Smart Mobility Hubs as Game Changers in Transport

 WP4. SmartHubs Living Labs
 T4.1. Setup and evaluation framework of Living Labs

 Deliverable D 4.1
 Setup and evaluation framework of Living Labs

 Version: 1.4
 Date: 23.08.2022

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 The project is supported by:
## Document change record

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<tr>
<th>Version</th>
<th>Date</th>
<th>Status</th>
<th>Author</th>
<th>Description</th>
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</thead>
<tbody>
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<td>08/07/2022</td>
<td>First Draft</td>
<td>TUM</td>
<td>First draft</td>
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<tr>
<td>1.2</td>
<td>22/07/2022</td>
<td>First Version</td>
<td>TUM</td>
<td>Feedback changes</td>
</tr>
<tr>
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<td>10/08/2022</td>
<td>Second version</td>
<td>TUM</td>
<td>Feedback changes II</td>
</tr>
</tbody>
</table>
# Table of contents

Document change recordlasses=""""""""""""""class=""""""""""""""""""""""""""""""

Table of contents

List of figures

1. Introduction
2. Set-up and evaluation framework
   2.1. Set-up Framework
   2.2. Planning
   2.3. Evaluating
   2.4. Application of the set-up & evaluation framework in the living labs
3. Concluding remarks
4. References
List of figures

Figure 1 The SmartHubs Integration ladder, Source: Geurs et al., 2022.................................................. 5
Figure 2 Living Labs’ stages for developing Smart Mobility Hubs .......................................................... 7
Figure 3 Methods and tools used in the LLs at different stages ......................................................... 8
Figure 4 Application of the Framework within the LLs context............................................................. 11
1. Introduction

Mobility hubs are a relatively new approach to transportation. They are designed with the intention of easing and increasing the attractiveness and convenience of multiple alternative modes of transportation. As discussed in deliverable 2.1. of the SmartHubs project, there are different definitions that define a mobility hub (Geurs et al., 2022). In this project, a mobility hub is “a physical location where different shared transport options are offered at permanent, dedicated and well-visible locations and public or collective transport is available at walking distance” (Geurs et al., 2022). Moreover, a Smart Mobility Hub (SMH) is defined as “a mobility hub which offers advanced levels of physical, digital, and democratic integration (i.e. minimum level 2 on physical, digital, and democratic integration)” (Geurs et al., 2022). As defined in Geurs et al., 2022, there are three different types of integration for mobility hubs that can lead to a SMH (Figure 1).

![Figure 1 The SmartHubs Integration ladder, Source: Geurs et al., 2022.](image)

In the SmartHubs project, we aim to study and support the planning of SMHs within our selected Living Labs (LLs). In this project, a Living Lab (LL) is a dedicated case study or testbed location with a planned or existing mobility hub (MH) with the intention to upgrade to a Smart Mobility Hub (SMH) and study its potential impacts. LLs are not necessarily a physical lab or a hub, but a dedicated demonstration site or a selected case study location. LLs are where the processes to achieve a SMH takes place such as participatory process, stakeholder engagements, and data-driven planning processes. In other words, they are sites where the application of tools and methods take place to support the physical, digital, and democratic integration.

In this report, we aim to summarize the different tools and methodologies from the SmartHubs project as a general framework to setup, plan, and evaluate LLs in the cities of Munich, Brussels, Istanbul, in Vienna & Eastern Austria, and in The Hague-Rotterdam Metropolitan Region. This goal of this framework is to be a common “methodological skeleton” of the LL evaluation process, in which the different LLs could follow and choose different methodologies and tools. This framework is a guide, summary, and support for LLs according to their specific objectives which fall in line with each city’s objectives, contexts, and policies.
2. Set-up and evaluation framework

This section demonstrates the set-up and evaluation framework through a flowchart of different methods and tools that LLs may use to implement a SMH. These methods and tools may be implemented in one or more LLs, but not necessarily in all. The implementation largely depends on the SMH’s objectives, which must be in line with the given policies. The framework has three main stages for each LL: I) Set-up, II) Planning, and III) Evaluation (Figure 2).

**Set-up** is the first stage for LLs, where the main objective is to set the goal of the SMH, i.e. “what is a SMH needed for?” or “what is the contribution of the desired SMH?” To decide on the goal, the city’s current policies and plans need to be reviewed in order to see how a SMH can help the city achieve its goals, i.e., to analyze, “what would the SMH be needed for?” In this phase, different stakeholders may start engaging in the planning process. The target group of potential users and the desired levels of physical, digital, and democratic integration should be taken into account when developing the overall goals of the SMH. For example, if a municipality wants to improve the intermodal connections between public transport and shared modes in order to expand the catchment area of the public transport network, then stakeholders, such as shared-mobility operators and users, should be engaged to identify appropriate levels of integration that would produce an effective system and result in the desired outcomes.

The second stage of the LLs is **planning**. The two main outputs of this stage are the location of the SMH and the elements that go into the SMH. In this project, the elements of the SMH should be designed in line with the needs of the stakeholders and potential users (target group needs). In this stage, not just one, but multiple SMHs could be planned in addition to multiple scenarios for each SMH. After the planning stage – specifically, the use of the co-creation tool, which helps define the needs of the relevant stakeholders and their relevant elements – new goals could be created within the LLs.

In the third and final stage, different scenarios within the LLs are **evaluated**. This is an ex-ante evaluation, which may be in terms of the impacts and whether it fulfills the needs of the city, stakeholders, and target groups. The impacts can be in terms of policies in addition to governance, economic, environmental, or social impacts. In this project, the impact of SMHs are also measured in terms of accessibility, resilience, integration to the PT network, and equity. If impacts and satisfaction of needs do not meet the goals, location and/or elements of the hub, then they should be changed. In addition, after the evaluation, other goals could be included in the LL and the process could start all over again.

Normally, a planning or co-design process is chaotic, meaning that you often jump back and forth between different phases. These three phases are not linear, which means that the process is dynamic. In addition to being influenced by differences between cities, neighbourhoods, or streets, the processes can vary depending on existing infrastructure, policies, plans, citizen needs, even culture. In other words, flowcharts contain an idealized situation that does not exist. However, the flowcharts can serve as a guide to set-up, plan and evaluate the living labs.

The messiness is integrated in the flowcharts by the arrows pointing in both directions.

- **Setup -> Planning**: after the main goals and strategies for the living labs have been established, they can move on to the next step to be planned.
- **Planning -> Setup**: if, during the planning process, the strategies and goals change based on the analysis of stakeholders and citizen needs or the urban structure and transport system, the strategies and goals need to be updated in the set-up process, after which the planning process starts again.
- **Planning -> Evaluation**: when different designs or scenarios of living labs are established, the evaluation process should start.
- Evaluation -> Planning: the planning process should be repeated or readjusted, if the evaluation shows that the living lab’s goals do not match the needs of citizens and stakeholders or the accessibility, resilience, or sustainability needs.

- Evaluation -> Setup: if new goals for the living lab are identified during the evaluation phase, the entire process can start over to incorporate the new goals. Finally, once the results the evaluation are consistent with the goals of the living lab, other living labs can be launched with their own new goals.

In the following sections, we present the different methods and tools used in the project for each stage. Furthermore, we present the link with the corresponding tasks (T) in the SmartHubs project. Figure 3 summarizes them as a common set-up, planning, and evaluation framework.

Figure 2 Living Labs’ stages for developing Smart Mobility Hubs
2.1. Set-up Framework

Each LL and SMH has different goals in terms of people’s needs in a city or a neighbourhood. This goal can be in relation to developing an alternative for sustainable mobility, increasing connection to public transport, filling the gaps within public transport, fulfil vulnerable citizens’ mobility needs, decrease emissions in a city, have a resilient mobility system, and so on. The goals should be in line with local and national policies and plans, which is checked in the policy and governance framework (T2.4). Additionally, the expected integration levels for the SMHs should be chosen based on the levels of physical, digital, and democratic integration defined in the definition and overview of mobility hubs (T2.1). The levels of integration can be a guide for selecting partners to participate in setting up the hub.
2.2. Planning

Based on the goals and the levels of integration, a location should be chosen for the SMH. The guidelines for the integration of mobility hubs into the urban space (T3.1) summarizes criteria to be considered in order to select a potential location. Moreover, participation processes and additional tools may also be considered to search for a potential location and should support with deciding on which elements are included in the SMH.

1. Citizens’ needs. These needs can be gathered through the following methods and tools:
   a. Users – non-users survey (T3.2)
   b. Interviews to end-users (T3.2)
   c. Co-design tool (T3.4). Interactive co-design games for supporting the planning process of mobility hubs. The results of each co-design game will depend on the specific research question(s) to be answered during the game. This tool will assist the planning and design process, encourage and support the communication between designers, users, researchers, and other stakeholders in order to help reveal new insights more candidly.
   d. Digital pillar & signage (T3.3.). Digital pillars can help in obtaining information, wayfinding, and information.

2. Stakeholder’s needs. Stakeholders point of view of feasibility and their interests for the hub.
   a. Co-design tool (T3.4).
   b. Co-design workshops with stakeholders.

In the case that the needs of citizens and stakeholders cannot be met because of the chosen location and level of integration, these steps may be repeated. Based on the needs, physical and digital elements of the hub should be established in multiple scenarios (min. 2) to be assessed in the next step. The scenarios are developed by identifying different sets of elements that can be used meet either the citizens’ needs or the stakeholders’ needs. Each of these sets of elements defines a scenario and each scenario can be compared to the other scenario(s) in order to identify the respective scenario’s pros and cons from the perspective of the different stakeholders.
2.3. Evaluating

Now that multiple scenarios have been created, they will be evaluated based on the following methods and tools:

I. **Co-evaluation of the potential scenarios:**
   - Appraisal Tool - Multi-Actor Multi-Criteria Analysis (MAMCA). How to rank the social and environmental sustainability impacts of the co-designed options as well as how to quantify and visualize the impact of different co-designed options within stakeholder priorities (T3.5)
   - Co-evaluation workshop with stakeholders and citizens
   - Stated-choice survey (T5.1, T3.2)
   - Interviews and focus groups (T3.2, T5.3)

II. "**Secondary**" data driven evaluation: resilience, accessibility, and integration of mobility hubs and public transport
   - Resilience tool: Indicators for accessibility, connectivity, and network resilience according to different disruptions are identified as well as the weakest link within the transport network (with/without SHM implementation) (T5.4)
   - Accessibility tool: This tool aims to develop a comparative accessibility assessment for different user groups and available transport modes. Different accessibility scenarios are built from the mobility hubs based on time costs depending on the mode and the social group being considered (T5.2)
   - Integration of mobility hubs and public transport (T5.5)
   - KPIs estimation: Key Performance Indicators (KPIs) are calculated based on those identified in T2.2 and the objectives of the LLs

III. **Policy and governance impacts** (T6.1). The co-creation process is examined using a participatory governance approach. This approach involves an evaluation of the democratic value of the participation process according to the democratic integration ladder (Figure 2).

The final step is to summarize the assessment results and make recommendations for decision makers. If the assessment is unsuccessful in meeting the goals, other scenarios should be selected within the setting-up phase, and either all or part of the assessment should start over. Moreover, results from other LLs could also be included as parts of the recommendations.

2.4. Application of the set-up & evaluation framework in the living labs

The set-up and evaluation framework is applied in the context of the living labs in the SmartHubs project. Figure 4 demonstrates the methods and tools categorized under ‘performed in all the Living Labs (except in Istanbul)’, and those that will be ‘performed in some living labs.’
3. Concluding remarks

The presented setup and evaluation framework is a set of methods and procedures used within the LLs in the SmartHubs project. Seeing that not all tasks have been completed at the time of writing, this report should be updated by the end of the evaluation of the LLs to generalize the steps and make them transferable for building other mobility hubs.

4. References