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THE FUTURE OF ON-DEMAND URBAN LOGISTICS

ULaaDS D7.8 Policy paper on the future on-demand urban logistics

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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 (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 (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, policy, framework, SUMP, SULP, logistics fora, parcel lockers, cargo-hitching, private micro-logistics

Copyright statement

Executive summary

The Horizon 2020 project ULaaDS addresses urban logistics challenges in European cities amid the rise of e-commerce. Trials conducted in bicycle-friendly cities—Bremen, Groningen, and Mechelen—showcased innovative solutions for sustainable urban logistics, which other cities could learn from.

This policy paper aims to highlight key lessons learned in ULaaDS, addressing primarily city planners and policy makers engaged in urban logistics. These findings were collectively assembled by ten partners from seven ULaaDS entities, who drew on ULaaDS trials and research, as well as other European examples. A concise version of this paper was presented at the Urban Mobility Days 2023 in Sevilla and is also available on the [ULaaDS website](#).

1. Optimize Urban Space Allocation

Ensure that public spaces in urban areas are allocated fairly, considering logistics too. This includes addressing any regulatory limitations on loading zones and access regulations, and implementing dedicated zones for efficient logistics operations. Enforcement might be necessary to avoid misuse.

2. Engage Stakeholders for Success

Engage relevant stakeholders from early stages of measure planning to ensure long-term success of urban logistics solutions. This involves seeking input from various parties and understanding the needs of the business community to ensure economically sustainable solutions.

3. Promote Fair Competition in Freight Transport

Encourage fair competition in freight transport by maintaining a level playing field for all operators. This means avoiding granting privileges to specific operators and providing support, such as governmental backing, to incentivize company participation in trials and innovations.

4. Understand Technological Solutions Right

Embrace technological advancements to improve urban logistics. Consider sustainable, accessible, and open systems for parcel lockers. Test new solutions to manage the curbside, deter illegal parking, and enable strict enforcement. Don't believe in stand-alone technological solutions like autonomous vehicles in mixed traffic or cargo hitching. Technology can deliver the expected impacts only when being integrated in the societal, functional and legal framework.

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1. Introduction

With the increase of e-commerce, urban logistics became a growing concern in all European cities. The European Horizon 2020 project ULaaDS (Urban Logistics as an on-Demand Service) showcases innovative solutions that could serve as inspiration for other cities interested in tackling their urban logistics challenges.

The ULaaDS research trials were implemented in three bicycle-friendly cities that had previously carried out a Sustainable Urban Mobility Plan: Bremen (DE), Groningen (NL) and Mechelen (BE).

Bremen is a harbour city in the North-West of Germany with 570,000 inhabitants. About 25% of all trips of its citizens are made by bicycle. It is awarded as the most cycle friendly big city within Germany. Groningen, in the North-East of the Netherlands, is a University City with about 200,000 inhabitants. The city is seen as a paradise for cyclists with some strong urban mobility planning and regional integration of cycle routes. Mechelen (87,000 inhabitants) is a historical city located at the North-East of Brussels. The city has signed a covenant with 33 logistics service providers and interest organisations to realise zero emission city logistics by 2030. All three cities have engaged their local government administrations, local partners from the logistics community, as well as research partners.

These cities demonstrated the potential of various kinds of zero emission solutions, including cargo bikes, in interaction with micro-hubs, parcel lockers and other elements. The project looked not only at commercial goods transport, but also private micro-logistics – as it contributes intensely to the urban transport situation. Cargo-hitching and automated means of transport are often seen as technological solutions, but ULaaDS found framework conditions and limitations to further exploit.

Four satellite cities - Alba Iulia (RO), Bergen (NO), Edinburgh (UK), Rome (IT) are project partners that selectively adopt ULaaDS solutions for replication.

2. Methodology

To increase the outreach of this policy paper, ten partners from seven ULaaDS entities carried out joint work in August and September 2023. Throughout 3 dedicated teleconferences and collaborative writing, the city of Bremen, Bax & Company, University of Groningen, TOI, IFZ, VIL, and Eurocities chose some key topics relevant for the future on-demand urban logistics. Partners drew on experience from the ULaaDS trials and research, as well as other European examples that have been presented during the ULaaDS study trips (e.g, Baerum, Barcelona, etc.). The main aim was to offer relevant policy insights to other entities interested in urban logistics.

After each partner provided their written input, the paper went through various rounds of feedback and editing, with Eurocities completing the final, shorter version. Eurocities also took care of creating

an appealing brochure which was presented and widely disseminated at the Urban Mobility Days 2023, in Sevilla.

The rest of the deliverable presents the original content assembled for this policy paper, while the brochure version is included in the Annex.

3. Policy considerations for the future on-demand urban logistics

SULP is not a SUMP

For municipalities, the high expectations towards SULPs do not always align with the reality of dealing with a highly competitive commercial market. Balancing the demands of that market requires fair and unbiased interventions – e.g., when it comes to ceding public space for parcel-lockers, micro-depots and micro-hubs. Frequently, white label solutions are unavailable, unprofitable or lack a neutral operator. National regulations add another layer of complexity, for example limiting local governments' tools for managing loading zones or access regulations.

These constraints have a ripple effect, influencing the relationship between city centres and suburban shopping hubs. Moreover, as e-commerce continues to grow, city centres must redefine their role, having to evolve beyond shopping destinations (one of their primary function for many decades) into vibrant spaces for hospitality, leisure, and urban living.

Co-operation with the business community

In ULaaDS, stakeholder engagement was paramount. The three lighthouse cities proactively shared their challenges and solutions with (potential) implementation partners, comprising representatives from public authorities, logistics service providers, shop keepers, experts, and other relevant parties. Cities sought input and feedback for different aspects of the planned implementation. Some of the main tools to retrieve the stakeholders' inputs and experiences were the conduction of local stakeholder fora, the application of the collective target system, as well as online surveys. The results yielded dual benefits, fine-tuning trials for better long-term outcomes and acceptance, while deepening the understanding of the business community's needs for economically sustainable solutions.

Freight transport dynamics: market competition as key framework

Unlike passenger transport, the domain of freight movement encompasses a wide spectrum, ranging from agile local start-ups to dominant players with a global reach. Margins are small in a highly competitive environment, and cooperation between competitors is rare. Proper regulation is crucial, as it should avoid any privileges for a single operator and ensure a fair playing field. While passenger transport is mostly (semi-)public and in direct dependency of public grants, logistics is mainly a private sector (except for postal services), being steered by regulatory frameworks. Fostering trust without overstepping antitrust boundaries is a delicate balance. Companies are more inclined to explore innovative solutions with public support – for example in research projects – though they are cautious about preserving their unique corporate identity.

Turning SULPs into actionable frameworks: The case of parcel lockers in Groningen

Parcel lockers are often seen as a sustainable alternative to home delivery. The idea is that introducing parcel lockers helps mitigating vehicle emissions, as well as nuisances and safety issues associated with home delivery. Recent research suggests these benefits are highly context dependent, especially when also considering the customer's travel to and from the parcel locker. Ensuring that customers travel sustainably requires sufficient density for parcel locker networks. Even without that density though, parcel lockers make perfect business sense, and are actually preferred over home delivery by several customer groups, as less costly alternative to home delivery. Hence, parcel lockers have been gaining momentum, and will be coming to many cities—whether contributing to sustainability goals or not.

Cities generally take one of two stances towards the rollout of parcel lockers: reactive or proactive. In a reactive approach, a city waits for the private sector to take initiative and then judges requests for parcel locker placement one-by-one. Whether this approach results in parcel locker placement depends on the local context, such as the competition for public space and strictness in requirements on street scene. In Baerum, for instance, the city might request parcel locker providers for planning applications for already installed lockers in public spaces. A proactive approach entails having a vision on the role of parcel lockers in the city, including either clear guidelines about how to apply for the necessary permits and/or a public tender for parcel locker services in public spaces. Over the course of the ULaaDS project, the City of Groningen changed its stance from a more reactive to a proactive approach, transferring lessons learned from project partner Mechelen. Specifically, the city teamed up with the University of Groningen and Bax & Company to draft a policy framework for parcel lockers in public spaces. The process included several public-private dialogues with various city departments and different logistics service providers, a benchmark of solutions across Europe as well as a spatial analysis of existing out-of-home delivery network and optimal parcel locker locations. Several angles were considered, including the sustainability impact of parcel lockers, accessibility, and the extent to which parcel lockers should be white label or open.

Street space organisation: follow the rules

Many urban centres are confronted with illegal parking of delivery vans – sometimes on cycle lanes or sidewalks, sometimes double-parking on car lanes. Dedicated zones for (un)loading could solve the problem, but require a rigid enforcement to keep those zones available for their purpose. A standout example comes from Barcelona, where delivery zones are rigorously monitored, backed by substantial fines of €200 for any infractions. This robust approach not only preserves these vital zones for deliveries but also minimizes disruptions to other traffic.

Cargo-hitching

Cargo hitching, the transport of goods and people using the same vehicles, promises to offer exciting potential to improve the efficiency of transport networks. ULaaDs has looked at two different ways to conduct cargo-hitching: trialling an autonomous vehicle with a parcel locker on board in Mechelen, and a simulation of an on-demand parcel and passenger service that uses spare capacity in vehicles to deliver parcels in Bremen.

In Mechelen, the possibilities of an autonomous shuttle transporting people and parcels were tested in a business park for a period of two months. The trial provided mixed results and some key insights on cargo-hitching. Enhancements are necessary to make this setup work: the self-driving technology needs to evolve in making smarter driving decisions, policy for implementation of self-driving vehicles will have to be adapted and the operational delivery service should be upgraded to ensure the availability and user-friendliness of the lockers in the vehicle.

In Bremen, a simulation was conducted to explore the delivery of parcels alongside passenger services during non-peak hours. The simulation revealed promising aspects such as potential savings in costs and emissions. However, it was observed that this approach might lead to increased waiting times for passengers.

Open questions remain:

- How do parcels reach the pick-up location and get loaded onto the vehicle?

- What measures will ensure the safe transport of goods when combined with passenger services?

- How can the freight be efficiently unloaded from the vehicle and delivered to its final destination in unmanned scenarios?

Private micro-logistics

Logistics is not limited to commercial transport, but also relates to private households. The various needs to transport cargo (or persons) has been labelled *private micro-logistics*. In Germany, a significant 30% of all trips are related to shopping. Within urban areas, the average shopping distance is approximately 4 km. This constitutes about 17% of the total mileage driven and contributes to roughly 10% of transport-related CO_2 emissions.

Given these needs and the relatively short distances involved, there is substantial potential for substituting car trips with cargo bike journeys. The ULaaDS trial conducted in Bremen demonstrates the significant impact of cargo-bike sharing. A survey of trial users found that a remarkable 55% of cargo-bike trips by respondents would have otherwise been undertaken by car.

4. Key recommendations

1. Optimize Urban Space Allocation

Ensure that public spaces in urban areas are allocated fairly, considering logistics too. This includes addressing any regulatory limitations on loading zones and access regulations, and implementing dedicated zones for efficient logistics operations. Enforcement might be necessary to avoid misuse.

2. Engage Stakeholders for Success

Engage relevant stakeholders from early stages of measure planning to ensure long-term success of urban logistics solutions. This involves seeking input from various parties and understanding the needs of the business community to ensure economically sustainable solutions.

3. Promote Fair Competition in Freight Transport:

Encourage fair competition in freight transport by maintaining a level playing field for all operators. This means avoiding granting privileges to specific operators and providing support, such as governmental backing, to incentivize company participation in trials and innovations.

4. Understand Technological Solutions Right:

Embrace technological advancements to improve urban logistics. Consider sustainable, accessible, and open systems for parcel lockers. Test new solutions to manage the curbside, deter illegal parking, and enable strict enforcement. Don't believe in stand-alone technological solutions like autonomous vehicles in mixed traffic or cargo hitching. Technology can deliver the expected impacts only when being integrated in the societal, functional, and legal framework.

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

5. Annex

Brief policy paper disseminated at the Urban Mobility Days 2023, in Sevilla

Navigating urban logistics: challenges, innovations, and realities

With the rise of e-commerce, urban logistics has become a pressing concern for cities across Europe. The Horizon 2020 project ULaaDS (Urban Logistics as an on-Demand Service) introduces innovative solutions, while revealing challenges in the competitive market landscape.

ULaaDS takes action in three bike-friendly cities: **Bremen** (DE), **Groningen** (NL), and **Mechelen** (BE), all of which have Sustainable Urban Mobility Plans in place. Bremen, a bustling harbour city in North-West Germany, stands out with 570k residents, a quarter of whom choose bicycles for their daily travels, earning it the title of Germany's most cycle-friendly city. Groningen, a university city in the North-East Netherlands, is well-known for its cyclist-friendly infrastructure, benefiting its 200k inhabitants. Mechelen, a historically rich city just North-East of Brussels with 87k residents, has committed to achieving zero-emission city logistics by 2030, chronicled in its covenant with 33 logistics service providers and interest organisations. These three cities, in collaboration with their local governments, logistics communities, and research partners, lead the way for ULaaDS: a range of cargo-bikes, micro-

hubs, and parcel lockers trials showcased their viability and added value.

Moreover, by testing cargo-hitching and autonomous vehicles, ULaaDS reveals the potential of these solutions while finding framework conditions and limitations that might hinder further exploitation. Besides, ULaaDS does not just focus on commercial freight, but also delves into private micro-logistics, a significant component of urban transport.

Additionally, four satellite cities - **Alba Iulia** (RO), **Bergen** (NO), **Edinburgh** (UK), and **Rome** (IT) - selectively adopt ULaaDS solutions, marking a significant step forward in urban logistics.

Explore the journey of the ULaaDS Satellite Cities
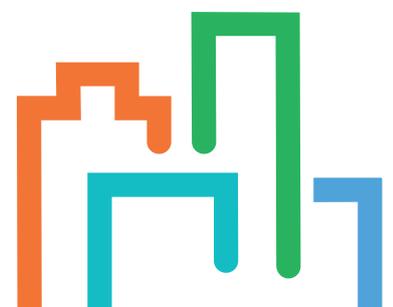
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For municipalities, the high expectations towards SULPs do not always align with the reality of dealing with a competitive commercial market. Balancing the demands of that market requires fair and unbiased interventions – e.g., when it comes to ceding public space for parcel-lockers, micro-depots and micro-hubs. Frequently, white label solutions are unavailable, unprofitable or lack a neutral operator. National regulations add another layer of complexity, for example limiting local governments' tools for managing loading zones or access regulations. These constraints have a ripple effect, influencing the relationship between city centres and suburban shopping hubs. Moreover, as e-commerce continues to grow, city centres must redefine their role, having to evolve beyond shopping destinations into vibrant spaces for hospitality, leisure, and urban living.

Cooperation with the business community

In ULaaDS, stakeholder engagement was paramount. The three lighthouse cities proactively shared their challenges and solutions with (potential) implementation partners, comprising representatives from public authorities, logistics service providers, shop keepers, experts, and other relevant parties. Some of the main tools to retrieve the stakeholders' inputs and experiences were the establishment of local stakeholder fora, the application of the collective target system, as well as online surveys.

The results yielded dual benefits, fine-tuning trials for better long-term outcomes and acceptance, while deepening the understanding of the business community's needs for economically sustainable solutions.

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> **Governmental support can facilitate urban logistics innovations, but companies are resistant if it dilutes their corporate identity.**

Street space organisation: follow the rules

In many urban centres, the issue of delivery vans parking illegally persists – whether on cycle lanes, sidewalks, or even double-parked on main roads. Dedicated loading and unloading zones have been helping in addressing this issue. However, their effectiveness hinges on strict enforcement to safeguard their purpose.

Freight transport dynamics: a delicate dance

Unlike passenger transport, the domain of freight movement encompasses a wide spectrum, ranging from agile local start-ups to global industry leaders. Competition is fierce, and cooperation between competitors is rare. Proper regulation is crucial, as it should avoid any privileges for a single operator and ensure a fair playing field. While passenger transport is mostly (semi-)public and in direct dependency of public grants, logistics is mainly a private sector (except for postal services), being steered by regulatory frameworks. Fostering trust without overstepping antitrust boundaries is a delicate balance. Companies are more inclined to explore innovative solutions with public support – for example in research projects – though they're cautious about preserving their unique corporate identity.

Turning SULPs into actionable frameworks: the case of parcel lockers in Groningen

Parcel lockers, touted as a cost-effective alternative to home delivery, are gaining ground across cities, regardless of their effectiveness in achieving sustainability goals. In Groningen, the city takes a proactive approach towards parcel locker placement in public spaces. Engaging in robust public-private dialogues and benchmarking solutions, the city mapped the existing out-of-home delivery network and potential optimal parcel locker locations for an open system. This comprehensive approach factored in sustainability, accessibility, and operational models, leading to a policy framework for parcel lockers in public space.

Cargo-Hitching for optimized passenger and freight transport

Cargo-hitching, the integration of goods and passenger transport within a single vehicle, holds significant promise for enhancing transportation efficiency. ULaaDS explored this concept in two distinct ways:

Mechelen's autonomous shuttle trial

In Mechelen, an autonomous shuttle was tested for two months in a business park, transporting both people and parcels. This setup showed potential, but revealed the need for enhancements. Specifically, the self-driving technology requires further testing and development to make smarter decisions to maintain a respectable driving speed. Moreover, policies and a regulatory framework for the implementation of self-driving vehicles will need to be created. Additionally, the operational delivery service should be upgraded to ensure the availability and user-friendliness of the lockers in the vehicle.

Bremen's simulation of cargo-hitching with on-demand passenger services

In Bremen, a simulation was conducted to explore the delivery of parcels alongside passenger services during non-peak hours. The simulation revealed promising aspects such as potential savings in costs and emissions. However, it was observed that this approach might lead to increased waiting times for passengers. As the speed of passenger transport is a prime concern in the service offering of on-demand passenger transport, it will receive priority over parcel delivery. The ULaaDs trials show that accurate forecasting of passenger and parcel demand is an important aspect of developing an efficient cargo hitching scheme.

Private micro-logistics

Logistics isn't only done by commercial operations. Every household engages in 'micro-logistics' regularly. In Germany, a significant 30% of all trips are related to shopping. Within urban areas, the average shopping distance is approximately 4 km. This constitutes about 17% of the total mileage driven and contributes to roughly 10% of transport-related CO_2 emissions. Given these needs and the relatively short distances involved, there is a substantial potential for substituting car trips with cargo-bike journeys. The ULaaDS trial conducted in Bremen demonstrates the significant impact of cargo-bike sharing. A survey of trial users found that a remarkable 55% of cargo-bike trips by respondents would have otherwise been undertaken by car.

55% of cargo-bike trips replaced car journeys in Bremen

ULaaDS key recommendations:

Optimize urban space allocation:

Ensure that public spaces in urban areas are allocated fairly, considering logistics too. This includes addressing any regulatory limitations on loading zones and access regulations, and implementing dedicated zones for efficient logistics operations. Enforcement is necessary to avoid misuse.

Engage stakeholders for success:

Engage relevant stakeholders in early planning to ensure long-term success of urban logistics solutions. This involves seeking input from various parties and understanding the needs of the business community to ensure economically sustainable solutions.

Promote fair competition in freight transport:

Encourage fair competition in freight transport by maintaining a level playing field for all operators. This means avoiding granting privileges to specific operators and providing support, such as governmental backing, to incentivize company participation in trials and innovations.

Understand technological solutions and embed them in the right context:

Embrace technological advancements to improve urban logistics, but keep a critical eye. Consider sustainable, accessible, and open systems for parcel lockers. Test new solutions to manage the curbside, deter illegal parking, and enable strict enforcement. Explore technological solutions like autonomous vehicles in mixed traffic or cargo hitching, but be mindful of their limitations as stand alone solutions. Technology can deliver the expected impacts only when integrated in the societal, functional and legal frameworks.

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