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SmartHubs

Smart Mobility Hubs as Game Changers in Transport

WP4. SmartHubs Living Labs

T4.2. Living Lab implementation Eastern Austria

Deliverable D 4.2

Living Lab implementation report Eastern Austria

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EXECUTIVE SUMMARY

The following deliverable summarizes the Living Lab implementation process of the Eastern Austria Living Lab (EALL). The EALL consists of two Austrian federal states: the Austrian capital and federal state Vienna and the federal state Lower Austria. As Lower Austria surrounds Vienna entirely, this leads to strong dependencies between spatial entities, especially when looking at mobility systems and commuter relations. The Living Lab is very heterogeneous regarding relevant governance, prerequisites for mobility hub developments and experience.

The strategic goals of the lab are for example the improvement of cross-institutional learning processes on mobility hubs in the region and support local stakeholders in building robust networks of mobility hubs through the use of the developed SmartHubs tools. Additionally, the SmartHubs project (www.smartmobilityhubs.eu) will enhance data availability in areas where no data on user needs and preferences are available. Two case studies in Vienna (Mobility station Maria-Tusch Straße and Mobility station Bruno-Marek-Allee) and one in Lower Austria (Mobility Station Pillichsdorf) were selected for the Living Lab implementation. Within the Living Lab planning process relevant needs of citizens and stakeholders have been identified and considered in the mobility hub design. These designs include for example improvements to the hub's surrounding public space and quality of short stay as well as awareness-raising measures to increase the attractiveness and visibility of the mobility hub to potential users. The final chapter consists of the Living Lab evaluation and gives insight on the survey which collected information on current and potential usage and the impact of mobility hubs - including a dataset with 550 valid responses from inhabitants of Lower Austria and Vienna. Finally, learnings, main findings and reflections on the Living Lab process conclude the deliverable.

1. LIVING LAB SET-UP

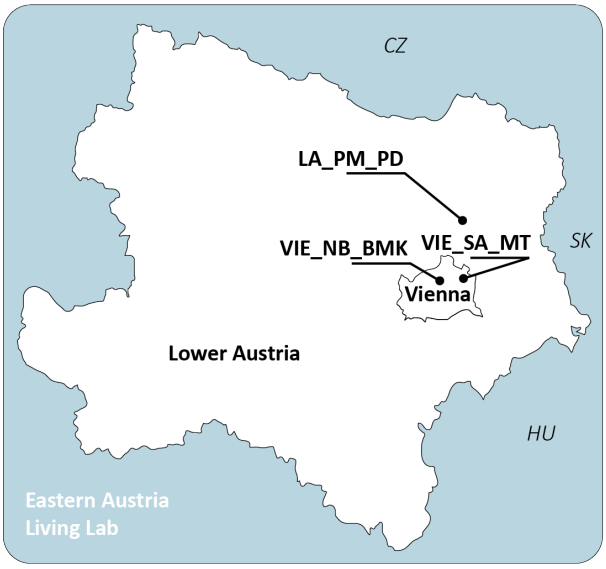
1.1.City context

Living Lab - spatial configuration overview

The Eastern Austria Living Lab (EALL) consists of two very heterogeneous Austrian federals states (as governmental bodies and spatial entities):

- the Austrian capital and federal state Vienna
- the federal state Lower Austria

Lower Austria surrounds Vienna entirely (see Figure 1) which has led to strong dependencies between these spatial entities, especially when looking into the mobility system and commuter relations. Throughout the Living Lab, different developments in the field of mobility hubs can be observed - several public and privately operated networks of hubs are in a process of establishment (ÖBB 360, LISA, Wien Mobil, Easymobil, MO.Point, …, see section 1.3, especially Figure 5, for more an overview on the networks). In the following an overview on the general context regarding the two entities, Vienna and Lower Austria, will be given.

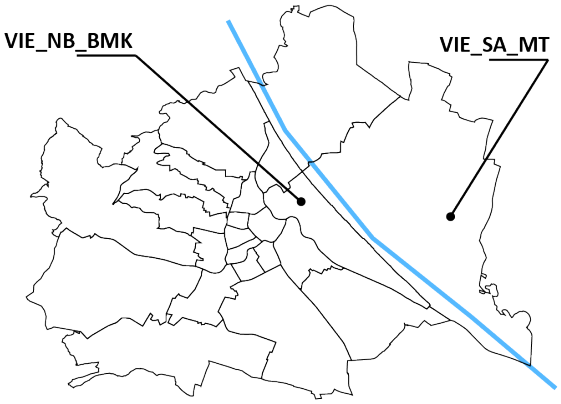


LA_PM_PD	Case Study Pillichsdorf (Lower Austria)
VIE_NB_BMK	Case Study Bruno-Marek-Allee (Vienna)
VIE_SA_MT	Case Study Maria-Tusch-Straße (Vienna)

Figure 1 Spatial context of the Eastern Austria Living Lab (borders: OpenStreetMap 2023)

Context Vienna (VIE)

Vienna is the capital of Austria, federal state and municipality in one entity. This situation also leads to certain overlapping competencies within the administration and policy (see D 2.3 Governance Frameworks for Mobility Hubs in the SmartHubs Living Lab Areas - Graf et. Al, 2023). Around 1.9 million inhabitants lived in Vienna in 2022 (see Land Wien, 2022) throughout 23 different districts. These districts show various forecasted dynamics regarding change in population, ranging from a decrease of more than 4% between 2018 and 2038 in the inner city district Mariahilf (6th district) to a growth of more than 16% in the same time period in Donaustadt (22nd district) (Stadt Wien, 2023 d). To reduce the pressure on the housing market, the City of Vienna, together with its partners, actively develops several new neighborhoods (Seestadt aspern, Nordbahnhof, Sonnwendviertel, ...) to accommodate this growth (see Stadt Wien, 2014).



VIE_NB_BMK	Case Study Bruno-Marek-Allee (Vienna)
VIE_SA_MT	Case Study Maria-Tusch-Straße (Vienna)

Figure 2 Location of the two Vienna case studies (borders: OpenStreetMap, 2023)

Looking at the current mobility behaviour with a constant share of car trips around 26-27% of trips, a strong call for action derives when comparing to the targeted 20% of car trips till 2025 (Stadt Wien, 2015). Connected to that, Vienna has a high rate of incoming commuters (AK Wien, 2015) with a high share of car trips with around 60% (see Kurier, 2021). A continual challenge is a seamless mobility

system across the city border, enabling car-free travel including the first- and last mile. Further challenges are connected to the redistribution of public space, with 65% of public space dedicated to one form of mobility, motorized traffic, which only represents 26-27% of all trips (Stadt Wien, 2023c, see Figure 3).

The Mobility concept from 2015 (connected to the STEP 2025) spans a wide range of objectives and measures. One overall strategy is the following:

""Enabling mobility without owning a car" is a central transport policy concern of STEP 2025. The level of motorization in Vienna has been falling for ten years – an indication that a flexible combination of modes of transport depending on the situation and occasion case already works today."

Actions to achieve this form of mobility are taken in field of new public transport infrastructure, with the largest investments going into new subway-lines in the inner-city districts (U2/U5 project, see Stadt Wien 2023a), as well as cycling infrastructure with around 50 projects currently ongoing in 2023 (Stadt Wien, 2023b).

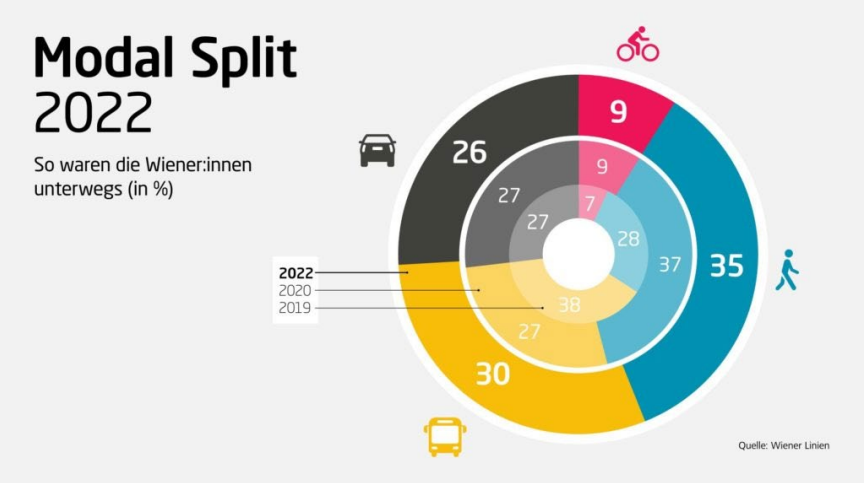


Figure 3 Modal Split for Vienna – only domestic mobility (Mobilitätsagentur Wien GmbH, 2022)

To enable the use of shared mobility, Vienna has a clear strategy to understand shared mobility as an important element of public transport (see Scholz, 2022). Following this approach, the public transport provider, Wiener Linien, was commissioned to plan and operate several city-wide services connected to shared mobility: car sharing, bike sharing and additional integrating elements like the Wien Mobil App (developed by the city owned company upstream) and around 100 multimodal WienMobil stations till 2025 (OTS, 2021). These Wien-Mobil stations are integrated into the city-wide strategy on mobility hubs in several contexts (see Scholz, 2022 and Stadt Wien, 2018).

Context Lower Austria (LA)

The federal state of Lower Austria, with an area of about 19,000 km² and about 1.7 million inhabitants, consists of 20 political districts. The number of inhabitants is expected to increase by about 7.5% until the year 2040 (Statistics Austria, 2022). However, due to the different spatial framework conditions, not all political districts are forecasted to expect the same level of population growth. For example, in rural areas in the north of the federal state in particular, a decline is expected. On the other hand, districts around the City of Vienna are becoming increasingly more populated, especially in the east and south areas leading to high commuter traffic volumes entering the city. In 2020, almost 200,000 inhabitants of Lower Austria had their workplace in Vienna (Statistics Austria, 2023). Depending on the characteristics of the area and available public transport services, between 63% and 83% of commuters used a car in 2014 (Rittler, 2016). In relation to the total population of the state, the modal split is equally car-oriented. In 2018, 64% of trips are made by car as driver or passenger, while 14% are made by public transport and 22% on foot or by bicycle (Herry Consult GmbH, 2020).

Figure 4 Location of the Lower Austria case study (borders: OpenStreetMap, 2023)

As a consequence of the forecasted developments and against the background of CO2 neutrality in 2040, the state government has published the Mobility Masterplan 2030+ (Amt der Niederösterreichischen Landesregierung, 2015). Among others, key areas of action include the development of supply and demand standards to establish attractive, efficient and affordable public transport. Fast and convenient cycle paths are to be built to encourage more people to cycle. However, car sharing is only mentioned in connection with park and ride, the establishment of mobility hubs was not considered in the masterplan. Hence the "Mobility Package Lower Austria 2018-2022" and recently updated to the period 2023-2027 have been published in order to define concrete next steps for a modern future-oriented mobility concept in Lower Austria (Rosinak & Partner ZT GmbH, 2017 and 2022). Challenges resulting from the trend towards multimodality and digitalisation were identified and concrete measures were derived. As a consequence, several interlinked fields of action were defined, for example attractive cross-modal offers, the situational use of the appropriate means of transport and the promotion and expansion of new forms of mobility (sharing instead of owning, electromobility, sharing systems, etc.).

In addition to many concrete (infrastructure) measures to be implemented in the coming years, the initiative "Mobility.Lab in Lower Austria" was established in this context, together with municipalities, to develop and test new mobility solutions. One of the initiatives launched by the Mobility.Lab in 2019 was LISA.Weinviertel, an innovative project in 11 municipalities in the Weinviertel region, aiming to improve mobility offers in rural areas (www.lisamachtmobil.at). One of these municipalities within LISA.Weinviertel is Pillichsdorf in the political district of Mistelbach, which is examined further on page 16. LISA builds on the creation of a holistic mobility approach consisting of public transport, cycling and innovative mobility concepts such as sharing and electric mobility in order to become less dependent on the use of private cars. Public transport stops and stations are not only to be made more visually appealing, but also upgraded to modern "mobility stations". For this purpose, not only the mobility offers were improved, but also a new common brand was developed to make the overall concept visible to the residents.

Based on the experiences of LISA.Weinviertel, the government of Lower Austria decided to establish the LISA concept from 2023 onwards in the City of Tulln. Tullin is a more urban area with about 16.500

inhabitants, connecting several locations in the city with railway stations and providing a combination of scheduled transport, on-demand shuttles, sharing offers as well as proper active mobility and modern infrastructure (www.lisa-tulln.at).

1.2.Living lab goals

As the Eastern Austria Living Lab covers very heterogeneous contexts regarding relevant governance, prerequisites for mobility hub developments and experiences, following strategic goals were defined for the Living Lab:

- Enhance cross-institutional learning processes on mobility hubs in the Eastern Austria region: as various actors with diverging interests are active in the region to establish mobility hub networks, the EALL will try to foster formats and general exchange across institutions.

- Support local stakeholders in long term planning, network building and a better understanding of possible impacts: as a special interest, building robust networks of mobility hubs is a shared challenge for some stakeholders in the region (Federal state of Lower Austria, Wiener Linien). Within the EALL, SmartHubs tools will be used to support strategic network planning (under the constraint of needed fast processes) and foster a better understanding of possible impacts.

- Reflecting SmartHubs Tools with planning practitioners: various tools will be applied in the case studies, others only presented to stakeholders in the EALL. Overall, the tools will be reflected regarding their practicability, relevance and complexity.

- Enhance data availability in Case Study areas through Smart Hubs surveys: the SmartHubs project will enhance the data availability in certain areas where no data on user needs and preferences are available - if possible, the generated data will be made available for follow-up activities.

These goals were reflected within the full partners of the SmartHubs Eastern Austria consortium (BOKU, TU Wien, MO.Point), based on the stakeholder needs and experiences of the consortium. The selected goals also link into the strategies for both Vienna and Lower Austria (as mentioned in section 1.1.) to further roll-out their mobility hub networks and connected services.

1.3.Local context of the Living Lab

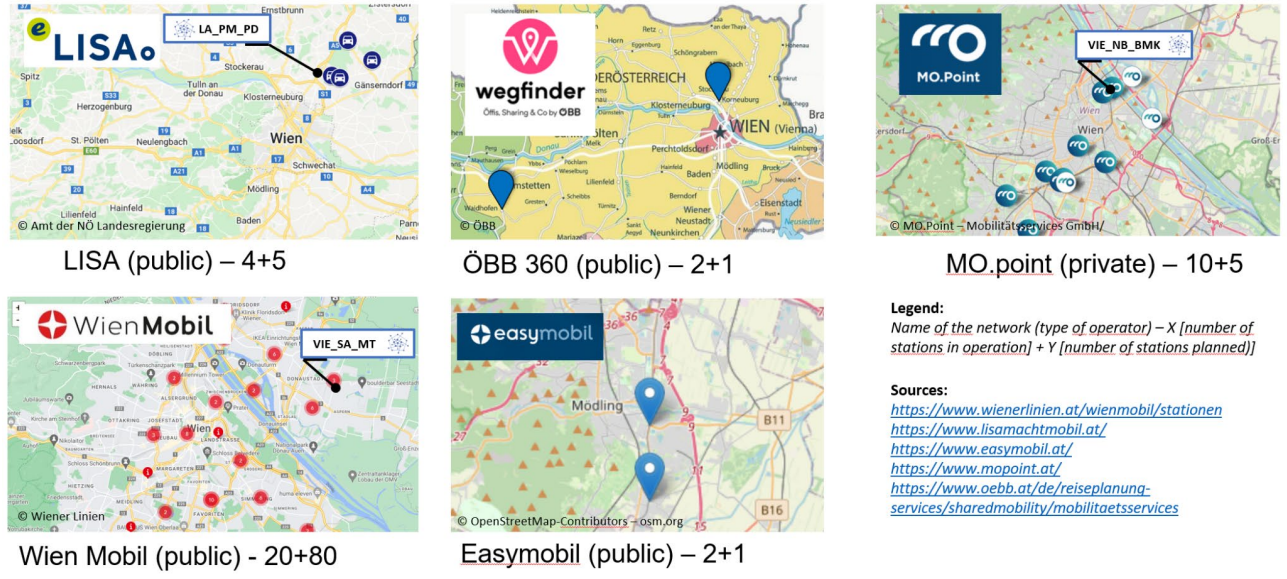


Figure 5 Overview of existing mobility hub networks in Eastern Austria

Since the mobility hubs concept already has a long history in the region, several networks have evolved, operated by different public and private institutions (see Figure 5 for a rough overview, some examples can be found in the ODP - see https://data.smartmobilityhubs.eu/index.php?title=Hubs&hub-country=Austria). The Eastern Austria Living Lab can be seen as a Multi-Operator Mobility Hub Ecosystem.

According to the overall SmartHubs Living Labs framework, case studies were chosen based on the following criteria: previous experience on the case study, integration into one of the mobility hub networks, access to local stakeholders and suitability of possible research questions to the SmartHubs approach / tools.

Based on further discussions with partners in the Living Lab, two case studies in Vienna and one in Lower Austria were selected:

- Mobility station Maria-Tusch Straße (VIE_SA_MT)
- Mobility station Bruno-Marek-Allee (VIE_NB_BMK)
- Mobility Station Pillichsdorf (LA_PM_PD)

In the following sections, the local context in the surrounding neighbourhoods will be explained for each of the case studies.

Seestadt aspern – neighbourhood (VIE_SA)

Figure 6 Overview on the case study location (© Daniel Hawelka)

Seestadt Aspern is a district under construction in Vienna's 22nd district, Donaustadt. It is currently one of the largest urban development projects in Europe. By the 2030s, more than 25,000 people are expected to live in the Seestadt and more than 20,000 people are expected to work there. Seestadt is located about seven kilometres east of Vienna's downtown inner city and has an area of about 240 ha. At present, about 9.500 people live and 4.000 people work in Seestadt (see the project webpage aspern-seestadt.at for more information). The "Pioneerquartier" was the first district where people moved in to.

Seestadt Aspern relies on an innovative mobility concept that aims for a modal split of 40% public transport, 40% cycling and walking and 20% car traffic. The current status comes close to the desired target (see mobillab.wien/storymaps for more interactive information on the mobility behaviour in aspern Seestadt). Sesstadt is connected to the city center by the U2 subway line, which runs at a high

frequency. Seven bus lines connect the Seestadt with the city and also the surrounding communities. From the rapid transit stop "Wien Aspern Nord'' inhabitants can reach Vienna's main train station (Wien Hauptbahnhof), Bratislava or other Viennese districts in just a few minutes. In the future, two tram lines will be extended to Seestadt. Parking in the Urban Lakeside takes place in the collective garages. Parking spaces are currently available for both permanent and short-term rentals in five publicly accessible collective garages. In Seestadt, bicycles, e-bikes and e-cargo bikes are currently available for rent at eight stations with the SeestadtFLOTTE. At the WienMobil station in Maria-Tusch-Straße, the WienMobil bikesharing service can also be used. The public space of the Urban Lakeside is designed to be particularly bike-friendly, with wide bike lanes and limited car traffic. In addition, with the Mobility Fund, Wien 3420 Aspern Development AG has the means to effectively scale mobility innovations in the neighbourhood. This mobility fund is financed itself through levies on the construction and operation of the garages. The aim of the fund is the promotion of sustainable mobility measures, for example, the bike rental system "SeestadtFLOTTE".

Seestadt is a developing area with new residents, also called pioneers, mainly families with children. The change of residence therefore offers the opportunity to break up mobility routines through appropriate interventions and mobility offers, so that new residents can readjust their mobility behaviour, with the expectation that they move less frequently by car and more frequently by bicycle, on foot and by public transport. The challenge is to promote sustainable mobility in a high-dense, semi-peripheral settlement. Currently, the mobility solutions on site are attractive offers for residents as they meet their needs and are partially free of charge. The compatibility of the SeestadtFLOTTE system with the overall Viennese system and the link to WienMobil still show potential for improvement.

Nordbahnhof – neighborhood (VIE_NB)

Figure 7 Overview on the central park in Nordbahnhof (© Promenade~dewiki, 2019)

The Nordbahnviertel is an urban expansion area under development in Vienna's 2nd district, which is being constructed in several phases. This centrally located and extensive area served as a freight station until the year 2000. Due to the dwindling importance of the station, a concept for the development of the area evolved in 1994 and further developed in 2014, whereby the area is to be opened up for various uses. With a size of around 85 ha , it is one of the largest and most important inner-city urban expansion areas in Vienna.

One focus of the area is residential use, with housing for 20,000 people expected by 2026. Currently, an above-average number of families with children and young people live in the Nordbahnviertel. There are also many young adults living in single-person households. People over the age of 65 tend to live in

buildings on the edge of the district. Office space is mainly located on the outskirts, while stores tend to be oriented towards the Praterstern in the south of the area.

The central location offers advantages in terms of transport access. Thus, the area is located in the vicinity of efficient and high-ranking public transportation. Adjacent to the south is the aforementioned Praterstern, one of the city's most important transportation hubs with a daily passenger frequency of over 100,000 trips. Regional trains, express trains, subways, trams and buses operate here, connecting the Nordbahnviertel with all central locations in the city, but also with the surrounding countryside.

The mobility concept of the Nordbahnviertel is based on sustainable mobility principle and a reduction of motorized private transport in the area. To meet this requirement, only a few parking spaces for cars are located in the public street space, whereby sufficient loading zones for delivery traffic have been taken into account. Most parking spaces are located in underground garages. Many areas are designed to be largely car-free, and through traffic is prevented. Further, the mobility concept focuses on the bundling of different mobility offers, whereby multimodality is to be promoted and different path sections are to be better linked. This is done on the basis of a combination of different modes of transport in order to provide residents with environmentally friendly and attractive mobility options. For this purpose, among other things, the existing tram line O was extended from Praterstern to the Nordbahnviertel. From 2025/2026, a further, completely new tram line will run through the Nordbahnviertel as a tangential line. All residential buildings are equipped with bicycle parking facilities. A further focus of the mobility concept is on sharing mobility offers.

Pillichsdorf – municipality (LA_PD)

Figure 8 Overview from the fields above Pillichsdorf

Pillichsdorf is a market town with 1.184 inhabitants (as of January 2022) in the district of Mistelbach in the State of Lower Austria. The village of Pillichsdorf is situated in the Weinviertel region, an intensively used agricultural area in the surroundings of the City of Vienna. Due to the proximity to Vienna, the population is slightly growing due to migration, which is slowed down by the limited supply of building land to a certain extent. The core settlement is following the main road covering an area of around 1.5 kilometres. Aside from the main road, the build up area is dominated by detached one family houses. The infrastructure for education is limited to the ground school and kindergarten. To access higher levels of education, pupils and students need to leave the municipality. Due to its agricultural usage, areas for leisure and recreation are limited to open landscapes mainly. In the southern fringe of the settlement, there is a sports area including football and tennis facilities. Shopping facilities are limited as well, supermarkets are located in the neighbouring town of Wolkersdorf.

Pillichsdorf is located approximately 20 kilometres northeast of Vienna and can be easily reached by car or public transport (bus service). Pillichsdorf is well connected to other parts of Lower Austria and Vienna through a number of transportation options such as by car. Pillichsdorf can be reached via the

A5 motorway, which links Vienna to Brno in the Czech Republic. The nearest motorway exit is at Wolkersdorf-Süd, which is approximately 6 kilometres west of Pillichsdorf. Public transport options in Pillichsdorf include buses and trains via park and ride facilities (train runs every 15 minutes to/from Vienna in peak time). The nearest train stations are at Gänserndorf, Obersdorf or Wolkersdorf, which is on the S-Bahn commuter rail network, providing connections to Vienna and other destinations in Lower Austria. From Wolkersdorf and Gänserndorf, buses operate to Pillichsdorf and other nearby neighbouring villages (every 30 minutes at peak periods and 60 minutes off peak). Additionally, residents and visitors use bicycles for transportation, as the surrounding area is relatively flat.

Pillichsdorf is a typical commuter community in Vienna's commuter belt. There are business parks offering employment in the vicinity, in Wolkersdorf, however the main direction of commuting is to Vienna. Residents then tend to drive to the park-and-ride facility in Obersdorf, or in some cases by bicycle but do not use the bus services, who detours to the railway via Wolkersdorf. The modal share is car dominated in the municipality. However, commuters, not owning an off-street parking space are restricted to park on street for more than 3 hours in the city of Vienna due to parking management. Therefore, using a park and ride is a good alternative and parking at the train stations, mentioned above, is free of charge.

1.4.Case study goals

Based on the SmartHubs integration levels (see Geurs et al., 2022, SmartHubs Deliverable D 2.1), the following section will showcase the defined case study goals in the form of a targeted integration level per field and necessary measures supported by the SmartHubs project.

Case study goals - Seestadt aspern (VIE_SA)

Integration field	Current (2023) -> Target level	expected to be completed by	description of measures supported by the SmartHubs project and relevant partners
Physical	2 -> 3	2024	placemaking activities (3420AG, City of Vienna)
Digital	2 -> 3	2026	highlighting conflicts (Wiener Linien)
Democratic	1 -> 2	2023	further integration of modes into WienMobil application (Wiener Linien)

Table 1 Targeted impact on integration levels (VIE_SA)

Central stakeholders relevant for the goals in this case study are Wiener Linien (public transport provider commissioned by the city of Vienna to setup and operate the mobility hub), the political representatives of the district Donaustadt (especially the traffic commission deciding on the use of public space) and 3420AG (local development agency managing a local mobility fund).

Case study goals – Nordbahnhof (VIE_NB)

Integration field	Current (2023) -> Target level	expected to be completed by	description of measures supported by the SmartHubs project and relevant partners
Physical	1 -> 2	2022	Wayfinding and information (Wiener Linien and MO.Point)
Digital	2 -> 3	2026	further integration of modes into WienMobil application (Wiener Linien)

Democratic	0 -> 3	2022	• interviews with intermediary institutions (MO.Point) • interviews with vulnerable to be excluded groups (MO.Point) • Co-creation activities to include opinions of users (MO.Point)

Table 2 Targeted impact on integration levels (VIE_NB)

Central stakeholders relevant for the goals in this case study are Wiener Linien (as operator of the Mobility hub), MO.Point (as being contracted with the operation of some services included in the hub) and the local housing developers (financiers of some services based on reduced parking regulations).

Case study goals – Pillichsdorf (LA_PM)

Integration field	Current (2023) -> Target level	expected to be completed by	description of measures supported by the SmartHubs project and relevant partners
Digital	0 -> 1		digital information screen (VOR)
Democratic	0 -> 1	till 2022	• interviews with intermediary institutions • interviews with vulnerable to be excluded groups

Table 3 Targeted impact on integration levels (LA_PM)

Central stakeholders relevant for the goals in this case study are the municipality and intermediary institutions.

1.5.Process overview and involved stakeholders

The overall process was structured into three phases, which had certain overlappings as some activities from the previous phase were still ongoing. The following chapters will cover some results of the Living Lab activities which can be seen in the figure below, further results can be found in the following deliverables within of the SmartHubs project (see for updates on the deliverables: https://www.smartmobilityhubs.eu/data)

- Phase development and setup (see chapter 2): Deliverable D3.4 - Report on recommended co-design technologies (to be published), Deliverable D 2.3 - Governance Frameworks for Mobility Hubs in the SmartHubs Living Lab Areas (Graf et al., 2023)
- Phase Co-Creation (see chapter 2): Deliverable D 3.2 - Needs of users and digitally excluded citizens (Martinez Ramirez et al., 2022a), Deliverable D3.4 Report on recommended co-design technologies (to be published)
- Phase Evaluation (see chapter 3): Deliverable D 3.5 - SmartHubs Appraisal Tool for sustainability and stakeholder assessment (Martinez Ramirez et al., 2022b), Deliverable 5.2 - Accessibility impacts of different urban logistics and mobility hubs settings (to be published)

As not all activities were realized in all case studies or in direct relation with case studies, relevant case studies are marked per activity.

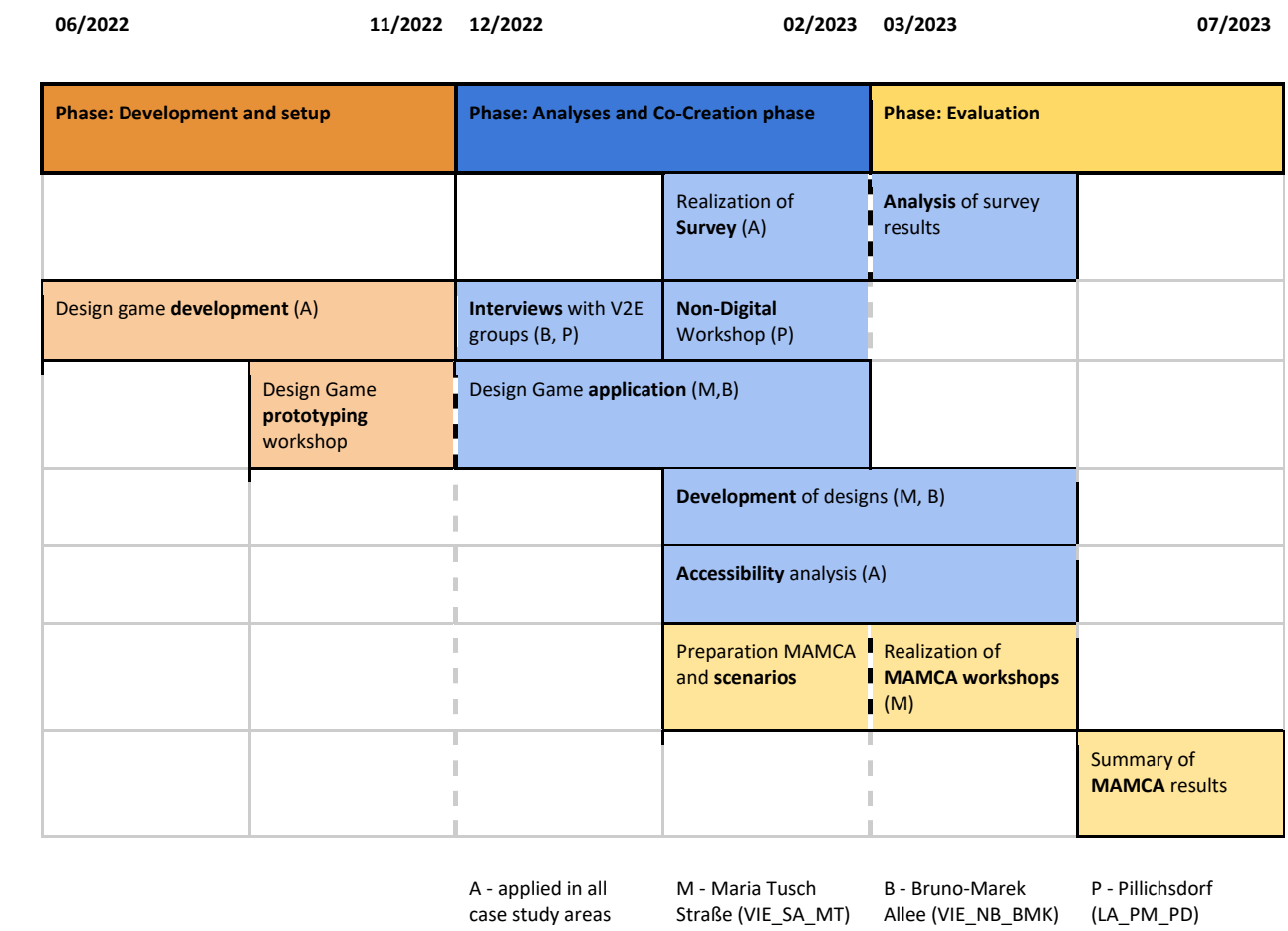


Figure 9 Living Lab process overview

The process involved stakeholders from the following sectors (full partners - FP, associated partners - AP, involved stakeholders - IS):

- Academia (FP: TU Wien MOVE and ACUR, BOKU Vienna)
- Industry (FP: MO.Point; AP: 3420AG, ITS Vienna Region, Mobility Lab Graz; IS: Wiener Linien, Salzburger Verkehrsverbund)
- Government (AP: Federal Govt. of Lower Austria; IS: City of Vienna, Stadt-Umland-Management Wien-Niederösterreich)
- Civil Society (IS: local citizens, participants of the voluntary environmental year)

Formats, primarily for exchange between two stakeholder groups (Symposium, workshops, interviews, …) or only mono-directional channels (social media, surveys, ….), were used throughout the Living Lab process.

Figure 10 Co-Creation afternoon at VIE_SA_MT

2. LIVING LAB PLANNING

2.1.Stakeholder needs

The following section will give an overview of relevant stakeholders in the Living Lab region and insights into their needs based on desk research, expert interviews, and publicly accessible presentations by some stakeholders. In relation to this, deliverable 2.4 (Governance frameworks for mobility hubs in the SmartHubs Living Lab areas, Graf et. Al, 2023) gives a deeper insight into the stakeholder setting for Vienna (chapter 8), partially also touching relevant stakeholders in Lower Austria working on cross-border concepts, plans or solutions (see p. 65).

Public transport providers: integration of services available at a mobility hub into the "own" main planning/booking channel (for example Wegfinder, WienMobil App) is a core interest of at least two of the largest public transport providers in the region: ÖBB and Wiener Linien. Both companies have regular partners for certain services at their mobility hubs, which are already partly integrated into the respective digital planning/booking channels (for example Tier and Kiwi being the E-Scooter partners of ÖBB360). See ÖBB, 2023 and Schöch, 2022 for more insights into the digital and analogue "multimodality-strategies" of both public transport providers.

Shared mobility providers: As a shared mobility provider, there are several requirements for mobility hubs to operate effectively. Key requirements include a favourable location:

- The mobility hub should be located in an easily accessible and highly visible location that is convenient for customers to find and use.
- It ideally should be located near public transportation or major thoroughfares to maximize accessibility.
- The hub should be equipped with the necessary infrastructure to support the shared mobility services, such as charging stations for electric vehicles, bike racks for bike-sharing programs, and parking spaces for car-sharing vehicles.
- A reliable and fast internet connection should be ensured at the location to support the digital platforms and enable seamless communication between the vehicles and customers.
- The hub should be designed to be flexible enough to accommodate different types of vehicles and services, and to be able to be adaptable as needed in the future.
- To enhance the customer experience, the mobility hub should also offer a range of amenities, such as restroom facilities, a waiting area, and a kiosk or digital display to provide information about your services.
- If the mobility hub is well designed it can help to streamline the operations, enhance the customer experience, and promote sustainable mobility practices, all of which are key to the success of shared mobility services.

Local development agencies: for some areas in Vienna, local development agencies, either contracted by the City and partners (as Public-private partnership, for example 3420AG) or by private institutions (for example value one), are organizing mobility services on a neighborhood level in new city development areas like aspern Seestadt or Viertel Zwei (see value one, 2023). Their financing schemes used, mostly based on payments by the building providers (for example Mobilitätsfonds aspern Seestadt, using financial resources from reduced parking space regulations ("Stellplatzregulativ") - see 3420AG, 2023) often limit their possibly funded solutions at mobility hubs. This leads to one core need, which is free accessibility of services at a mobility hub (co-)financed by them to at least all inhabitants in the neighbourhood managed by them.

Politicians (city level, municipality, district level), Public administration: section 8.4.2. Discursive Negotiations in Graf et al., 2023 covers well some insights into ongoing discussions and possible deductions on this particular stakeholder needs. For example, for the Vienna case avoiding conflictual topics was a behaviour mentioned by some of the interview partners.

2.2.Citizens needs

Deliverable 3.2. "Needs of users and digitally excluded citizens" (Martinez Ramirez et al., 2022a) identifies needs and barriers of disadvantaged users and investigates the usefulness of mobility hubs to improve the mobility of vulnerable citizens in the Living Labs in Anderlecht, Eastern Austria, Munich, and Rotterdam-The Hague.

Semi-structured interviews were conducted in the Eastern Austrian living lab and the focus was laid on:

- experts which have in-depth knowledge about the group being studied (due to their professional activity or their position in a community etc.) (experts on children, low-income citizens, peri-urban and rural inhabitants, n=4)
- women and peri-urban and rural inhabitants as vulnerable groups and potential end-users (n=7)

As already mentioned, the overall analysis of the interviews was done in deliverable 3.4. However, some relevant aspects with the focus on women should be summarized here, because they serve as a basis for the development of the design game (EALL version) and specifically the character cards. Here are some key facts from end-user and expert perspective:

- Women tend to have more fragmented mobility, with several destinations per day, and make more shorter trips per day than men, for which they rely primarily on active mobility, especially walking.
- Physical environment and the spatial and geographical distribution of transport services (for example carrying groceries, using trolleys, or accompanying children) are considered important
- Additional facilities within the hub that would allow them to rest, wait and reduce the number of trips per day (for example public toilets, sheltered waiting rooms, grocery stores, parcel lockers and storage rooms) are suggested.
- Accessibility: all elements of a mobility hub should be at the same level, and the hub should be barrier-free.
- Aesthetics of the hub (such as green elements and cleanliness); good lighting, easy-to-navigate design of spaces and vehicles, and cleanliness of facilities are relevant for some members of this group and can increase the feeling of safety.

The identified needs serve as a starting point for the design game. The main idea was to develop a game which addresses hubs more as "places to meet" including offers and services to attract more users. Finally, the team agreed to develop a game which gives players the chance to come up with creative ideas to make mobility hubs more attractive through non-mobility services (for example events, communication, services, …). More about the process can be found in the Deliverable 3.4. "Report on recommended co-design technologies".

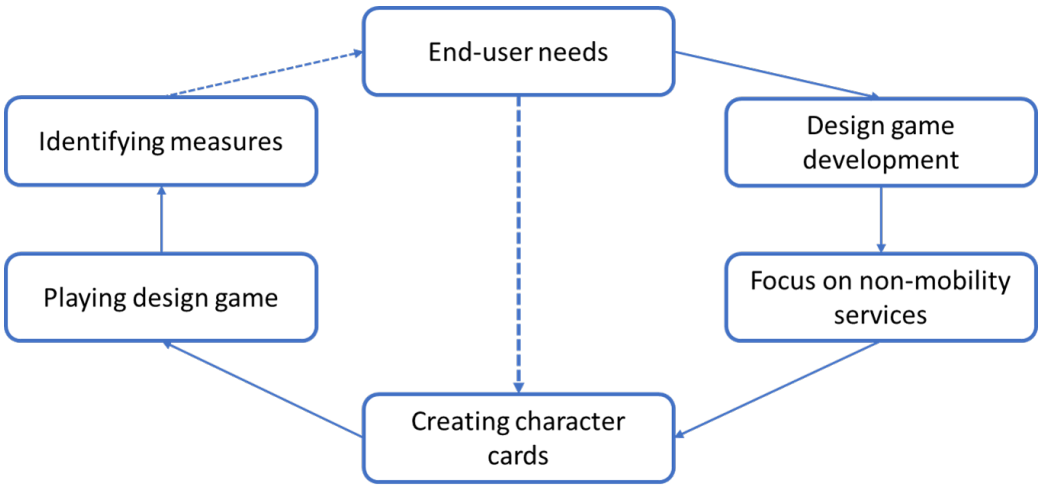


Figure 11 User needs - design game cycle

Predefined and blank character cards were provided by project partner ACUR and they can be used to represent different types of stakeholders and users. Within the Living Lab, the cards were configured to portrait different user groups and their specific needs. The developed character cards provide basic information on a character as a potential user of a mobility hub. The cards include the name, age, sex, job and hobbies. From the perspective of the character, the players identified around 50 measures which can help to make a mobility hub more attractive. The measure includes:

- Advertising: analogue/ digital; Geotargeting; bulletin board; social media; Screen
- Cooperation: clubs; Transportation providers; Newspaper; Stores
- More offers: activities for certain groups; prizes; sports; gardening, discounts; complementary equipment; forum; vouchers
- Event Festival: Music; donations; information event; competition; singing; hiking
- Greening: trees; Facade greening
- Stay: seating
- Other keywords: Integrating hubs in Google Maps; Cost transparency; Tourism; Accessibility: Awareness raising

These measures can be integrated into the design of future mobility hubs (see section 2.5.)

2.3.Case study Status-Quo

Maria Tusch Straße (VIE_SA_MT)

Entry in the Open Data Plattform: https://data.smartmobilityhubs.eu/wiki/Hubs/62

Integration field	**Level (05/2023)**	**Description of minimum level requirements** following SmartHubs integration ladder
Physical	2	At least two shared transport modes in acceptable walking distance to public transport with wayfinding and information of using the service and at least two services (for example parcel locker, kiosk) in acceptable walking distance. Universal design principles are considered.
Digital	2	Multimodal travel planners can be used to plan public transport services and one shared mode at the hub. Minimum inclusive design requirements are considered such as simple and intuitive app design.
Democratic	1	Participation takers got asked into a consultation process, Information was recognized. No or limited attention to involve vulnerable user groups.

Table 4 Level of Integration VIE_SA_MT

The mobility hub Maria Tusch Straße is part of the city-wide network called “Wien Mobil Stationen”. It is located at one of the main roads in Seestadt aspern, in the so called Pionierquartier neighborhood. The hub has been in operation since 2021, as the first Wien Mobil station in Seestadt aspern, following up the local network of bike sharing stations called “Seestadtflotte”. The next public transport stop is called “Johann-Kutschera-Gasse”, offering a bus service between two subway stations (Aspernstraße and Seestadt) from 4 a.m. till 1 a.m. in an average frequency interval of 15 min. The subway station Seestadt can be accessed by a 900m (~10min) walk or bike ride (~5min). There connections operating into the district and city centre every 5-10 min from 5 a.m. to 12 p.m. (and the whole night through on weekends).

The hub offers various shared mobility services like bikes, 3 different car sharing services (Eloop, ShareNow, Wien Mobil Auto), E-Scooters and mopeds. These services are located on both street sides of

Maria-Tusch Straße, on on-street parking lots and on the pavement level. The services are partly integrated (information) into the Wien Mobil app, however booking is only available for public transport.

Wayfinding is integrated into a sign post giving a small overview on the location of all services across the hub. In addition to the mobility services mentioned above, a Self-service bike repair station is available.

The public space around the hub is mainly dedicated to active forms of mobility and uses of stay. Still, most of the surfaces around the hub are sealed and no or minimal possibilities for shade are given. Also surrounding buildings do not provide sufficient shade due to the great distance from across the street (~30m) and the orientation. No crossing (pedestrian crosswalk, ...) is accessible between the services at the hub across the street (the nearest one's are 150m away).

Bruno-Marek Allee (VIE_NB_BMK)

Entry in the Open Data Plattform: https://data.smartmobilityhubs.eu/wiki/Hubs/8

Integration field	Level (05/2023)	Description of minimum level requirements following SmartHubs integration ladder
Physical	2	At least two shared transport modes in acceptable walking distance to public transport with wayfinding and information of using the service and at least two services (for example parcel locker, kiosk) in acceptable walking distance. Universal design principles are considered.
Digital	2	Multimodal travel planners can be used to plan public transport services and one shared mode at the hub. Minimum inclusive design requirements are considered such as simple and intuitive app design.
Democratic	1	Participation takers got asked into a consultation process, Information was recognized. No or limited attention to involve vulnerable user groups.

Table 5 Level of Integration VIE_NB_BMK

The mobility hub in Bruno Marek Allee is centrally located in a residential area in the urban expansion area Nordbahnviertel and has been in operation since 2020. About 200 - 250 meters away are the nearest public transport stops Krakauer Straße and Bruno Marek Allee. Here, tram line O operates every 6 minutes on weekdays, which means that the Praterstern transport hub can be reached in approximately 4-5 minutes. About 500 meters away is the nearest bus stop, Jakov Lind Street. Here the bus route 82a operates every 15 minutes. There is no bus service on Sundays.

The mobility hub's sharing offer is primarily aimed at the local population. The mobility hub is marked by floor markings and signs, and there are no weather-protected rest areas for users at the location. At the mobility point itself, there are parking spaces for private two wheeled vehicles as well as a public e-charging station with 2 charging points.

The mobility hub is operated by MO.Point and WienMobil. WienMobil is the mobility platform of the municipal transport operator Wiener Linien. At the mobility hub, users can rent a car-sharing vehicle, 2 e-cargo-bikes and 3 e-bikes. The car-sharing vehicle is located in the public street space while the sharing bikes are located a few meters away in a semi-private area. The sharing car is offered by Wiener Linien and operated by Sharetoo, a Porsche brand.

The car on offer is an electrically powered Skoda Enyaq iV. The range is given as 395 kilometres. To rent the WienMobil e-car, a user account with Sharetoo is required. For the e-load bikes and e-bikes, you need a user account at MO.Point. In order to use the full range of services offered by the Mobility Hub,

two different registrations and user accounts are required. On both platforms there are different tariff models for the sharing vehicles, which are based on frequent or occasional users.

Pillichsdorf (LA_PM_PD)

Entry in the Open Data Plattform: https://data.smartmobilityhubs.eu/wiki/Hubs/18

Integration field	Level (05/2023)	Description of minimum level requirements following SmartHubs integration ladder
Physical	0	One shared transport mode, not walking distance to public transport, no integration between the modes. No universal or minimum design criteria are considered.
Digital	0	No digital integration of shared and public transport mode options offered at the hub. There are separate services and platforms for each mode. No universal design criteria are required.
Democratic	0	No involvement or consideration of stakeholder interests and user needs.

Table 6 Level of Integration LA_PM_PD

The mobility hub in Pillichsdorf is part of the mobility concept "LISA.Weinviertel", which was implemented in the province of Lower Austria in 2019. The bus stop at the main square has been upgraded to a modern "mobility station" and is connected to the nearest main station in the municipality of Wolkersdorf via a new regional bus line established in 2019. From 4:51 a.m. to 10:57 p.m., the bus operates every half hour with a travel time of about 15 minutes to the railway station and with a direct connection towards the City of Vienna. In addition, there are several stops along the line in the Pillichsdorf municipal area, but other neighbouring municipalities are well connected to the hub by the new bus line, for example Großengersdorf (3 minutes bus ride) or Bockfließ (6 minutes bus ride). Since 2022, the bus line has been operated using electric buses.

The bus stop offers a covered glass shelter with seating as a waiting area. In addition to the well-known sign of a regional public transport stop in the region, a LISA-branded pillar was erected, which provides information on the bus timetable in paper form behind glass. In addition, there is a route network map showing the stops with additional mobility offers such as passenger shelters, (partially) covered bicycle racks, lockable bicycle boxes, e-car sharing stands and charging stations, park & ride spaces.

Within walking distance of the bus stop, an e-car sharing car operated by the association fahrvergnügen.at, has been available since 2020. Signposts in the LISA brand show the way and a new booking system was implemented which is straightforward and easy to use. After a one-time registration including tariff selection, selection of the means of payment, upload of the driver's license on the website lisa.familyofpower-mobility.com, an own card is activated to unlock the car on site. Information on the service and the booking process is made available on the municipality's website (pillichsdorf.at). Registration is free of charge for Pillichsdorf citizens. The hourly costs for using the car range from €6.12 to €8.96 depending on the chosen tariff. In addition, there is a 50% reduction price for owners of a monthly or annual public transport pass. As the booking system is based on close cooperation with an existing carsharing association, e-cars can be booked throughout Austria at a uniform tariff via the association "carsharing Austria" without additional registration. This creates an overall offer in combination with public transport for the region.

The car on offer is an electric Hyundai Kona with a range of up to 484 km and a charging time of 47 minutes to bring the state of charge from 10 to 80% at a 100 kW fast charging station, according to the technical information on the website (hyundai.at/kona-elektro/technik). So it is not only suitable for short distances, but for longer ones as well.

In addition, three bicycle boxes are offered within walking distance of the bus stop. They can be booked by registering at the municipal office, where the key to lock the box is also handed over. As with the car-sharing system, information about these bicycle boxes are embedded on a broader scale on the website of Radland Ltd., an agency of active mobility (radland.at/radgaragen).

2.4.Mobility hub design

Maria Tusch Straße (VIE_SA_MT)

Based on the results of the Design game, expert interviews with local stakeholders and a Co-Creation event on site, it became clear that the existing mobility hub needs to be improved in its attractiveness concerning the surrounding public space and quality of short stay. The following elements are recommended to be implemented to support the goal of physical integration and to tackle the above-mentioned challenges (bundling them in a placemaking approach):

- shading in public space close to the hub
- possibilities for sitting and short drop off of luggage / goods
- low-maintenance greening-solutions for a cooling effect
- detailed analogue information on all services available at the mobility hub

Below, a possible solution can be seen, which includes elements on shading, sitting and possibly areas for analogue information around the services at the mobility hub (and POIs around).

Figure 12 Planned intervention at VIE_SA_MT (© Greenlab, 2023)

Bruno-Marek Allee (VIE_NB_BMK)

Based on the results of the Design Game, certain elements can be derived that can contribute to the further development and improved integration of mobility hubs. In general, the attractiveness of mobility hubs can be increased by linking the mobility offer with other uses, an additional offer, an incentive system and/or awareness-raising measures.

To increase the attractiveness and visibility of a mobility hub, various events can be held directly at the location. For example, a street festival with a broad impact can increase the level of awareness of a mobility hub on the one hand and demonstrate to potential users on the other. Existing users of the

mobility hub can meet non-users here, which means that an exchange of experiences takes place, and under certain circumstances, new users can be won over for the mobility hub. The mobility offer can be used free of charge as part of a street festival. In the course of this, different competitions can take place and prizes can be distributed, such as free minutes for sharing vehicles. Further incentives can be created by linking the use of sharing offers with a bonus system. For example, users can be rewarded with a voucher for a local bike store for every 50 kilometres of driving distance with a sharing bike. This will also increase the local value chain.

The players of the design game often indicated that most of the inhabitants are likely not aware of the offers of the mobility hub. Measures of analogue and digital advertising to address especially teenage and elderly citizens are proposed.

Further incentives for the use of sharing services can be created by rewarding the use of sharing vehicles. Those who travel with a sharing vehicle to certain destinations can take part in activities at a reduced price, for example admission to the soccer stadium, a reduced price for a windsurfing course at the lake and so on.

Many car owners are not aware of the actual monthly costs of their private car. Awareness-raising measures can aim to point out the monetary advantages of sharing offers to potential users. For this purpose, information folders can be displayed at the location that show a cost comparison, but also clarify the environmental advantages of sharing offers.

3. LIVING LAB EVALUATION

3.1.Survey implementation

This sub-chapter focuses on the description of the survey that was designed in the project to collect information on the current and potential usage and impact of mobility hubs. In the next two sections (3.1.1 - 3.1.2) the survey design and the data collection process are described. In 3.1.3 and 3.1.4 we present the data preparation process and main characteristics of the sample, respectively.

3.1.1.Survey design

The survey design focused on gaining insight into the characteristics (sociodemographic, mobility, and environment) of current and potential users of mobility hubs as well as on people's barriers and willingness to use mobility hubs. The survey explores all three dimensions (physical, digital, and democratic) of the SmartHubs integration ladder. The survey is divided into seven sections (Figure 13). The first section introduces the survey objective and informs the participant about the data storage, usage and anonymization. The respondents should sign an informed consent before proceeding to the following sections. In the second section, the survey collects data on the participants' sociodemographic characteristics and home location. In addition, the respondents report on their usage of smartphones, apps, and various digital payment methods (digital skills). The next part of the survey gathers information on respondents' mobility habits, capabilities, and vehicle ownership. Among others, participants have to report on the usage frequency of shared and own mobility within the last year. At the end of this survey part, non-users of each shared mobility mode (shared car, shared e-scooter, shared bike) specify why they have not travelled by the specific transport mode. The next section focuses on the current usage and awareness of mobility hubs as well as of needs and preferences from future hubs. Each of the last two parts of the survey entails a stated preference choice experiment. In specific, a mode choice and a hub's characteristics experiment are presented. The two experiments provide insight to the degree that people consider important and are willing to pay for an increased physical and digital integration of mobility hubs. The survey concludes with a set of questions on past and future involvement in public participation processes (democratic integration). All questions are marked as mandatory.

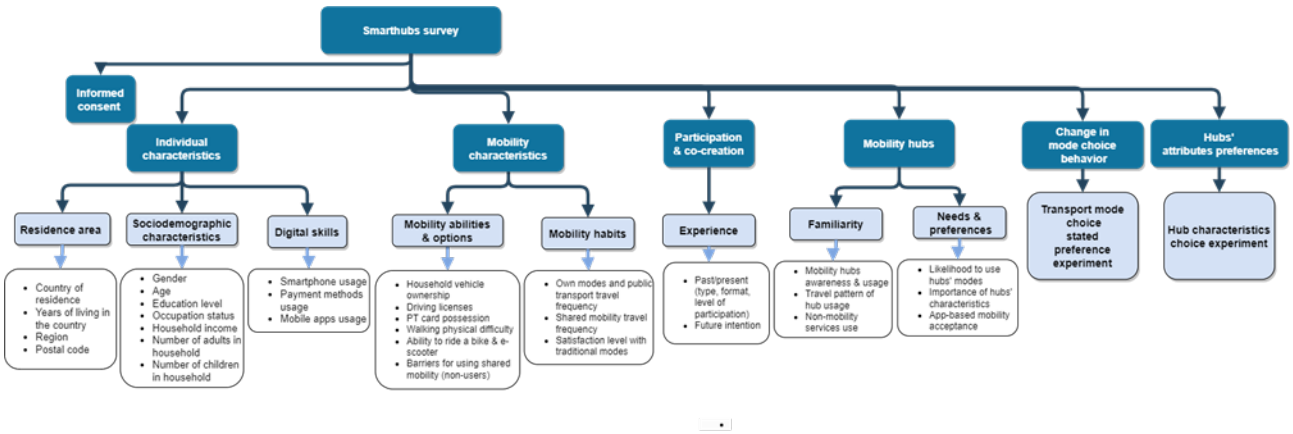


Figure 13 Overview on survey content

The survey was tested internally among the main project partners in Austria. To check the survey readability for the population, people from all sociodemographic groups took part in the pilot. During the testing phase, the survey participants provided feedback and pointed out necessary changes in the survey content and presentation. The received feedback was evaluated and the survey was updated to best accommodate the participants' needs.

3.1.2. Data collection

The survey design aimed to accommodate responses from residents in the Eastern Austria Living Lab (EALL). While the total area of Vienna is targeted for data collection, in Lower Austria the focus is only on rural areas. In Figure 14 the relevant postal codes in Lower Austria are illustrated.

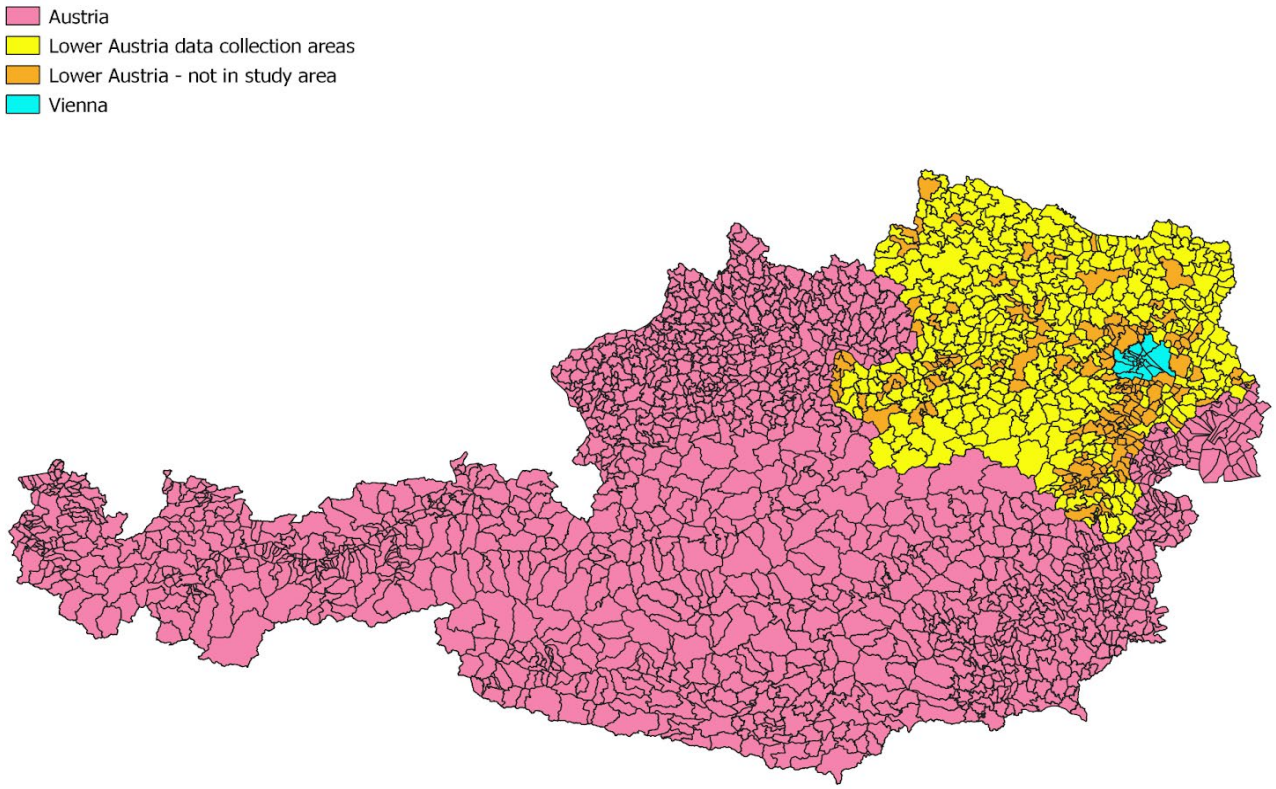


Figure 14 Overview on data collection areas

The target sample size was set to 500 respondents. The SmartHubs project aims to understand the needs from mobility hubs and their potential impact to vulnerable-to-exclusion groups of the total population.

To ensure that enough data are collected for all groups of interest, a stratified sampling method was selected. Based on the sociodemographic characteristics of the Living Lab, quotas were set for multiple sample characteristics. In Table 7, the minimum sample size for six characteristics of the participants is presented.

Sociodemographic characteristic	Minimum sample size
Female	100
Older than 65 years	100
Low education level	50
Low income level	100
Low digital skills	25
Rural area resident	75

Table 7 Sampling strategy

To achieve the sample requirements a panel company was recruited to assist in the data collection. In addition, an open invitation to complete the survey online was disseminated via social media. The survey data collection started in December 2022 and the panel data collection lasted for 2 weeks. The open invitation to participate remained active until the end of January 2023. Data were also collected via assisted interviews in an event that took place in Pillichsdorf, Lower Austria, on January 31st. The main aim of the event was to recruit people who have difficulties in filling in an online survey. In total, 1032 responses to the survey were recorded across all data collection efforts. From those, 970 (94%) were provided via the panel company.

3.1.3. Data preparation

Before proceeding to the analysis of the data, the raw data should be prepared. The first step is to distinguish between invalid and valid survey responses. Six criteria were used to determine the validity of a registered response to the survey. The first step was to check for the provision of informed consent. All people provided their consent for storing and handling their data. The next two criteria (survey status, respondent id) relate to the panel data requirements. In particular, four survey tests conducted by the panel company and eight survey submissions with missing information in the "respondent id" field were excluded from the analysis (Figure 16). The remaining 958 survey responses were reviewed for validity of the home location of respondents. Since data collection targeted only people living in Vienna and the rural areas of Lower Austria, participants who reside in other areas should be ignored in the analysis. The last step is concerned with the survey bias. The respondents who participated via the panel company had a monetary motive to complete the survey. Due to this, it is essential to check whether the panel respondents filled the survey without reading it but instead rushed through it just to reach the prize associated with submitting a complete survey response. In Figure 15, the distribution of the response duration for various age groups is illustrated. As expected, older people required more time to respond to the survey than younger ones. The lower acceptable limit is set to the Q1 percentile of the teenager's group, which is equal to 234 seconds ~4 minutes. The four minutes value was also confirmed as the minimum acceptable response duration during the survey pilot and tests by the project team and is thus considered the most suitable minimum response time.

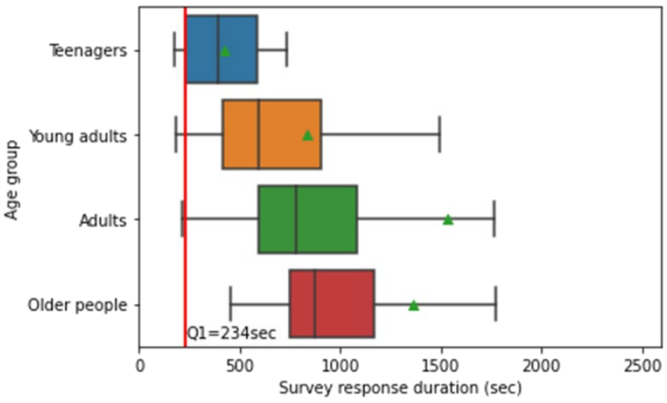


Figure 15 Comparison of survey duration

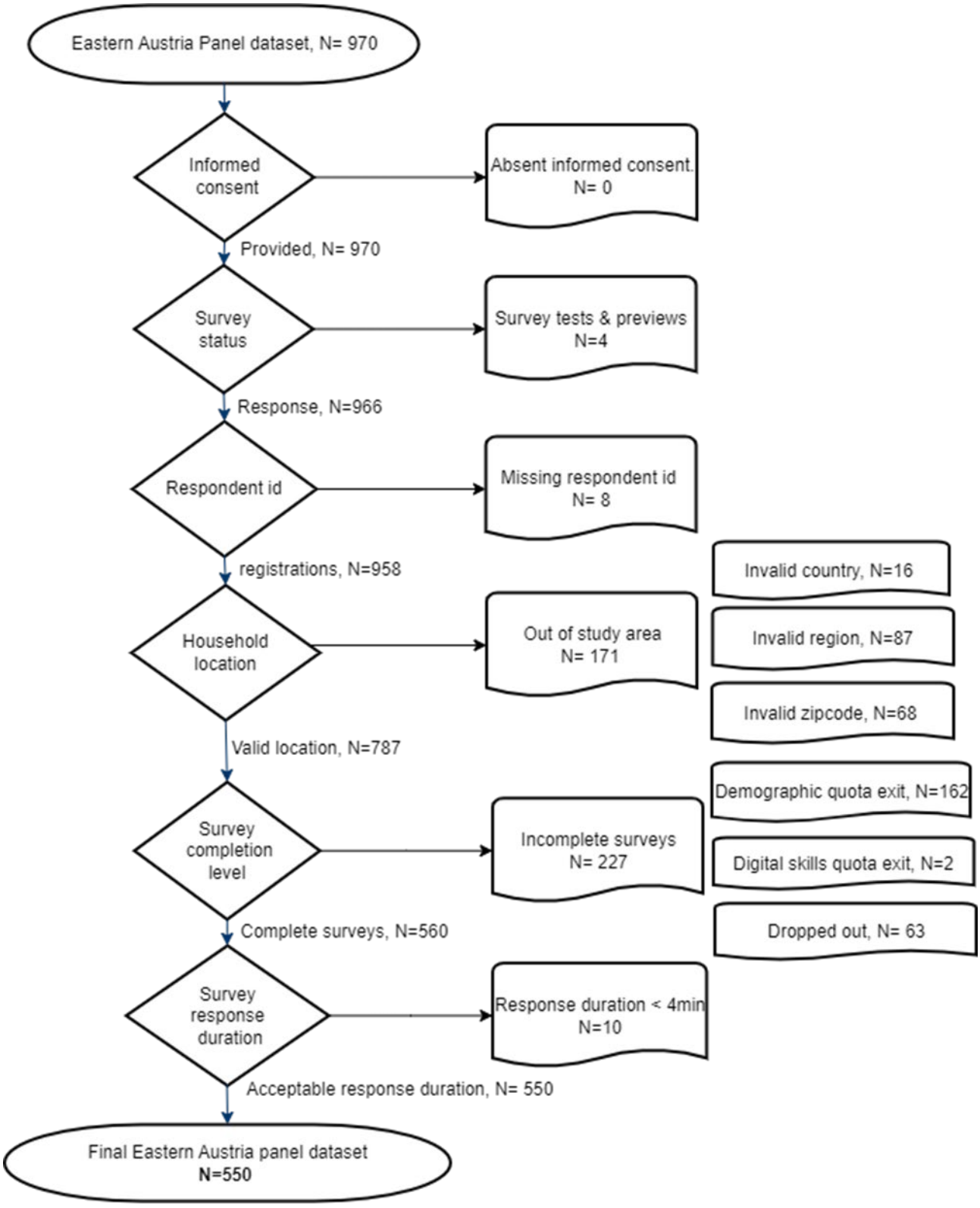


Figure 16 Overview on steps for exclusion of responses

The final panel dataset entails 550 valid responses (Figure 16). The same procedure, excluding the panel-specific steps, was followed for the 62 survey responses that were collected via all other distribution channels. Almost half (30) of the initial dataset is considered valid. The final data set from the Easter Austria living lab contains 580 complete survey responses.

3.1.4. Sample characteristics

The sample is quite balanced in terms of gender with females being slightly more (~51.7%). In Figure 17, the sample characteristics in regard to age, income and digital skill level are illustrated. As seen, the vast majority of survey respondents are adults between 25 and 65 years old, with a medium household income level. People older than 65 years are overrepresented in the sample in comparison to population statistics but this is due to the quotas set for these specific groups in the sampling (see Table 7 above). In terms of car ownership, the largest share of the sample owns at least one car. Nevertheless, half of the respondents from Vienna do not have any car available in their household.

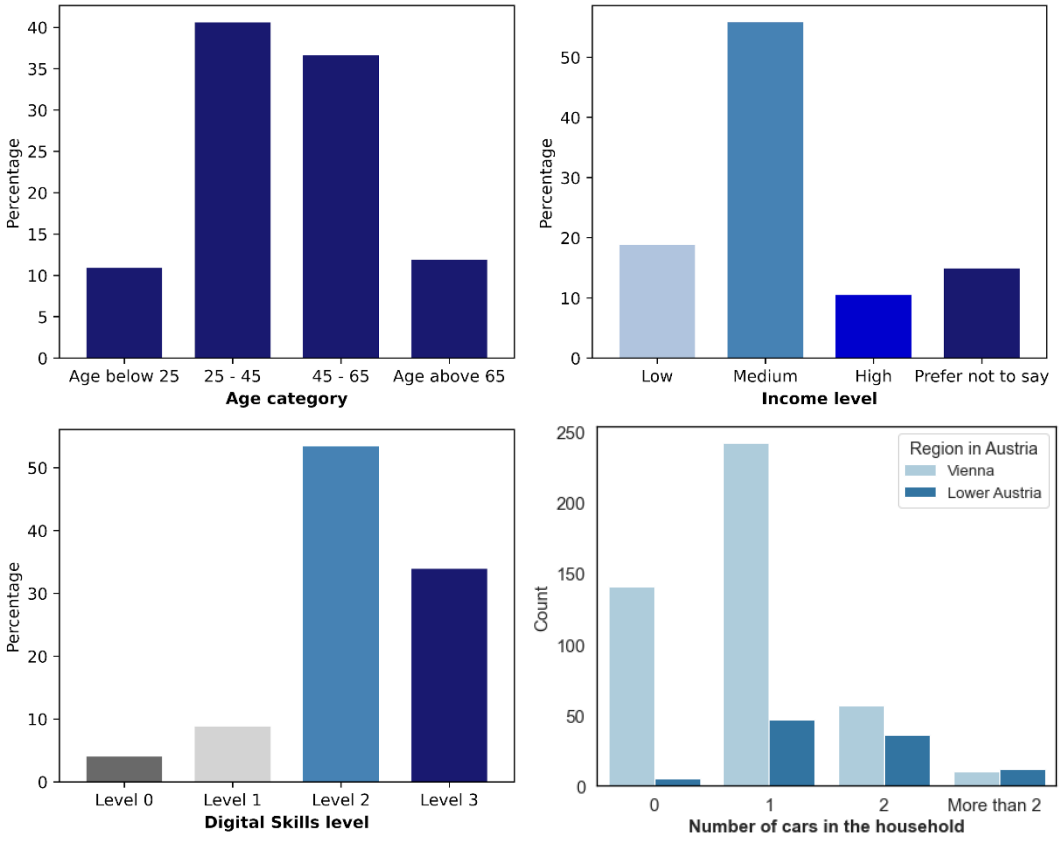


Figure 17 Overview on sample characteristics

Apart from the sociodemographic characteristics, the survey also collected data on the current mobility habits of respondents. Specifically, the survey participants reported the frequency of travelling by personal car and shared modes of transport. Travelling by personal car, public transport and on foot are the three most common transport modes for the respondent's everyday trips (Figure 18). Among the people who own a bike (383), most people use their bike at least a few times per month. It should be noticed that the sample varies per own mode in Figure 18 because the question was presented upon availability of each mode in the respondents' household.

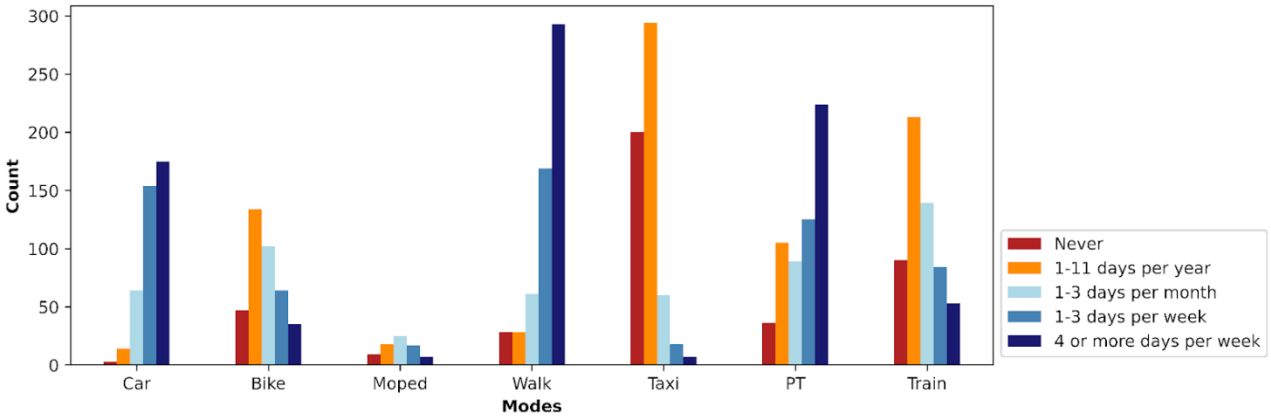


Figure 18 Frequency of usage per mode

To analyse the current level of familiarity with shared mobility, respondents also reported on how many times they have travelled by four different shared modes (share bike, share car, shared e-scooter, shared moped) within the last year. The car is also a popular mode among shared modes (Figure 19). Although e-scooters have the lowest proportion of frequent users, travel by e-scooter was reported for at least four days per week, more respondents reported to have travelled at least once by e-scooter over the last year than by any other share mode.

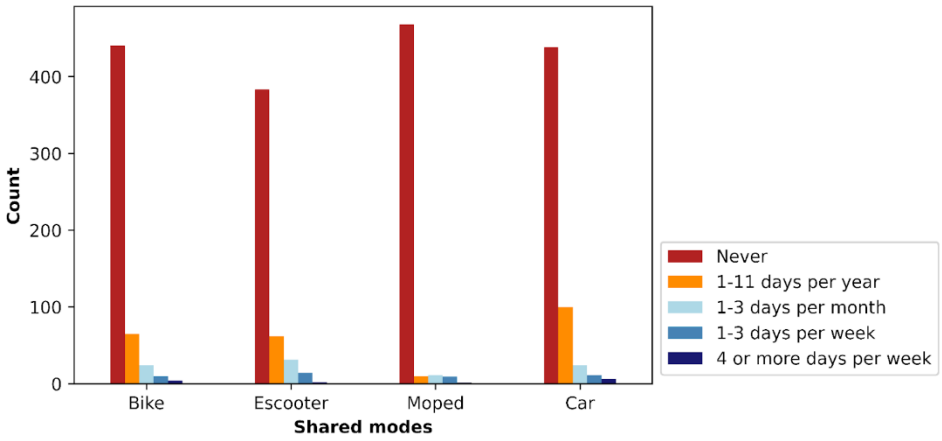


Figure 19 Frequency of usage per shared mode

Respondents who have never travelled by the four above mentioned shared modes, provided information about the reasons that have discouraged them from using these modes. The preference for travelling by personal bike is at the top of the list of barriers (Figure 20). Reduced accessibility, in terms of walking distance, to shared bikes is the second most common barrier mentioned by the survey participants. The long distance to available vehicles, was also mentioned by non-users of shared e-scooters. Nevertheless, other factors such as reduced safety and high renting cost are also among the top five barriers to using the available shared e-scooter vehicles (Figure 21).

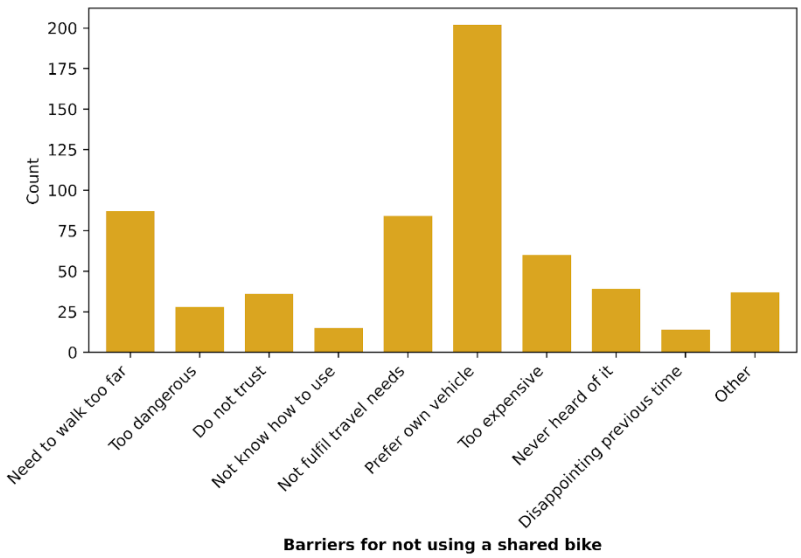


Figure 20 Barriers for not using a shared bike

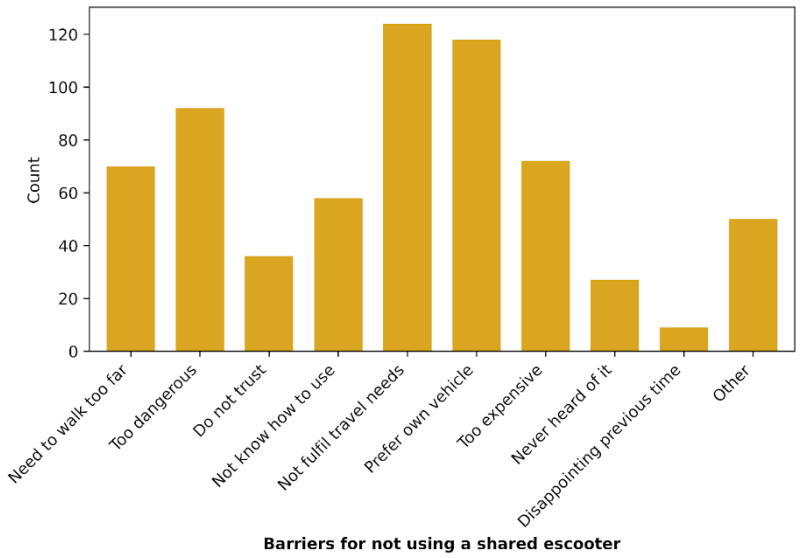


Figure 21 Barriers for not using a shared E-Scooter

Regarding familiarity with mobility hubs, most respondents (314, ~54%) indicated that they have already seen a mobility hub in their area of residence. However, among those people who are aware of hubs, the majority (214,~68%) have never used any mobility or non-mobility service at a hub. From the total sample, only 15% (87) have ever used a mobility hub in their area of residence (Figure 22).

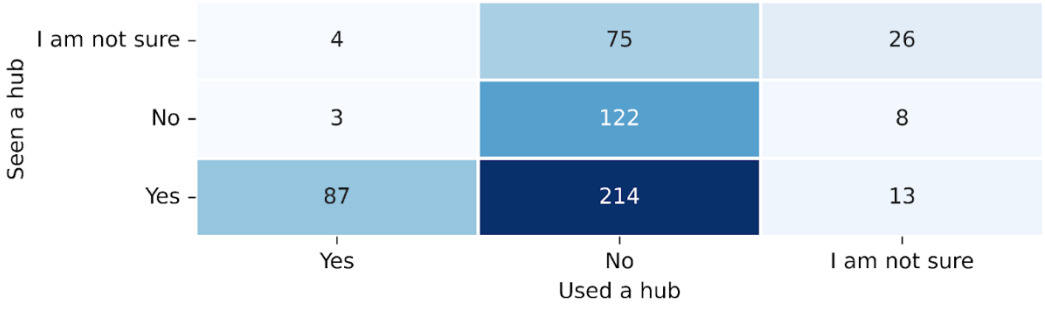


Figure 22 Usage and observation of a hub

Further results of the survey will be presented in future project deliverables of WP5: D5.1 – Mobility hubs impact on mobility patterns and behavioural change, D5.3 – Equity assessment, and D5.5 – Integration of mobility hubs and public transport and possible others.

3.2.Alignment of Mobility Needs

To allow a first comparison of the single mobility hub case studies regarding alignment with mobility needs, the SmartHubs Accessibility-Tool (Lead TUM), still in development along the SmartHubs project (see the future Deliverable 5.2) is used. In the following Table 8, POIs accessible by 5 min walking (average speed, as example – the time can be adapted in the tool) on the actual street network are compared for all three case studies.

	points of interest reachable in 5min walking (average speed)									
Case study	**restaur-ant**	**bakery**	**super-market**	**kinder-garten**	**doctors**	**pharm-acy**	**pub**	**toilets**	**school**	**pt_stop**
VIE_SA_MT	3	0	1	2	8	1	0	0	1	3
VIE_NB_BMK	3	1	3	3	1	0	0	1	0	6
LA_PM_PD	1	0	0	1	0	0	0	0	0	4

Table 8 Overview on POI's accessible from the case study hubs

This analysis gives a first glimpse of the possible needs users can satisfy in the respective catchment area around the mobility hub (in this example only for walking, the tool is/will be able to analyse also for other modes). Below, the details and mapped isochrones by case study are shown - showcasing the fully automated process possible with this Accessibility-Tool prototype. These results are preliminary and further development of the tool will provide more accurate representations of the amenities that are accessible from each of the mobility hub locations.

Mobility station Maria-Tusch Straße (VIE_SA_MT)

For Maria-Tusch Straße it can been seen clearly that the hub as a target point makes adjacent parks and green areas (for example Yella-Hertzka-Park) accessible by the shared modes present at the hub.

	id	travel_Time	restaurant	bakery	supermarket	kindergarten	doctors	pharmacy	pub	toilets	school	pt_stop	mode
0	h1	5.0000	3	0	1	2	8	1	0	0	1	3	Walk

Figure 23 Accessibility Analyses for VIE_SA_MT

Mobility station Bruno-Marek-Allee (VIE_NB_BMK)

For Bruno-Marek Allee station, the railway lines in the east still represent a border to the neighboring areas and POIs. As the directly surrounding ground floors facing Bruno-Marek-Allee partly are still under construction, in the future more POIs will be accessible.

	id	travel_Time	restaurant	bakery	supermarket	kindergarten	doctors	pharmacy	pub	toilets	school	pt_stop	mode
0	h1	5.0000	3	1	3	3	1	0	0	1	0	6	Walk

Figure 24 Accessibility Analyses for VIE_SA_BMK

Mobility Station Pillichsdorf (LA_PM_PD)

Most of the POIs are located west, east and south of the hub. In the north, a green area with some recreational facilities (for example hiking paths) can be reached.

	id	travel_Time	restaurant	bakery	supermarket	kindergarten	doctors	pharmacy	pub	toilets	school	pt_stop	mode
0	h1	5.0000	1	0	0	1	0	0	0	0	0	4	Walk

Figure 25 Accessibility Analyses for LA_PM_PD

3.3.Alignment of Citizen and Stakeholder Interests

Along the Living Lab process, the focus for evaluation was shifting from single case studies to a more overarching issue relevant for all the case studies. This aligns with the Living Lab goal to support local stakeholders in long term planning, network building and a better understanding of possible impact. As stated in section 1.3, the EALL Living Lab consists of several types of mobility hub networks. These networks also follow different approaches (based on financing mechanisms, interests of operators or their clients) regarding selection of locations for mobility hubs:

- minimizing the distance between shared mobility services at hubs and residential locations
- minimizing the distance between shared mobility services at hubs and the public transport stops
- using existing mobility infrastructures like parking garages for additional shared mobility services

As these different approaches also show different impacts by stakeholder, 3 scenarios representing these approaches will be appraised using the online MAMCA (Multi-actor multi-criteria analysis) tool (for methodological basis see Deliverable D 3.5 - Martinez Ramirez et al., 2022b). Results and reflection on the application of the tool will be published in a designated deliverable.

Two workshops (with representatives of all stakeholder groups) will be used to collect criteria and weighting for as well with each stakeholder group. Planned stakeholder groups which will be involved are: private mobility hub operators, residents, public transport operators with own mobility hub network.

4. SUMMARY

4.1.Main Findings and learnings

Main findings and learnings connected to the EALL-Process can be summarized into the following aspects:

- understanding hubs not just as places for change between modes, but as possibilities (given the right infrastructure) for reducing necessary trips per day (for example being able to leave luggage at the hub before returning home allows connected shopping trip by foot - instead of extra trip in the evening)
- connected to this, aspects of placemaking around hubs (in an integrated approach) and relevant non-mobility services are not yet on the agenda for mobility hub operators, the focus lies on evidence-based planning of the necessary mobility services at the mobility hub
- based on the accompanying communication in the Living Lab, it can be stated that the openness of stakeholders for tool-innovation in the context of mobility hubs is not very high
- the developed design game was successful in generating innovative ideas "outside-the-box"
- using the SmartHubs integration levels showcases a low level on democratic integration in the Eastern Austria region, first pilots where possible in the course of the SmartHubs project (Design Game, interviews, …)
- further development will be needed to link measures on mobility management / communication (if existent on local or city-level) to existent mobility hub services

As a connecting and final learning, during the implementation of the Eastern Austria Living Lab, the diversity of competences and disciplines necessary for the planning and operation of a mobility hub (network) became clear. This can challenge stakeholders involved regarding the profiles of necessary team profiles (for example a public transport provider will need additional in-house competencies beside civil engineering to be able to run the necessary processes connected to mobility hubs).

4.2.Recommendations

Based on the experiences and preliminary results, the following overall recommendations are given following the three integration fields:

- Physical: connecting existing public space transformation processes with the establishment of mobility hubs allows to reduce the number of processes needed as well as overall costs - for this better information flows and coordination across administrative units and stakeholders is needed. This will also allow better placemaking around the mobility hub.
- Digital: further integration of mobility and non-mobility services into the existing digital platforms (like WienMobil, Wegfinder …) is needed, with the aim to also enable payments for all modes in one app. Additionally, digital incentive-strategies to reward multimodal behaviour could be integrated.
- Democratic: connected to digital integration, on-site kiosks (in cooperation with existing services on site / shops) could serve on the one hand as service for non-digital users, on the other hand as a direct link to the users to collect needs and ideas for improvements.

Regarding transferability of results and applied tools to other processes, there is still the need to define a clearer, more resource efficient workflow between tools and communication towards stakeholders. Especially when looking at the ambitious goals of the City of Vienna and the complex negotiations with the district level, being able to act fast, flexible but supported by evidence-based tools will be key.

4.3.Process Discussion

The defined case study goals, which showcase the planned contribution of the project regarding the further development of the selected mobility hubs, were ambitious in relation to the available budget, taking into account the complexity of relevant stakeholders and necessary processes.

The overall dynamic on mobility hubs in the Living Lab region showed to be a challenge for the process: political plans were changing along the project lifetime, attention of stakeholder was very much concentrated on ambitious realization plans and new local hub developments occurred. Not always the involved stakeholders were able to be transparent on future plans, as these were still part of political negotiations. For the future setup of such a Living Lab, more resources should be allocated to the development of small new formats for flexible, decentral stakeholder involvement (for example 1to1 30min innovation exchanges, …).

Different than planned, the survey was implemented not only in the three living lab locations, but in the broader area around them to better understand the factors affecting the potential of mobility hubs.

4.4.Next Steps

In the Eastern Austria Living Lab, as a final step (see section 3.3), the MAMCA tool will be applied. Additionally, Austrian stakeholders will still be involved in testing the SmartHubs tools which are in process of development (like the Accessibility Tool) and inputs for the data quality management in the Open Data platform (data.smartmobilityhubs.eu/). Two further deliverables with direct input from the EALL will be finished over summer: one on the results of the MAMCA application and one on the recommended co-design technologies including documentation on the development process of the Vienna Design game. As support of the final dissemination, a concluding stakeholder workshop is planned to showcase all SmartHubs tools at once to collect ideas for uptake and application in upcoming planning processes.

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