-mobility operators will be explored as a financing option to define the business cases, in which both charging stations and battery exchange stations are managed of third-party operators e.g., Apcoa, and available for rent to retailers and private users.

6.1.3 In-Hub Logistic Use-Case

A plan for logistic operations and maintenance operations for logistic vehicles is envisioned. At the moment, several conversations are in place with logistic operators, establishing a series of services that the hubs aim at including in the first phase of the project.

Holstenstraße:
- Micro-Depot (consolidation and storage)
- E-Sprinter Charging station
- Parking
- Maintenance
- Open packet station (for pickup)

Kaltenkircher Platz:
- Parking & Charging for E-Sprinter
- Parking
- Maintenance
- Battery exchange center for eCargobikes

Altona Train Station:
- Parking
- Charging station
- Maintenance:Battery exchange center for eCargobikes

6.1.4 Inter-Hub Logistic Traffic

The logistics traffic between the hubs is being planned with freight consolidation in mind. To decrease individual carrier traffic, arriving goods is unloaded at one hub, then collected by a "inter-hub" carrier,

who distributes it to other hubs. Additional hubs, in addition to those constructed under the MOVE21 architecture, are being studied.

6.1.5 Combined Traffic

A use-case of combined transport is being planned using vehicles to transport people and freight, either simultaneously or with a time-share scheme. Utilizing passenger vehicles during off-peak hours is being considered. An in-depth analysis of passenger mobility demand and logistic volume prediction is being performed in order to detect the areas where the usage of vehicles for mobility could be reduced. The use of those vehicles could be transferred to a different area to perform an exchange of deliveries between hubs that are in place. As of today (March 2022), the analysis is undergoing.

Preliminary results of the analysis performed by SmartCity DB for the district of Altona show certain gaps in accessibility to public transport, with lower accessibility to public transport stops and stations in the western parts of Altona. To compensate for this accessibility deficit, an “on-demand” shuttle solution could be viable. To keep a consistent service that acts on-demand, the demand peak hours are also analyzed. Windows of off-demand hours are being established and recommended as suitable time slots for logistic use.

In the Grant Agreement of MOVE21, the company VHH with IT-services of Ioki was mentioned as the envisioned service provider. However, the continuation of the current services in the areas of Lurup and Osdorf beyond 2023 has not been confirmed yet. Thus, an expansion to further areas, that could be required for the use-case in MOVE21, is in doubt. Discussions with VHH/Ioki and other mobility providers are planned, including an assessment of the operation areas based on the aforementioned analysis by SmartCity DB, which is planned to conclude in May 2022.

- The consideration of Iserbrook, Sülldorf, and Rissen for passenger mobility.
- The Schnackenburgallee area should also be considered - the connections here may not only be the Diebsteich S-Bahn, but also the Bahrenfeld S-Bahn (or new Ottensen station) as shuttle start/endpoints to be considered (background: parallel funding projects)
- A comparison and parameter-check with the existing Lurup and Osdorf operating areas with the relevant key data would be desirable in order to learn from the current Ioki operations in terms of capacities and usage periods.

6.1.6 Social Use-Case

The project MOVE21 intends to provide incentives for public-public and public-private cooperation and for the involvement of civil society. The project deploys innovation actions in the Living Labs by the implementation of a Quadruple Helix Innovation Model. In this, the involvement of citizens and civil society organizations is specifically pursued by inviting local citizen associations, collectives, and people who live in the area (and thus are experts with local knowledge). The involvement of citizens and civil society within the Innovation and Co-Creation Partnership (ICCP) is intended to create *short-term social, economic, and wellbeing impacts,* as well as *to support the uptake of smart urban mobility solutions.* As mentioned several times in the Grant Agreement, MOVE21 will apply strong citizen engagement in its co-creation and co-design processes. The involvement of citizens and society in MOVE21 is considered in a direct and indirect form. Direct involvement implies active participation and/or an active role in the deployment of solutions in the place. It also promotes the inclusion of citizens (as proxies) within the project organizational framework as part of the ICCPs. Indirect involvement would encompass the consideration of information generated by citizens, without an explicit connection between citizens and the Task Forces. In this context, several involvement levels are defined. The direct and active involvement of both citizens and representatives of civil society including representatives of vulnerable

groups recognized by the EC (referred to as *proxies*) is planned at levels 2 and 3. Indirect involvement of citizens and proxies as surveys and/or data monitoring is planned at levels 1 and 4.

Level 1: Surveying and status quo mapping
In order to define the status quo of the locations where the living labs are implemented, the involvement of social data is envisioned to tailor use-case solutions to each specific social context. This status quo definition is represented by the context analysis that involves social and spatial indicators together, and it is currently published as D3.1. In addition, part of the status quo analysis is included in the ex-ante measurements included in the Impact Analysis Framework, referring to the values measured before implementing the solutions.

Level 2: Active voice selecting a use-case
The project envisions the involvement of people framed as *active citizen engagement* during the definition of policies and solutions through inclusive co-creation models. Involving open citizenship through a dynamic and open innovation process helps better define needs, barriers, and challenges bringing citizens, policymakers, and experts together. Participation in the use-case selection is relevant when creating a sense of ownership of solutions that ultimately allows for wide acceptance and uptake of said solutions.

Level 3: Implementation of the use-case
The ICCP framework involves the design and implementation of self-sustainable business solutions including the involvement of civil society. In addition, the project objectives include the involvement of Quadruple Helix actors in the deployment, replication, and upscaling of solutions. In particular MOVE21 plans to perform specific activities geared toward citizens to take up MOVE21 solutions.

Level 4: Impact monitoring
The Impact Analysis Framework (D8.1) involves a set of indicators that are related to civil society. These indicators combine a series of direct monitoring of impact, such as pedestrian flow increase, as well as perceptual factors such as perceived level of security. The monitoring of these impacts is performed before, during, and after the MOVE21 solutions are deployed.

In the case of the Hamburg LL, a specific use-case dedicated to social aspects is defined as one of the main uses of the hub located in Holstenstraße 20. The project aims at implementing a social or cultural use to be hosted in parts of the building, of ca. 60 sqm, with access to kitchen and bathroom facilities in the building. This social use-case is planned to be combined with two additional use-cases in the same building: mobility of goods and mobility of people. The social use-case in Hamburg is framed under the direct and active participation levels (2 and 3) including use-case selection and implementation. This is addressed with the concept of a mixed social-use scheme that envisions a combination of multiple uses and operators in the room dedicated to the social use-case.

The scheme of multiple social use-cases envisions one “main” use-case and operator, and additional “secondary” use-cases, potentially offered by additional operators.

A property rental contract is to be signed between the property owner and the District of Altona, which establishes the conditions to use the building for MOVE21. Smart City DB will be the main operator of the hub with reference to its main uses in logistics and mobility. The District of Altona and Smart City DB will conclude a separate agreement to arrange the conditions and obligations that have to be considered for the operation of the hub. Subsequently, additional usage agreements are to be signed by Smart City DB and the operators of the mobility of people and goods. The responsibilities for the establishment and supervision of the social-use-case, however, are planned to stay at the District of

Altona. For the implementation and coordination of the social uses, a “main” social-operator is planned to be found.

The “main” social-operator is offered to use shared and exclusive space on a reduced or free of charge. The “main” social-operator should be responsible for the maintenance of the shared rooms used by the public (kitchen, floor, WC), as well as organizing and guaranteeing the operability of the “secondary” use-cases.

The “secondary” use cases are subject to the conditions established by the “main” operator in additional usage agreements.

Main Use	Secondary Use(s)
Medium-long term planning	Periodic or limited length (shorter)
Full length of the rental period (18 Months)	Scheduled or on-demand
Depending on MOVE21	Depending on the “main” use-case
Operated by Proxies / main associations	Operated by Citizens / smaller associations
Top-down approach	Bottom-up approach

Table 9. Description of the different uses envisioned

6.1.6.1 Main use-case

The room is to be used within the framework of a patronage model to create an open offer for people from the district. In this sense, basic equipment is to be provided that can be used by local actors for different target groups. Such equipment essentially includes sufficient chairs, tables, dishes, cooking facilities, as well as tools for craft and artistic activities.

The goal of the social use is to create low-threshold access to cultural education and leisure activities for people of all ages. In addition, the project is intended to promote positive contact between new and old residents and local cooperation in the district, as well as to support social cohesion.

Within the framework of networking various initiatives, individual actors, and existing institutions, a platform is to be created on the basis of which the discussion of contemporary social processes as well as environmental and climate change related issues can be stimulated. Within the framework of the promotion of artistic and manual skills, creative forms of expression and thus the self-confidence of children and young people are strengthened. The project also builds bridges to cultural and social institutions that extend beyond the duration of the interim use. The social use designed in this way promotes inclusion and social development in the district.

The “main” use-case is to be operated by the main organizations of civil society, and it needs to be compatible with the other use-cases in the building being (1) the mobility of goods and people in other rooms of the building and potentially outdoor spaces, and (2) other social use-cases to be combined with the same room at different timeframes.

6.1.6.2 Secondary use-case/-s

The secondary use-case(s) definition is planned to be the result of a scouting process in the form of an open-call initiative that aims at opening the possibility of participating to all civil society and citizens that are interested in the definition and implementation of social use. The room dedicated to the social use-case in Holstenstraße 20 would be offered to test bottom-up initiatives for short periods and shall be taken as an opportunity to test operational models for small associations, start-ups, and individual citizens.

The secondary use-case(s) need to be temporally and spatially compatible with the “main” use-case. The secondary use-case(s) is intended to be shorter and easy to implement as a “plug and play” solution. This implies that the solution would be highly replicable, meeting the MOVE21 ambition of testing and replicating, and being highly innovative.

Phase 1: Open Call
Participants are identified, contacted, and offered to join bilateral meetings with the Task Force. An open call is published, to call for additional initiatives and ensure the open accessibility of the room for the citizens.

Phase 2: Preparation
A selection of social uses is announced, and a schedule of integration is proposed to the winners. A utilization contract is created and necessary basic equipment for the diverse use of the rooms is listed and made available in the room. The cost coverage of additional equipment is to be defined.

Phase 3: Operation
The rooms are used by various initiatives and actors. It is desirable that these uses are interlocked in the course of time so that a mixing of the target groups can take place. To this end, there will be regular meetings of the initiatives offering social uses. During these meetings, challenges in the use of the rooms and possible solutions will also be discussed.

Phase 4: Documentation and replication potential
In the last period, the social use will be reflected upon. The focus will be on successes, challenges, and failures in achieving the above goals. Both the “main” and the “secondary” use-case operators are required to submit a report after their operation, collecting key lessons learned in order to be able to replicate solutions in the future, beyond the project framework. Furthermore, possibilities to maintain created networks and offers in the district will be discussed. It is intended to conclude the social use case with a joint closing event with the operators.

6.2 Knowledge Brokering needs

This section briefly describes the opportunities and needs for knowledge brokerage derived from the Crossovers and the Innovation Agenda presented in the sections above. These needs are established in relation to the main topics of the Action Plan. Currently, the Hamburg LL is planning the development of the overall concept for each test site with the TF. How exactly other stakeholders will contribute still needs to be discussed and decided.

The knowledge brokerage processes will
- deliver timely and relevant state-of-the-art knowledge,
- analyze the current situation,
- provide support for the co-creation of innovations and
- help to design possible interventions.

	Hamburg LL TF & ICCP	**MOVE21 and WPs** M21 & WPs
Test Sites	**Property Owner and TF:** Adoption of common mission and vision. **Property Owner and TF:** Adoption of an operational time schedule.	**TF, WP3 and WP6:** Workshop on spatial challenges and solutions to find locations. **TF and WP4:** Governance agreements made between Property Owner and TF: how to overcome (spatial and governance) challenges. **TF and WP10:** Local communication at the level of general public communication about the project.
Mobility Use-Case	**Mobility operator and Logistic operator:** Space management and needs. **Mobility operator and TF:** Adoption of common mission and vision. **Mobility operator and District of Altona:** Establishment of usage agreement and time conditions. **Mobility operator and TF-PM:** Adoption of an operational time schedule.	**TF and WP5:** Digital Twinning to simulate patterns, use, and impact of the mobility offer. **TF, WP5 and WP7:** Input for integration of small mobility solutions in logistic hubs with reference to other cities, **TF and WP8:** Monitoring procedures and KPI reporting. **TF and WP10:** Local communication to maximize visibility and end-user buy-in to ensure that the mobility services in the hubs are used by citizens.
In-Hub Logistic Use-Case	**In-Hub Logistic operator and TF:** Adoption of common mission and vision. **In-Hub Logistic operator and District of Altona:** Establishment of usage agreement and time conditions. **In-Hub Logistic operator and TF-PM:** Adoption of an operational time schedule.	**TF, WP4 and WP6:** Responsibilities and involvement of the logistic operators in the ICCP structure, as well as governance agreements. **TF and WP4:** Ensure correct balance between logistic stakeholder interest and the other stakeholders (passenger mobility and social uses). **TF and WP5:** Assessment of the solutions and their integration with the other use-cases considering multiple operators. **TF and WP7:** Input from other cities activities considering the adaptation of the Hamburg model. Output from Hamburg LL to other cities to facilitate replication. **TF and WP8:** Monitoring procedures and KPI reporting. **TF and WP10:** Local communication at the level of information to the public. Citizen buy-in will be needed in those cases including parcel delivery.
Inter-Hub Logistic Traffic	**Inter-Hub Logistic operator and TF:** Adoption of common mission and vision. **Inter-Hub Logistic operator and TF-PM:** Adoption of an operational time schedule. **TF and BVM, BWI:** Establishment of a regulatory framework for multiple operators of cargo in an integrated infrastructure .	**TF, WP4 and WP6:** Responsibilities and involvement of the logistic operators in the ICCP structure, as well as governance agreements. **TF and WP5:** Digital Twinning to simulate patterns, use, and impact **TF, WP5 and WP9:** Establishment of a business model sustained beyond the project lifetime. **TF and WP8:** Monitoring procedures and KPI reporting. **TF and WP10:** Local communication at the level of information to the public.

Combined Traffic	**Combined traffic operator and TF:** Adoption of common mission and vision. **Combined traffic operator and TF-PM:** Adoption of an operational time schedule. **TF and BVM, BWI:** Establishment of a regulatory framework for integrated use of people and freight in the same vehicles. Testing and concluding user readiness. **TF and ÖPNV:** Alignment with existing infrastructure of public transport, public opinion and open usage.	**TF and WP5:** Digital Twinning to simulate patterns, use, and impact, and assessment in consolidation of freight. **TF and WP8:** Monitoring procedures and KPI reporting. **TF and WP9:** Ensure the mixed-use vehicle business model self-sustainability and exploitation beyond the project lifetime. **TF and WP10:** Local communication of activities and public opinion management to ensure public acceptance of the demonstration actions.
Social Use-Case	**Social operator and Logistic operator:** Space management and needs. **Social operator and TF:** Adoption of common mission and vision. **Social operator and District of Altona:** Establishment of usage agreement and time conditions. **Social operator and TF-PM:** Adoption of an operational time schedule. **Social operator and other social operators:** Alignment in operational phase and compatibility of uses.	**TF and WP2:** Ensure proper treatment of users/proxies and data. **HH-TF and WP3:** Overview and guidelines of the social use-case. Assessment in the multi-user model operation. Potential additional educational uses to be considered. **TF, WP3, WP4, and WP6:** Responsibilities and involvement of the social operators in the ICCP structure, as well as governance agreements. **TF, WP3 and WP8:** Monitoring procedures with special focus on perceived qualities. **TF, WP3 and WP10:** Local communication and stakeholder involvement. Establishment of the site's identity. Maximize citizen buy-in. Special target to the hyper-local social environment (immediate surroundings). **TF, WP7:** Replication scheme for integration of social and cultural uses in available spaces in other cities.

Table 10. Description of main Knowledge Brokerage needs

6.3 Timing of the Knowledge Brokering process in the Living Lab

The timing of the knowledge brokerage process in the Hamburg LL is linked to the establishment of the Innovation and Co-Creation Partnerships that will ensure the extension of measures after the end of the project. MOVE21 intends to develop long-term, scalable business models in direct collaboration with users and additional actors in the framework of an expert network. For the conception and design of the ICCP, the task force held several internal workshops in order to develop a common vision and mission. In addition, the task force had initial meetings with LI-HH to discuss and agree on the objectives and the organizational structure of the ICCP. The results of these workshops and the current status of the ICCP development are summarized below.

6.3.1.1 Vision statement

The ICCP prepares the ground for integrated mobility and logistics innovations and launches them in Hamburg. The ICCP works as an advisor, facilitator, and networker to manifest the MOVE21 goals "on the ground" and creates the local conditions through its know-how and broad network for sustainable urban mobility and logistics transformation.

The ICCP:
- Strengthens local acceptance and anchoring of MOVE21;
- Operates an active network to achieve the goals;
- Assumes a central exchange and advisory function due to its expertise;
- Supports the development and implementation of integrated mobility and logistics innovations;
- Ensures the establishment, connectivity, and market acceptance of the solutions developed;
- Takes up developed approaches and innovations for replication and upscaling and continues them beyond the project duration.

6.3.1.2 Mission statement

The ICCP actively contributes to achieving MOVE21s goals on a broad basis.

The ICCP:
- Is in exchange with local stakeholders and actively involves them from the beginning;
- Works together in a transparent and results-oriented manner;
- Keeps an overview of the different concerns and interests;
- Tests and trials the marketability of innovations;
- Develops its own business cases and functional solutions based on the approaches of MOVE21;
- Identifies appropriate funding programs.

6.3.2 Objectives of the ICCP

The ICCP will be launched during the duration of the MOVE21 project to promote knowledge exchange and collaboration among stakeholders who are (or want to become) active in the thematic field of integrated urban logistics and people mobility. In this regard, the ICCP builds with the LI-HH on an already existing network to leverage existing expertise in the topic area of logistics innovation and the integration of logistics and people mobility. Another reason for connecting to an existing network is to enable continuation beyond the lifetime of the project. In order to create a good basis for innovation, the ICCP should be composed of different local actors (quadruple helix) from the public and private sectors as well as academia and civil society. The ICCP will discuss topics such as local innovation potentials, as well as technological, economic, legal, and organizational hurdles and possible solutions.

In order to achieve these goals, stakeholders from the following areas have been identified by the Hamburg task force to be part of the ICCP working group (*Arbeitskreis*): specialized authorities (BVM and BSW), public transport, the housing industry, charging infrastructure, municipal. Recycling/Disposal, Chamber of Commerce, Chamber of Crafts, as well as science and civil society.

6.3.2.1 Organizational structure of the Arbeitskreis (draft).

A new LI-HH board /working group for the topic area of Urban Logistics/Last Mile under the leadership of BWI was identified as a suitable common starting point for the Innovation Co-Creation Partnership. The board/working group should serve as an opportunity for networking and exchange within the branch in order to promote the implementation of the resolution on Last Mile (*Drucksache*). The linkage between logistics and people mobility needs to be further elaborated, as it is less established than last-mile logistics and there is a greater intersection with other stakeholders (e.g., New Mobility Solutions, BVM). In addition, specifically suitable partners still have to be identified for the field of personal mobility (e.g., from the BVM). As the leader of the board/working group and through its participation in the MOVE21 project, BWI contributes the relevant project topics from MOVE21 to the working group. Topics relevant to MOVE21 beyond logistics and people mobility, such as the involvement of social and cultural stakeholders, will be addressed in separate workshops organized by the MOVE21 task force.

6.3.3 Action timeline

The Living Lab Hamburg established a timeline that incorporates the Knowledge Brokerage events that are envisioned for the upcoming development of the project. As stated above, the timeline is conditioned by the establishment of the ICCP, the incorporation of additional actors to the ICCP, and the accomplishment of the project milestones. Additionally, the interdependencies between priority topics described above also have a potential impact on the timeline development, since key facts such as the signature of contracts with the property owners might condition the possibilities of establishing more concrete work plans. The intended timeline for the year 2022 in terms of TF, ICCP, and MOVE21 exchanges in the context of the Hamburg LL (as of March 2022) is depicted in Figure 3.

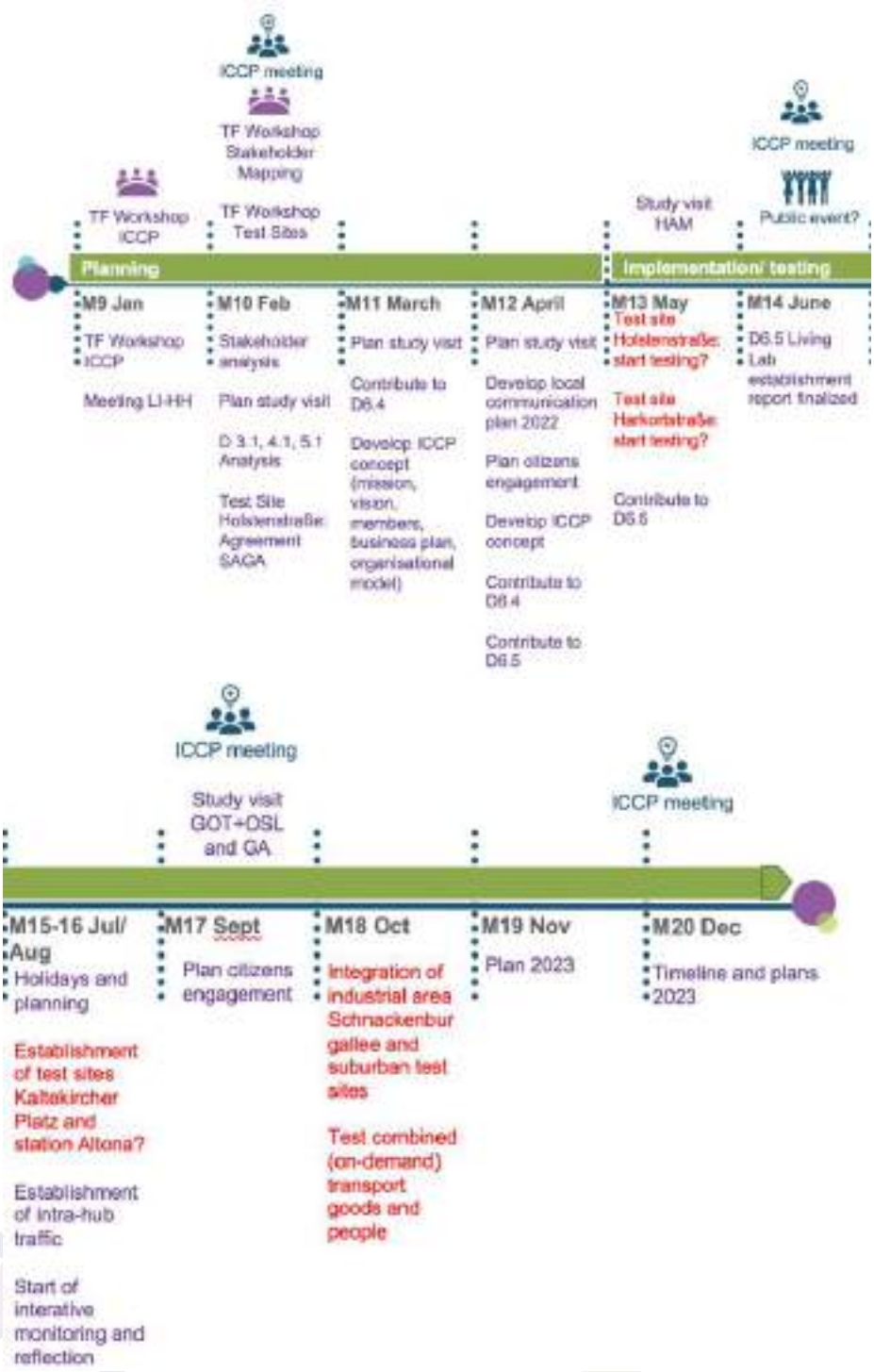

Figure 3. Envisioned Timeline as of March 2022.

7 Conclusions

With a comprehensive view of the priority topics defined in the Hamburg Living Lab, and in light of the inter-dependences between several tasks that integrate the activities of these priority topics, the current

status and upcoming development of the Hamburg LL are assessed with an integrated SWOT diagnosis.

Strengths

- The priority topics are actions of different nature, involving a different set of stakeholders each. These actions (use-cases) are not designed for a specific site, but as a deployment methodology with an individual topic focus, and under a general umbrella of inter-connectedness. Therefore, each action can be planned independently and progress can be made by different actors in parallel.
- The involvement of one of the main stakeholders at the city-scale, the Logistik-Initiative Hamburg, at the early stage of the ICCP establishment is a strength, as it will consolidate the elemental organizational and communication structure of the ICCP and will be ready for further actors.

Weaknesses

- Even though the “use-cases” are able to be planned independently, there is still a strong dependence on the selection of a site. While the use-cases are designed as methodologies, there are still implementation measures that need to be considered and adapted to a specific context. The TF aims at developing a set of "building blocks" to be implemented in the different test sites, but not necessarily all. They are to be a basis for upscaling actions beyond the MOVE21 project.
- Even though the ICCP is in place with a major actor in the field of logistics, there is still a noticeable lack of involvement of other actors in the ICCP, especially in the field of passenger mobility. While a plan to involve a “social” operator in the ICCP is in place with HausDrei, there is no defined strategy to include “mobility” actors yet. In order to address this issue, the involvement of further actors will be discussed in the near future.

Opportunities

- As stated above, the methodologies defined following a use-case approach constitute the opportunity for an easier replication and upscaling, close to a “plug-and-play” type of solution.
- Once the building models are defined and the solutions are operating, the proper documentation will establish a direct correlation between method and results, constituting a legitimate corpus of collective scientific knowledge.
- Knowledge Brokering could potentially speed up processes and decision-making, for instance, offering results of simulation scenarios or involving best practices in governance innovation.

Threats

- As the test sites have not been fully secured yet, the main threat relies on the fact that there is no assurance of the actions or “use-cases” to be able to be deployed regardless of the spatial conditions. Furthermore, extensive delay in the securement of the test sites might result in the need of redesigning the “use-cases” themselves, as the actors might have re-evaluated their interest, or the use-cases supplied by MOVE21 might have been covered by other external actors in the landscape.

This deliverable is intended to provide insights into the contextual factors that need to be taken into account for the development and deployment of the proposed MOVE21 solutions. D6.4 gives an overview of key subjects that are being addressed, and will be addressed in the future. This deliverable also emphasizes the interdependencies between those key topics, and the connections to WPs in MOVE21 and their respective expertise. For this reason, we see a need for exchange, discussion, learning, and collaboration between the Hamburg LL and the WPs.

To have a successful knowledge brokerage process, the Hamburg LL needs to be aligned with WP3, WP4 and WP5, especially to develop specific aspects of each use-case. Again, the expertise of WP3

on social matters, WP4 on governance, and WP5 on technological solutions and integration should be applied to the unique needs of each test site. To do so, the process of concretizing the actions and plans on the side of the Living Lab needs to be mirrored by the assessments and work on the side of the WPs. As depicted in Table 4, the majority of actions are still in a planning phase. In the upcoming months, major efforts must be put in knowledge exchange with other cities through WP7, in order to learn from them and to transfer the lessons learnt from the implementation of the different use cases. It is especially relevant to work in coordination with WP10 to guarantee stakeholder involvement and end-user buy-in, and with WP8 to monitor the progress and the results of the demonstration actions in order to learn about their success and their impact. These learnings will be consolidated into business models that can be sustained beyond the project in cooperation with WP9.

Finally, when the solutions are implemented and replicated, there may be other difficulties that require expert input and should be addressed in the knowledge brokerage process in order to ensure high impact of solutions and their likely success.

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