URBAN LOGISTICS AS AN ON-DEMAND SERVICE

# Logistics ecosystem stakeholders' needs and requirements

ULaaDS D2.6: Local ecosystem stakeholders´ needs and requirements & prioritisation of use cases – final version

Date: 29/02/2024

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The ULaaDS project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 861833. ULaaDS is a project under the CIVITAS Initiative.

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THE CIVITAS INITIATIVE IS CO-FUNDED BY THE EUROPEAN UNION

# Deliverable details

| Project acronym | Project title |
|---|---|
| **ULaaDS** | Urban Logistics as an on-Demand Service |

| WP | Deliverable title |
|---|---|
| **2** | D2.6 Local ecosystem stakeholders` needs and requirements & prioritisation of use cases – final version |

# Document history

| Version | Date | Author(s) | | Status* | Dissemination level** |
|---|---|---|---|---|---|
| **1.0** | 12-02-2024 | Günther Illek, Melanie Troppe | | Initial draft | CO |
| **1.2** | 26.02.2024 | Günther Illek, Melanie Troppe | | 2nd draft | CO |
| **1.3** | 27.03.2024 | Domien Stubbe, Roos Lowette, Karsten Hüsemann, Günther Illek, Melanie Troppe | | 3rd draft | CO |
| **2.0** | 29.02 | Günther Illek, Melanie Troppe | | Approved and submitted | PU |

*Status: Draft, Final, Approved, Submitted (to European Commission).

**Dissemination Level: **PU**: Public; **CO**: Confidential, only for members of the consortium (including the Commission Services); **EU-RES** Classified Information - restraint UE; **EU-CON**: Classified Information - confidential UE; **EU-SEC**: Classified Information - secret UE

| Contractual delivery date | Actual delivery date | Deliverable type* |
|---|---|---|
| **29-02-2024** | | R |

*Deliverable type: **R**: Document, report; **DEM**: Demonstrator, pilot, prototype; **DEC**: Websites, patent fillings, videos, etc; **OTHER**; **ETHICS**: Ethics requirement; **ORDP**: Open Research Data Pilot.

# Project abstract

ULaaDS sets out to offer a new approach to system innovation in urban logistics. Its vision is to develop sustainable and liveable cities through re-localisation of logistics activities and re-configuration of freight flows at different scales. Specifically, ULaaDS will use a combination of innovative technological solutions (vehicles, equipment and infrastructure), new schemes for horizontal collaboration (driven by the sharing economy) and policy measures and interventions as catalysers of a systemic change in urban and peri-urban service infrastructure. This aims to support cities in the path of integrating sustainable and cooperative logistics systems into their sustainable urban mobility plans (SUMPs). ULaaDS will deliver a novel framework to support urban logistics planning aligning industry, market and government needs, following an intensive multi-stakeholder collaboration process. This will create favourable conditions for the private sector to adopt sustainable principles for urban logistics, while enhancing cities' adaptive capacity to respond to rapidly changing needs. The project findings will be translated into open decision support tools and guidelines.

A consortium led by three municipalities – so called lighthouse cities- committed to zero emissions city logistics -Bremen, Groningen and Mechelen - has joined forces with logistics stakeholders, both established and newcomers, as well as leading academic institutions in the EU to accelerate the deployment of novel, feasible, shared and ZE solutions addressing major upcoming challenges generated by the rising on- demand economy in future urban logistics. Since large-scale replication and transferability of results is one of the cornerstones of the project, ULaaDS also involves four satellite cities (Rome, Edinburgh, Alba Iulia and Bergen) which will also apply the novel toolkit created in ULaaDS, as well as the overall project methodology to co-create additional ULaaDS solutions relevant to their cities as well as outlines for potential research trials. ULaaDS is a project part of ETP ALICE Liaison program.

# Keywords

Multi-Stakeholder Approach, Stakeholder Mapping, Stakeholder Network, Local Fora, Collective Target System, Deductive Impact Assessment, Decision- Making Processes, Needs and Requirements

# Copyright statement

# Executive summary

ULaaDS wants to re-shape the urban on demand logistics by introducing sustainable solutions, which were implemented in the lighthouse cities Bremen, Mechelen and Groningen. These solutions focus on containerised last-mile delivery, sharing economy platforms for on-demand city logistics, city-wide platform for integrated management of urban logistics, dual mobi-hubs and cargo hitching. In order to achieve viable long-term solutions, the support of various stakeholders was needed.

Solutions and decisions are generally more accepted by the affected companies and people - which will be referred to as stakeholders - if they are involved in the development of the solutions and decision-making processes (Aifandopoulou et al., 2019). Furthermore, it is crucial for the sustainable long-time success of a solution to take the needs and requirements of stakeholders into account. Different approaches are possible depending on the extend of the participation process. Nonetheless each involvement process depends on a framework of preoperational and accompanying steps to achieve the aim of the process.

The Deliverables 2.5 and 2.6 will introduce the multi-stakeholder approach as it was planned and implemented in the ULaaDS lighthouse cities Bremen, Groningen and Mechelen. The aim of this approach was to further define the respective needs and requirements for the planned ULaaDS Trials in a co-creation dialogue with relevant stakeholders. Therefore, the deliverable will introduce the methodological approach and framework for the stakeholder engagement in the project which was adapted for each city regarding their trials and needs.

The overall multi-stakeholder process comprised a stakeholder mapping process, a series of local fora and related working groups, the collective target system approach, and further data questionnaire as well as the deductive impact assessment approach.

The results of the ULaaDS stakeholder engagement processes are described in two deliverables:

The presentation of the results of the ULaaDS Stakeholder Engagement Process are split between two deliverables. The results of the local fora and of the collective target system will be shown in **D2.5: Report on local fora meetings**. The results of the stakeholder mapping and the discussion of the needs and requirements for the ULaaDS trials will be presented within this deliverable, **D2.6: Local ecosystem stakeholders`needs and requirements & prioritisation of use cases – final version**.

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# 1. Introduction

The growing need to consider sustainability for urban freight transport adds more complexity to the already very challenging logistic processes in most cities.

To achieve successful implementations, an early and continuous stakeholder engagement is crucial. Including various groups of stakeholders within a decision-making process provides a more comprehensive overview and strengthens decision-making on a factual basis, ultimately reducing uncertainties (Stringer et al., 2008; Russo et al., 2021). Stakeholder engagement should be integrated into the decision-making process in the earliest stages since it systematically represents stakeholders.

The ULaaDS project supported the lighthouse cities Bremen (BRE), Groningen (GRO) and Mechelen (MEC) on their way to sustainable city logistics. Since all cities have a different baseline and framework conditions, each city will have to face different challenges and possibilities of stakeholder.

In each city, a combined usage of five different methods was foreseen to retrieve the needs and requirements necessary for a successful implementation of the ULaaDS trials.

Stakeholder engagement was planned to start already before the trialling of the new urban logistics solutions, building on inputs and needs from logistic service providers, public authority, academia, residents and consumers. According to their inputs, the trials were adapted to increase the effectiveness and the acceptance of the new solutions among stakeholders.

The presentation of the results of the ULaaDS Stakeholder Engagement Process are split between two deliverables:

1. The results of the local fora and of the collective target system will be shown in **D2.5: Report on local fora meetings**.
2. The results of the stakeholder mapping and the discussion of the needs and requirements for the ULaaDS trials will be presented within in this deliverable, **D2.6: Local ecosystem stakeholders' needs and requirements & prioritisation of use cases – final version.**

The deliverables are closely connected. To allow easier reading and a more comprehensive understanding, certain text passages may occur in both deliverables.

# 2. Methodologies

Identifying the needs & requirements of the stakeholders involved in the ULaaDS trials and assessing their impact on the implementation's plans was one of the key challenges of the project. This chapter will introduce the main methodologies used in the ULaaDS multi-stakeholder process, which were:

- The identification of relevant local stakeholders via stakeholder mapping.
- The introduction of a collective target system to elaborate common and diverging aims and objectives.
- The establishment of a co-creation dialogue via local fora.
- Data collection.
- The deductive impact assessment.

## 2.1 Stakeholder mapping

As a starting point and to gain knowledge and understanding of the local logistic ecosystem within the three ULaaDS-lighthouse cities – Bremen, Groningen and Mechelen – a stakeholder mapping process was conducted. Therefore, the responsible partners of the consortium had to appropriately identify, describe and - at a later point - involve the specific stakeholder groups prevalent in each of these cities.

As a preparation for the stakeholder mapping, a template table was elaborated by the partners FGM and RUG, including the measures and approaches proposed in the DG Move non-binding guidance document on urban logistics N°3/6 by Van den Bossche et al. (2017) and sent out to the lighthouse cities (BRE, MEC, GRO) with the request to fill their local stakeholder network contacts into this table, based on their subjective estimations and experiences. In most cases the answers had to be chosen from a dropdown menu to allow easier processing of the information and data.

Within this table it was the task of each city to fill in 13 columns with attributes per stakeholder, including information about:

Table 1: Information per stakeholder in the stakeholder mapping process

- **Stakeholder type**
- **City the stakeholder will be active in**
- **Keyword for their activities (e.g. Frontrunner or Follower ...)**
- **Involvement history**
- **Research Trial the stakeholder will be part of/participating in (inner city and urban/peri-urban area)**
- **Importance for ULaaDS**
- **Influence on other stakeholders**
- **Expected main contribution + further information**
- **Expertise + further expertise**
- **Stakeholder legitimacy**
- **Stakeholder's interest**

The lighthouse cities filled in the table in three rounds before the local fora, one in December 2020 followed by updates in July and November 2021. Since the project naturally evolves, the necessary stakeholders might change as well. Hence, a stakeholder mapping should always be seen as a living process.

In order to evaluate the stakeholders who shall be involved in the local fora for the respective city, an adapted version of the Interest Power Grid of Mendelow, A.L. (1981) was implemented. The latter gives insight about how to manage stakeholders with respect to their estimated power and interest. Data about the stakeholders was filled in by the cities themselves. Since we asked for the nature of interest instead of a quantitative assessment in form of a Likert scale, Mendelow's interest power grid was adapted in that way that all interests have an equal value except the interest of simply being informed. In other words, the adapted version of the method focuses on a qualitative statement of the interest and a quantitative statement regarding the power. Figure 1 shows the difference between Mendelow's interest power grid and the adapted version used for ULaaDS.

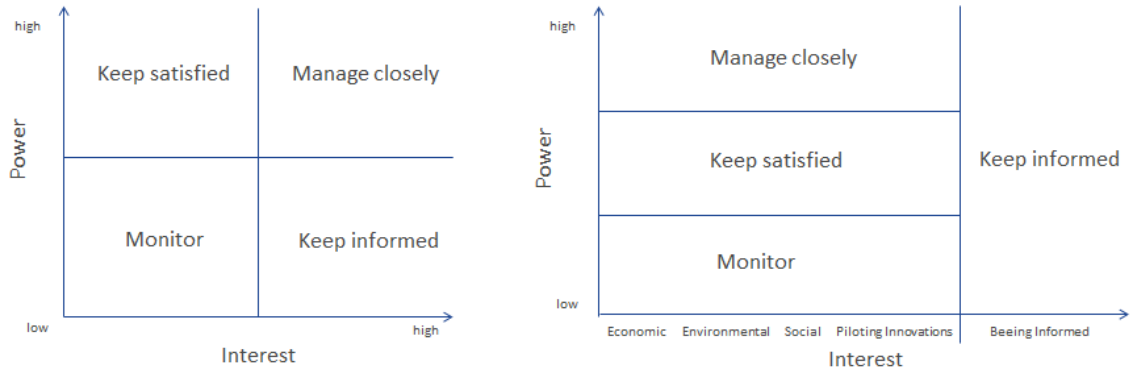


Figure 1: Left: interest power grid from Mendelow A.L. (1981); right: adapted interest, power grid with qualitative statements of the interests

The overall power for ULaaDS was calculated according to the weights in Table 2. Since the stakeholder mapping is a subjective approximation which only serves for internal estimation needs, the weights were elaborated in internal discussions. Importance and influence for ULaaDS, the stakeholder's legitimacy, the influence on other stakeholders as well as the keyword were taken into account according to a certain ratio.

Table 2: Attributes used for the calculation of the overall power of stakeholders for ULaaDS with the respective weights

| Attribute | Weight for the calculation of the overall power |
|---|---|
| **Importance and Influence for ULaaDS** | 0.35 |
| **Legitimacy** | 0.3 |
| **Influence on other stakeholders** | 0.15 |
| **Key attribute** | 0.2 |

For each of those attributes there were different answer options, which can be seen in Table 3. For this, we defined *n* (see Table 3), which reflects the maximum points that can be reached per estimated answer. For the calculation of the overall power of a stakeholder for ULaaDS we then used *n* to avoid disproportionate ratios.

$$Power = \frac{Importance}{n_{importance}} + \frac{Influence}{n_{influence}} + \frac{Legetimacy}{n_{legitimacy}} + \frac{Keyword}{n_{keyword}}$$

Table 3: Answering options and their respective rating for the attributes used for the power calculation

| *n* | | Answer options | | | | | |
|---|---|---|---|---|---|---|---|
| **Importance for ULaaDS** | 2 | Very important | Moderate important | Not important | | | |
| | | 2 | 1 | 0 | | | |
| **Influence on other Stakeholders** | 2 | High influence | Moderate influence | No influence | | | |
| | | 2 | 1 | 0 | | | |
| **Legitimacy** | 6 | Expertise and directly involved in research trial | Expertise and directly affected by research trial | Expertise and indirectly affected by research trial | No expertise and directly affected | No expertise and indirectly affected | Expertise and not affected by research trial |
| | | 6 | 5 | 4 | 3 | 2 | 1 |
| **Keyword/ Attribute** | 2 | frontrunner | representative | follower | newcomer | interested | |
| | | 2 | 1 | 0 | 1 | 0 | |

Therefore, the power for each stakeholder is between 0-1 being it 1 the maximum possible power assigned to a stakeholder. This leads to the further differentiation between the stakeholders. Stakeholders with an interest but being informed with a power of 0-0.3 should be monitored, stakeholders from 0.3 – 0.6 shall be kept satisfied and all stakeholders above should be closely managed.

The stakeholder mapping is mainly a tool for internal elaboration and evaluation, which helps to manage the awareness about the existing stakeholders and their potential roles. By carefully going through the results, it was possible to choose stakeholders for the planned trials to increase the potential for a successful implementation of the trials. Since this mapping is of dynamic nature it was conducted firstly to prepare for the planning process and could be repeated e.g. in-between other stakeholder engagement processes. The results of the stakeholder mapping will be presented in chapter 3 of this deliverable.

## 2.2 Collective Target System

The Collective Target System (CTS) is a tool to evaluate common and conflicting goals in a specific topic, e.g. sustainable urban last mile logistics, and use it as a tool of decision-making so that acceptance within the stakeholders increases. This tool occurred in literature for the first time by Russo et. al (2021). In a nutshell, this method is asking different stakeholder groups questions in three categories.

Table 4: Schematic display of the condensed group results [%] from the collective target system

| | Strongly agree | | | Slightly agree | | | Neutral | | | Slightly disagree | | | Strongly disagree | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S1 | S2 | S3 | S1 | S2 | S3 | S1 | S2 | S3 | S1 | S2 | S3 | S1 | S2 | S3 |
| **Social Goals** | | | | | | | | | | | | | | | |
| **Goal 1** | | | | | | | | | | | | | | | |
| **Goal 2** | | | | | | | | | | | | | | | |
| **… Goal n** | | | | | | | | | | | | | | | |
| **Environmental Goals** | | | | | | | | | | | | | | | |
| **Goal 1** | | | | | | | | | | | | | | | |
| **Goal 2** | | | | | | | | | | | | | | | |
| **… Goal n** | | | | | | | | | | | | | | | |
| **Economic Goals** | | | | | | | | | | | | | | | |
| **Goal 1** | | | | | | | | | | | | | | | |
| **Goal 2** | | | | | | | | | | | | | | | |
| **… Goal n** | | | | | | | | | | | | | | | |

In its original form, the questions have been set through literature study and were answered using 5 point Likert scale. The results were compared per stakeholder group. Finally, the use of a Kruskal Wallis test, a statistical test uses ranks in one-criterion variance analysis to detect diverging goals, highlighting objectives that may need further discussion between the stakeholders.

For ULaaDS, it is planned to use and partly adapt the CTS methodology as described here:

- The stakeholders will be allocated to one of three stakeholder groups. The categories will be slightly adapted into the three pillars of sustainability: social, environmental and economic sustainability.
- For the goals that shall be answered with the Likert scale there will be generic questions and further questions tailored for the actual trials in the cities.

- The CTS will be used after the first round of Local fora.
- The results of the CTS process are presented in deliverable **D2.5: Report on local fora meetings.**

## 2.3 Local Fora

In ULaaDS it was foreseen that each lighthouse city will conduct at least three local fora – divided over two trials – initiating a multi-stakeholder process and establishing a co-creation dialogue between all the parties involved in the trialling of the ULaaDS solutions.

In each city, the first round of local fora per trial was planned to be conducted before the effective trial implementation phase starts, in order to gather information about the needs and requirements of affected stakeholders which will be followed by further steps of assessment and discussion to define their impact on the trials planned. The trials in Bremen will deviate from this approach, as both trials start with already existing implementations that should be expanded.

A second local forum per trial was foreseen to be conducted approximately after the first six months of actual trialling. These fora's objective would be to get feedback from the stakeholders involved in the trials and evaluate possible improvements for the trials and to inform stakeholders about the status quo and experiences made so far. Since the content of these intermediate fora depends on the developments, the fora will be planned after the trialling started.

Further details to the local fora, their actual implementation and correlated learnings are presented in Deliverable D2.5: Report on local fora meetings.

## 2.4 Data collection

Collecting data to prepare the trials is another vital part of the trial preparation phase. It is closely connected to the multi-stakeholder process, as some data needed may be retrieved by the stakeholders involved in the ULaaDS trials.

It was significant to gain functional information like vehicle properties, delivery frequencies, order organisation, timeframes for deliveries e.g. as well as social aspects to optimise the plans for the UlaaDS trials. Especially qualitative data was foreseen to be collected within the participation process. This includes non-measurable data like the awareness of sustainable solutions as well as the willingness to pay for sustainable deliveries.

Within the project, there were different ways to collect the data: If possible, data shall be collected during the local fora. As time was limited within the local fora, another option was to ask the stakeholders for their data contribution in follow up workshops and bilateral communication. Last but not least, questionnaires were conducted were needed.

## 2.5 Deductive Impact Assessment

Based on the results of the multi-stakeholder process, specifications, adaptions and optimisations for the ULaaDS trials should have been elaborated. Therefore, a qualitative approach was developed, called **deductive impact assessment** (see figure 2). Within this iterative process, all the inputs from the stakeholders, their needs, requirements and priorities were split into functional and further implications (see steps 1 and 2 below). The influence of these implications are compared to the original use cases planned within ULaaDS (3). If further information is needed, further consolidation of the stakeholders will take place e.g. meetings or questionnaires. In step (4), the fusion, the information gathered in the local fora, their correlated implications, the original plans for the use cases and the knowledge from other steps of the project were combined to finally allow the adaptation of the ULaaDS-Trials.

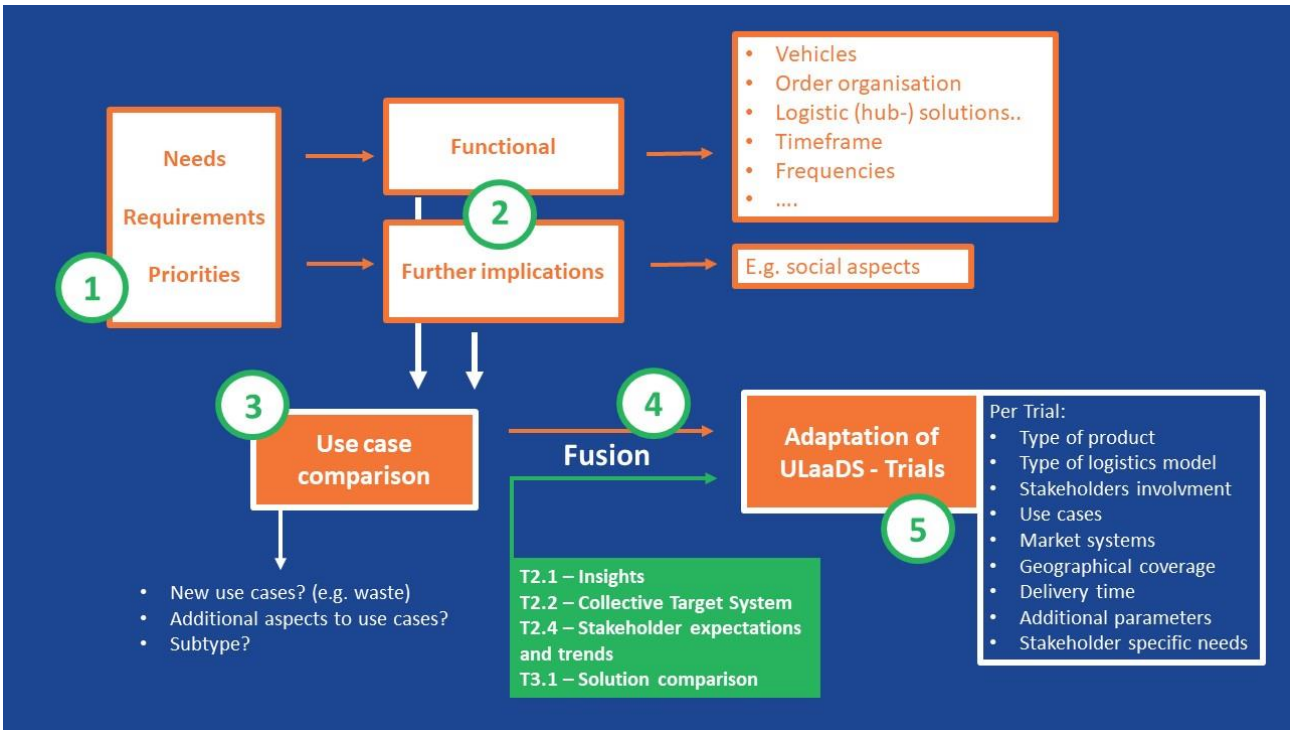


Figure 2: Scheme of the deductive impact assessment

# 3. Stakeholder Mapping Results

## 3.1 Existing urban logistics networks in the ULaaDS lighthouse cities

The results of the stakeholder mapping process allowed to elaborate information about existing urban logistics networks in each lighthouse city. For each of these cities the logistic network relevant for ULaaDS has been visualized and can be seen in Figure 4 to Figure 6 on the following pages.

The cities of Groningen and Mechelen have a long history in building a network of various logistic stakeholders within the city. Both cities have a strong focus on shaping the city using a story telling approach, introducing their vision of the city's future to the different stakeholders. Groningen decided already in 2014 that by 2025 the city logistics will be zero emission. In 2017 they started to install focus groups for sustainable logistics and in 2018 a local convenant for sustainable logistics was signed by logistic stakeholders. Since 2021 a SULP is established by the city council. The ULaaDS trials are embedded within this vision and shall support the finding of solutions for retailers in the inner city. Since the city is engaging with stakeholders for the past years it is feasible that already a strong network is implemented which supports the implementation of a co-creation dialog and the solutions in general.

Mechelen has applied a similar approach. The city invested an amount of resources in stakeholder engagement within the last 5-6 years' which ultimately led to a city convent with 29 signatures from logistic companies, interest organisations and retailers. During this process a zero- emission working group was formed which meets twice a year to work towards the goal of a zero-emission city by 2030.

Bremen does not have a long history in the involvement of the logistics operators and therefore the network is in a developing stage. However, the trial affected by this can build on a previous work relation with stakeholders in the project Urban-BRE.


Figure 3: Logistic network as a basis for ULaaDS trials in Groningen, with frequencies of contact (w – week, m- month and a – year)

ULa

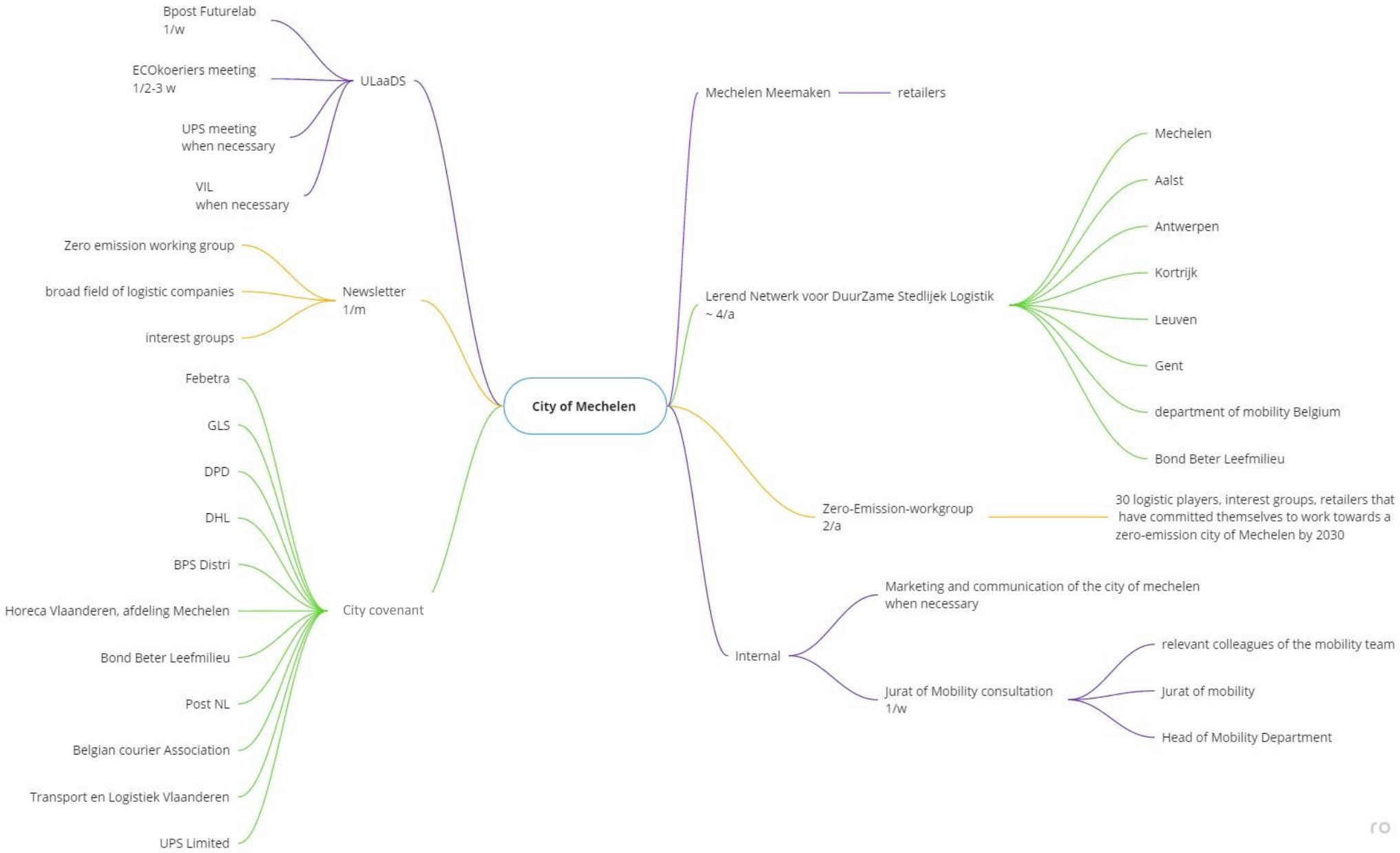


Figure 4: Logistic network as a basis for ULaaDS trials in Mechelen, with frequencies of contact (w – week, m- month and a – year)

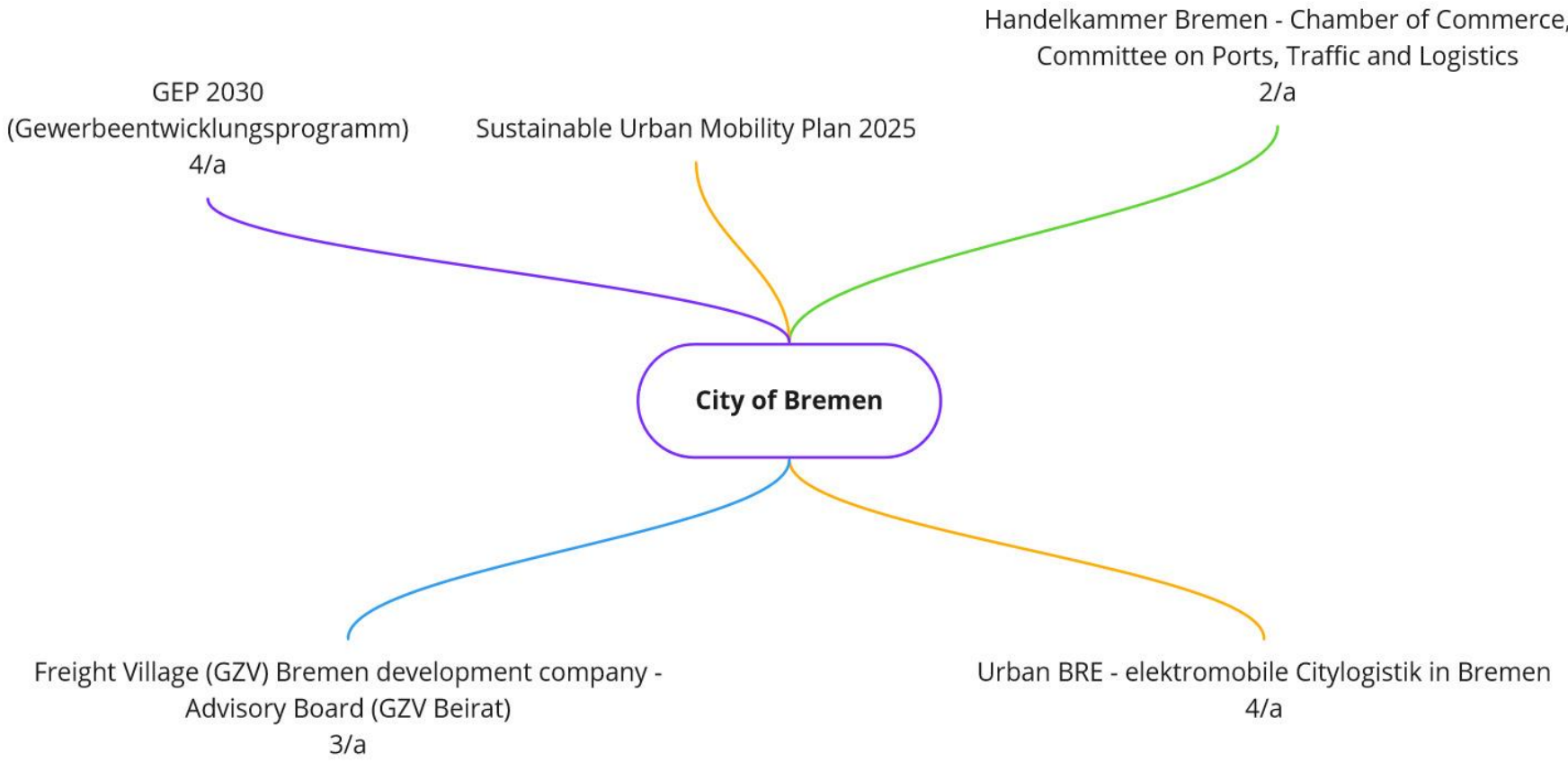


Figure 5: Logistic network as a basis for ULaaDS trials in Bremen, with frequencies of contact (w – week, m- month and a – year)

## 3.2 Choosing relevant stakeholders for ULaaDS trials

In ULaaDS, a big part of the project is dedicated to the implementation of 2 or 3 Research Trials per lighthouse city, one located in the inner city, and one located in a (peri-)urban area of each city. Due to the great amount of stakeholders mentioned to consider and the fact that the consortium has to start a co-creation dialogue based on the results of the stakeholder mapping in WP2, each city was informed and advised on a bilateral basis about recommended further handling of stakeholders and if it would be feasible to include further stakeholders from varying stakeholder groups. Depending on the results of this process and the regarding objectives of the engagement processes, the consortium was also able to decide on with whom to implement the local fora in the upcoming co-creation dialogue.

First of all, a distinction was made between stakeholders which are directly affected from or involved in the ULaaDS trials and stakeholders who are not directly related. Also, there are project partners which are responsible for the implementation, however, there are also external stakeholders who are important for the successful implementation and long-term success of the project, such as e.g. consumers. Furthermore, the stakeholder process requires input from stakeholders which are not directly affected by or involved in the ULaaDS trials but non the less are still important for their expertise. This stakeholder group would for instance include researchers and academia.

In order to achieve a diverse and fruitful stakeholder composition, the stakeholder ratio shown in Table 4 was set as aim for the local fora. This ratio was previously proposed for stakeholder engagement by the NOVELOG Guidelines for the Planning and Development of SULPs.

Table 5: proposed ratio of stakeholders for the engagement process based on the Novelog guidelines for planning and development of SULPs

| Group Number | Group Name | Stakeholder [incl. subgroups] | Expected percentage within the local fora |
|---|---|---|---|
| **Group 1** | Supply chain stakeholders | G1.1 Shippers, Transport Operators, Shippers and Receivers | Up to 28% |
| | | G1.2 Shopkeepers, Offices, Residents | |
| **Group 2** | Public authorities and Other Stakeholders | G2.1 Public Authorities | Up to 28% |
| | | G2.2 Associations, Researchers and Academia | Up to 36% |
| **Group 3** | Experts | G3.1 Experts, city residents, users, vehicle and IT providers, etc. | Up to 8% |

From a practical point of view, a stakeholder engagement process does always depend on resources not only from the city's side but also from the side of stakeholders who shall engage with the project. **It is hard to keep in balance the advantages for stakeholders participating and the effort on time and monetary basis that those stakeholders have to invest**. Especially some stakeholders from big companies e.g. often lack time or capacities to cooperate in a long and expensive engagement process. But also, the requests for their attendance is rising more and more due to the rising amount of sustainable topics, policies and logistics projects. As a result, time can be a limiting factor for availability. So in reality, many difficulties can appear in the realization of an engagement processes.

During the ULaaDS project, it became clear that it was not reasonable to always stick to the ratio proposed by the NOVELOG guideline, which is covering the stakeholder engagement from the point of view of SULP creation. In implementation, some stakeholders needed more attention and a closer cooperation than others, which was rather achieved by adaptions to the initial approach. A good example for that are the trials in the peripheral area of Bremen and Mechelen, where only a small number of stakeholders had to be involved. E.g., in Mechelen the autonomous vehicle with integrated parcel locker will be tested at a business site. As a result, also here the stakeholder list is comparably manageable.

Table 5 shows the first ratios results of the stakeholder groups for each city and trial after processing the stakeholder mapping results. Due to the different approach in the trials regarding the trial cargo-hitching in Bremen and the autonomous vehicle in Mechelen, those two trials have not been included.

Table 6: Stakeholder group percentage, 3nd round of stakeholder mapping for the trials in the cities

| | | Mechelen | | Groningen | | Bremen | |
|---|---|---|---|---|---|---|---|
| | **Proposed %** | **Joint trial** | **Autonomous Vehicle** | **Inner city** | **P&R site** | **Micro-hub logistics** | **Cargo bike sharing** |
| **G1 Supply chain stakeholders** | 28 | 17 | - | 59 | 62 | 57 | 0 |
| **G2.1 Public Authorities** | 28 | 42 | - | 19 | 15 | 17 | 55 |
| **G2.2 Associations, Researchers and Academia** | 36 | 38 | - | 22 | 24 | 20 | 45 |
| **G3 Experts** | 8 | 4 | - | 0 | 0 | 7 | 0 |

In general, a lot of trials had a surplus of potentially relevant stakeholders in the stakeholder group 1: logistic service suppliers and supply chain to choose from.

For the micro-hub logistics trial in Bremen, the city was able to build upon an already well-rehearsed network of stakeholders due to the project Urban-BRE. There was a surplus in the stakeholder group G1: Logistic service providers, however, the objective of the first local forum was of informative nature and it was therefore feasible to focus on logistic service providers´ participation.

For the trial in Mechelen in the inner city, crucial stakeholders were the ULaaDS partners Bpost, Ecokoeriers UPS and the shop owners, since the trial was supposed to focus on B2B delivery mainly. Other stakeholders from the stakeholder group "supply chain", like logistic service providers, were planned to be consulted in form of shorter meetings, lowering the effort needed to participate. This stakeholder group also represented the customer group and is therefore crucial for the success of the trial. As a result, their needs are vital to consider, and the stakeholders had to be managed closely.

Regarding the trial for the inner city of Groningen: Based on the results of the stakeholder mapping, not only shop owners but also respective representative organisations were recommended to be managed closely due to their influence and expertise. Shop owners do belong to the stakeholder group G1 since they are part of the logistic supply chain. Thanks to the help of the GroningenCityClub, a representative organisation of the shop owners from the inner city, Groningen was able to involve specific shop owners who committed to the participation. Not only local shop owners can be possible customers but also e-commerce companies were supposed to participate. Since the big number of businesses the ratio for the stakeholders is shifted towards the stakeholder group G1.

# 4. The Needs and Requirements of the Stakeholders

The application of the above mentioned methodologies – mainly via the local fora – led to a variety of stakeholders' needs and requirements for the respective trials in the ULaaDS light house cities or important correlated topics. In the following chapters, these requirements will be introduced per trial and city. For further information about the Local Fora themselves, please read deliverable D2.5: Report on local fora meetings. In the original approach, it was planned to follow the Deductive Impact Assessment method introduced in chapter 2.5. This method in was implemented for the first two fora, one in Mechelen, one in Groningen, but finally did not correlate with the needs of the light house cities themselves, which preferred to document the needs and requirements in their own ways, also in different styles depending on the actual issues that were discussed.

## 4.1 Stakeholders' Needs and Requirements – BREMEN

### 4.1.1 Trial 1: Containerised Last Mile Solution

#### 4.1.1.1 General trial description:

The first ULaaDS trial in Bremen focussed on expanding the number of micro hubs and cargo bike freight transport building on the forerunner project called Urban BRE which started 2019. Within this forerunner project, a micro hub was set up, from which cargo bikes from the ULaaDS partner company Rytle are used to deliver the last mile to the inner city. Within ULaaDS, the focus is set to the transport of general cargo on palettes instead of courier express freight itself and expanding the number of micro hubs within the city. In the first local forum, Bremen's aim was to introduce the already achieved successes regarding cargo freight transport and the vision of the city on how to expand this measure with the help of the ULaaDS project to the various stakeholders. In this ULaaDS Trial, 2 stakeholder fora took place.

#### 4.1.1.2 Needs and Requirements Local Forum 1, 08.09.2022:

In the first forum, seven needs and requirements have been detected. From the view of the logistics service providers the following two were **directly connected to the trial**:

1. There is a need to present a clear business model showing costs and benefits of this logistics solution.
2. There is a need for strong arguments to attract other companies to participate. So far there were arguments missing concerning the economic benefits for the LSPs.

3. There was the discussion to integrate another major logistics service provider as a key player in the next local forum.
4. There is a need to solve the chicken and egg problem: the system is not economically feasible because not enough companies are using the service vs. not enough companies are using the service because it is not economically feasible.

These arguments were seen to have a **high** priority for the trial implementation.

Further points of discussion were more general and had an overall **lower** priority for the trial itself, including:

5. There is a need to discuss the amount and availability of parking lots and loading zones for deliveries.
6. There is a need to discuss the traffic signs for parking regulations.
7. There might be a need for a smart system to regulate the timeslots for the parking zones.

Within the forum itself, there were many questions raised but only a few aspects answered. As a result, it was planned to further discuss these needs and requirements also in local forum 2.

#### 4.1.1.3 Needs and Requirements Local Forum 2, 13.06.2023:

The second local forum had the objective to bring forward three different topics related to the Trial implementation, which are:

- GRAZ LOG as an example for Midi-Hub solutions: Is this approach a more suitable way to organise urban last mile logistics?
- Smart Loading Areas: Optimising the parking situation in the inner city
- Logistics concepts based on city location – focus inner city

**Within all these discussions, the following needs and requirements of the LSPs directly connected to the ULaaDS trial were detected:**

1. There might be a need and possibility to do a combined transport of bulkier deliveries and parcels
2. There has to be a clear insight and transparency into the costs, both for B2B and B2C
3. There has to be pressure from the side of public authorities – e.g. changes in the regulatory frameworks – to make consolidation process necessary.
4. There still are challenges in data security that have to be solved.
5. There is a need for Open-Source Solutions, e.g. for the scanner hardware.

Arguments 1 and 2 were seen with medium, 3-5 with high priority.

#### 4.1.1.4 Résumé

In overall, the local fora gave a profound insight into the needs and requirements of logistics service providers for the specific ULaaDS trial. The most important and general ones can be summarised as follows:

- Logistics service providers need a clear insight into the costs and benefits of new solutions.
- There must be a level playing field for all actors, hence the regulatory framework must be changed to raise the need for consolidation.
- Also, there is a need to optimise the overall regulatory and infrastructural framework (traffic signs, availability of parking lots).
- Data security is a key aspect in discussions, as logistics is a highly competitive field.
- Open-source solutions have a clear potential to ease workflow processes.

Within the setting of Bremen's trial 1 it was not possible to elaborate answers to all the needs and requirements mentioned above. Especially the elaboration and presentation of a business model with clear costs and benefits proofed to be rather challenging due to restricted financial insights into the business background of partners involved. Other aspects discussed were highly dependent on outlying factors, like national regulation frameworks, political discussions or limits in influence of the people involved from the side of public authorities involved in ULaaDs.

### 4.1.2 Trial 2: Cargo Bike Sharing Service

#### 4.1.2.1 General trial description:

The second trial focussed on private logistics. Within the ULaaDS project and together with ADFC, Bremen will discuss 24/7 cargo bike sharing options as well as the improvement possibilities of the existing Fietje network with five new cargo bikes. The 24/7 offer can be implemented either together with already offered services or with the city's initiative of a comprehensive city driven cargo bike sharing network that was announced during the ULaaDS project in June 2021. The city-wide sharing network shall consist of cargo bikes which will be offered for little monetary compensation. Therefore, it was necessary to re-discuss the role of the ULaaDS solution of Fietje and potential complementary measures for private micro logistics. In this ULaaDS Trial, one local forum was held.

#### 4.1.2.2 Needs and Requirements Local Forum 1:

The local forum was clearly used to clarify major aspects of the existing renting scheme as well as to define details of a potential new cargo bike sharing scheme. The main aspects related to the needs and requirements will be discussed in this deliverable too. An interactive online poll tool was used to retrieve the participants' opinion in situ.

The following questions were discussed:

1. **What's the best bike for a cargo bike sharing system?**

There are different kinds of cargo bikes available, all with their distinctive pros and cons in handling. In the discussion, Long Johns, Longtails, Trikes and mixes of them, as well as others were proposed in the survey. Long Johns are two wheelers, so they are rather small in width and with a similar steerability as normal bikes. On the other hand, trikes offer a better stability at stops, but can be more challenging to new users when riding, especially in curves. The applied interactive online tool result showed a clear win for Long John-Bikes.

2. **What kind of equipment is needed for the bikes?**

This discussion was about the potential use cases and settings in which the cargo bikes can be used and what kind of additional equipment should be offered to allow for an optimal user experience. In discussion were:

- A box for cargo
- Additional equipment to secure the load (e.g. lashing straps)
- Child's seat
- Electric propulsion
- Rain cover

In overall, there was a high agreement to offer this equipment, especially the one needed for cargo.

3. **Is there a need for lockers at the rental point?**

- Lockers allowing to store the above mentioned or the user's accessories would further increase the comfort of the renting process.

4. **Discussion about rental system outline: 24/7 & unpersonal vs limited access but personal advice and control: Role of Fietje vs role of new bike sharing system of the City of Bremen**

- Within the existing Fietje rental scheme, cargo bikes can only be booked for whole days. As a result, the availability is more limited compared to a "shorter time"- booking approach. Furthermore, the Fietje bike are given out personally by staff of the specific location points, e.g. a bakery. The accessibility of the bikes is also limited by the opening hours of the respective shops. Although the participants of the local forum agreed on the importance of a 24/7 accessibility of rental bikes, the Fietje system will not be able to offer this service in the given set up. Hence it is the task of a new rental scheme to take over this kind of service.

5. **Features of the new bike sharing system**

The new bike sharing system to be introduced is defined by following offers and services:

- 24/7 accessibility
- Easy access via a booking system available on all platforms (computers, mobile phones…)
- Pick up and drop off are at the same station.
- The bikes shall have an eye-catching branding to be clearly recognisable and appealing as well as to prevent possible theft.
- Bluetooth locks and GPS tracker shall ensure further theft protection.
- Marketing shall be integrated into existing networks and bike apps, wherever possible.
- Aspects and variants of pricing were discussed

6. **Furthermore:**

- Test rides and introductions for heavy duty bikes shall be offered for new customers.
- The new system shall be considered as a complementary offer, not in concurrence to Fietje.
- In the first years, the system shall be funded by the City of Bremen. Hence, there will be a limited number of stations and bikes at the beginning, which will – at least in the beginning – be concentrated where the possibility for private individuals to park cargo bikes is limited

#### 4.1.2.3 Résumé

The local forum in Bremen's cargo bike sharing Trial was very well used and allowed to discuss a comprehensive range of important factors for the existing renting scheme as well as defining the key expectations for the new rental scheme planned by the City of Bremen. The needs and requirements described in the section above are very specific and can be easily applied to other similar trials. The use of the online poll app during the forum allowed to give further weight to the results.

### 4.1.3 Trial 3: Cargo-Hitching Simulation

Within the third trial together with Via Van, combined person and freight transport were simulated on an industrial site. This trial aimed for the reduction of freight transport traffic within an industrial site by taking advantage of other passenger trips that take place simultaneously. Since little number of stakeholders are involved due to the nature of the trial and its location, the involvement process did not require a local forum but will be consisting of regular meetings and exchange with all the stakeholders involved.

Due to many changes in the set up the trial was even shifted to a simulation by ViaVan alone.

Nevertheless, two needs & requirements concerning the framework setting have been detected:

1. The driver of the bus is not allowed to leave the vehicle during a ride.
2. The drivers often are people with limited physical capacities, so it was not guaranteed that handling parcels in a greater amount is withing their physical abilities.

In both cases, a second staff person could be a solution, but it clearly influences the economic viability of the trial.

## 4.2 Stakeholders' Needs and Requirements – GRONINGEN

### 4.2.1 Trial 1: Vehicle Sharing in the Inner City

#### 4.2.1.1 General trial description:

The first ULaaDS trial implemented in Groningen aimed to provide logistic solutions for shop owners within the inner city and should originally implement a crowdsourcing platform marketplace for city logistics. Groningen dedicated itself to reach zero emission city logistics by 2025. While this commitment should result in a more liveable city, local businesses may face additional challenges correlated to the shift to zero emission city logistics—on top of the already challenging economic situation with competing e-commerce channels. The City of Groningen wants to assist local businesses in this transition by involving them in the development and trialling of the ULaaDS solutions. In this regard, two solutions have been discussed to be trialled.

First, Groningen wanted to explore the use of a local pickup and delivery service—with hub. This solution should provide local businesses the option to let parcels for home delivery be picked up from their local store by cargo bike and delivered to consumers. This service should include home deliveries in Groningen (by cargo bike) and beyond (via subcontracting), be open for multiple local cargo bike operators, and have different delivery speeds (same-day, next-day, multi-day delivery).

Second, a solution with shared zero-emission vehicles was planned to be implemented and tested. This was the trial the city decided for, due to the responses from the stakeholder engagement process. The fleet of vehicles included different vehicle types (i.e., cargobike, trike, van) which were placed at different locations.

#### 4.2.1.2 Needs and Requirements Local Forum 1:

In order to achieve solutions which will work for the different needs and requirements of shop owners, Groningen set on a collaborative approach with the aim to develop solutions together with stakeholders and the ULaaDS partner Groningen City Club. The local forum was clearly set up to clarify the most important needs and requirements to get the trial started. The City of Groningen was very active and already had meetings with stakeholders before the first official local forum, setting a profound base for conversation. From the City's perspective, it was important to clarify where to start first and to finetune the first details for the implementation. The needs and requirements retrieved include:

1. **Priorities: which implementation idea shall be implemented first?**

As introduced above, the City of Groningen considered two approaches to improve the situation for the local shop keepers, a micro hub solution or vehicle sharing. This questions was already pre-discussed in a preparatory kick off-meeting, leading to the decision to start (and stick) with the vehicle sharing scheme.

2. **What types of vehicles shall be offered?**

Already in the first meetings it was decided to offer an E-cargo bike and an E-Van.

3. **Vehicle specifications: E-Van:**

The E-Van offered shall fulfil the following expectations:

- A sufficient range to reach other cities/towns in the region. 200km is seen as sufficient.
- Preferably not a vehicle that is too large, because otherwise the threshold to enter it will also be greater.
- Consideration of the vehicle height for parking garages.
- A Loading capacity of at least 4 to 5 $m^3$.
- Advertisement for the project (or sustainable business) on the vehicle.
- Additional equipment for the transport of goods e.g. push carts.

4. **Vehicle Specifications: E-cargo bike**

- It should have a capacity of 200 kg.
- There shall be a rectangular box on the bike to allow the stowage of the deliveries.

5. **How often do the specific entrepreneurs use the delivery van? Listed below per participant:**

- 2 times a week, half day per week
- No need
- 2 to 4 times a week for 2 to 3 hours – in high season more often than in low season
- 3 to 4 times a week for a few hours. Sometimes a whole evening
- One half day per week
- A few times a week, 1 to 2 hours

Resumé: One E-Van will be sufficient for the start.

6. **How often does the entrepreneur use the cargo bike? Listed below per participant.**

- 2 hours at a time. A lot of weight has to be transported in it.
- 1 time every 2 weeks. 1 hour at a time.
- No need because the shop has its own cargo bike.
- 4 times a week
- Depends on demand, perhaps once a week.
- No need

Resumé: One cargo bike will be sufficient for the start.

7. **Choice of the vehicle provider**

- Based on the needs mentioned above, it was viable to start the implementation simple with one vehicle per category. Scale up should be an option for later.
- A quick start of the implementation was preferred. If a potential long lasting solution includes a fossil fuelled van at the beginning, it would be (temporarily) accepted.

- It was planned to consult three different providers and check their capabilities to fulfil the expectations of the stakeholders involved in the trials. The expected time frame for this process, from consultation to receiving the quotes of potential providers was around six weeks.

**8. Choice of Location – E-Van**

- The municipality would provide an available location and the application for the charging station.
- To increase the visibility, the E-Van should be located on an outside location, on the edge of the city center.
- Preferably, it should be located as close as possible to the entrepreneurs participating in the ULaaDS trial.
- As a consideration for a future scale up activity, it was agreed upon to spread the vehicle locations, to allow easy access for multiple entrepreneurs.
- Three locations were already discussed, with one having the option to be possibly combined with a hub location later on. No decision was made during the local forum.

**9. Choice of Location: E-Bike**

- I was agreed, that placing at a bicycle repair shops turns out to be difficult, as the shops are already fully packed with bicycles, and also there is limited accessibility due to the opening hours.
- Two different bicycle parking garages in the inner city seem fine. There would be no dependency on shopping times and the cargo bike could also be used in the evening.

**10. ICT-Solution**

- A reservation system was needed to organise the bookings.
- Due to the comparably small amount of participants in the trial, a simple but practical solution could already work.
- The supplier of the vehicles may also have a reservation system available. This will be checked during the consultations of the potential providers.
- If no reservation system is available at the provider, it was an option start with an Outlook calendar. The participating entrepreneurs can make a reservation here.
- A potential local software provider will be consulted.

The first local forum for the inner-City Trial in Groningen was planned out well to retrieve a broad variety of important needs and requirements to successful continue with the trial's implementation. At the end of the forum, responsibilities, next steps and the correlated time frame were documented in an action list of to do's.

#### 4.2.1.3 Needs and Requirements Local Forum 2:

After the first local forum, the City of Groningen succeeded in setting up the trial in close cooperation with the local stakeholders. The interaction with the entrepreneurs was ongoing as necessary between the local fora and hence a lot of open points were already solved in between the local fora. Related to this, the list of needs and requirements was shorter compared to the first forum.

1. **General consideration:**

- Even though most entrepreneurs already know how the rental scheme works, it seemed still important to elaborate a document containing basic rules, manuals and information on what to do in specific cases, e.g. in the event of a breakdown.

2. **Recruiting new participants:**

- There already were further entrepreneurs that showed interest in participating in the trial. It was discussed if sending out newsletters inviting for participation would be a viable option.

3. **Vehicle charging**

- There was the need to clarify charging costs at a certain charging point.

  It was discussed if there is a possibility to charge electricity of a more sustainable, local provider, maybe even helping to reduce the charging costs.

4. **Pricing**

- There was a need for information on the pricing, so that entrepreneurs can at least calculate with a fictive price during the test trial implementation (which is covered by the City of Groningen).

5. **Scheduled vs flexible use**

- At the moment the local forum was held, there was occasional discussion about the need for a mix of options for fixed bookings and cases of flexible use. This seemed to be mainly correlated to the number of vehicles available, a “one-vehicle problem”. There was already an idea for a possible solution with the vehicle provider, which needed a follow up.

The second local forum helped to further clarify aspects of optimisation and how to successfully continue with the implementation.

#### 4.2.1.4 Resumé

For its inner-City Trial, the City of Groningen was able to get fully involved with the local stakeholders. The City already had a lot of experience in stakeholder engagement, which clearly showed during its work on the trial implementation. Furthermore, involving the City Groningen Club as partner was another key decision to be as close as possible to the relevant stakeholders and to

easily obtain their needs and requirements. In general, the approach to the needs and requirements was very profound, starting with the important basic decision on which part of the possible trials to focus on. The first forum gave a profound base to work and elaborate the trial on. A continuous stakeholder exchange also outside of the local fora activities allowed to keep the cooperation with the stakeholders lively and solution oriented.

### 4.2.2 Trial 2: Logistics Services to Multi-Modal Mobility Hubs

#### 4.2.2.1 General trial description:

The City of Groningen's second trial was planned to be conducted in the suburban area, offering urban logistics services to the Park and Ride (P&R) location Hoogkerk, just outside the city. This location attracts many commuters parking their car or arriving by bus, to travel their final leg towards the city of Groningen by bike, bus, or taxi. The parcel locker system is integrated into the public transport system, sharing its location and available infrastructure capacity. Commuters can use the parcel locker for collecting or returning parcels (i.e., reverse logistics). At this site, a parcel locker should be implemented, which could be used by commuters to allow them an easy access to their parcels while also saving additional traffic due to pick up related trips. The parcel locker can be used by every logistics provider, shop owner or commuter. Furthermore, it should be tested whether and how local entrepreneurs could benefit from the use of the parcel lockers too.

The parcel locker shall be operated by the OV Bureau as a third party. The data which shall be gathered on the one hand regarding the usage (pickup/drop off per day) and on a survey developed by RUG which will target users and shall elaborate the travel distance and mode of transport etc.

#### 4.2.2.2 Needs and Requirements Local Forum 1:

Within the first local Forum in Groningen's parcel locker trial, the focus was to start with basic questions concerning the trials, as many aspects had to be clarified before reaching the actual implementation phase. Also, the needs and requirements gathered in this forum were often left without a complete answer in the forum itself. The questions concerning needs and requirements included:

1. **Is there a need for return options?**
2. **What are the trends in C2C-deliveries and do parcel lockers play a role here?**
3. **Do parcel lockers need an address to be navigable?**
4. **Transparency on effectiveness of parcel lockers in contributing to traffic reduction, and what number of lockers is needed to achieve this?**
5. **Incentives for pickups on the way home.**
6. **Parcel lockers could be linked to mobility hubs of public transport.**
7. **It is important to avoid too many systems or providers next to each other.**
8. **Is there a need for a framework for locations in or near public buildings?**
9. **How to guarantee social control at the lockers' sites?**
10. **Is governmental intervention needed, or would the market arrange itself?**

Compared to the inner-city trial described in the chapter before, this trial needed more general discussion to start, which is also related to the fact that on a long run, it is planned to install a lot

more parcel lockers within the city. In other words, the potential of scale up activities was already integrated in the very first forum. Discussions were held, but in overall there was the need for further exchange.

#### 4.2.2.3 Needs and Requirements Local Forum 2:

Within the second local forum, the requirements for a successful trial implementation were further specified. Four basic scenarios were considered in the discussion held:

Table 7: The 4 basic scenarios

| The 4 basic scenarios | |
|---|---|
| **Type of Operation** | **Detail of delivery** |
| **White Label** | All suppliers can deliver to the parcel lockers themselves |
| **Single Label** | All parcel lockers are supplied via a hub of the operator of the parcel lockers |

1. **Single Label vs White Label - What could revenue models look like?**
2. **Link to a broader logistics network**
3. **Appearance of the lockers.**
4. **Are the lockers easy to move?**
5. **Price incentives to foster Parcel locker usage**
6. **Open for returns to online shops?**
7. **Parcel lockers for shipment?**
8. **Realistic pilot periods?**

It was agreed upon that the above mentioned aspects will be best further explored in bilateral exchange with different logistics service providers. The questions for these exchanges included:

- **Which data can be shared?**
- **Manoeuvrability**
- **Incentives to use the lockers**
- **Return shipping possible?**
- **Consolidation approach for white label system**
- **Needed Pilot duration**
- **Modularity**

The results of these 1 to 1 exchanges are not public, but it was possible to elaborate a good overview of the status quo of possibilities.

It was agreed to implement the trial with Deburen. Until the end of the trial phase, it was not possible to start the actual use of the parcel lockers due to challenges in getting the electricity necessary for the project. In hindsight this was one of the greatest learnings: even basic facilities may need a lot of time and planning them ahead can significantly accelerate implementations.

#### 4.2.2.4 Resumé

The implementation of the parcel locker trial proofed to be more challenging than expected in the beginning. At the same time, the City of Groningen was planning far ahead, already having in mind potential scale up activities after the trial and due to that the stakeholder engagement process had more open details to it than in other cases in the ULaaDS project.

As a result to the whole process, partner BAX elaborated a guideline from the city wide integration of parcel lockers from the point of view of the City of Groningen, called "Finding the right space for urban logistics".

## 4.3 Stakeholders' Needs and Requirements – MECHELEN

### 4.3.1 Trial 1: Combined Last Mile Solutions

#### 4.3.1.1 General trial description:

The City of Mechelen has the vision to have a Zero Emission Zone installed in the city centre by 2030. The trials performed in the ULaaDS project aimed for solutions of business to business (B2B) deliveries. Three ULaaDS partners planned to trial innovative logistic solutions regarding a city-wide platform for integrated management of urban logistics.

The plans therefore were: The three partners should participate in the first trial which aims for the bundling of resources for a zero-emission delivery ecosystem within the cities. Ecokoeriers and UPS should do the first- and last-mile delivery by cargo bike to a micro hub within the city. They should optimize their routing by dividing the orders by size and place. Bpost should deliver the freight from the micro hubs to the city hub and lastly, from there, the further delivery should be done by Bpost or UPS, depending on the client's agreement. Each of the mentioned partners would focus on different aspects within the trial.

The objective of the stakeholder involvement process is to define the right settings for these operations and get insight about customers' needs and possible obstacles that need to be circumvented. The aim of the involvement process was also to discuss conditions under which service providers will be accepting to use this bundling of freight streams. This trial did not only require stakeholder involvement but also collaboration in order to define the solution in such a manner, that as many logistic service providers will join as possible.

After the second local forum, the trial was discontinued due to barriers and challenges in cooperation and business case elaboration, that could not be overcome during the project.

#### 4.3.1.2 Needs and Requirements Local Forum 1:

Within the first local forum, the project idea was presented to logistics service providers, network organisation and the Flemish department of mobility. The possibility of a micro-hub and framework conditions for other logistics service providers to engage were in the focus.

The open questions, needs and requirements elaborated and discussed in this forum, mainly from the point of view of logistics service providers, comprise of:

1. What is needed for logistics operators to start working via the planned city hub, in other words: to deliver their goods in the city hub instead of at the end clients' address?
2. Is it possible to use the Hub for Express pickups?
3. Is it possible to deliver also chilled or frozen goods, or high valuable goods?
4. For security and insurance reasons: all sites will be equipped with cameras.

5. How to deal with the biggest challenge: data sharing?
6. Brand visibility: will there only one Brand or is a combination of brands possible?
7. It must be a win-win situation for all parties, not only financially, but also in terms of time, for example.
8. Not everyone can invest in heavily zero-vehicles.
9. Concerning Sustainability: Vans are already full, there is not anything to gain, to reduce the number of vehicles movements.
10. Do we have 'money' left to be sustainable?
11. Problem of electrification: especially with trucks this is a problem, load capacity shrinks considerably.
12. What about necessary charging infrastructure?

In overall, the first meeting was a good starting point for an ongoing discussion for the whole project. So far, the needs and requirements elaborated set a well-usable base for upcoming meetings.

#### 4.3.1.3 Needs and Requirements Local Forum 2:

Within the second forum for Trial 1 in Mechelen, the shops and restaurant owners contributed with eight needs and requirements. The discussions brought useful insights on what to consider when setting up new logistics services:

**First, the considerations in original quotes:**

1. “The volume of parcels for my shop is too large to be able to transport it by cargobike.”
2. “There are at this moment still a lot of deliveries that can be best performed with a truck because of the high volume.”
3. Discussion on the timeframes (deliveries need to be done before 11 am or after 6 pm): “The morning timeframe is too short to do all the deliveries in a good way. The actual timeframe is problematic.”
4. Discussion on data: “There is not enough data for the moment. We don’t know enough to make good decisions and policy. We are acting now without having a view on the bigger picture.”
5. Discussion on the delivery on the Ijzerenleen (= one of the main shopping streets with also a lot of restaurants): “There are already a lot of deliveries at 5 am which creates noise nuisance. Also in this street the timeframe until 11 am is not enough. How to make the good combination with being also a nice and liveable street which is nice for the shoppers and visitors?”
6. Question on the time of pick-up of parcels: “Until what time will there be pick-ups performed? This is relevant for online sales where a promise is made ‘ordered before…. PM, delivery the day after can be guaranteed’.”

7. Discussion on delivery frame: “Does this always have to be day+1? Is this what the consumer wants?”
8. “If only a few shops will participate, then the impact will be too small.”

Nearly all these arguments can be considered as having **a high priority** for a successful implementation of the trial.

#### 4.3.1.4 Résumé

In a more general approach, the needs and requirements mentioned above could be summarised as discussion about

- How to cooperate as a logistics service provider?
- What kind of goods can be delivered?
- Brand visibility in white-label hub solutions.
- Vehicle capacities and associated impacts on the duration and quality of the deliveries
- Necessary delivery time frames
- Pick up times
- Duration of delivery
- The need for data to establish a sound and viable solution, but also challenges in data sharing.
- Potential impacts of changes on the liveability of city streets

Hence it can be said that the customers of logistics services want to be assured that new logistics services do not deteriorate the quality of the services considering time frames and duration of deliveries and amount of vehicles in the streets. Costs were not explicably mentioned, but it could be that there is a hidden concern about costs connected with the capacities of the vehicles, as the use of low dimensioned vehicles may lead to more time spend on deliveries and therefore increase the staff costs significantly.

### 4.3.2 Trial 2: Autonomous Vehicle

#### 4.3.2.1 General trial description:

The second trial in Mechelen implemented the use of an autonomous vehicle for parcel delivery. Starting with a theoretical approach, five scenarios were described and provided to a panel of experts and stakeholders. Their input and feedback on the proposed scenarios were used to choose one scenario for effective trialling. The scenario chosen was a cargo-hitching scenario, where a parcel locker will be integrated in an autonomous vehicle for passenger transport. Bpost was foreseen as the partner filling and picking up the parcels in the vehicle. At a later stage of the implementation, partner VIL teamed up with another project called Art.Forum (Interreg), in which

Mechelen is also a partner, focussing on the AV transport of people. In combined efforts, it was now planned that the automated vehicle will bring and pick up people and parcels in an industrial park, on a public open road.

#### 4.3.2.2 Needs and Requirements “Local Forum 1”:

As the trial was implemented in cooperation with a Art.Forum, the participation process before the trial implementation was led by Studio Dott. Here some insights into potential needs and requirements via their presentation “Citizen participation autonomous shuttle” from August 2022 [Studiodott 2022].

The Focus and expectations of different stakeholder groups as well as the Pros and Cons are presented in Table 8 and 9.

Table 8: The Focus and expectations of different stakeholder groups

| Focus of different stakeholder groups | | |
|---|---|---|
| **Experts and city services** | **Citizens** | **Business Park Stakeholders** |
| **Fixed route** | Flexibility as a key demand | Employers: shuttle from station to business park |
| **Competitor of the bicycle** | Tailor made transport | Employees: not a reason to get rid of their car |
| **Shared mobility** | Sustainability | Focus on time and efficiency |
| **Ghost cities** | Unhappy about public services | Part of their own supply chain/logistics |
| | Affordability and accessibility for everyone | |

Table 9: The Pros and Cons expected

| Pros and Cons expected | |
|---|---|
| **PROs** | **CONs** |
| **No driver – e.g. 24 hour service possible** | Flexibility is a key demand |
| **Solution to the parking problem in the city centre** | Lack of human intervention (social control, ethics, …) |
| **Car-free city centre** | Little trust in interaction with other road-users |
| **Tailor-made transport for people with reduced mobility** | Customized infrastructure needed? |
| **Useful for tourists (no transport, not in a hurry, flexible…)** | Too slow, people take their bike |
| **Faith in the municipality: if applied, the technology is secure** | Dealing with obstacles |
| **No human = no emotions e.g. traffic aggression** | Doubts about combining passenger transport and cargo |
| **Can be a solution for charging infrastructure electrical cars** | Getting used to shuttle as a fellow road-user |

The work done gives a good insight into the expectations of different stakeholder groups and into more public expectations as well. As the use of automotive vehicles is still a topic far from every day use, the participation also included general questions and approaches to the topic..

#### 4.3.2.3 Needs and Requirements Local Forum 2:

The second local forum was done after the trial phase was finished. The aim of this forum was to discuss the results achieved, challenges and chances encountered as well as to discuss their meaning for future implementations. To better understand the following discussion, there is a short outline

The cargo hitching trial was implemented between July and August 2022 in a business park in Mechelen-Noord. The vehicle travel time was 17 minutes per round for 2,1 km of trip length. The vehicle had 6 lockers inside, in two different sizes (S and M). the vehicle had a capacity for 6 people, three sitting, three standing. The maximum speed was 15 km/h. in average, 8 people per day used the vehicle, with a maximum of 38 a day.

The locker was reserved 26 times, three times for the first mile and 23 for the last mile. In the second case, 11 times the parcel did not fit into the locker, for two different reasons: The parcel was too big or there was no free space available.

The aspects of the trial discussed in the local forum were:

1. **How could we have increased the locker usage?**

The following ideas were elaborated:

- Larger lockers are needed to deliver larger parcels.
- Locker localization, expand access to the lockers (now only employees can use it and no local residents)
- By offering a fully integrated app
- It was 'new' (AV) and 'novel' (mobile locker), and hence most people chose shuttle ride instead of using locker
- It could be helpful to keep a locker space available for longer than 24 hours

2. **How could we have increased the usage of autonomous vehicle for person transport?**

- Via more focus on mobility needs of potential passengers

3. **Which were the effect of combining person and freight transport?**

   a. **Positive effects**

- Fewer vans on the road due to combination
- The trial is helping to achieve a mental shift, getting people to think in a combined way and change their mobility behaviour (e.g. lean lockers in Mechelen, consumers are now more likely to go by bike or on foot to pick up parcels instead of by car)

   b. **Negative effects**

- Loss of time for passengers
- Vehicle testing has seriously lowered passengers' expectations. If innovation does not 'come along' immediately, perception becomes 'rather' negative (typical of change process).
- The Maxim Speed applied was not suitable for parcel delivery and was set due to passenger safety concerns.

4. **What was needed to increase the performance of this pilot?**

**a. Structural**

- Have a van drive autonomously with a driver in it, this way it can carry out other tasks while driving (e.g. relabelling), courier can focus more on giving service than on transport
- Autonomy had not been considered influential on parcel locker usage in this trial. A van driving around manned would not make much difference. It did on passenger transport because this was rather touristic to try it out.
- For parcel delivery, mentality change is hyper important
- Include AV more in spatial planning as there are now stops and signs for public transport and more
- Make decision mechanism less 'black and white', more interpretation
- Determining even more where 'need' is right.

**b. Legally**

- Adaptation of legislation, e.g. the need for steward being present
- Interpretation of Liability (NOW in traffic: you are responsible to follow rules, you are not responsible for your own behaviour), for an AV vehicle an error is accepted much less than for a person.

**c. Technological**

- All services have to be integrated in 1 app that is simple.
- Geolocation needs to be much more accurate to allow for better planning.
- Respond to obstacles has to be more flexibly, speed needs to be higher to be perceived not annoying within normal traffic flows.

#### 4.3.2.4 Resumé

From a stakeholder engagement perspective, the automotive vehicle trial in Mechelen proofed to be very interesting, as it is the only trial with a local forum after the trial has ended, which allowed to elaborate on possible changes in future trial set ups. Thanks to a good preparation of topics, it was possible to retrieve important information for the future of AV applications.

# 5. Discussions

The discussion of the methodologies applied within the stakeholder engagement processes in this project is split between two Deliverables. D2.5 Report on local fora meetings focusses on the description of approaches and results of the local fora itself, as well as on the outcomes of the collective target system method.

D2.6, the deliverable at hands, will discuss the methodologies applied in general, the results of the stakeholder mapping and the needs and requirements obtained within the local fora.

## 5.1 Discussion: Methodologies

A profound stakeholder mapping process at the beginning of any participatory process clearly served as ideal preparation to choose the right stakeholders to engage. The power-level-assessment was a helpful step in this process. Nonetheless power can be understood as power regarding the success of the process/implementation and not necessarily economic power. The approach of focussing on local fora proofs to be generally important and viable, but it also showed that in reality a flexible approach is necessary to achieve the best output for the trial preparation. The collective target system helped to assess the aims and objectives of the different target groups, giving the chance to detect additional needs for exchange between different stakeholders. Data collection is always a challenge but could nevertheless be realised during the project lifetime. The deductive impact assessment approach was also viable per se, but in reality it showed that a more hands on approach is by far sufficient, especially as the trials differ in their specific implementation.

A key aspect within the ULaaDS project was the limited availability of certain stakeholders. It is important to keep in mind the expectations of stakeholders and find a balance between the time requested and the willingness of stakeholders to invest time. As the overall activities to foster sustainable urban last mile logistics thrives, it also shows that even people willing to participate in different projects and implementations may struggle to find time to participate. More and more projects are asking for their attention.

## 5.2 Discussion: Stakeholder mapping

The stakeholder mapping approach served as a starting point for the whole stakeholder engagement activities planned within the ULaaDS project. It helped to visualise the existing activities of the light house cities and let the partners draw conclusions from how cities can – over time and thanks to their efforts made in previous initiatives and projects -build up whole networks to come back to when new activities are planned.

Already in the first mapping process it showed that Groningen and Mechelen had a whole range of people and companies to contact from previous projects. Compared to that, Bremen was at the beginning of building up its contacts but brought in partner TBNLR, who had the necessary contacts.

In a following step, for each stakeholder 13 different attributes were documented and finally the stakeholders were mapped using an adapted approach of the Mendelow power grid, appointing the different stakeholders to one of the 4 topics:

- manage closely
- keep satisfied
- monitor and
- keep informed.

At the beginning of the stakeholder engagement process, it was aimed to have a certain share per stakeholder group involved in the local fora. This share was introduced to take care that a broad variety of stakeholders is represented in the whole process. At a later point during the implementation the initial considerations for this share was given up and adapted by the needs per trial that evolved during the project implementation.

## 5.3 Discussion: Retrieved needs and requirements

The identification of the needs and requirements was a paramount outcome and one of the main objectives of the stakeholder fora. In the original approach, it was planned to follow the Deductive Impact Assessment method introduced in chapter 2.5. This method was implemented for the first two fora, one in Mechelen, one in Groningen, but finally did not correlate with the needs of the light house cities themselves, which preferred to document the needs and requirements in their own ways, also in different styles depending on the actual issues that were discussed.

**The local fora proved to be a viable source to retrieve the needs and requirements for the different trials. As each trial was very specific, the approaches and questions used differed from each other.**

When trying to cluster the different topics of the needs and requirements, it could be roughly done like this:

- Basic needs of logistics and correlated framework conditions
- Basic information on the trials planned, including information about the respective use ad business cases behind.
- Specific needs for a sound and optimised trial implementation, like vehicle specifications, technical aspects of the implementation, …
- Needs for scale up activities of a trial in test.
- Needs and requirements for alternative solutions for future implementations.
- Needs relevant for an optimised implementation of a trial.

Nearly all of the trials were able to hold a local forum before the actual trial phase was in place and as a result there was the possibility to optimise the trial layout and planning accordingly. The most intense interaction between the ULaaDS partners and other stakeholders was realised in Groningen's Trial 1. This may be correlated to the following reasons: Partner Groningen City Club was an established representative of the target group with easy and direct access to the stakeholders. Furthermore, the City of Groningen was able to focus great resources of time and efforts on the trial.

**Trying to generalise the success factors lying behind, they can be summarised as:**

- Choose active partners with a strong influence on the target group.
- Plan to invest enough staff and time to engage the stakeholders.
- The greater the influence of a public authority, the easier it is to actually implement a trial. A strong collaboration between different public authorities or departments within the same public authority can strongly help to achieve the objectives.
- Offer the stakeholder involved the power to actually determine aspect of the implementation planned.

Preparing the stakeholder engagement processes before the actual implementation proofed to be very helpful.

# 6. Conclusion

The ULaaDS lighthouse cities put a lot of effort in preparing a future zero emission city logistics. The ULaaDS trials were an important mile stone supporting this transition within the cities. In ULaaDS, the involvement of all relevant stakeholders via a multi-stakeholder approach was paramount for the successful implementation of the trials. This was recognised by all lighthouse cities and therefore all put a great commitment in elaborating suitable solutions with the help of the local fora. For this purpose, a variety of methods were elaborated and will be applied to collaboratively develop solutions for complex city logistic settings.

In overall, five different methodologies were applied in combination in each of the light house cities, with the stakeholder mapping providing the perfect start position for the actual engagement process. In overall, the combined approach offered the possibility to retrieve the needs and requirements necessary to re-define and optimise the trials planned within the project. Depending on the actual trials, the focus of the information gathered differs in specific aspects.

The most important clusters of needs and requirements elaborated are:

- Basic needs of logistics and correlated framework conditions
- Basic information on the trials planned, including information about the respective use ad business cases behind.
- Specific needs for a sound and optimised trial implementation, like vehicle specifications, technical aspects of the implementation, …

ULaaDS clearly showed that stakeholder engagement can offer profound insights into the reality of different target groups affected by measures set by the cities. And whereas it is no discussion to define the worth of these activities, **it has to be highlighted that stakeholder engagement is a process that has to be approached with a strong dedication, also in terms of staff and time to achieve the best results**.

# Acronyms

Table 10: Acronyms

| Acronym | Meaning |
|---|---|
| **AI** | Artificial Intelligence |
| **AV** | Autonomous Vehicles |
| **D** | Deliverable |
| **EC** | European Commission |
| **GA** | Grant Agreement |
| **ICT** | Information and Communication Technology |
| **LF** | Load Factor |
| **LSP** | Logistics Service Provider |
| **O** | Objective |
| **ODD** | On-demand Delivery |
| **P** | Product |
| **PA** | Public authority |
| **PPP** | Public Private Partnership |
| **PM** | Person Month |
| **SUMP** | Sustainable Urban Mobility Plan |
| **SULP** | Sustainable Urban Logistics Plan |
| **T** | Task |
| **UC** | Use Case |
| **UCC** | Urban Consolidation centre |
| **UFT** | Urban Freight Transport |
| **ULaaDS** | Urban Logistics as an on-Demand Service |
| **WBS** | Work Breakdown Structure |
| **WP** | Work Package |
| **VUR** | Vehicle Utilisation Rate |
| **ZEV** | Zero Emission Vehicle |

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