HUPMOBILE

ITS Experimental Policy Recommendation Roadmap for BSR Cities

HUPMOBILE – Holistic Urban and Peri-urban Mobility
ITL Digital Lab, 2022

Imprint

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Project note

The EU co-funded project **HUPMOBILE – Holistic Urban and Peri-urban Mobility** (2019–2021) brings together municipalities, universities and other expert organisations in their efforts to develop a holistic approach to the planning, implementation, optimisation and management of integrated, sustainable mobility solutions in the Baltic Sea port cities.

The carried out activities enable major urban mobility stakeholders such as city authorities, as well as infrastructure providers and transport providers to assess and integrate innovative mobility options into their mobility management plans and policies. The developed HUPMOBILE framework allows the planning and implementation of well-functioning interfaces and links in urban- and peri-urban transport considering the different transportation flows in the local context.

Within HUPMOBILE, partner cities plan, test and implement innovative sustainable urban mobility for both people and goods (i.e. freight, cargo logistics and delivery), which are easily adaptable for follower cities. These include greener urban logistics and combinations of goods- and passenger traffic, intelligent traffic systems-based services, tools for stakeholder participation, and new tools for transportation mobility management and Mobility-as-a-Service (MaaS).

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1. Introduction

This report introduces an experimental and open way how cities can test novel ideas to face urban challenges in the field of mobility and validates this in Baltic Sea Region cities. Typically, a roll-out of novel ideas into actual urban services and products is a long and expensive process from the city government perspective. In this project, a concept on how to set up innovation-lab-type more experimental pilots is introduced, building on the previous conceptual and empirical evidence of the minipilots concept. Empirically, Intelligent transportation system (ITS) minipilots were designed for four BSR cities of Hamburg, Turku, Tallinn and Riga with actual street-level testing in three of them. Although the main concept is harmonized across all pilot sites, the idea and implementation of the minipilots follows a bottom-up logic with decision-making on the key characteristics of minipilots given to cities themselves. The data was collected via analysing HUPMOBILE project documents and meetings with city representatives. In addition, the minipilot in Tallinn is complemented with feasibility study on adaptive traffic lights.

Recently, it is more broadly discussed among researchers and practitioners how cities can be more open in their innovation process. For example, several researchers [1] – [5] have proposed the Living Lab concept for urban environments with a goal of making the innovation process more experimental and participatory. According to literature [6], "a living lab is a physical or virtual space in which to solve societal challenges, especially for urban areas, by bringing together various stakeholders for collaboration and collective ideation. " In regard to empirical evidence, the previous studies have mainly focused on analysing the living labs within one city, for example, there are case studies of Rotterdam [2], Suurpelto [4], Barcelona [7] or Manchester [8]. When looking for the comparative case studies, there tend to be only one-country or one-region based cases such as Finnish cities of Helsinki, Tampere, and Oulu [9] in addition to cities of Helsinki, Tallinn and Vantaa where Living Lab concept is coupled with Pre-procurement [10]. Therefore, there seems to be a research and practice gap on comparative case studies involving cities from different countries.

This paper looks into the minipilots designed to make specific examples how three Baltic Sea Region European cities of Tallinn, Turku and Hamburg can solve their mobility-related challenges with application of novel solutions or technologies. In addition, the city of Riga also participated in this programme in designing a minipilot which was not implemented due to administrative challenges and Covid 19. Conceptually, the key characteristics of minipilots are the following: they are city challenges based; they promote open selection of novel ideas; very limited funding (around € 20 000) is provided by the cities mainly for start-up companies, universities or SMEs; and there is a potential to develop this minipilot into service, if successful. The minipilots are expected to develop a concept or a prototype and run a very limited trial (e.g. 1-3 weeks) including real people and stakeholders.

However, bringing novel solutions to the city streets is a challenge itself where several barriers have to be overcome, most critically, how to promote this concept internally within a city and how to find resources for this, both in terms of money and people. Therefore, several barriers and enablers of setting up experimental small pilots are analysed with a focus on value generation and real involvement of participants and stakeholders. It is also important to underline that minipilots were designed and implemented differently in participating cities, following each city's involvement and procurement

practices and strategic interests in the field of mobility. Therefore, the minipilots themselves differ quite substantially in their scope and design across different cities.

2. Minipilots Conceptual Framework

It has become commonplace to argue that local governments can no longer achieve public goals by themselves and have to work through networks [11]. In the literature, the concept of minipilots (or agile pilots) is also linked to the Public Value (PV) theory, offering a shift towards an 'adaptive model' for local governments, where large-scale investments are preceded by agile, open, bottom-up and experimental trials [12]. In order to achieve adaptive governance [13], organisations need to be able to deal with the changes and introduce more decentralised and bottom-up decision-making structures via mobilising more talents and participants.

The research method in this paper is a combination of meetings with city representatives and analysis of minipilots' project documents. In addition to regular meeting and workshops, in Mid-2021, interviews were conducted with key project officers representing four cities, including also Riga, where the plan for the minipilot was designed but not implemented. The online interviews lasted approximately half an hour each and they were audio-video recorded. Additional documents such as procurement files and/or internal description of minipilot plans were received from all four cities prior to the interviews.

The design of the minipilots concept started in 2019 as a collaborative process within the HUPMOBILE project. An early concept was introduced to four cities during the meeting in Tallinn (Estonia) in February 2019 where it was agreed to add two cities to this process (in addition to Riga and Tallinn, also Hamburg-Altona and Turku). This was followed by the next steps introduced in June 2019 in Espoo (Finland) during the project kick-off in the Aalto University (Finland). A finalized concept, involving the interests of all participating cities, was introduced in December 2019 in Södertälje (Sweden). As a key principle, each city could decide themselves which urban mobility challenge the minipilot is dealing with and how to launch and implement minipilots. In June 2020, the minipiloting plans were published in the webinar format (https://www.youtube.com/watch?v=4oqYufx-WqI&ab_channel=UBCSustainableCitiesCommission). After that, the minipilots were planned, designed and implemented from mid-2020 to late 2021.

Conceptually, the minipilots contribute to the knowledge creation on how cities can solve mobility challenges by applying novel solutions. The procurements of minipilots were either planned with an 'Innovation Challenge' type of principle, where the needs of the city and expected outcomes of the procurement were described, but the exact technological solution and their functionalities were left open for the companies and/or citizens to plan and propose. The aim of the challenge-based procurement is to help the procuring authorities to find the best solutions that are in the market, and on the other hand, to drive the companies and citizens to propose solutions that are better targeted towards the real need of the cities and end-users. Alternatively, cities were also able to follow the 'Traditional Procurement' approach: the solutions were predefined by cities (without crowdsourcing) and then procured.

3. HUPMOBILE Cities Minipilots In a Nutshell

3.1. Tallinn minipilot

In the case of the city of Tallinn, the minipilot is combined with a pre-feasibility study of adaptable traffic lights. The study investigates various adaptive traffic management market solutions in EU cities, analyse investment and running costs and map potential transport corridors and needed data layers in the case of the city of Tallinn. It also analyses integration potential with new technologies and transport modes. The pre-feasibility study is complemented with a minipilot, to test and validate technologies in a real traffic situation, after potential corridors are mapped. Thus, the minipilot focuses on how to implement adaptive traffic management in Tallinn (see figure 1), as it has the potential to make traffic smoother and significantly reduce congestion. This is especially important as the city of Tallinn plans to narrow its streets and close car lines with more priority given to public transport. In this context, adaptive traffic lights have the potential to increase traffic throughput. The adaptive traffic lights are also considered as a key enabler of automated vehicles that have also been tested in the city of Tallinn ([14], [15]).

Figure 1. Adaptive traffic Management in Tallinn

Key details

- Urban Challenge: Increasing congestion
- Location: Kopli/ Tööstuse crossing
- Duration: one month in live traffic
- Partners: Civitta and Stratum
- Enablers: open innovation involving companies and universities

- Key value: an opportunity to learn from actual experiment
- Follower city: Tartu

The detailed description of Tallinn's minipilot can found in a separate HUPMOBILE file, see https://www.hupmobile-project.eu/materials/reports.

3.2. Turku minipilot

Turku plans to support decision-making on developing traffic arrangements in the city centre, and move as much as possible traffic from the centre to other routes by implementing a registration plate study on through traffic with possible subsequent restrictions and monitoring their effect. In the city centre vision process, the idea of private car traffic restriction on the central bridge (Tuomiokirkkosilta) was proposed to enlarge pedestrian-friendly urban space and to make the city centre more attractive and safer with less noise and emissions. This vision process was followed by a difficult debate and a decision whether in the near future private car traffic can use the bridge for travel to and from the city centre. On the other hand, it is quite largely accepted that through traffic can be moved to elsewhere. As an enabler, an upcoming joint terminal building in the port of Turku opens up new opportunities to reorganize the traffic arrangements around the port and its surrounding areas – to improve accessibility, fluency and traffic flows.

In the minipilot, the city of Turku analyses how much through traffic exists as an input to assist further plans to move this traffic outside from the city centre (see figure 2). This is achieved via traffic flow analysis with registration plate identification technology surveying the number of vehicles, vehicle type, the volume of through traffic between each measuring point, hourly distribution of the through traffic and the registration address of the vehicle. The predicted covid-19 situation's impact to the traffic volumes wasn't very significant, around 0,4%.

Key details

- Urban Challenge: Private car traffic in the city centre and different aspects related to it
- Concept/ prototype: Through traffic study via collecting and analysing volumes, routes and vehicle types of the through traffic in the city centre.
- Duration: approx. 3 weeks
- Partners: Nodeon
- Enablers: new technology to be tested, demand for data. Reorganization of traffic arrangements.
- Barriers: lack of resources (time and money)
- Value generated: support decision-making, promote sustainable modes of traffic

Figure 2. Through traffic study minipilot in Turku

The detailed description of Turku's minipilot can found in a separate HUPMOBILE file, see https://www.hupmobile-project.eu/materials/reports.

3.3. Hamburg minipilot

In order to deal with the challenge of decreasing motorized (freight) traffic, the city of Hamburg plans to deploy a network of mobility micro-hubs in the Altona district. The first one focusing on goods de-

liveries with cargo bikes (see figure 3) was installed as a minipilot in the main train station of the district. This minipilot aims to reduce motorized cargo traffic in a very busy urban space where cargo vans tend to park often in the second row of the street which blocks other traffic participants and/or on cycle paths and pedestrian zones. The micro-hub at the main train station serve different modes of transport users using long-distance trains, S-trains, buses, taxis, sharable public rental bikes and cars.

Figure 3. Cargo bikes in Hamburg

Conceptually, micro-hubs are small logistical locations. When small electric cargo bikes are combined with micro-hubs, this potentially contributes to more sustainable logistics. With the reduced number of larger vehicles in city centres, the sustainability of transport improves, potentially having positive public health effects thanks to cleaner urban air and smaller noise pollution. Two aspects are particularly relevant for the development of micro-hubs. Firstly, a suitable premise should be identified that remains affordable and is located in much-commuted space such as the city centre. Secondly, a micro-hub benefits particularly if it can meet expectations of local businesses in addition to its main task of distributing goods.

The micro-hub at Altona station has been operating in the basement of the main railway station in the district since the beginning of 2020. The space is roughly 80m² involving Wi-Fi routers, electric plugs, working desk and a small locker. It is operated by Deutsche Bahn – Smart City that owns the station. However, due to the Covid-19 pandemic, the restrictions also influenced the micro-hub's operation.

Key details:

- Target: Decrease of motorized traffic
- Aim: Last-mile cargo bikes in micro-hub
- In operation since 2020
- Location: Main station in Hamburg Altona
- Key enabler: indicating a suitable urban place
- Key barrier: public space is rare in densely populated cities
- Partners involved: Deutsche Bahn – Smart City

The detailed description of Hamburg's minipilot can found in a separate HUPMOBILE report "Feasibility Study Logistics Hub Altona" (www.hupmobile-project.eu/sites/hupmobile/files/outputs/feasibility_study-_logistics_hub_altona.pdf).

3.4. Riga minipilot' s Concept

In the case of the city of Riga, the minipiloting concept has been agreed-upon and is ready to be implemented. However, the city of Riga had to delay it firstly for administrative reasons – the pilot was supposed to take place in the Port of Riga but in 2019-2020, the ownership of the Port was transferred from the city of Riga to the Central Government of Latvia which affected several ongoing projects and plans. This was coupled with a period of uncertainty in which the city of Riga did not have a proper administration due to several political turbulences (the central government managed the city). However, independent of that, the city continued planning the minipilot that was supposed to be launched in the second half of 2021, similarly to minipilots in Tallinn and Turku. However, the planning stage was a bit longer and during the last Minipilots meeting with the City of Riga, ITL Digital Lab and Aalto University as a coordinator in September 2021, it was jointly agreed to still launch the minipilot, as the preparations had been ongoing. However, this was ceased as a process because of the full Covid 19 lockdown with movement restrictions starting from October 21 that lasted until November 15 due to very high Covid19 rates in Latvia. Therefore, under this situation, it was unfortunately improbable to launch the minipilot in 2021 as planned.

Riga's initial plan for a minipilot (as of mid-2021) is connected to the Freeport of Riga with a goal to select a smart mobility solution aiming to improve logistics in and around the port. The focus is on the management of cargo transport flows on roads, passenger mobility and increased efficiency of data analytics. The minipilot has been discussed with Freeport and city officials and it is planned to be launched as an innovation partnership (students' competition). Key details:

- Challenge: making transport system more integrated
- Enablers: progressive City Council and Digital Development
- Barriers: Covid19 pandemic, structural changes in the management of city and port, administrative issues.
- Value generated: clean air and water via reduction of emissions
- Stakeholders: city, port, students

4. Roadmap for BSR Cities

This section offers a step-by-step approach for BSR cities that are interested in experimental policies via application of minipilots. Minipiloting is a model for developing and testing novel urban services in real-life setting in a co-creative way. Minipilots are **short** (less than 6 months) and **cost-effective** (often in the range of € 5 000 - € 20 000) applied in **real-life city environment**. This makes them different

from large-scale research and development intensive pilots that can take years before implementation and are more expensive (for example, large-scale climate-neutral-smart-city pilots tend to be approx. in the size of € 500 000 – € 1 500 000, initiated either by NetZeroCities consortium in Europe or by the FinEst Centre for Smart Cities in Estonia). In addition, minipilots are **experimental** – the aim is not to produce a desk research as a main deliverable but the focus is on rapid implementation. Furthermore, being more experimental means also **taking risks** whereas some minipilots succeed (working Proof of Concept) and some can also fail (the solution does not work as expected in real life). After initial experimentation, successful minipilots can be scaled up to larger pilots and then eventually to everyday urban services. In the case of failing minipilots, this can be valuable feedback and save significant amount of time and investments. Thematically, minipilots can be executed in **several domains** (e.g. built environment, energy, mobility, data and governance) and they usually test and apply **novel technologies**. Minipilots are conducted on a **small scale**, often in the district or even street levels. Lastly, minipilots are **participatory,** they promote the collaboration of cities with several stakeholders like companies and universities and they also engage residents to the process.

In general, minipilots are suggested to be executed in the following way:

1. **Plan a programme** with 3-5 minipilots. In this way, the programme can reach out to more participants interested in testing out their solutions in a partnership with a city. This assumes raising funding for these minipilots and facilitating the programme. Minipilots' program typically costs around € 50 000 and are implemented quickly (up to 6 months) but the program needs also a proper facilitation (e.g. 25% of experienced urban developer's workload in approximately 12-month period with support from the communication team).
2. **Definition of urban challenges.** Minipilots are best designed when they are problem-based and related to the design of urban policies. These problems can be defined by city officials, researchers or then crowd-sourced to residents; or then combined. The addressed problems can be either narrow (e.g. there are too many heavy-good-vehicles in front of main train station in a city X) or broad (climate change affects urban living globally). It would also be good to indicate expected impacts of minipilots.
3. **Call for Minipilots.** When minipilots are procured in an open call, a very important step is to minimize the administrative burden as much as possible. For example, many cities in BSR can procure solutions up to €20 000 with simplified procurement model, without the need for a complicated formal procurement process. However, this can vary in cities and across internal and external financing rules. In a light procurement model, there are more competitive ideas submitted as a response to a call – a simple, fully open and easy process attracts more participants. It is also important to internally design how open is the call – e.g. can everybody internationally participate including residents, NGO-s and companies or is it designed exclusively for local start-up companies. It is also wise to launch this call for minipilots with involvement of key stakeholder networks. The open call is also expected to have a clear selection criteria, for example, see table 1.

Table 1: Indicative selection criteria of minipilots

Criteria for evaluation	Evaluated in scale 1-5
Innovativeness of the trial	• a genuinely new service idea or product • the experiment generates new practices/solutions/aspects to a specific challenge
Potential for a scalable service	• usability of the service • the functionality of the business model • the potential for long-term solution • can be put in practice in up to 6 months • can work in multiple cities at the same time
Teams and resources	• skills and know-how of the executive team • other resources of the executive team (e.g. funding, collaboration) • potential to continue developing the service after the experiment • will be executed by a consortium of more than one organisation or company
Smart, agile and user-driven	• service/product utilises ICT-technology or data • use of agile development methods • service responds to the needs of users

4. **Selection Process.** A call for minipilots is expected to raise competition among technology-based ideas. Preferably, an Evaluation Committee is set up where each member (e.g. a civil servant, a researcher from university, a corporate representative) evaluates each proposal according to the evaluation criteria and later a consensus meeting is followed to confirm the ranking of minipilots; or make chances to this. In order to meet financing rules and address potential complaints, it is advised to internally document this process. It should be also mentioned that the price factor is usually not the most important one when evaluating the ideas, as the investment is relatively small. Thus, it matters more what is an expected impact of a potential minipilot and less whether it is 14 888 or 14 889 euros as a cost.
5. **Experimentation.** After winners are announced, implementing teams have usually up to 6 months to run their pilots, see also figure 4. In some cases, there might be expected support needed from the participating city in terms of infrastructure or permits. In terms of financing, a good practice is be to pay 50% upfront and 50% when a pilot is delivered but this can vary.

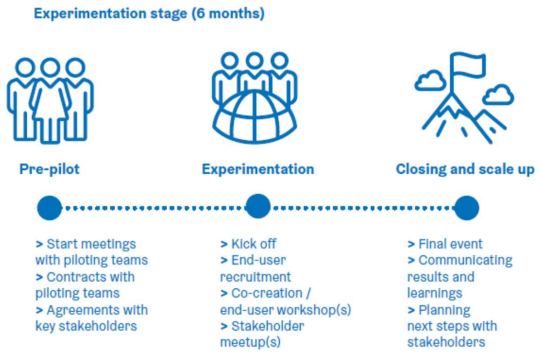

Figure 4. Experimentation stage. Source: Forum Virium Helsinki

6. **Lessons Learnt.** This step is important to analyse which ideas can actually have potential to be scaled up later on as larger pilots or even as a new urban service – also minipilot authors are more motivated to participate in this process if they can later scale up their ideas.

5. Discussion

This report contributes to the debate on how cities can open up their innovation processes to become more agile, experimental and participatory. To the knowledge of authors, the current literature lacks comparative insight how open innovation lab are implemented in different cities. Conceptually, a contribution to developing a minipilot framework for cities is made, based on the Public Value theory in order to focus on the solutions that are challenge-based and that could be replicated in several cities. Empirically, this concept is validated in three different cities with different experience.

This paper combines the experience of different European cities and reflects their innovation capabilities, policies and procedures. Within the same minipilots framework and similar resources, the outcome of the HUPMOBILE project provides a comparative case on how cities can trigger living-lab types of trials. As the planned minipilots are in a different implementation stage, it is early to compare them – this will be done after all minipilots are conducted. The minipilots, ideated from bottom-up in each city, also range conceptually from microhubs to adaptive street lights to license plate recognition to open innovation for port areas. In the case of one minipilot (Tallinn), a comprehensive pre-feasibility study was preceded before implementing the minipilot in fall 2021. Hamburg, that started its cargo bike microhub minipilot jointly with Deutsche Bahn already in 2020, has conducted a follow-up study on where and how to extend these solutions in the city of Hamburg. In the case of Turku, the license plate recognition pilot was online for three weeks in the Summer of 2021, including data analysis that compares the private cars that travel to/ from to the city centre with the through traffic based on the registration address data. In Riga, the process was started to conceptualize the urban port challenges jointly with city and port authorities leaving a minipilot still into the design process. All minipilots aim to test some idea that can be leveraged, if successful.

This analysis did not focus on the effect of covid-19 pandemic but it is clear that all minipilots have been directly influenced by that. The last face-to-face interaction with cities was in December 2019 in Sweden after which the harmonized design and implementation of minipilots moved fully online. All minipilots have been delayed at least 6 months due to the health crisis and restrictions. In addition, as the minipilots were conducted under the covid-19 restricted conditions, this also affects the results in all cities. Firstly, Hamburg Central stations has restrictions for passengers, Turku central city has less throughput traffic during this year compared to pre-covid19 period and Tallinn's adaptive street lights minipilot was inspired by making the outbound ferry traffic (coming from Helsinki) smoother and this traffic is many times less in volume in 2021. In the case of Riga, the covid19 delayed the process itself as co-creation with students is something that would have been better facilitated in a face-to-face setting, in addition to administrative challenges and unexpected lock-down.

For future research, this concept could be elaborated further based on the Public Value Theory and Living Lab concept. Empirically, also experience and tools from other cities promoting agile pilots and experimental innovation could be involved with practical steps for Pre-Procurement, such and the city of Helsinki whose innovation company Forum Virium Helsinki has published a pocketbook for agile piloting (https://drive.google.com/file/d/1L7c-FEUOFfvWQE3am35SYk-4bvJPz7RH/view) and the city of Amsterdam that launched Startup Amsterdam programme in 2015 (https://www.iamsterdam.com/en/business/startupamsterdam). Very recently, in November 2021, also UN-Habitat and Sweden launched a minipiloting programme for four cities in UK, Brazil, Uganda and Columbia (Bristol, Curitiba and Makindye Ssabagabo and Bogota), see https://climatesmart.citieschallenge.org/

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