

Groningen trials: report

ULaDS D4.5 – Groningen

ULaDS practical research trials

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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 technology 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 (SUMP). 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 (pilot cities) committed to zero emissions city logistics (Bremen, Mechelen, Groningen) has joined forces with logistics stakeholders, both established and newcomers, as well as leading academic institutions in 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

Urban logistics, sustainability, trials, testing, guidelines, framework, Lighthouse Cities, WP4 Effective Trialling, Mechelen, Groningen, Bremen, VIL

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Executive summary

This executive summary provides insights into the municipality of Groningen's pioneering efforts toward achieving zero-emission urban logistics, focusing on two key trials under the Urban Logistics as a Service (ULaADS) initiative.

Trial 1: Groningen Inner City Trial Conducted in collaboration with the municipality and the Groningen City Club, Trial 1 centers on a platform enabling local shopkeepers and entrepreneurs to access shared zero-emission vehicles. With a goal of supporting the city's vision for zero-emission logistics by 2025, the trial employs shared resources strategically placed throughout the city for efficient deliveries. Key phases of implementation, a comprehensive business model, and lessons learned underscore the city's commitment to developing a collaborative delivery model, emphasizing shared zero-emission vehicles to enhance urban logistics resilience.

Trial 2: ULaADS Initiative Trial 2, part of the ULaADS initiative, targets the integration of logistics services into a Park and Ride area. Led by OVB and supported by the municipality and RUG, the trial focuses on sustainability and reducing transport kilometers. Challenges related to permits, spatial integration, and infrastructure are addressed through a developed policy framework. A spatial analysis in collaboration with Bax & Company identifies suitable locations for parcel lockers, contributing to the city's commitment to reduce CO2 emissions and enhance accessibility.

Groningen navigates challenges in achieving an efficient parcel locker network while balancing spatial constraints, environmental goals, and stakeholder interests. Ongoing spatial analysis and policy framework development aim to optimize parcel locker placements, ensuring positive impacts on logistics efficiency. Stakeholder engagement, encompassing providers, local authorities, and the community, remains pivotal for successfully integrating sustainable urban logistics into Groningen's evolving urban fabric. The trials exemplify Groningen's commitment to innovative solutions, stakeholder collaboration, and a sustainable urban logistics future.

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ULaDS D4.1: Trial experimental plans description repository for effective implementation (and iterations)



1. 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
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
ULaDS	Urban Logistics as an on-Demand Service
WBS	Work Breakdown Structure
WP	Work Package
VUR	Vehicle Utilisation Rate
ZEV	Zero Emission Vehicle

2. Intro

This report describes two trials that were carried out in the context of Ulaads in the municipality of Groningen. These trials are in line with the city's ambition and vision for city logistics and .

The city of Groningen was one of the first large municipalities in the Netherlands to decide to introduce a zero-emission zone in the city center in 2025. With this zone we not only want to limit emissions, but we also see it as part of a broader approach, namely to make the city center liveable, vital and attractive again. Cars, trucks and vans should no longer dominate the street scene - the resident and visitor must be central.

The city is also working hard on facilitating policies. Part of this is to help small entrepreneurs make their logistics zero emissions. After all, for many retailers the latter is still a significant challenge, also given the often significant investments involved.

With about 230.000 inhabitants, Groningen is the largest city in the North of the Netherlands. Groningen is a vibrant university city, with the youngest average age of inhabitants in the Netherlands.

It is known for its progressive mobility strategy, for example, by banning cars largely from the city in its 1977 “traffic circulation plan”. More recent examples include the Green Deal city logistics (2014) and the Sustainable Urban Logistics Plan (2021). The two Groningen research trials as part of ULaADS focus on the implementation of a shared platform for logistics and urban logistics as a service for commuters.

- Population 2019: 230.000
- Daily Urban System 500.000
- 140.000 jobs
- 60.000 students
- 8.000 international students
- Average age: 36.4 years

3. Current urban logistics in Groningen

In Groningen many logistic flows are moving by road, water and rail. The majority of logistics movements in Groningen take place by road. With the reconstruction of all crossings of the ring road in recent and coming years, we ensure that there are good and direct connections to our business parks. Freight transport by water and rail is relatively marginal within the municipality.

The city centre attracts many visitors, companies and tourists, and therefore also a lot of logistics. These logistics companies are usually located at the work locations in the outskirts of the city of Groningen, but there are also many smaller logistics companies spread across the city. At the

Westpoort business park, space is still available for new large-scale companies in the logistics sector. This space is also badly needed for the transition towards sustainable, future-proof logistics. Several new logistics companies have been added to Westpoort in recent years. Planning for the ZESS (Zero Emission Smart Shared) Hub Westpoort is currently underway. The hub's facilities are made available to third parties. The hub will also be equipped with a filling station for clean fuels.

In the city centre, logistics is often accompanied by congestion, unsafe traffic situations for pedestrians and cyclists, noise nuisance and problems with air quality. That is why Groningen is committed to reducing and making logistics flows more sustainable.

The approach to city logistics in Groningen is part of the integrated city center program 'Space for You'. Public space is under pressure due to the many different functions that all claim space. This concerns, for example, pedestrians, cyclists, terraces, advertising objects and logistical traffic. Furthermore, Groningen states that it is very important that all public space in the city center is easily accessible to everyone. The approach to urban logistics is laid down in the vision "Space for zero-emission urban logistics". This vision sets out a number of concrete measures that should ensure that the spatial claim of logistics is better balanced with other functions. The concrete measures are:

- increasing window time area in 2022
- smart access policy from 2022
- enforcement with ANPR cameras from 2022
- establishing a zero emission zone by 2025

In addition to ensuring zero-emission logistics, Groningen also wants to act upon the amount of logistics vehicles in and around the city centre. The city will take a critical look at who is allowed to access and when. With the help of a new logistics traffic enforcement system, we can provide very targeted access to parties. For example, the city aims for a balance between supply traffic and a pleasant living environment for residents and visitors to the city centre.

In recent years there has been considerable growth in smaller forms of logistics transport, partly because more private individuals and companies are opting for online store purchases. This growth is increasing pressure on space in the city. To reduce this pressure, Groningen is looking, together with logistics businesses, for more efficient logistics solutions, such as central collection points.

By 2035 Groningen wants all logistics transport flows within the municipality to be zero emissions. The city administration is exploring which measures in shopping centres, residential areas and villages have the potential to stimulate and accelerate the transition to ZE logistics in these areas. This is done by making wider use of measures that they will be implementing for the city centre in the coming years and by introducing new business models for high-volume logistics and supply. New urban areas will be designed in such a way that heavy logistics, for supermarkets and catering, for example, do not have to pierce the neighbourhood deeply.

Groningen sees that logistics service providers itself want to contribute to this transition. However, it is too early to give the market a free hand. The control over which alternatives to allow and not to allow in the city centre is crucial. This is done by:

- Connecting: bringing different parties from the "logistics chain" together, look for suitable locations together with logistics businesses and make it possible to create new, efficient concepts.
- Boosting: helping set up logistics hubs that act as transshipment centres for goods delivered by large long-distance vehicles into small, clean vehicles such as cargo bikes and light electric transport vehicles. In the short term, this requires an active role from the city; in the long term we think we will take a step back and leave initiatives to the market.
- Supporting: helping businesses with the introduction of sharing platforms for logistics vehicles

Finally, the Focus Group for Urban Logistics convenes three to four times a year under the chairmanship of the City of Groningen. It includes representatives from the Groningen City Club, Koninklijke Horeca Nederland (organisation representing the hospitality industry), market vendors (CVAH), business associations TLN and Evofenedex, TopDutch Logistics, VNO-NCW MKB Noord, the University of Groningen and EnergyExpo. The focus group reflects on policy and projects and liaises with members.

4. Report of the trials

Collectively, the Groningen trials cover all ULaADS solutions and schemes. There will be two main trails. Trial 1 focuses on developing and promoting a platform for shared zero-emission vehicles to enable collaborative delivery models for shopkeepers and other entrepreneurs in the city. Trial 2 focuses on the implementation of logistics services at a multi-modal mobility hub for commuters. Below, each of the trials is discussed in more detail.

4.1 Groningen inner city trial

4.1.1.1 Initial trial set up - as communicated in the Grant Agreement

In Trial 1, the municipality of Groningen (GRO) and the Groningen City Club (GCC) organize the development, implementation, and promotion of a platform that enables local shopkeepers and other entrepreneurs with access to different types of shared zero-emission vehicles. Trial 1 will test a platform for the on-demand supply of shops and delivery to consumers in the city of Groningen. Generally, the aim of such platforms is to pool resources and freight flows from different actors in the city. The pooled resources may include either vehicles or facilities—or both, and can be owned by local shops, suppliers, or logistics service providers. The platform can help to meet the regulatory framework of a city, such as time-access restrictions and emission zones.

Trial 1 addressed the ULaADS schemes #2, #4 and #5.

- #2: Crowdsourcing platform marketplace for city logistics
- #4: Location and infrastructure capacity sharing
- #5: Transport vehicle capacity sharing

Subpillar 2.2 – page 96 of the grant agreement:

“The chosen design of ULaADS offers participants, including solution providers, the possibility to directly demonstrate and evaluate the knowledge that will be developed on the basis of practical analyses, real city cases, theory development and tests. For this, ULaADS will perform a total of 4 research trials, tailoring the 2 ULaADS solutions -in the form of the 5 schemes just presented- to the different typologies and requirements of the 3 “lighthouse” cities. Starting from urban logistics infrastructures, systems and services already in place and operational in the Lighthouse cities of Bremen, Groningen and Mechelen will play a motivational role and provide tangible and measurable demonstrations of the ULaADS solutions and benefits that can be attained. They will integrate research trials into permanent activities, upscaling and improving the ULaADS solutions and measures.”

In Task 4.4 of the Grant Agreement the initial setup for the first Trial is described as follows:

“The first research trial in GRO aims at ULaADS solution 1, addressing scheme #2 and answering to UCs 1,2 and 4. In this trial, GRO will work together with DRO who will be providing and adapting their digital platform for integration of crowdsourced bicycle couriers focused mainly on the inner city.”

DRO went bankrupt during the project. A new project partner was found with retailers' association GCC to carry out the trial.

4.1.2 Trial set up and implementation

In Trial 1, the municipality of Groningen (GRO) and the Groningen City Club (GCC) organized the development, implementation, and promotion of a platform that enabled local shopkeepers and other entrepreneurs with access to different types of shared zero-emission vehicles.

The vehicles were available at different locations throughout the city. This concerns the integration of mobility networks (Solution 2), with location and infrastructure capacity sharing (Scheme 4) and vehicle sharing (Scheme 5). The shopkeepers used the shared vehicles for supplying their shops and/or delivering to their customers in the city and its peri-urban and rural region.

The platform could also be used for organizing the delivery of orders from multiple participating shopkeepers. It links to the second trial in that these deliveries can be made to parcel lockers located at mobility hubs, parking garages, offices, hotels, etc. This facilitates the design and use of collaborative delivery models (Solution 1), with a city-wide platform for the integrated management of urban freight transport (Scheme 3).

The other two schemes as part of Solution 1, namely the integration of crowd-sourced bike couriers (Scheme 2) and containerisation (Scheme 1) may be considered as the trial continues. The trial design allows for the integration of those two schemes but started with a focus on making zero-emission vehicles available to local shopkeepers and entrepreneurs, while building towards an integrated management of urban freight transport in Groningen and its surrounding peri-urban and rural regions.

In Trial 1, the municipality of Groningen (GRO) and the shopkeepers organisation for the inner-city Groningen City Club (GCC) organize the development, implementation, and promotion of a platform for the on-demand supply of shops and delivery to consumers in the city of Groningen. Trial 1 addresses both ULaADS solutions across at least three schemes as indicated in Table 4.1.

Trial 1 addressed the ULaADS schemes #2, #4 and #5.

- #2: Effective integration of passenger and urban freight mobility services and networks
- #4: Location and infrastructure capacity sharing
- #5: Transport vehicle capacity sharing

4.1.2.1 Initial setup

In this trial the municipality of Groningen (GRO) and the Groningen City Club (GCC) organized the development, implementation and promotion of a platform for the on-demand supply of shops and delivery to consumers in the city of Groningen. Trial 1 addresses both ULaDS solutions across at least three schemes as indicated in Table 4.1.

GCC replaced the original partner in this Trial: Dropper (DRO), due to bankruptcy. In replacing DRO with GCC, the focus of the intended trials has shifted somewhat from platform technology development into stakeholder involvement towards optimal design and use of the platform. This shift had implications for the trials in Groningen—where DRO was to develop, implement and test the platform—and Mechelen—where DRO was to license its software. This document outlines the plan forward, as agreed by Groningen and Mechelen on September 16th, 2021.

The platform enables local shopkeepers and other entrepreneurs with access to different types of shared zero-emission vehicles. This pilot therefore anticipates the policy of the municipality of Groningen, which stipulates that logistics in the city center must be zero emissions by 2025. In addition, a wish of the municipal council is being fulfilled to help small businesses with the transition to the use of zero-emission vehicles. For many of these entrepreneurs it’s difficult to acquire these vehicles due to the high investments involved and also the lack of suitable ZE vans.

The vehicles will be available at different locations throughout the city. This concerns the integration of mobility networks (Solution 2), with location and infrastructure capacity sharing (Scheme 4) and vehicle sharing (Scheme 5). The shopkeepers and entrepreneurs can use the shared vehicles for supplying their shops and/or delivering to their customers in the city and its peri-urban and rural region. The platform can also be used for organizing the delivery of orders from multiple participating shopkeepers. It links to the second trial in that these deliveries can be made to parcel lockers located at mobility hubs, parking garages, offices, hotels, etc. This facilitates the design and use of collaborative delivery models (Solution 1), with a city-wide platform for the integrated management of urban freight transport (Scheme 3).

The other two schemes as part of Solution 1, namely the integration of crowd-sourced bike couriers (Scheme 2) and containerisation (Scheme 1) may be considered as the trial continues. The trial design allows for the integration of those two schemes but starts with a focus on making zero-emission vehicles available to local shopkeepers and entrepreneurs, while building towards an integrated management of urban freight transport in Groningen and its surrounding peri-urban and rural regions.

Table 4.1 ULaDS solutions and schemes Groningen trial 1

Solution	Scheme
1) Collaborative delivery models to enhance logistics efficiency and multimodal mobility in cities	3. City-wide platform for integrated management of UFT
2) Effective integration of passenger and urban freight mobility services and networks	4. Location and infrastructure capacity sharing 5. Transport vehicle capacity sharing

4.1.2.2 Local Fora

For the trial in the inner city of Groningen we wanted to set on a collaborative approach with the shopkeepers and shopkeepers organisation (GCC). Advantage of such an approach is the high acceptance among stakeholders, since they are actively shaping the solution implemented later on. As such an approach needs significantly more time, only one local forum before the trial phase did not seem sufficient. Instead of one local forum, the following approach took place for trial 1: the need to find solutions for the business related logistic in the inner city was pitched to the shop owners with the help of the Groningen City Club. An emphasis was laid on the urgency and the opportunity to actively shape solutions that will fulfil their needs. The response to this opportunity was well by the shop owners. In a first meeting the ULaDS project as well as the vision of the city for the future were introduced. This led to an open discussion about the obstacles that shop owners are concerned about. This first meeting and all following meetings were set to a duration of two hours. With the inputs collected from the first meeting, an interview guide was prepared with the aim to analyse the logistic profiles and prepare for the next meeting. In total 20 interviews with shop owners were conducted in order to gain further and more detailed insight. The results of the interviews were presented in a second meeting where the specifications of the ULaDS trials solutions were elaborated. In order to work on solutions for various diverging needs three working groups were built, which focus each on different solution specifications for the trial. For the input for the working groups' wishes and demands of the shop owners were discussed subsequently in this meeting.



With the inputs gained from the second meeting the needs were structured and narrowed down to possible solutions/trials by the working groups. Three thematic alignments were found. One group

each will deal with solutions directed towards sharing platform of zero-emission vehicles, a city hub with delivery service and other solutions for shop owners for whom the previous mentioned solutions do not work. For the third meeting the topics locations, vehicles, providers, services and other stakeholders were prepared so that in the third meeting with also included other stakeholders like providers of logistic services the trials can be concretized and work appointments can be scheduled. With this meeting solutions have been formulated with the collaboration of those stakeholders involved. As post processing steps offers of logistic service providers will be discussed. Furthermore, for the solution concerning the sharing platform IT education has to be prepared in order to avoid complications for shop owners. The locations for vehicles have to be fixed as well including thoughts about infrastructure.

During the development of the Groningen trial, the ULaDS Local Forum resulted in a strong focus on assisting local shopkeepers and entrepreneurs in meeting the future regulatory frameworks of Groningen. Specifically, Groningen will extend the geographical zone to which time-access restriction will apply in 2022—and that zone is also designated to become a zero-emission zone by 2025. In between 2022 and 2025, parties entering the city can get a waiver for the time-access restriction, allowing them to enter also outside the time window if they use a zero-emission vehicle. Especially for smaller-sized vehicles (e.g., light electric freight vehicles and vans), concerns about the lack of availability and higher total cost of ownership are alleviated due to changes in the market. Nevertheless, many local shopkeepers and entrepreneurs are not able or willing to invest in a new vehicle, which hampers their access to the city in which they operate. What is more, local authorities see an opportunity to limit the number of vehicles used in the city. Combined, these observations resulted in a trial design where the focus is on rolling out a platform where local shopkeepers and entrepreneurs can organize using shared electric vehicles.

4.1.2.3 Platform shared (zero-emission) vehicles

After the Local Fora the first aim defined for the trial is as followed:

Develop and promote a platform for shared (zero-emission) vehicles to enable collaborative delivery models for shopkeepers and other entrepreneurs in the city. The main goal is to stimulate a platform that:

- o can organize the delivery of orders from multiple shops in the city center to consumers in the city and its neighboring peri-urban and rural areas. The deliveries may include possibilities to deliver via mobihubs/parcel lockers, parking garages, offices, hotels etc.
- o provides access to multiple zero-emission vehicles for shared use by local shopkeepers and entrepreneurs.

Objectives (as D.5.2 ULaDS factsheets baseline and city profiles)

1. Increasing the use of cargo bikes and other zero emission vehicles (and decreasing the use of polluting vehicles)
2. Increasing the efficiency/use of transport vehicles
3. Increasing livability and safety because of the use of smaller, silent, and clean vehicles
4. Giving more target groups the opportunity to use electric vehicles.

5. Reducing CO2 emissions

4.1.2.4 Three Phases

Phase 1: stakeholder requirements

GCC was involved with gathering requirements from local entrepreneurs in Groningen, including end-users (e.g., shopkeepers, restaurant holders), but also vehicle and/or logistics service providers.

Lessons learned:

By focusing on a broad core group, with representatives from different sectors, such as fashion stores and fresh food stores, more expertise was required, which benefited the trial.

Ensure continued involvement of entrepreneurs. Due to the long duration of the trial, lack of clarity about the end product and the entire process of the trial, it sometimes proved difficult to ensure commitment and a number of retailers decided to drop out.

The involvement and cooperation between retailers and the university was very useful. Measurements could be converted into valuable data.

Phase 2: Selecting platform provider and onboarding

Based on the requirements a selection for a party that could provide the platform took place. While the broad budget constraints and total costs are more or less clear, the precise division of costs for the different parts of the implementation are still uncertain at this stage. For example, the relation between the cost of developing the platform itself versus the costs for onboarding its users depends on the specific requirements and or platform provider chosen.

After selecting the platform provider, local entrepreneurs needed to be onboarded and provided with the logistics services and/or vehicles made available through the platform.

Phase 3: Testing the platform

GCC, RUG and GRO were responsible for monitoring the impact of the platform in the city of Groningen. The testing phase started with two different vehicles: an electric cargo bike and a Carver (Light Electric Vehicle). Both had limited capacity. The third vehicle that was tested proved to be the most popular: an E-Van





Lessons learned:

The use of electric transport becomes interesting when the pain is really felt. The design of the trial in which vehicles were made available free of charge did not always provide a realistic picture. Some

retailers did not go so far as to actually test within their business operations whether it has added value.

The positive thing is that we were able to test different types of vehicles. From this we could conclude that the cargo bike becomes interesting as the distance between the store and the parked vehicle decreases and therefore convenience prevails.

4.1.2.5 Business and operating model

The focus of the platform on sharing vehicles had implications for the business and operating model, (Table). Specifically, the mission statement becomes to pool zero-emission vehicles and freight flows of multiple local shopkeepers and entrepreneurs. The value proposition focuses on the use of shared, zero-emission vehicles, which on the one hand should facilitate shopkeepers in exploring how these vehicles can be used in their operation while on the other hand ensuring they keep their access to the city as the regularly framework becomes increasingly stringent.

Table Updated business model canvas for integrated management of urban freight transport in Groningen Trial 1

Mission statement: To pool zero-emission vehicles and freight flows of multiple local shopkeepers and entrepreneurs				
Key partnerships: 1. Vehicle provider 2. Platform provider 3. Local authorities	Key activities: 1. Provide an overview of where and when vehicles are available 2. Facilitate the reservation of vehicles	Value proposition: 1. To enable the use of shared, zero-emission vehicles 2. Familiarize local shopkeepers with the use of zero-emission vehicles 3. Ensure that local shopkeepers and entrepreneurs keep having access to the inner city.	Buy-in & support: 1. Local shopkeepers and entrepreneurs that need a vehicle for urban freight flows	Beneficiaries: 1. Local shopkeepers who keep having broad access to the city 2. Citizens and other people staying in the city benefit from improved efficiency (e.g., less vehicles, fewer buildings for logistics) 3. Platform/vehicle provider who will obtain a new business model
	Key infrastructure and resources: 1. Zero-emission vehicles 2. Infrastructure for parking the vehicles 3. Platform for checking vehicle availability and booking		Deployment: 1. Find entity that provides the vehicles 2. Find entity that provides the platform 3. Identify locations for parking the vehicles	
Budget costs: 1. Cost involved with the use of the vehicles 2. Cost involved with developing the platform 3. Transaction cost involved with the reservation system			Revenue streams: 1. Fee for using the vehicles 2. Membership fee for access to the platform 3. Advertisement	
Environmental costs: 1. Energy for operating the vehicles 2. Energy for infrastructure changes 3. Energy for operating platform			Environmental benefits: 1. Reduced greenhouse gas emissions from the use of zero-emission, rather than traditional vehicles 2. Reduced greenhouse gas emissions from better utilization of vehicles	
Social risks: 1. Not all shopkeepers and entrepreneurs may benefit from the use of the shared vehicles and may lose access to the city as a result 2. Vehicles use public space, which may result in less space for other social activities			Social benefits: 1. A reduced number of vehicles operating in the city 2. More compliance with rules and regulations due to unlocking of up-to-date information directly to logistics providers	

In terms of key activities, the platform should provide an overview of when the vehicles are in use and where and when they are available. The platform should also provide an easy booking system through which vehicles can be reserved and paid. The vehicles are of course a key resource, as are the locations where the vehicles can be parked. In this trial, different types of zero-emission vehicles will be used, namely a zero-emission van, a light electric freight vehicle, and an electric cargo bike. The vehicles will be assigned to a fixed parking location. Shopkeepers and entrepreneurs need to collect and return the vehicle to that location. Key partnerships involve the vehicle provider, the platform provider, and local authorities. In this trial, the vehicle and platform provider are the same party. Local authorities need to approve the use of the vehicles, their parking location and potential changes to the charging infrastructure to enable recharging of the vehicles.

The main costs are involved with the vehicles. In this trial, the vehicles are owned by a service provider that also provides that platform through which the vehicles can be reserved. Based on the usage of the vehicles during the trial, important lessons can be learned about a viable business model for both the user and provider of the vehicles. Specifically, different types of local shopkeepers and entrepreneurs can be determined based on their usage, for example, in terms of frequency, duration, and the moments at which they use the vehicles. This information can feed into a rental cost structure with some form of dynamic pricing to accommodate different user types. The service provider needs to be able to receive a return on investment on the vehicles as well as cover the cost of operating the platform. While being without exhaust pipe emissions—that is tank-to-wheel emissions—the vehicles do use energy. At the current energy mix in the EU, this will involve well-to-wheel emissions related to generating the required energy. Potential infrastructure changes and the platform will also require energy. A social risk of the platform is that not all shopkeepers and entrepreneurs find out about the availability of the shared vehicles, or that they have operating models that are not well suited for the use of those vehicles. Because the platform is seen as a mitigation strategy for more stringent access regulations of the city, those shopkeepers and entrepreneurs may need to buy their own zero-emission vehicles to avoid limiting their access to the city. In order to make the vehicles visible and attractive in use, they will need to be parked in visible and convenient locations, which will consume scarce public space.

The buy-in and support of local shopkeepers and entrepreneurs that (may) use the shared, zero-emission vehicles is crucial for the success of the platform. For the deployment of the platform, a company that provides the platform and/or vehicles need to be found. In principle, these two can be separated and a platform may also provide access to vehicles that are owned by external stakeholders. For example, a shopkeeper may also bring in a vehicle as a resource to the platform that can then be used by another shopkeeper. In this trial, however, all vehicles are provided by the same company that provides the platform and—at least at the beginning—no vehicles owned by shopkeepers will be included. During the deployment of the platform, local authorities need to identify suitable locations for parking the vehicles. These can be dynamic locations, when the system is free-floating, or fixed locations, when vehicles in the system need to be collected and returned to the same, fixed location. In this trial, the latter applies. Key beneficiaries of the system are the local shopkeepers and entrepreneurs, who by using the vehicles keep their broad access to the city, get access to vehicles at relatively low cost and may develop new business models using the vehicles. Residents of the city benefit from improved efficiency of the urban freight flows, but also by a broad range of local shops. Lastly, the provider of the platform and/or vehicles will obtain a new channel for their services.

The main source of revenue for the platform will be the fee for using the vehicles. In this trial, the fee will not apply to users to first explore how the vehicles can be used. But, based on the lessons learned by the users and provider, a fee structure will be developed as part of the trial. This fee structure should be high enough to cover all cost associated to the vehicle and leave some profit for the provider while still low enough to remain attractive for broad use by shopkeepers and entrepreneurs. Other potential sources of revenue could be a membership fee of users—hence, not only charging per time or km used, but also for having access to the platform in the first place—and/or by placing advertisement on the vehicles. Environmental and societal benefits stem from a

reduced number of vehicles and more efficient use of vehicles. Societal benefits further come from enabling more stringent regulations while not limiting the range of shops in the city.

The general business and operating models for the ULaDS trail 1 in Groningen is clear. At a more precise level, the operating model for both solutions are also clear. Yet, in terms of the business model, this trial is aimed at better understanding the precise fees, possible membership structures and advertisement revenue.

A key reason for not fixing this prior to the start of the trial is that these fees and other revenue streams depend strongly on the usage of the solutions. Specifically, the fixed investment costs in are clear and make up the majority of the total cost. In Trial 1, these investment costs concern the purchasing price of the zero-emission vehicles. The depreciation period for these assets is also given in advance. In order to have a viable business model, the total revenue stream should cover the initial fixed investment costs as well as the variable operational costs and a profit for the provider of the vehicles. This is largely determined by the usage of the vehicles. The more frequent the use, the lower the fee per use could be.

Another key reason not to fix the fees is related to the perspective of the user. In this trials the use of the solution requires a shift from business as usual—both in terms of behaviour and operational processes. By starting both services at low cost or for free, potential users can explore the services at low cost. This may enhance their willingness to make changes to other parts of their operation and explore new ways of doing business. It seems important that the initial users know that the low cost of free use of the solution is only because they are initial users. That is, that they are explicitly taking part in the discussions about a viable business model, including the cost for using a vehicle or locker. In the trial, the risk for the providers is covered as part of the project. A potential shortcoming would be that potential users think the services are indeed free, and will no longer be interested when they need to pay. Of course, it could be that there is no viable business case where the users are accepting the fee while the providers make a sufficient profit.



4.1.2.6 Next steps

As of November 1 2023, vehicles and platform provider Century will switch to a ULaADS follow-up model with payment by entrepreneurs. A joint plan for scaling up the number of vehicles will also be made. ULaADS trial 1 will therefore continue to exist.

4.2 Groningen Trial 2, Logistics services at P+R site

4.2.1 Initial trial set up - as communicated in the Grant Agreement

Trial 2 was intended to add a logistics service to a P+R area on the outskirts of Groningen. Many commuters travel to the P+Rs around Groningen every day. The aim of this was to develop an attractive service for commuters and to make logistics more sustainable by reducing and replacing the transport kilometres driven. Target groups for this Trial were 1) commuters, 2) national delivery services, 3) local couriers and 4) local SME companies. Trial 2 addressed the ULaADS schemes #2, #4 and #5.

- #2: Crowdsourcing platform marketplace for city logistics
- #4: Location and infrastructure capacity sharing
- #5: Transport vehicle capacity sharing

Subpillar 2.2 – page 96 of the grant agreement:

“The chosen design of ULaADS offers participants, including solution providers, the possibility to directly demonstrate and evaluate the knowledge that will be developed on the basis of practical analyses, real city cases, theory development and tests. For this, ULaADS will perform a total of 4 research trials, tailoring the 2 ULaADS solutions -in the form of the 5 schemes just presented- to the different typologies and requirements of the 3 “lighthouse” cities. Starting from urban logistics infrastructures, systems and services already in place and operational in the Lighthouse cities of Bremen, Groningen and Mechelen will play a motivational role and provide tangible and measurable demonstrations of the ULaADS solutions and benefits that can be attained. They will integrate research trials into permanent activities, upscaling and improving the ULaADS solutions and measures.”

In Task 4.4 of the Grant Agreement the initial setup for the second Trial is described as follows:

...“The second trial will include schemes #2, #4 and #5 presenting combined solutions 1 and 2. This trial tackles ULaADS UCs 1,2,4 and 5 and will be implemented in the urban and peri-urban areas of Groningen during 12 months led by OVB, in charge of the MobiHubs concept. RUG will play an important role supporting the municipality to define and monitor trial implementation.

Contribution in the task by each partner involved:

- GRO: Task leader, coordination of trial activities
- DROP, OVB: trial of solutions
- RUG: Support the city in the coordination of trial activities and ensure execution according to plan”...

4.2.2 Trial set up and implementation

4.2.2.1 Initial setup

In this Trial the municipality of Groningen (GRO) and the public transport organisation of the provinces Groningen and Drenthe (OVb) will experiment with the addition of logistics services to multi-modal mobility hubs for commuters. Trial 2 addresses both ULaADS solutions across two schemes as indicated in the table below.

Solution	Scheme
1) Collaborative delivery models to enhance logistics efficiency and multimodal mobility in cities	3. City-wide platform for integrated management of UFT
2) Effective integration of passenger and urban freight mobility services and networks	4. Location and infrastructure capacity sharing

The addition of logistics services is centred around the instalment of a parcel locker system at the Park and Ride (P&R) location Hoogkerk, just outside the city of Groningen. 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 (Solution 2) sharing its location and available infrastructure capacity (Scheme 4). Commuters can use the parcel locker for returning parcels they received before or collect parcels they had delivered to the parcel locker.

The parcel locker system can also be used by shopkeepers and entrepreneurs in the city. This is facilitated by means of a collective service (Solution 1, Scheme 3) focusing on reducing the dependence of shopkeepers and entrepreneurs on their car or van. Specifically, shopkeepers and entrepreneurs can drive from home to the mobility hub, where they can drop off their goods and travel to their shop by means of bike or public transport. Goods are then bundled and delivered to the shops from the mobility hub. Reversely, the parcel lockers can also be used for the “first mile”—that is, e-commerce deliveries can be taken from the shop to the parcel lockers at the hub.

4.2.2.2 Local Fora

During the project two Fora were held to discuss the purpose of the logistics service at the P+R site, and the purpose of logistics services at mobility hubs in general. The main focus was on the question whether a parcel locker network would be profitable and if a parcel locker network would bring down the number of driven kilometers by motor vehicles and would bring down the amount of emissions.

Forum 1

Forum 1 was held on 3 October 2022. Several specialists of the city of Groningen were present, as well as the public transport organization, researchers, a supplier of white label parcel lockers and a commuter.

Who	Type	Organization
Person 1	Parcel locker provider	Deburen
Person 2	Public Transport organization	OV Bureau Groningen Drenthe
Person 3	Specialist / Advisor	Royal Haskoning DHV
Person 4	Researcher	RUG (University of Groningen)
Person 5	Commuter	-
Person 6	Advisor Living Environment	City of Groningen
Person 7	Advisor Real Estate	City of Groningen
Person 8	Advisor Mobility Hubs	City of Groningen
Person 9	Advisor Urban Logistics	City of Groningen
Person 10	Advisor Urban Logistics – Economy	City of Groningen

During the plenary part, research by the University of Groningen and practical experiences already gained with parcel lockers at mobility hubs of the OV Bureau Groningen Drenthe were discussed. The advantages and disadvantages of white label parcel lockers versus single label parcel lockers were discussed. A white label parcel locker can be used by multiple suppliers and a single label parcel locker is in principle used by one supplier, only for its own deliveries.

Reducing the number of kilometers driven by motor vehicles is an important aspect. Research shows that parcel suppliers will drive fewer kilometers if they can make more use of parcel safes. The rule is: the closer the network of parcel lockers, the fewer kilometers are driven. However, there is also the risk that consumers will collect their parcels by car. The greater the distance to the parcel locker, the more likely the consumer will be inclined to take the car. With a dense network of parcel lockers, more consumers will be inclined to pick up the parcel by foot or by bicycle.

Group work	
Notes Group 1	Notes Group 2
<p>Note the difference in densities for placing parcel safes:</p> <ul style="list-style-type: none"> - more critical in urban areas and preferably in line with standing structures - Linking to hubs in rural areas. - Avoid placing all kinds of different locker systems next to each other. <p>How do you invite people to pick up their package on their way home after work?</p> <p>Place parcel lockers in high traffic locations, such as universities</p> <p>Significant increase expected for parcel lockers, as manned points are expected to decrease further in the future and due to staff shortages.</p>	<p>Make sure that parcel safes do not appear everywhere in the context of a livable living environment.</p> <p>Set strict requirements for locations</p> <ul style="list-style-type: none"> - preferably in/near public buildings - focus on trip chaining (couple visit) <p>Hubs are less attractive than, for example, supermarket locations</p> <p>Little social control on P&R.</p> <p>You can promote social contact by, for example, placing a parcel safe in a community center</p> <p>Question: if the government forbids placing parcel safes in public space, will the 'market' still pick up on this?</p> <p>Some examples from Utrecht, Tilburg and Miami:</p> <ul style="list-style-type: none"> - Pilot in Utrecht, parcel lockers in parking garages were unsuccessful: consumers had difficulty finding the place - Pilot in Tilburg, where parcel lockers were much more visible, turned out to be successful - In Miami everyone has their own parcel locker.

	<ul style="list-style-type: none"> - See also: https://www.acm.nl/sites/default/files/documents/2020-05/marktstudie-last-mile-pakketbezorging.pdf - What is visible, but not a public space?
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The cautious conclusion after Forum 1 was that the city would benefit most from either a comprehensive and dense network of parcel lockers, or no parcel lockers at all.

Forum 2

Forum 2 was held on 11 April 2023. Several specialists of the city of Groningen were present, as well as the province of Drenthe, the public transport organization, researchers and three suppliers of parcel lockers.

Who	Type	Organization
Person 1	Advisor Urban Logistics – Economy	City of Groningen
Person 2	Advisor Urban Logistics	City of Groningen
Person 3	Advisor Urban Logistics	City of Groningen
Person 4	Advisor Living Environment	City of Groningen
Person 5	Advisor Real Estate	City of Groningen
Person 6	Project Manager Mobility Hubs	City of Groningen
Person 7	Advisor Public Transport	City of Groningen
Person 8	Advisor shared mobility – mobility hubs	City of Groningen
Person 9	Urban Architect	City of Groningen
Person 10	Advisor mobility hubs / parcel lockers	Province of Drenthe
Person 11	Specialist / Advisor	Royal Haskoning DHV
Person 12	Researcher	RUG (University of Groningen)
Person 13	Researcher	RUG (University of Groningen)
Person 14	Representative of local businesses	Business Organization West Groningen
Person 15	Parcel locker provider	Deburen
Person 16	Parcel locker provider	PostNL
Person 17	Parcel locker provider	DHL
Person 18	Parcel locker provider	DHL

This Forum was the starting point of a market exploration by the municipality of Groningen. The central question was under what conditions parcel locker suppliers can realize a network of pick-up and drop-off points for parcels. This market exploration is the preparation for a concession that the municipality of Groningen wants to set out for the operation of parcel lockers in public spaces.

After the Forum, the municipality of Groningen had a one-on-one discussion with each of the three suppliers to clarify the specifications for the concession request. Below is indicated for each anonymized provider which specifications he can/wants to meet.

Provider A
<p>Open model > gray Parcel Locker, with orange letterbox. Other companies can use lockers in this system. Agreements with other delivery companies need to be made at management level. Other parties can only deliver if contract agreements have been made on management level. The starting point is to place the parcel lockers in the public space. Also because of the combination with mailbox, which must be accessible 24/7.</p> <p>Replaceability: It takes half a day work to (re-)place a parcel locker. The parcel lockers are not attached to the ground. There is a concrete base underneath the parcel locker. Provider A will pay the costs for permit application and installation of power and foundation.</p> <p>Incentives to foster the use of parcel lockers: spreading vouchers via retailers for deliveries in a parcel locker. Provider A prefers to work on this topic together with the municipality. (promote traveling for pickups by foot/bicycle or possibly in a combination trip)</p> <p>Return shipments to online shops can be done via the parcel lockers. Private individuals (or small online shops) cannot use the safe to send parcels. Private individuals (or small online shops) can use manned drop off point of Provider A to send parcels.</p> <p>Realistic pilot period: We need to make agreements about that. A pilot of a year is too short and will cost a lot. Also, in terms of measuring the effects, a year is too short. Two years is minimum. Provider A applies 5 years for a pilot if there are no other agreements with municipalities.</p> <p>Sharing data: Provider A and the municipality can make agreements about this.</p>

Provider B
<ul style="list-style-type: none"> - At the moment the parcel lockers of Provider B are single label. DHL is working on software to be able to use the parcel lockers white label. - Provider B also delivers in parcel locker of other companies. - If others are going to deliver to Provider B's lockers, this will not happen via a Provider B hub. Third parties then deliver to the parcel locker by themselves. - Before other companies can deliver, they must have made agreements with Provider B. - Sharing data is not a problem. Provider B is open in this. - Shipments from private individuals/small webshops can be send via the Provider B parcel lockers. There is a maximum (so that for instance one webshop cannot lay hold on the full capacity in once). - Neutral color of the parcel locker is possible. Gray. With Provider B logo (unclear whether another logo is allowed). - Replaceability. The current parcel lockers are difficult to move. Because of the concrete base. Provider B is now working on pre-fab concrete blocks that are easy to move / remove. A power connection is always required. - Incentives to foster the use of parcel lockers: this is mainly the task of the online shops. This is partly in the agreements that Provider B makes with them, especially with larger online shops. - Provider B does distribute vouchers from the parcel lockers for shops in the vicinity of the parcel locker. This stimulates combined trips.

Provider C
<p>Provider C is now seeing things change within local government. The importance of parcel lockers is increasingly endorsed by local governments. It is mainly about quality of life. Barcelona is a good example. Traffic disappears and parks etc. come back. You do need facilities.</p> <p>There is a big difference between Provider C and other parties. Provider C is the only one who does not transport parcels by themself. They only facilitate the parcel locker. Other parcel locker suppliers are carriers and have a clear revenue model for using parcel lockers in their business model (because last mile delivery is expensive).</p> <p>Provider C works with several parcel delivery companies. There is also a delivery company that doesn't want to cooperate with Provider C.</p> <p>Revenue model: carriers pay per package in the parcel locker. A parcel locker can pay the investment back in approximately 5 years.</p> <p>A pilot period can be shorter than 5 years. But needs to be at least 2 years.</p> <p>Filling the parcel lockers via a hub: Provider C is talking about cooperation with, among others, Cityhub and the Groene Rijders. There are also appointments with online shops like Douglas for using the parcel lockers for deliveries.</p> <p>Single label via a hub will not work says Provider C. Then, for instance, Delivery service A must first deliver the packages to the hub of Delivery service B.</p> <p>Provider C logo must be placed on the parcel locker. It can be a small logo. If it is recognizable. The parcel lockers are also easy to wrap with visuals. A total wrap now costs €3000.</p>

Replaceability. Not very easy. It's a steel safe. With a sturdy and heavy plate underneath. Yes, movable. But you shouldn't do this too often. But after a pilot period of 2 years it should be fine. An electrical connection is always required.

The parcel lockers are modular. 1 column contains 2 columns of lockers. The next generation of parcel lockers consists of 1-column vaults.

Provider C software is linked to the software of their partners. As a result, the correct size of the lockers is also automatically selected.

Data sharing is no problem. Has already been done with the University of Groningen. What Provider C can supply is relatively limited: what passes through the lockers each day. And whether it is first or last mile.

The parcel lockers are available for shipments from private individuals and small online shops. But the shoemaker can also put a boot in it. Not much of these kind of services is done already. But a perspective for the future. The lockers have been used by private persons in this way. For example and exchange of equipment of a company between employees. We don't see using the lockers for wrong things happening, that's because users have to identify themselves. Provider C can open all the lockers for the police to check whether it contains drugs, weapons or explosives.

Does Provider C use incentives to stimulate use? Yes, through information on social media. In recent years, this is almost no longer necessary.

Modality:

- People walk up to 300 meters
- People cycle up to 1100 meters
- Then people take the car

What does Provider C need from the municipality to create a network

- Flat surface
- The right location (commercially speaking)
- (so no starting money)

4.2.2.3 Permits for placing a parcel locker

To install a functioning parcel locker, a land use agreement, a building permit and an electricity connection are required. It was a difficult process to meet these preconditions, this led to delay in the Trial. One of the causes of the difficult process was the lack of an policy framework for parcel lockers in Groningen.

Below we provide a deeper explanation per topic.

Spatial integration

The pressure on public space is great throughout the city. All space has already been allocated to a function. In recent years we have seen that new functions are making a claim on the existing public space.

- We see an increase in transformer electricity stations to meet the increasing demand for electricity.
- We see an increase in boxes for network providers for television and internet.
- We see an increasing need for greenery and trees to respond to heat stress and flooding.

In addition to the above functions, with the parcel lockers, we are now addressing a new object with a spatial claim in the public space.

Another issue with spatial integration is the size of the parcel lockers. A small parcel locker measures 2.5*2*0.5m. A regular sized parcel lockers measures 5*2*0.5m.

- All objects and buildings are designed in such a way that they border the public space with a representative side. Searches in practice show that it is difficult to find a location for a parcel locker that respects existing facade views and representative greenery.
- By obstructing visibility, a parcel locker can undermine road safety.
- By blocking visibility, a parcel locker can undermine social safety.

There is also a practicality issue for the accessibility of the parcel lockers by car.

- The parcel locker needs to be easily accessible for the delivery van to pick-up and drop-off parcels.
- For customers, the parcel lockers must be accessible by foot or bicycle. The parcel lockers should not make it attractive for customers to collect parcels by car.

Land use agreement

Due to the increasing pressure from various functions on public space, the municipality of Groningen has in recent years implemented a stricter policy on granting use of municipal land to third parties. In the absence of a policy framework for parcel lockers, reaching an agreement for land use was a difficult process.

- Based on new policy for land use, the municipality of Groningen applied a standard rental price for the land use, which corresponds the land use price for all other third parties.
- The provider of the parcel locker did not agree to this rental price, even though it was reimbursed by the ULaADS project. The provider was afraid of precedent effect and saw the risk that similar prices would eventually be charged by other (Dutch) municipalities.

Eventually the city of Groningen and the parcel locker provider came to an agreement with the following conditions.

Conditions for land use agreement during the Trial	
-	The user is aware that the installation of parcel lockers is in a pilot phase that will run until the end of 2024;
-	The user is aware that the municipality issues a tender to which the various providers of parcel lockers can respond;
-	The user is aware that there is a possibility that the parcel locker(s) will have to be removed after the pilot phase or adapted to the applicable (policy) rules;
-	The user is aware that if the parcel lockers are allowed to remain permanently after the pilot phase, this land use agreement will be converted into a rental agreement or that a ' <i>Right of Building</i> ' will be established;
-	The user is aware that the costs relating to the possible establishment of the ' <i>Right of Building</i> ' are at his expense;
-	The user is aware that a land use agreement will only be concluded for one location in the context of the pilot phase.

Electricity connection

There is a waiting period of three to sometimes six months in the Netherlands to have a new electricity connection installed. During the trial process, we discovered that we could not use an existing electricity connection that had recently been installed for a storage of electric shared bicycles at the P+R. This has led to delays in the execution of the Trial.

4.2.2.4 Policy framework for parcel lockers

At the same time as applying for permission to install the parcel locker for the trial, the municipality of Groningen started drawing up a policy framework for parcel lockers in public space. Requests for parcel lockers in public spaces reach us from delivery companies and parcel locker providers. That is why we worked out in the policy framework at which locations and under what conditions parcel lockers can be installed within the municipality of Groningen.

Delivery companies are looking for options to deliver parcels as efficiently and quickly as possible. They prefer to deliver each parcel in first time and drive as few kilometers as possible per parcel.

A network of parcel points in the municipality where they can deliver packages is an efficient way of working for these companies. That is why many parcel points have been established in stores (especially in the past). This is more difficult nowadays, because stores cannot cope with the increased pressure. As a result, the delivery companies are looking for alternatives; such as parcel lockers in private or public space.

Installing parcel lockers offers a solution for delivery companies. This allows them to expand their network of parcel points and deliver parcels more efficiently. When delivering parcels to a parcel locker, the customer does not have to be at home, and to deliver multiple parcels, the delivery person only has to make one stop. For example, installing parcel lockers can ensure that delivery vans have to make fewer kilometers and fewer stops. This means less CO₂ is emitted and fewer vans will probably have to drive in residential areas to deliver parcels to homes.

Parcel lockers in public spaces have a spatial impact on the living environment. The appearance of buildings, streets and squares can be affected. The accessibility and safety of certain places may be affected because delivery vans and residents come to this point. Furthermore, the positive impact of fewer CO₂ emissions and fewer buses in residential areas is highly dependent on the locations of the parcel lockers. Reducing CO₂ emissions is not a given, because if the parcel locker is too far away from residents, they are more likely to pick up the parcel by car.

The following principles and preconditions have been elaborated in the policy framework for the installation of parcel lockers.

Principles	
<ul style="list-style-type: none"> - We want all delivery companies to use the same parcel lockers, preferably in the same network. This can be achieved through 'white label' parcel lockers (managed by a third party) or through 'open/single label' parcel safes (managed by a offering party, which opens the safe to other providers). - The white or open/single label parcel lockers have a certain appearance, but this is further tailored to the appearance of the Hub where they are placed. - Parcel lockers may only be placed at specific locations in public spaces: <ul style="list-style-type: none"> o Mobility hubs. Mobility hubs are places where different forms of transport come together and where people can quickly switch from one mode of transport to another. By integrating parcel lockers into these hubs, we can reduce the number of kilometers driven by delivery parties and reduce congestion in urban areas. This also increases the chance that parcels will be picked up during an already existing trip. o Social neighborhood and community centers (community hubs). Community hubs have a safeguarding function and bring people together from different social layers. We see shopping centers, community centers and community centers as examples of a social hub. Parcel lockers at these locations may be placed on private land or on public land, this must be considered on a case-by-case basis. Placing parcel lockers at these social hubs makes them widely accessible. Picking up a parcel can also bring people into contact with each other, with organized activities or with the local shops located there. - Parcel locker providers can install a parcel locker on private land (in consultation with the relevant landowner). Naturally, they must comply with the municipal zoning plan and aesthetic policy (where applicable). 	

Spatial integration

- Placing parcel lockers within the hubs with the back-side to the wall of buildings or objects. Preferably not as a stand-alone object.
- The appearance of the parcel lockers must match the appearance of the relevant mobility hub.
- Social safety of the location is examined prior to installing the parcel locker.
- Parcel locker must be safely accessible for both the delivering company and the customer picking up the parcel. No nuisance should be caused to local residents.
- The usual size of a parcel locker is approximately 5*0.6*2, each hub will determine which size fits best.

Appearance assessment

- Integration into the street scene.
- Sightlines of iconic elements/buildings and monuments.
- Composition, relationship to public space and elements in public space.

Flexibility and temporariness

- Because it is unclear how long the parcel safe will be a solution for the delivering parties, and developments in this sector are changing rapidly, it is important that the parcel safes are movable. It must be possible for the parcel lockers to grow with the development of the hub and with new developments. If necessary, the parcel locker can be removed by the managing party.

Land use

- The mobility hubs are located on municipal owned land. A land use agreement will be concluded with the municipality for a parcel locker.
- The space around the parcel locker must be accessible to all residents and delivery services and remain properly managed.

Data sharing

- It is crucial for monitoring and evaluation that the municipality has access to the data of the installed safes.
- General figures about usage: number of parcels in/out per day, the average time a parcel stays in the locker (delivery vs. return), how the delivering company delivers the parcels (what kind of vehicle), how customers pick up the parcels (car vs. walking /bicycle, combined ride), occupancy of the locker, etc.

4.2.2.5 Spatial analysis parcel locker network

It is important to protect public space, after all, this is the space intended for all residents. We only want to integrate parcel lockers in the municipality of Groningen in an efficient and accessible manner, only in certain parts of the public space. The public space available for parcel lockers consists exclusively of available spaces at mobility and community hubs.

Mobility hubs are places where different forms of transport come together and where people can quickly switch from one mode of transport to another. By integrating parcel lockers into these hubs, we can reduce the number of kilometers driven by couriers and reduce congestion in urban areas. This also increases the chance that parcels will be picked up during an already existing trip.

Community hubs are places where people come together visibly and in physical contact. Social hubs have a safeguarding function and bring people together from different social layers. We see shopping centres and community centers as examples of a social hub. Placing parcel lockers in social hubs makes them widely accessible. Picking up a parcel can also bring people into contact with each other, with organized activities or with the local shops located there.

In collaboration with Bax & Company, a study was conducted into suitable locations for parcel lockers. This takes into account various local characteristics, such as population density, street networks, locations of mobility and community hubs, existing closed networks of parcel lockers, etc. A spatial analysis showed the coverage gaps in the current distribution of parcel points. This research revealed approximately 20 hub locations where parcel lockers could be installed. When a hub is developed, this research serves as input for the possible location for parcel lockers, guided by the principles of the hub implementation program.

4.2.2.6 Report summary: Finding the right space for urban logistics, a framework for open parcel locker systems

“Like many innovations, parcel lockers took cities by surprise, developing much more rapidly than associated policies and regulations. Some public authorities are trying to find a middle ground between allowing such services to spread freely on streets, while managing the additional pressure they might bring to public spaces, traffic, and overall quality of life.

The City of Groningen, in collaboration with the University of Groningen and Bax & Company, is one of the few public authorities to have developed a framework for an open parcel locker system. The extensive development process included:

- Interdepartmental collaboration within the city
- Stakeholder engagement via logistics fora within the ULaDS project
- Academic studies led by the University of Groningen
- A benchmarking of other international practices
- A spatial analysis for the potential placement of parcel lockers

The following pages summarise the benchmarking exercise, as well as the process and results of the spatial analysis conducted by Bax & Company. Despite a very limited number of good practices, we have analysed and compared other parcel locker frameworks and approaches from Austria, Norway, the UK, the US, and Singapore. The search for other examples and best practices from around the world led us to conclude that work in this direction is still emerging. When led by public authorities, most parcel locker programmes are rather experimental in nature, and only some of the existing guidelines (e.g., from Austria) provide a thorough overview of aspects to consider for implementation.

The spatial analysis followed different stages in continuous consultation with the city’s employees, helping Groningen find the most suitable spots for parcel lockers. The aim was threefold:

1. To ensure accessibility for active travel, avoiding car travel for parcel pick-ups

2. To complement the existing private parcel locker networks, adding facilities in underserved areas
3. To develop an integrated approach which embeds logistics services in the city's mobility hubs strategy

The following insights can serve as a guide for public authorities looking to develop a well-thought, coordinated approach. They are also beneficial for parcel locker providers interested in improving their services and adapting to different city requirements, including accessibility and aesthetics. Although complex, Groningen's approach is replicable in other contexts, too, allowing public and private stakeholders to work together in the transition towards sustainable urban logistics. This way, municipalities can ensure that their ambitious zero-emission policies can be implemented with less pushback from the local community. This is bolstered by tangible support for businesses and citizens, ensuring sustained economic activity within the city."

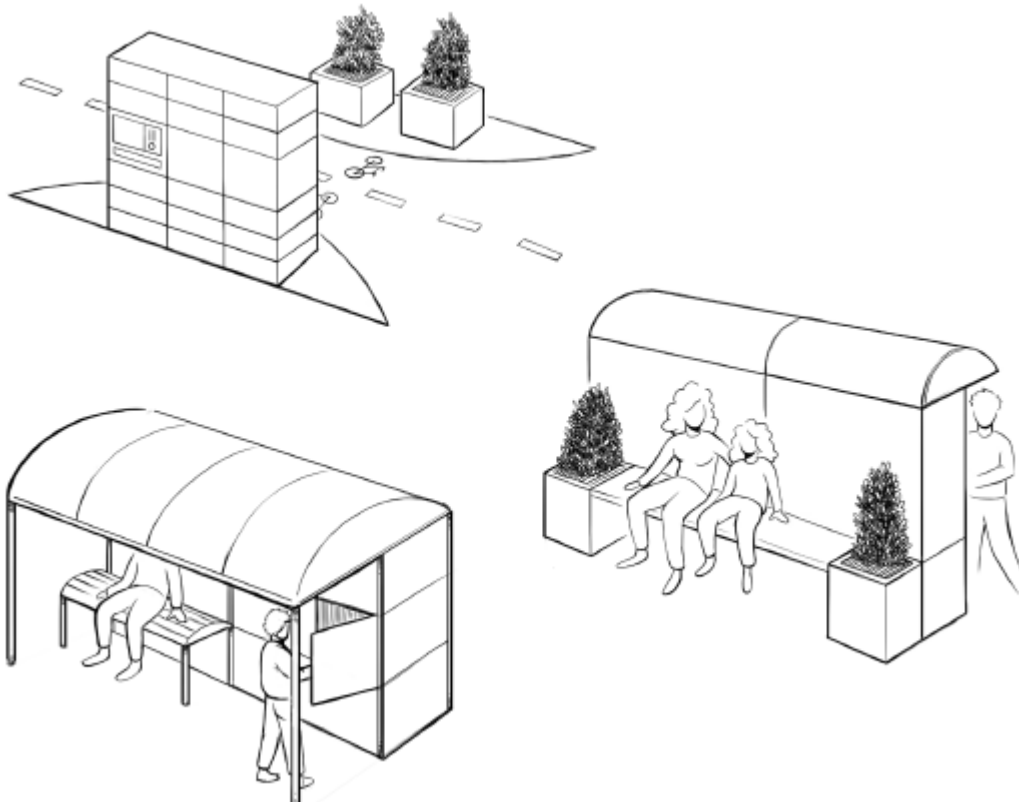


Figure from the report: parcel locker integration in public space

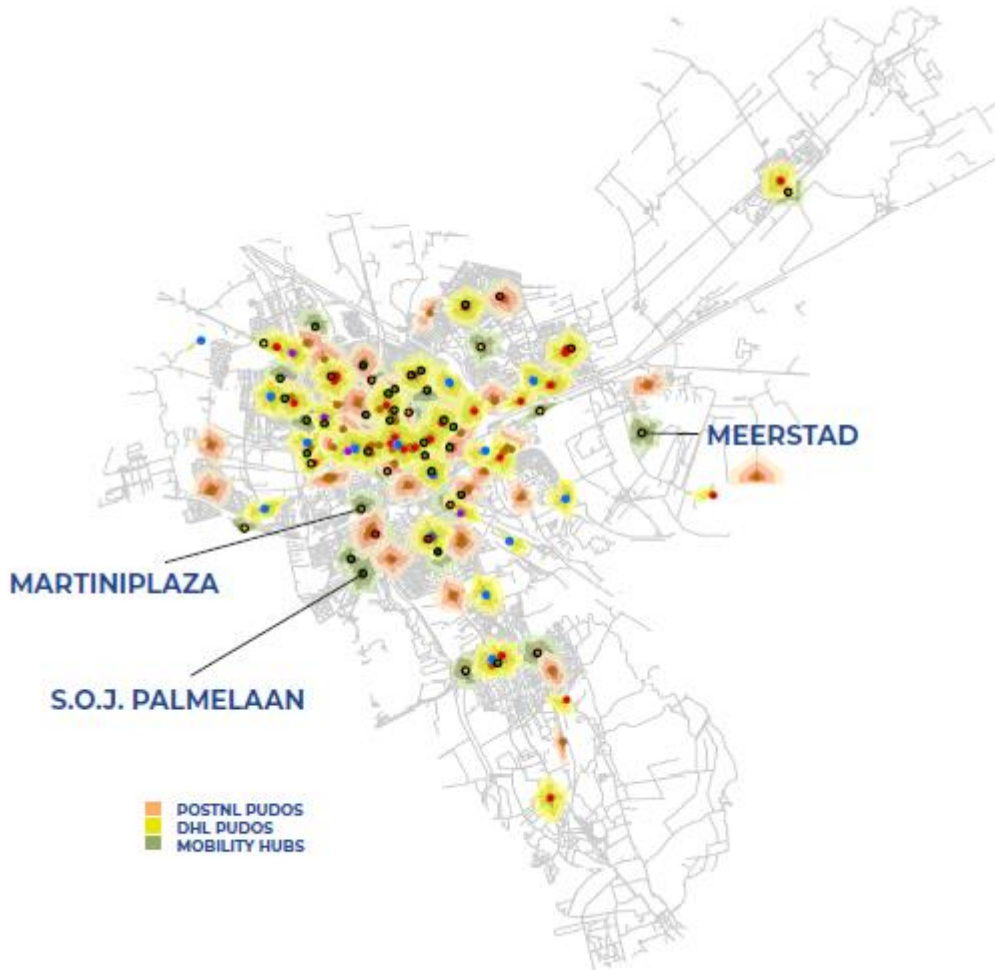


Figure from the report:

priority locations for parcel lockers to complement the existing private offer

4.2.2.7 Next steps

The municipality of Groningen is currently working on drawing up a concession for gaining a permit to operate parcel lockers in public space. At least 3 companies will be asked to make an offer. The municipality of Groningen currently assumes a minimum of 10 and a maximum of 20 parcel lockers in public spaces. This can still be deviated from during the concession granting process.

In addition to a permit for the entire concession, a building permit is also required for each parcel locker. The municipality establish clear conditions and guidelines in the policy frameworks so that there is clarity for both the applicant and the assessor of the permit application.

5. Overall conclusion of trials in Groningen within the ULaDS project – vision of the city

Upon scrutinizing Trial 1, a robust business model emerges for a platform facilitating local retailers and entrepreneurs' access to diverse zero-emission vehicles. The success of achieving zero emissions necessitates not only the involvement of logistics companies but, more crucially, active engagement with local entrepreneurs.

Amidst the challenges, securing space for new functionalities in the limited public domain, whether for vehicles or locker cabinets, is increasingly daunting. This challenge is amplified by the municipality of Groningen's commitment to reclaim open space, prioritizing a seamless environment for cyclists and pedestrians.

The inherent unpredictability of a pilot project underscores the importance of preserving adaptive capacity. Acknowledging that unforeseen factors will arise during the pilot, allowing for flexibility is imperative to its success.

Policy formulation plays a pivotal role and can manifest in various forms. It can function as a regulatory tool, acting as 'the stick' guiding the pilot's course. Alternatively, a pilot can inform and contribute to policy development through collaborative discussions with stakeholders.

The complexity of the process is compounded by the involvement of numerous stakeholders. Navigating this intricacy requires a comprehensive approach that acknowledges the diverse perspectives and interests involved. Effective collaboration and communication among these parties are integral to streamlining the process and ensuring the success of sustainable urban logistics initiatives in Groningen.

6. Attachments

6.1 Location study parcel lockers

6.2 Business and operating models