Paper ID #212

Mobility Lab Helsinki: Learnings from pilots in 2019-2021

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Abstract

This paper describes how the City of Helsinki enables testing and development of innovations. Through five examples of concrete urban mobility pilots with the Helsinki's smart mobility testbed, Jätkäsaari Mobility Lab during 2019-2021, we describe learnings and value of different ways of supporting piloting and co-creation of new solutions in the real world and with citizens. Needs vary from physical locations and instalments to citizen engagement as test users, and similarly added value for the companies range from visibility and references to understanding and learning about feasibility and acceptance. Open-minded and collaborative experimentation can lead to identification of new opportunities as well as faster adoption of successful solutions. The paper gives those developing new solutions an overview of Helsinki's testbed approach and an idea about collaboration possibilities as well as insights for other living lab or innovation platform actors.

Keywords:

Living lab, pilot projects and demonstrations

Background

There are various approaches and terms used for environments and activities aiming to enable and accelerate the co-development and testing of innovations, such as living labs, innovation platforms, and testbeds. While the focus and flavours vary, the general objective is typically to make it a leaner and quicker process to test how things work in practice and to gain valuable feedback from a real operational environment through engaging users. The goal is to help companies learn, validate or redefine their designs, gain references, and introduce new solutions to existing challenges.

As a part of the Helsinki City Strategy 2017-2021 [1], the city's goal was to develop the entire city as a platform for testing and enabling innovations and business solutions. Helsinki is big enough to develop and test significant and scalable solutions while at the same time being agile and small enough for it to be feasible in practice. Following this strategy, the city has established development and testing platforms – knows as testbeds – that are physical or virtual environments that ease the access for doing practical piloting in a real environment. The content areas include EdTech, Built Environment, Circular Economy, Health & Wellbeing, and Smart Mobility. The city's resources, such as buildings or data, as well as schools, health centres and other service units, are utilized as product test and development environments. [2]

The smart mobility testbed Jätkäsaari Mobility Lab, named after the disctrict of Jätkäsaari as a focused area for many smart mobility pilots, was established for 2019-2021 as a project funded through the city's innovation fund. The project, which aimed to enable and support companies and research, development and innovation actors to test their new mobility solutions and ideas in the urban environment, was coordinated by the city's economic development department supported by the city-owned innovation company Forum Virium Helsinki. From 2022 onwards, the smart mobility testbed activities in Helsinki are continued under the name of Mobility Lab Helsinki [3] with an updated focus based on the learnings from the past as well as current strategies, needs and identified opportunities.

Through selected urban mobility pilots implemented as part of the Jätkäsaari Mobility Lab, this paper describes different ways the testbed has supported companies developing and testing novel smart mobility solutions in Helsinki in 2019-2021, and the value it brings to them. The examples and the learnings aim to explain the versatile ways of enabling practical piloting and the benefits they bring. The paper serves as both a summary of Helsinki as a testbed as well as insights for others running or planning living lab or innovation platform activities.

Jätkäsaari Mobility Lab: pilots and enabling them

The Jätkäsaari Mobility Lab (later referred to as simply the Mobility Lab) project was done during 2019-2021. The project enabled, facilitated and supported various and diverse smart mobility pilots with an open approach. About 25 small-scale experiments and agile pilots, and about ten larger-scale pilots were conducted, with a varying role and ways of support by the Mobility Lab. The Mobility Lab contributed to pilot preparations, implementation and follow-up activities. The goal was on one hand to support companies in their own piloting activities, and on other hand to speed up the introduction of innovations that meet city-defined challenges.

The Mobility Lab had diverse role in the different pilots and experiments. Ten of the small experiments were procured by the Mobility Lab as agile pilots, aiming to find innovative solutions to address city-defined challenges through open calls. In many cases, the Mobility Lab provided the real-world testbed for pilots and projects, that were funded by other external funding sources, such as EU funding programmes, or the companies' own R&D budget. The Mobility Lab acted as an entry point to companies and developers, and facilitated contacting and discussion with the city departments. The Mobility Lab helped to find the right persons in the city organisation and translated city's priorities and needs to the companies. More generally, the Mobility Lab also helped especially foreign companies and innovation actors understand the context, stakeholders and ecosystem in Helsinki.

Mobility Lab Helsinki: Learnings from pilots in 2019-2021

The Mobility Lab consisted of seven key functions that supported companies in preparing, conducting and scaling up pilots and experiments. These were:

1. **Urban test area**. The Mobility Lab activities concentrated in the West Harbour area, and especially in the district of Jätkäsaari, where a busy passenger port is located, where new technologies and services were piloted in the real-world urban environment, together with local residents.
2. **Smart infrastructure.** The city had readiness to cover costs of deploying smart infrastructure, that enabled piloting and experimentation of impactful solutions (i.e. electricity, data connections, hardware instalments).
3. **Residents as test users.** The residents of Jätkäsaari neighbourhood had an active role in the living lab, e.g., in defining the focus for piloting programmes, contributing to the selection of pilots and, importantly, acting as test users and providing feedback about the piloted solutions.
4. **Agile piloting programme.** Agile piloting is a challenge-based innovation process, which seeks innovative solutions and procures small-scale pilots from companies [4]. The Mobility Lab conducted three rounds of agile pilots. Some of the pilots presented below (Trombia Free, Vianova, and Bercman), entered the Mobility Lab through open calls for agile pilots.
5. **Co-creation space "Urban3".** A co-creation space, inhabited by several organisations focusing on the digitalisation of the urban environment, was established in the Maria 01 startup campus, with the aim to facilitate collaboration across business ecosystems.
6. **Business and investor contacts**. Mobility Lab provided contacts to City's entrepreneurial services NewCo Helsinki, the Maria 01 startup ecosystem, and other relevant organisations.
7. **Networking.** Together with different projects and actors, Mobility Lab organised networking events, in which info about the piloting possibilities and the results of the conducted pilots was shared.

Next, we present five case examples of concrete pilots, through which we describe how the Mobility Lab supported smart mobility pilots in Helsinki. These cases, and learnings from them, demonstrate different ways living labs can provide added value to companies.

Testing in a real urban environment: Case Trombia Free

One key function of the Mobility Lab was providing the urban environment as a testbed for companies to develop and pilot new solutions. In the feedback by the piloting companies, the possibility to run pilots in street environment was much valued, as it enabled testing the feasibility of solutions in real-world setting, identifying preconditions and restrictions of use, and studying public perceptions.

Perhaps the most visible and media-attention raising pilot in the street environment was Trombia Free, an autonomous, fully electric street sweeper, which was piloted among real traffic in Jätkäsaari and bike lane Baana (Figure 1). The street cleaning pilot was conducted from 19 to 27 April 2021. The

low-noise street sweeper operated in the densely built environment during night-time. The sweeper operated autonomously, although, a professional driver accompanied the vehicle in order to secure safe operations among traffic.

Figure 1 – Trombia Free in Jätkäsaari, spring 2021. (Photo: Vesa Laitinen)

The involvement of Helsinki City Construction Service company, Stara, was crucial for the pilot. The Trombia team used Stara's warehouse in charging, cleaning and maintenance of the sweeper. Trombia Free took part in Stara's street cleaning operations. Mobility Lab facilitated the discussion between Stara and Trombia. Mobility Lab applied for the permits for the use of street space and for autonomous driving from municipal and national authorities, and supported in the communications as well as conducted a public acceptance study. The direct citizen engagement through established trust and communication channels is an added value real world testing can provide compared to closed environments and test tracks.

First references and direct feedback: Case Bercman Technologies

In many cases, running a pilot in a real street environment requires enabling infrastructure and support for hardware instalments. Mobility Lab supported several companies in finding suitable locations for pilots, installing hardware, and providing electricity and data connections.

The Smart Pedestrian Crosswalk, a solution developed by the Estonian company Bercman Technologies, was piloted in Jätkäsaari in 2019. The pedestrian crosswalk in Selkämerenkatu street was equipped with two traffic signs, containing technology that produced data about traffic (traffic

volumes, speeds, speeding violations) and the environment (temperature, moisture) (Figure 2). The data was provided to traffic planners in a dashboard. The led-illuminated signs had warning functions for pedestrians, but this feature was only used in restricted demonstration events.

Figure 2 – Bercman's Smart Pedestrian Crosswalk in Jätkäsaari, fall 2019.

The Mobility Lab supported the pilot in finding the right location for the pilot, applying permits for instalment, and facilitated the discussion with the City's traffic planners. The Mobility Lab communicated the pilot to residents through local social media channels and replied to residents' questions and concerns, both online and in info events.

The pilot in Jätkäsaari was the first one in a truly urban environment for the solution, providing a market reference. The results and learnings from the first pilot, the real-world experiences and close dialogue with the city, provided insights to product development, allowing the company to develop next-generation products that were more cost-efficient. The pilot helped the company understand city's needs and expectations, and to collect feedback from the local residents.

New and open data: Case Jätkäsaari Smart Junction

One of the Mobility Lab's aims was to help companies, researchers and other parties use open data for development of new innovations. One spearhead project providing open APIs for traffic data in the Mobility Lab was the Jätkäsaari Smart Junction, conducted by Aalto University and Helsinki-based company Conveqs [5]. Radar-based traffic sensing equipment was installed in intersections on the road from the harbour to the motorway, providing detailed data about the traffic volumes, vehicle types, and speed on each lane (Figure 3).

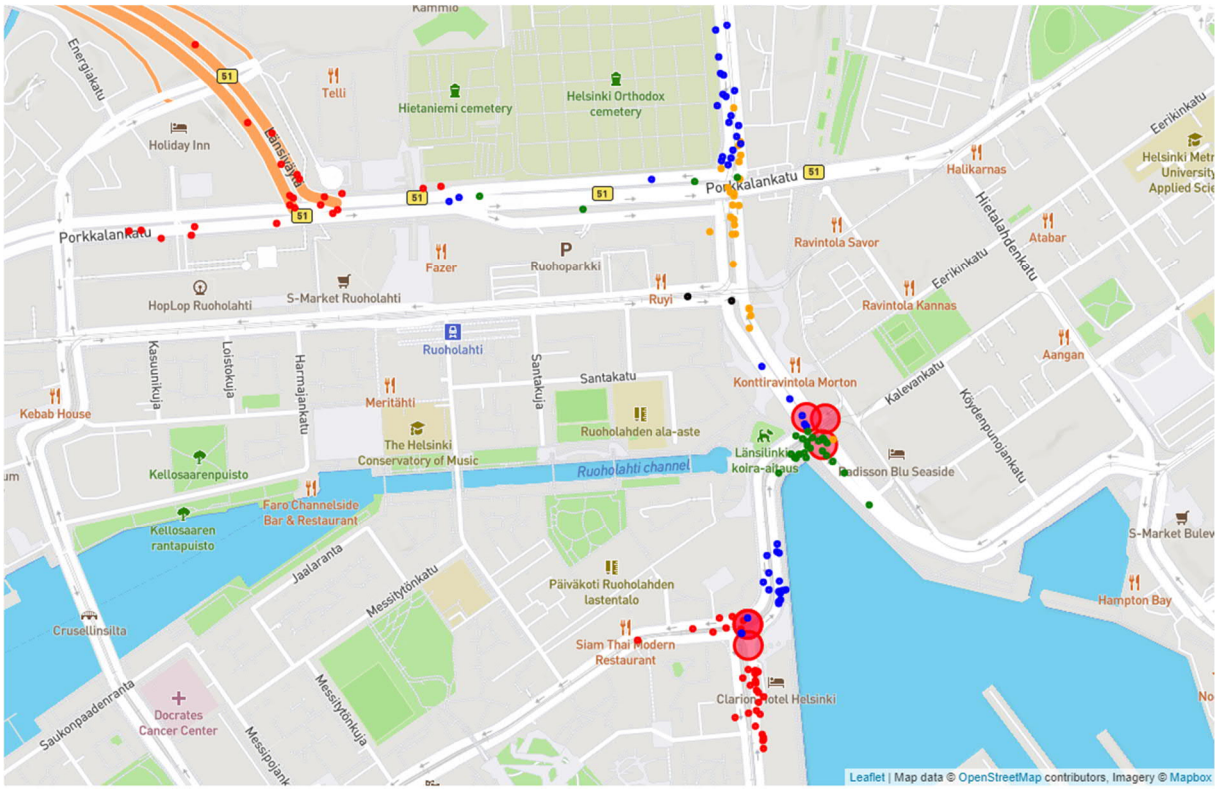

Figure 3 – Vehicle tracking by radars in intersections in the West Harbour area, Helsinki.

The project is both developing new simulation models as well as generating open data to fuel further innovation activities. Aalto University develops traffic flow modeling and traffic light optimization in the area. The idea is that accurate real-time information in the form of a digital twin enables the development and testing of new and optimized traffic signal control. Besides radar data, the model integrates other available data sources as well such as the traffic signal status and tram movement.

The Mobility Lab partly funded the hardware and instalments. The city is a key partner in the project, enabling the instalments in the intersections and providing access to, e.g., traffic light systems. The real-time traffic data is available for companies, researchers and other third parties through APIs. Other Mobility Lab pilots have utilised the data in their pilots such as other traffic measurement pilots and in development of a mobile app that provides real-time traffic information to local residents.

Citizen engagement and participation: Case Callboats

The Mobility Lab utilized participatory methods in its testbed activities. The co-creative approach involved citizens, the city representatives, private companies and researchers. Residents of Jätkäsaari took an active role in activities, for example, in defining the challenges of the piloting programmes, in selecting the pilots, and as end-users of piloted services.

An example of a broader citizen-centric process (beyond the Mobility Lab) is Helsinki's participatory budgeting in which residents came up with ideas for city fund allocations for improving their neighbourhoods, and then voted on which ideas should be implemented. The first round of participatory budgeting took place in 2018-2019, with over a thousand proposals submitted and a budget of 4.4 million euros.

One proposal voted for implementation was an electric ferry to Vartiosaari, a recreational island in Eastern Helsinki lacking a regular waterway connection. At around the same time, a company was looking for a place to test and demonstrate their new on-demand ferry. Based on the proposal and the opportune company need, the Mobility Lab helped connect these and facilitated the discussion between the ferry operator and the city representatives to plan and execute a pilot in close collaboration with the island's resident association

The Mobility Lab coordinated and facilitated the pilot in 2020, taking care of many of the practicalities, including charging infrastructure. The on-demand electric ferry service Callboats transported residents and tourists to Vartiosaari (Figure 4). It had over 7000 customers over the season. The pilot was considered as a success, and it resulted in requests of continuation, and a follow-up in another location in 2021. Besides a successful service in itself, the pilot works as a good example of how Mobility Lab can help translate residents' wishes and companies' test location needs into successful, concrete pilots.

Figure 4 – Callboats on-demand electric ferry in Vartiosaari, summer 2020. (Photo: Vesa Laitinen)

Exploring the potential of novel solutions: Case Vianova

The Mobility Lab added value not only for companies, but also for the city itself. Experimentation and piloting provide information to the city about new ideas and latest innovations. The concrete pilots reveal first-hand information about the feasibility of new technologies and services, as well as about their potentials, preconditions and restrictions. It is a way for the city to stay up-to-date about emerging solutions and to explore their potential for wider implementation.

In 2020, the French company Vianova conducted a micromobility data sharing pilot in Helsinki. Vianova's solution was based on the MDS (Mobility Data Specification) framework, which enabled secure exchange of data between mobility providers and cities. Aggregated and anonymised mobility data was shown on a dashboard, giving the City of Helsinki an overview of how, when and where the e-scooters were used.

The joint pilot was a collaboration between Vianova, micro-mobility operators Voi and Tier, and the City of Helsinki. Forum Virium Helsinki, the city's innovation company, took the role of data controller in the pilot. Mobility Lab facilitated the discussion and co-development between the collaborators.

The pilot led to a follow-up contract between the city and Vianova, and serves as an example of how pilots can help in identifying potential new technologies and provide information about their feasibility through concrete pilots – hopefully leading to further use and scaling up beyond the pilots.

Lessons learned and value of a mobility lab

Different technologies or services have different needs and requirements for them to be tested in meaningful ways. Therefore, the types and relevance of support actions and their perceived value for different companies and developers also varies. One key distinction is between solutions that require physical installations or deployment in the urban environment and digital ones. While the role of a city is quite evident in the first in order to get the necessary basic deployments of pilots done, the role of the Mobility Lab has been important in supporting the user participation in basically all types of pilots.

For services aimed at citizens, whether new transport alternatives or information apps, established trust, familiarity and communication channels for test activities is valuable in order to raise awareness about the pilots and encourage people to participate and provide feedback. For solutions for, e.g., traffic managers or planners, facilitating a dialogue with the right experts and stakeholders is important in order to get the most out of the experiments – both for the companies, in learning about real user needs and expectations, as well as the potential customers, in testing and learning the right things.

The dialogue with the potential new customers and partners is usually considered one of the most valuable parts in the pilots, alongside other feedback and references gained for future development and

marketing, respectively. This can be particularly relevant for startups that have less direct contacts and experiences to customers. Similarly, opportunities to test and demonstrate something completely new can be a crucial step in establishing credibility and gaining references for customers, investors etc.

Compared to scattered, isolated pilots, the Mobility Lab helped communicate and spread awareness of the pilots more. While most eye-catching and futuristic pilots, such as the Trombia Free street sweeper, can gain a lot of visibility and media attention on their own, the Mobility Lab can communicate several pilots in many occasions and events over time, adding on to the awareness about the solutions and companies. With our Mobility Lab, we have had the benefit of Helsinki's good reputation as a place to look for, when it comes to mobility innovations in that different innovation actors want to hear what is being done in Helsinki. Besides dissemination, the Mobility Lab acting as an umbrella for smart mobility activities helped network different parties and find synergies between projects.

Even though the Mobility Lab's point of view primarily in enabling the testing of ideas coming from companies, the interest and active participation of the city (often being the potential customer or a necessary partner) is usually important in order to ensure valuable learnings as well as potential for future implementations and scaling up. In some cases, however, facilitating the testing towards citizens or with other partners may be enough, e.g., with business-to-consumer services where the city has a less direct role in the future.

By being more involved in pilots from defining needs and learning about new technologies, a city can use testbeds to improve their own understanding of where the state-of-the-art is at and to identify opportunities to address challenges or engaging citizens. The agile pilot approach where the city (together with the Port of Helsinki, public transport stakeholders and citizens) define challenges is one direct way for finding interesting, novel solutions. With a total of 82 proposals for the three open calls done by Mobility Lab in 2020-2021, they were a very effective way of raising interest of various companies, both from Finland and abroad.

Aligning timelines, interest and possibilities from companies wanting to test something, involving the needed parties and initiating necessary projects for it can often be complicated and slow. Calls with specified budgets, expectations and timelines are a way of helping ensure certain milestones and achievements are reached. However, flexibility can be recommended where possible in order to ensure pilots are meaningful and provide the most value out of them rather than sticking to strict deadlines just because it was defined beforehand. The Mobility Lab's period of 2019-2021 was affected a lot by the covid-pandemic and a lot of planned experiments had to be revised and pushed much further to the future in order for them to make any sense and to produce meaningful results.

Related to meaningful plans and implementations, it is important for different parties to be clear about

the expectations about the pilots. These include what kind of results are the goal (from technical validation to creating impacts), what kind of user involvement is realistic (e.g. how many people can be reached as test users, whether the service is mature and user-friendly enough), and what are the expectations and possibilities for continuation after the pilot (e.g. expectations of direct sales afterwards, limitations of public procurement practices).

Conclusions

This paper provided an overview of the City of Helsinki's testbed approach and how experimenting and developing new innovations are enabled and supported. Through five selected example cases of smart mobility pilots, we described different ways the Mobility Lab helped run concrete pilots, and what kind of benefits the support provided the testing companies.

The Mobility Lab helped create awareness and synergies between different activities and stakeholders. Instead of individual projects here and there, it helped in forming and finding a broader view of and links between different activities. Still, it was far from all encompassing, but a valuable point of entry for someone with an idea or a need looking for information or collaboration opportunities.

The practical support in testing things in the urban space, establishing dialogue with the right experts, and help in engaging citizens as test users are valuable functions needed for meaningful pilots. While it is clear, a lot of pilot ideas may not be feasible or interesting in the context of Helsinki, a dedicated Mobility Lab provided a channel for discussion and collaborative planning for potential cases.

While the learnings and example cases were from the Jätkäsaari Mobility Lab project period of 2019-2021, the testbed activities in are continued seamlessly from the beginning of 2022 onwards under the name Mobility Lab Helsinki. Therefore, this paper has provided not only an overview of what has been done in Helsinki and the results and learnings from it for those planning their own living lab or innovation platform activities, but also still valid information for those developing their own smart mobility solutions and looking for a real urban environment to test them in.

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