



ASPIRE



ADVANCED LOGISTICS
PLATFORM WITH
ROAD PRICING AND
ACCESS CRITERIA TO
IMPROVE URBAN
ENVIRONMENT AND
MOBILITY OF GOODS

Policy Recommendations for implementing Sustainable Freight distribution and Last-mile delivery in small and mid-sized historic towns



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LIFE ASPIRE PROJECT

ADVANCED LOGISTICS PLATFORM WITH ROAD PRICING AND
ACCESS CRITERIA TO IMPROVE URBAN ENVIRONMENT AND
MOBILITY OF GOODS

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Abstract (EN)

With more than two decades of experience in sustainable urban freight operations, in 2017 the Municipality of Lucca mobilised the LIFE ASPIRE project (*Advanced logistics platform with road pricing and access criteria to improve urban environment and mobility of goods*). The project developed an innovative “credit-based” policy for rewarding freight operators in the urban area, and implemented new eco-logistics services managed by an innovative IT platform “LOCMAP”.

The LIFE ASPIRE Project is effectively demonstrating how new eco-logistics services (Load/Unload parking lots and e-cargo bike Sharing, both managed by the innovative platform “LOCMAP”), joined with new access rules (for restricted traffic and low emission zones), can play a major role in the “last/first-mile” freight transport solutions, as possible measures to face the increasing issues related to the e-commerce and managing the transition towards eco fleet, low emission zone, and carbon-free logistics.

Based on the assessment of the impacts of the implemented measures, this deliverable presents a set of recommendations for the integration of sustainable logistics solutions, as demonstrated in Lucca, into the Sulp and Sump planning tools. It is more and more necessary that Municipalities come back to a central role about planning and control of mobility services in an integrated scenario, in which a new space management policy is planned to guarantee dedicated spaces to collective transport and freight delivery, and an effective control, coordination of the different processes on the network is put in place, to evaluate the performances and the impacts, using specific KPIs.

Abstract (IT)

Con oltre due decenni di esperienza nella logistica urbana, il Comune di Lucca, nel 2017, ha avviato il progetto LIFE ASPIRE (*Advanced logistics platform with road pricing and access criteria to improve urban environment and mobility of goods*). Il progetto ha sviluppato un'innovativa politica, basata su criteri di premialità, in merito al trasporto merci nell'area urbana, implementando nuovi servizi logistici gestiti tramite un'innovativa piattaforma “LOCMAP”.

Il Progetto LIFE ASPIRE sta dimostrando come i nuovi servizi logistici (Aree di Carico/Scarico e servizio di e-cargo bike Sharing, entrambi gestiti dall'innovativa piattaforma “LOCMAP”), affiancati a nuove regole di accesso (per zone a traffico limitato e zone a basse emissioni), possano svolgere un ruolo importante nella distribuzione delle merci dell'ultimo/primo miglio, nella risoluzione delle crescenti problematiche legate all'e-commerce e alla gestione della transizione verso flotte ecologiche, zone a basse emissioni/emissioni zero, e logistica sostenibile.

Sulla base della valutazione degli impatti delle misure implementate, questo Report presenta una serie di raccomandazioni per l'integrazione di soluzioni logistiche sostenibili, come dimostrate a Lucca, negli strumenti di pianificazione PUMS e PULS. È sempre più necessario che i Comuni tornino ad un ruolo centrale nella pianificazione e controllo dei servizi di mobilità in uno scenario integrato, in cui si favoriscano lo sviluppo di nuove politiche di gestione dello spazio urbano, per garantire aree dedicate al trasporto collettivo e alla consegna delle merci, e si dia inizio ad un coordinamento efficiente dei diversi processi sulla rete, per valutare le performance e gli impatti tramite specifici KPI.

1. Introduction

1.1 Background and aim of LIFE ASPIRE Project

The European Commission has set its ambitious targets to shift from a carbon-based to a climate-friendly economy. Europe is expected to become carbon-neutral by 2050, and, in this context, the Commission proposed to reduce greenhouse gas emissions to at least 55% below 1990 levels by 2030 (COM/2020/562 final). Transport represents almost a quarter of Europe's greenhouse gas emissions and is the main cause of air pollution in cities and, within the sector, road transport is by far the biggest emitter accounting for more than 70% of all GHG emissions from transport. In urban areas, despite freight transport representing only 15-18% of urban traffic, it accounts for about 25% of total transport air pollution¹ (CO₂ and secondary pollutants) and over 20% of congestion costs, and it is a key contributor to road injuries².

The negative impacts of freight last-mile delivery on urban mobility and the environment have been even boosted by the COVID-19 pandemic. People (in particular teens and young adults) are more and more preferring to shop online (+31% in Italy in 2020); alternative options for collection and delivery are spreading rapidly (Pickup Points, Automated

Parcel Lockers, Smart Parcel Box, Drones, etc.); the number of shops offering 'free delivery' and 'convenient/free return options' is increasing; confidence in shopping online for grocery products is growing (+70% in Italy in 2020), which is expected to develop into a lasting behavior for the majority of consumers.

This general context becomes even more critical in small-/mid-size European historic towns (like Lucca), i.e., urban areas with a total population between 50.000 and 180.000, having an historic centre as a core element of the town's economic, social and cultural life and development. Here, a mix of critical issues – ranging from the physical characteristics of the urban environment and road system, to the very dense concentration of activities in a small area, the limited budgets of local administrations, the higher impacts of the recent economic crisis, etc. – provide further challenges.

There is a growing consensus on the idea that sustainable urban freight operations, in terms of energy efficiency and noxious and GH gas and other emissions reduction, can be achieved by adopting an appropriate mix of different measures, such as Access Control Systems (ACS) to the Restricted Traffic Zone (RTZ), optimized urban freight transport and delivery plans, clean vehicles and low emission technologies, restrictions and public incentive policies, last mile and added value services, integration of city logistics processes within the overall management of urban mobility. Further to this, an even stronger opportunity for

¹ 1. ALICE. Urban Freight Research Roadmap; European Road Transport Research Advisory Council: Brussels, Belgium, 2015

² CARE (Community database on Accidents on the Roads in Europe) - Annual Accident Report 2017

achieving cleaner city logistics is offered by proper integration of the latest “green vehicle” technologies. Generally speaking, different ICT infrastructures are nowadays installed in EU towns and are available for the application of specific enforcement control schemes, aimed at reducing, among the others, the negative impacts of last mile logistics processes.

In this context, the LIFE ASPIRE Project (*Advanced logistics platform with road pricing and access criteria to improve urban environment and mobility of goods*) implemented a set of measures - regulatory, organizational, operational and technological - which extends/integrates the ones already implemented in the city of Lucca, in order to achieve higher standards of urban air quality and energy efficiency and, consequently, improving the quality of life of people (in particular of residents but also tourists).

The project aimed to develop an innovative “credit-based” policy for rewarding freight operators in the urban area, implement new logistics service schemes to promote sustainable and smart management of urban space/environment. New eco-logistics services targeted to transport operators in last-mile deliveries have been successfully developed, managed by the innovative platform “LOCMAP”.

In more detail, LIFE ASPIRE implemented four main classes of measures:

- Design and implementation of a new "credit-based" access control policy, related to the last-mile delivery/collection of goods;

- Installation of new Restricted Traffic Zone (RTZ) gates with new RFID UHF devices, to monitor the number of daily RTZ accesses by commercial operators;
- Development of loading/unloading parking lots management system;
- Installation of innovative e-cargo bike sharing service, to provide a 100% green solution for last-mile deliveries.

The introduction of the LIFE ASPIRE approach, based on a "credit access" policy supported by the Logistics Credit Management Platform (LOCMAP) and by the enhanced (RFID UHF) Access Control System, with the introduction of the two innovative logistics services (also managed by LOCMAP), encouraged:

- lower access and shorter presence in city center of different categories of transport operators and type of vehicles, leveraging on a stricter and innovative regulation enforcement and control technologies;
- larger zero emission freight distribution, leveraging on the development of the new Load/Unload parking lots Service or using the new Cargo-bike Sharing Service;
- transport operator virtuous behaviors.

1.2 Action C “Project impacts evaluation”

LIFE ASPIRE successfully designed, developed, and demonstrated the following measures:

- n. 22 RTZ gates with new RFID UHF devices;

- n. 34 Load/Unload (L/U) parking lots equipped with smart wireless sensors located in 12 L/U areas.
- New “credit access” policy, related to the last-mile goods delivery;
- New Logistics Credit Management Platform “LOCMAP”, dedicated to freight distribution processes;
- Innovative e-cargo bike Sharing Service for transport and commercial operators (n. 3 stations equipped with n. 3 e-cargo bikes each);
- Replicability and transferability analysis in partner cities of Stockholm and Zadar.

The goal of the Activity C.4 is to evaluate and assess the impacts of the LIFE ASPIRE measures based on the datasets collected under Action C.2 during the demonstration. The Action C.4 conducted an evaluation of environment, energy, socio-economic and transferability impacts in Lucca (as demonstration site) and, under Action B.4, in Zadar and Stockholm (as transferability sites), resulting from the demonstration of the LIFE ASPIRE measures and services. Particular attention was paid to the results of the implemented “credit based” access policy and to the related Logistics Credit Management Platform (LOCMAP). Collected data and information (Action C.2), indicators (including LIFE performance indicators) and project performance parameters (related to pollution, noise, consumptions, etc.) have been computed in order to assess the contribution of LIFE ASPIRE services and measures to the reduction of greenhouse and noxious pollutant emission and to the energy consumption.

Within this Activity, the subaction C4.4: EU policy recommendations aimed to draft recommendations to policy makers to and contribute to the updating of the relevant EU legislation.

1.3 Scope of the Deliverable C4.4

Based on the results of the Activity B and the assessment of the impacts of the implemented measures, this deliverable aims to present a set of recommendations for the integration of sustainable logistics solutions, as demonstrated in Lucca, into the SULP and SUMP planning tools, considering the rise of e-commerce and its implications for the delivery chain management and policymaking.

The deliverable presents the mutual relations in terms of the main institutional, organizational, operational aspects, including key indications concerning the design and scaling-up of the implemented solutions, the supporting elements, and stakeholder responsibilities (Section 4).

The methodological approach adopted by the Project has been generalized at the EU-wide level taking into account the features of European mid-size cities. The analysis of the local regulation in the Lucca pilot site has been capitalised to define the possible adaptations and modifications to the national legal frameworks to provide financial incentives and regulatory instruments to achieve zero-emission goals. Specific indications concerning the roles and responsibilities of public authorities are finally summarised in Section 5.

2. The Urban Governance and Logistics Context

2.1 Overview

Since almost two decades, the latest policy directions set by the European Commission and Parliament have been aiming to substantially reduce the overall carbon footprint. Consequently, different Authorities such as Municipalities and Regions have been tried to develop strategies and interventions to decarbonise the transport sectors and reach specific targets (lastly, the reduction of greenhouse gas emissions to at least 55% below 1990 levels by 2030 (2030 Climate Target Plan) and 90% reduction of transport emissions by 2050 (EU Green Deal).

Freight transport has an important role to play in reducing GHG emissions. The carbon emissions from worldwide freight transport were approximately 3 billion tonnes of CO₂ in 2020, representing roughly 9% of total global carbon emissions³.

In particular, city Logistics in Urban areas:

- Cause of more than a quarter of overall urban transport CO₂ emissions (and 30 50% PM and NO_x)
- Produce impacts on the urban environment, noise, urban public space, air quality, and living conditions
- Is a relevant traffic component in the city (freight vehicles making up between 15% and 25% of all vehicle kilometres travelled⁴)

Figure 1 Urban delivery context



Considering the issues related to last-mile delivery and the impacts from traffic pollution, the optimization of urban logistics processes is one of the main factors on which to intervene to improve the overall urban mobility, also favouring the introduction of new service schemes, business models and supporting technologies for the management of the supply and demand.

Indeed, improvements and changes in urban logistics management processes (such as the use of green vehicles, the increase of the load factor, the optimization of routes, the access control of access to the LEZ, the loading/unloading parking systems, etc.), can produce significant positive effects on air quality and overall urban liveability.

³ ITF (forthcoming), Transport Outlook 2021, International Transport Forum, Paris.

⁴ ALICE-ETP & POLIS (2021). Cities-Regions and companies working together. Guide for advancing towards zero-emission urban logistics by 2030.

In this context, digitalization and ICT systems can play an increasingly decisive role in freight transport in urban areas. Likewise, there is the need for continuous involvement of all the stakeholders involved in the logistic chain both in the decision-making processes and in the choice of solutions to be implemented.

The strategic importance of the logistics sector has therefore prompted the Administrations to implement interventions to make urban delivery more sustainable. At the local level, almost all medium-large municipalities have developed, over time, systems for regulating commercial traffic, introducing specific rules to govern traffic flows (both passenger and freight), including the last-mile delivery of goods. In Italy, in recent years, there has been growing attention to city logistics at the level of Provinces and Regions, while at a higher level, the issue was addressed by the National Logistics Plan 2011-2020.

In addition, the European Commission has placed the development of the SUMP (Sustainable Urban Mobility Plan) at the core of the planning of mobility processes as *"A Sustainable Urban Mobility Plan has as its central goal improving accessibility of urban areas and providing high-quality and sustainable mobility and transport to, through and within the urban area. [...]. It presents, or is linked to an existing, long-term strategy for the future development of the urban area and, in this context, for the future development of transport and mobility infrastructure and services"*⁵. Consequently, freight transport is one of

the macro issues that SUMP must address in order to ensure the overall sustainability of the mobility and transport services.

In general, however, the issue of logistics goes beyond transport policies in the strict sense as it involves economic policies. It also relates to a reorganization of the production chains, with increasing shares of activities not strictly linked to "manufacturing", which are often parceled out and/or outsourced to optimize costs, times, and quality. The freight demand must therefore be seen as one of the components of the demand for logistic services, which includes an integrated system of services and infrastructures for the transport, handling, storage, management of stocks and orders, etc., depending on the needs of the various actors involved in the logistics chain (transport operators, producers, wholesalers, retailers, HoReCa⁶ operators, etc.).

There are other urban logistical flows, in addition to those strictly related to the last mile distribution of goods, such as those relating to the distribution of mail, waste collection, craftsmen's activities, the building sector, and, in the case of Lucca, the paper sector.

Urban logistics is therefore a key element of the entire governance of urban mobility, with the peculiarity of being regulated/influenced by local authorities (mainly at the municipal and regional level) and organized and managed mainly by private entities.

This peculiarity implies, at the city level, the need to implement efficient solutions to combine different and (often) conflicting interests, according

⁵ COM(2013) 913 final, ANNEX 1

⁶ HOtel, REstaurant e CAtering (o CAFè) sectors.

to the various actors involved (local administrations, shopkeepers, freight operators, citizens, etc.).

At present, the most recent document, at the European level, relating to the development of a Sustainable Urban Logistics Plan - Sulp consists of the SUMP Guidelines 2.0 and, more specifically, the "*Topic Guide - Sustainable Urban Logistics Planning*" published in June 2019. The document, which takes up and updates the first" Sustainable Urban Logistics Plan (Sulp) Guidelines "defined by MemEx within the European IEE ENCLOSE Project, constitutes the reference for the 'elaboration of the Sulp of Lucca, in which the indications provided by the guidelines of the Sulp are declined with respect to the specificities of the territorial context, of the commercial/artisanal and productive activities of the City of Lucca.

More recently, the relevance that SulpS are starting to have was also confirmed by their inclusion among the objectives of the 2021-2022 Work Program - "Climate, Energy and Mobility" of the Horizon Europe Program.

2.2 Urban Mobility Governance: main axes of intervention

Since the last decade, the European Union set up different and interrelated directives, funding and programme initiatives with the scope to push an integrated approach to urban mobility in the EU towns and urban area, including measures and interventions targeted to the shift of mobility demand from private mode to collective and active new services

supported by clean/zero emissions vehicles and digitalization tool. This policy involves some main aspects of urban governance, including:

- i) knowledge of mobility demand trends;
- ii) integrated transport planning, monitoring and control;
- iii) coordination among modalities in terms of payment and user information and,
- iv) cooperation among mobility and transport operators.

The European Union is aware of the complexity and different impacts of urban mobility and believes that mobility governance can be a relevant tool for increasing the overall accessibility and sustainability of the towns not only related to the transport services and offer but also wrt the urban liveability, air quality, energy savings, environment renewal.

Therefore, a specific methodology for planning urban mobility was released by the European Union in the last decade with the Sustainable Urban Mobility Plan as the reference framework for pushing the design and implementation of sustainable mobility services around the collective transport backbone and clean and active services in all urban areas.

On this basis many European towns, with different dimensions, roles and functions, have planned their own mobility policy (with the development of SUMP) running on the main axis of intervention summarised as the following ones:

Figure 2 Urban Mobility Governance: main axes of intervention

Qualification and diversification of public transport services as dedicated and priority corridors (BRT-BHLS), flexible transport, Demand Responsive, feeder, etc.



Realization of ITS infrastructure and digital solutions for network traffic data collection, crowdsourced data, process monitoring and control, real time information, etc.



Urban Freight Transport/City Logistics solutions tailored on the context conditions (last mile services, UCC, Access Control, Cargo bike, awarding platform, etc.)



Integration of different modalities, services interoperability and payments,



Active and complementary modes (bike, ride sharing-station, vans sharing, car sharing, etc.)



Coordination/Cooperation among different mobility and transport operators based also on Mobility as a Service (MaaS) approach



These axes of intervention include, as already stated, a portfolio of different measures and solutions that should be analysed, defined and tuned on the town characteristics and requirements in order to “make effective urban mobility governance really sustainable and “clean” by zero emissions.

In practical terms, Local and Regional Administrations should face the urban mobility and environmental problems with a mixed set of **SOLUTIONS** enabled by **TECHNOLOGIES**, **INFRASTRUCTURES** and **REGULATORY FRAMEWORK** acting also on the related **ORGANIZATION** and **OPERATION** ISSUES.

2.3 Challenges of Freight Transport in Small (Historic) Towns

As faced and demonstrated by the Life-Aspire project, the problems and impacts due to the urban freight delivery and in general to the different logistics processes (including waste, reverse packaging, etc.) are still more emphasised by some peculiar aspects related to small towns as the following ones, among the others:

- urban environment/infrastructure (old road, narrow streets, lack of platform, etc.);
- more strict access and parking regulations;
- presence historic heritage;
- mixture of traffic and pedestrian spaces with higher risks for pedestrian safety.

These, and other negative factors, provoke not only negative environmental impacts (pollution, noise, etc.) but also higher costs of logistics processes, with few possibilities by the involved stakeholders to modify the reference operation scheme.

In addition, with the increase of the e-commerce the small towns started to pay attention not only to what happens in the inner centre but also in the districts close the inner centre.

Taking into account also the Urban Freight Strategy of some small towns (including Lucca, Zadar, Stockholm for the historic peninsula) we have identified, as collateral work developed in the LIFE ASPIRE Project, some common base objectives and criteria aimed to guarantee the overall

accessibility and rules compliance by the last-mile transport operators paying the attention to not shifting the above problems and impacts from the historic/inner centre to other areas/districts of the town.

Figure 3 Aerial view of Lucca city center



These criteria include:

- *Redesign some streets* for the safety of pedestrians and efficient movement of delivery vehicles.
- *Identify incentives* to encourage virtuous behaviour of the transport operators and other clean “last mile” delivery solutions.
- *Zoning revision* for defining the most suitable rules for freight distribution in other urban districts and not only in the inner centre.
- *Implement possible other agreed* delivery schemes in the district where it is possible as a pilot project.
- *Provision of financial and other types of incentives* for electric delivery vehicles and related charging stations.
- *Coordination with neighbouring towns* (same function area) to develop a common regulation framework

In Lucca, some of these criteria have been receipt in the Sulp, which was defined to create the conditions for a permanent dialogue among administrations, transport operators and the involved different stakeholders. Therefore, Lucca Municipality activated supporting measures for pushing a virtuous behaviour of the last mile transporters (optimized loading factor, reduction of the number delivery journeys, etc.) and of shopkeepers (delivery out of hours, reverse logistics, etc.). Moreover, Lucca defined measures and services to promote zero emission delivery (cargo bike, etc) and possible consolidation center implemented with different approach (from infrastructure to the stakeholder's agreement for some specific processes).

The main common element was also the attention to two main aspects: the access rules related to vehicle typology, and the engagement process to achieve a general consensus on the rule and measures to be adopted.

3. City logistics and Urban Planning strategies in practice

3.1 Cross-relations between planning instruments

The SUMP and Sulp, to be included in the regional and national planning scenario, must be conceived from a perspective of integration and coordination with the existing territorial planning and transport instruments at local level, and interfacing with the plans of the same and upper level not only coming from the same sector. as a superordinate plan to the plans of sector. The Sulp should be defined taking into account the general context provided by (Figure 4):

- i. EU Directives and National Plans (Transport, Mobility, Land use, Infrastructure, Digitalisation, Energy, etc.);
- ii. Regional Plans and strategies (Spatial development, Environment, Infrastructures, etc.); and
- iii. Local and Municipal level where to share, on the one hand, the main Societal goals (environmental, ethical,...) set and agreed in the context of the EU framework, and, on the other hand, common objectives (at the urban governance level) with the other sector/plans (Smart City Strategy,

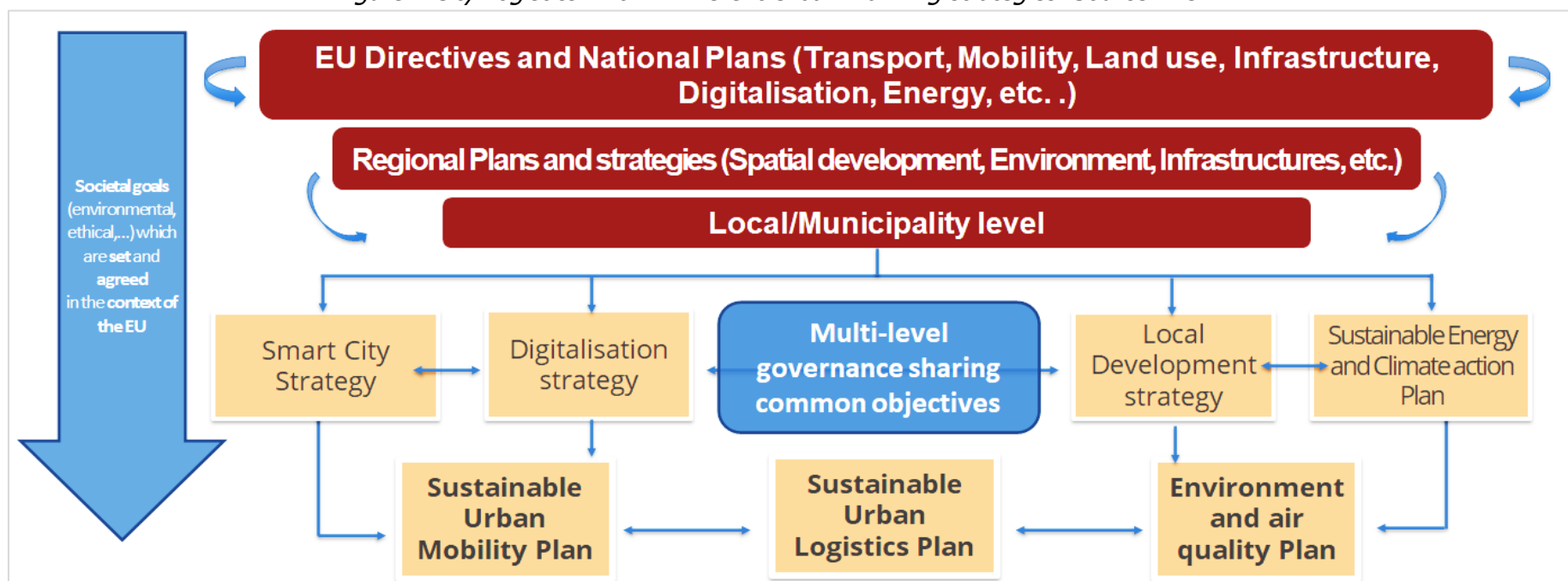
Digitalisation strategy, Local Development strategy, Environment and air quality Plan, Sustainable Energy and Climate action Plan, etc.).

The Sustainable Urban Logistics Plans, as already stated, is closely interrelated with the development of SUMP and with the environment and air quality plan. Therefore, to build the logistics ecosystem, from the Municipality side it is important to consider the SUMP as a dynamic process recognizing the necessary operational and technological resources for its management over time.

It is necessary among the others the following actions/measures:

- consultation and engagement of the overall involved actors
- coordination and facilitation of the dialogue among services/actors with different and almost opposite interests (cyclists, taxis, PT, micro-mobility, pedestrians)
- management of the urban spaces congested for traffic and parking due also for the increase of last mile and home delivery processes;

Figure 4 City Logistics within Different Urban Planning strategies. Source: MemEx



- evaluation of the different impacts also in terms of the overall urban liveability analysing the relation among freight distribution and the road network structure in particular for these aspects available space, section safety and congestion, environmental and noise impact, common regulation.

It is therefore of primary importance that administrations prepare a detailed methodology to define and integrate the different plans, defining the competencies of the involved actors, the reference regulations and the role of the other stakeholders involved.

Figure 5 SUMP and SULP mutual relations



3.2 Policy Frameworks at local level: Lucca case study

At the local policy level, LIFE ASPIRE contributed to the updating of the approach/regulation incorporated into the new "*Mobility, parking and access implementation Plan*" for the historic center of the city (PUMS, deliberation of Lucca City Board n. 16/2021 – effective from 1st June 2021).

In particular, the PUMS includes **specific rules** related to a **new pricing system for permits to RTZ**, according to the "polluter pays" principle. Furthermore, in the same Plan, it is foreseen that the Municipality of Lucca will continue to implement measures to reduce the negative impacts of polluting vehicles, making the **access rules progressively more restrictive** and favouring the use of less polluting urban logistics vehicles.

Moreover, some of the LIFE ASPIRE aspects are included in the *General Plan of Urban Traffic of Lucca* (PGTU, deliberation of Lucca City Council, n. 10/2017) and in the *Sustainable Urban Logistics Plan* (SULP), developed by the City of Lucca.

The measures and services demonstrated within the LIFE ASPIRE project are included also in the approved Lucca Sustainable Urban Mobility Plan (SUMP SULP, deliberation of Lucca City Council n. 107/2018). The Plan confirms and develops the principles already established in the short-term SUMP (i.e., the PGTU), regarding the incentives to use more

sustainable freights transport. The Plan, taking into account also some guidelines of the Italian Ministry of Infrastructure and Transport, foresees among others: the introduction of a rewarding system for less polluting vehicles; the adoption of a set of rules that awards a sustainable last mile delivery; the rationalization of loading/unloading bays also through the use of electronic and IT tools. The Lucca SUMP clearly considers LIFE ASPIRE as one of the instruments for the fulfilment of its goals.

It is important also to highlight that city logistics measures and services developed by LIFE ASPIRE are also in line with the local PAC - *Piano di Azione Comunale d'Area 2019-2021* (Air Quality Plan) approved by the Municipality (deliberation of the City Board n. 73/2019) and they will be confirmed and further implemented in the next drafting of the local Air Quality Plan - PAC 2022-2024 (e.g., vehicles category emission allowed to access the RTZ).

Concerning the regional level, LIFE ASPIRE contributes to the target set by the Regione Toscana for the Plain of Lucca (deliberation of the Regional Council n. 72/2018). Due to the particularly high number of exceedances of PM10 limit values, the municipalities of the Area of the Plain were assigned a relevant emission reduction objective. The LIFE ASPIRE project represents the positive actions developed by the City of Lucca to contribute to reaching this important goal.

Concerning the national level, LIFE ASPIRE shared its experience with the Ministry of Transport to help the ongoing revision of the relevant national normative concerning access, parking and circulation inside RTZs (Decree 250/1999 and related guidelines approved in 2019).

In particular, the contribution focused on the technological infrastructures (i.e., use of the RFID UHF Antennas), on the allowed time spent by transport operators inside the RTZ, and on the data storing and related privacy aspects. The office of the ministry showed high interest as some of the LIFE ASPIRE contents are in line with the actions carried out by the Ministry in the implementation of the Agreements signed in Turin by the Government and the European Commission in the frame of the Clean Air Dialogues (i.e Intervention Area 3 Mobility - Action 2, related to RTZ management).

In this sense, at the national/regional level LIFE ASPIRE promoted and fostered the participation in the Technical and Scientific Committee – among other members - of the Italian Ministry of Infrastructure and Transport and Tuscany Region (Mobility Department). As above mentioned, these two members are key actors in the development policies at national and regional level concerning the access to the Restricted Traffic Zones of the cities and the use of ICT/RFID for the control of the access and other related policies.

At the European level, the LIFE ASPIRE project has taken to the attention of the UVAR community of experts the need to address awarding scheme as a relevant aspect to consider in the implementation of UVAR (Urban Vehicles Access Regulations, ITS Directive 2010/40 / EU and Regulation (EU) 2017/1926), thanks to the participation of the city of Lucca to the network of Pilot sites of the UVAR Box project, (EC DG MOVE/B4/SER/2019-498/SI2.832125).

Apart from the technological point of view, LIFE ASPIRE creates also synergies and integrations with other EU policies concerning urban

mobility. In particular, the LIFE ASPIRE approach for urban freight distribution management foster transport operators to adopt low/zero emission commercial vehicles, contributing to the Lucca 2030 objective of a nearly-zero emissions last mile delivery and is in line with the recent initiative Urban Mobility Framework – part of the wider “Efficient and Green Mobility Package” to be released on December 2021 which aims to make urban mobility more sustainable, smart, and healthy.

The approach developed by the project was studied by Zadar and Stockholm and helped to focus sustainability aspects of city logistics, also with involvement of local stakeholders, in order to properly address them in the local policy context.

4. Planning sustainable urban logistics

4.1 Strategic preconditions

Based on the analysis summarized in the above sections, we present some considerations about the possible approach to be followed by a local administration that aims to face the “complex issue” of freight distribution in urban areas. From a logistics planning point of view, these could be considered enabling factors towards sustainable urban logistics. They come from the experience gained in LIFE ASPIRE project, and could be summarised in the following points, without pretending that they are exhaustive and unique:

- 1) Sustainable Urban Logistics need to be recognised as a process with direct and indirect impacts on the functioning of the city, where different (and often conflicting) interests have to be faced;
- 2) Urban Logistics has to be integrated in the overall urban and mobility policies (first of all the SUMP) and the city services plan (in terms of space and timing);
- 3) Be aware that any solution implemented/to be implemented should contribute to the overall sustainability of the logistics process and services schemes, and should tend towards zero-emissions operations.

Facing Urban Logistics means to act on different aspects of the overall urban structure and life, such as among others: i) Governance and Urban Policy (Regulations, limited traffic zone, low emission zone, access regulation, etc.); ii) Engagement and active participation of different and relevant involved stakeholders and associations; iii) Realization of Infrastructure (if necessary) and soft-solutions (carefully designed and agreed) based on the evaluation of the related multiple impacts; iv) Proactive Business and management models (investments, organization, incentive, etc.);and v) Considering the e-commerce phenomena and trends also from urban traffic and space management side.

Urban Logistics Plan should then be defined in relation to the development of SUMP and integrated with Mobility Policies, considering the possibility to share some specific measures and regulations. For this a unified approach is requested to urban and mobility planners especially in small and medium-sized towns.

The digitalization and IT Systems are considered potential tools and enabling factors to:

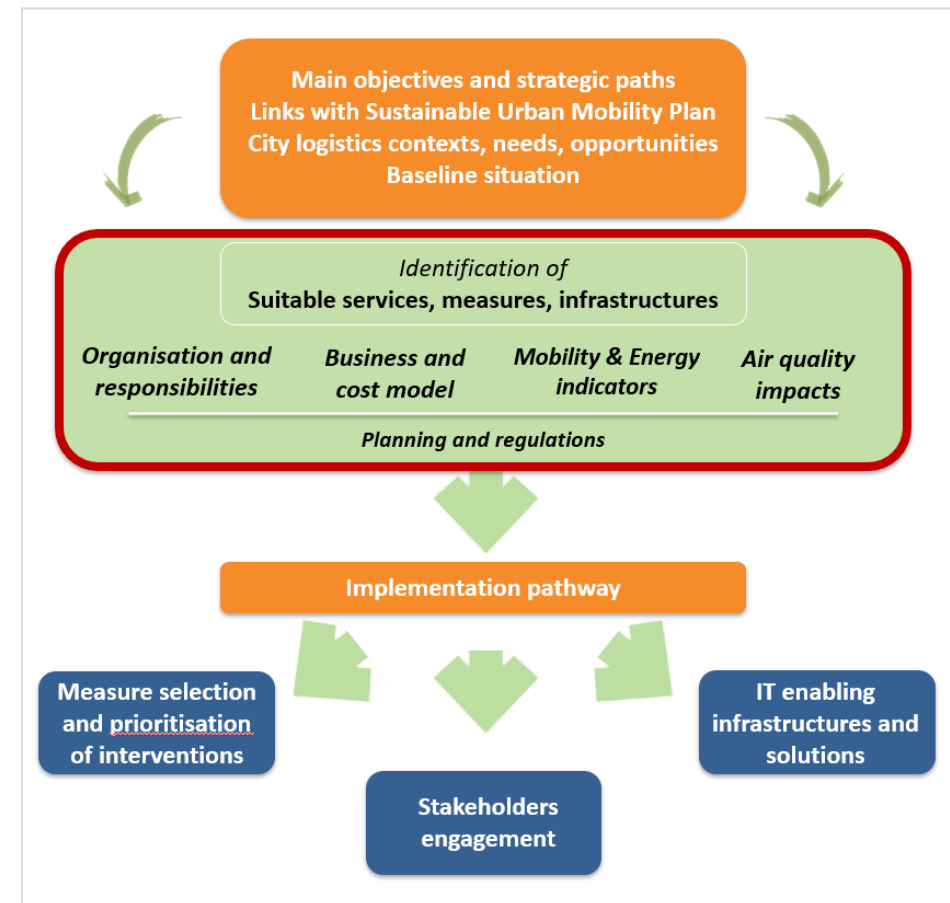
- Directly achieve a specific objective (i.e., the LOCMAP Platform in ASPIRE);
- Implement supporting solutions (e.g., Access Control system) or;
- Facilitate the engagement and cooperation of the different involved stakeholders.

4.2 A set of possible solutions

Once that city stakeholders agreed to take action according to the above-mentioned principles, it is important to mobilise a step-by-step process aiming to put the sustainable freight strategies into practice. As shown in Figure 6, one of the key tasks to be performed consists in the identification of the most suitable logistics measures and services to be implemented, as well as the organisation dimension, the business model, the mobility and energy key performance indicators and the air quality impacts to be monitored.

Different solutions (not only physical or ICT based) are available to face the Urban Logistics problems, covering the objectives and directions set by the EU directives and funding strategy. In the LIFE ASPIRE Project, we analysed and developed solutions concerning not only the realization of digital platform and solutions (LOCMAP, access control and freight parking area monitoring systems) and zero emission services (cargo bike service) but also regulations and behaviour awarding criteria/schemes in order to make more sustainable the last mile good delivery in the inner center and in the neighbouring districts.

Figure 6 SULP Implementation strategy. Source: Own elaboration on Guidelines – Developing and Implementing a Sustainable Urban Logistics plan



The market currently offers many solutions involving different levels of complexity, innovation, digitalization forgetting often the organization and operation dimensions involved in these solutions. Therefore, it is necessary from the Administration point of view to be aware of the requirements and impacts of the solutions/measures which could be proposed or drafted by the planners.

Considering also the results of the transferability process carried out in ASPIRE towards Zadar and Stockholm and taking into account the freight delivery schemes and practices implemented in other towns and European projects, we identified some base “solutions” or issues that could be considered and evaluated for any Urban Logistics policy the town aims to carry out.

The first step is undoubtedly linked to the development and definition of a Sustainable Urban Logistics Plan in relation with the other strategic urban plan (in primis, the SUMP (see the sections above)). The Sulp should present an analysis of a portfolio of possible measures and interventions that could be large and varied in any case referred to the specific urban and functional context. Based on the work carried out in ASPIRE we identified the following ones as relevant and as the most recurrent in the SULPs developed for the European towns especially and small and medium-sized cities:

1. Regulation Framework
2. Low Emission Zones-UVAR
3. Cargo-bike service and mini transshipment hubs
4. Control System of loading/unloading areas
5. Urban Consolidation Centers,

In the above list, the digitalization aspect was not indicated as one of the “solutions or measures” as it plays a transversal role among the different solutions and intervention allowing, for example, to collect data on the delivery process and to make data available with the different stakeholders. The ITS solutions have a specific role as single or coordinated systems (e.g., in UVAR approach, the system is dedicated to the control and monitoring the entrance and exit in Low Emission Zones) while the digitalization crosses each solution at different levels allowing different functions (from booking and information on L/U lot occupancy to allow the crowdsourcing data collection on delivery services).

The LOCMAP solution, a *rewarding platform based* on the behavior of last-mile service operators (see section 4.4), aims to control and make more sustainable and “clean” the last mile good delivery in the inner center. The integration with different services and systems is a strict requirement for LOCMAP operation, making this solution quite complex from the digitalization processes. Therefore, this digital solution should be assessed according to the local context and the evaluation of the main impacts, from the reduction of pollution and operators' business to investment, operation, maintenance costs, and organizational models.







In the following, a short summary of these possible solutions/intervention along with the key findings drawn from the experience of some ASPIRE partners (MemEx, Lucense and Lucca Municipality) and the results of ASPIRE project for potential applicability in other similar towns are presented.

Regulatory instruments



Access rules of Milano urban area







Challenges

-  Need for a strong and constant political will capable of being able to implement the new legislation in the period of city government.
-  The support and involvement of all relevant stakeholders, including trade associations and citizens, and correct information management are essential.
-  Risks of opposition by groups / associations of shopkeepers for the impact on self-refueling (or on home delivery)
-  Need for private investments to adapt the company fleet to the access rules in terms of zero or low emissions (e.g., purchase of electric vehicles)
-  Necessary investments by transporters in the renewal of the fleet to meet the entry criteria with respect to power supply
-  Increased commitment of the Municipal Offices for administrative management resulting from the new rules (eg release / renewal of access permits)

Concept

- Specific rules are defined and implemented by the Municipality to control the access and parking of commercial vehicles to / in the areas of interest, such as Pedestrian areas, ZTL, LEZ, etc. (more generally defined as UVAR - Urban Vehicle Access Regulation).
- They specify the definition of the time windows (hours) of access and the access restriction / permissions with respect to the type of commercial vehicles (power supply, emissions, dimensions, etc.) and the category of users. Furthermore, the possible parking methods may be included (e.g., use of specific L/U slots), as well as the regulations on the fee to access certain areas (or at certain times).
- Possibility of defining rules based not only on "static" parameters but also "dynamic" parameters (e.g. permanence time, number of access / day, use of freight stalls, etc.).
- The rules should be framed in the mobility scenario with respect to the Pedestrian Areas, ZTL and LEZ present
- Access control policies must also be related to the management strategies of urban spaces, as emerged in this period of pandemic and post-pandemic. Furthermore, they must also take into account the necessary technological support (which may already be present or not).

Opportunities and recommendations

-  Defined rules, except for minor adjustments, to remain stable over time (at least 5-7 years) to allow operators to manage fleet renewal plans and investments
-  Avoid total restrictions on access, leaving the possibility of access / operation under specific rules and conditions
-  Include the regulation of the self-refueling transport of the shopkeepers in the reference area. Define rules for the use of urban spaces (e.g., parking areas)
-  Assess the possibility to manage/limit the maximum number of vehicles circulating in the same time period in the same area
-  Encourage/reward the adoption of electric or low-emission vehicles, orient the behaviour of transporters towards an increase in the % load of their vehicles
-  Rules should facilitate the acquisition/transmission of data from the Operators to the Administration

Access Control Systems



Access Control Gate, Prato

Challenges



Relevant investment, in any case to be shared with the part of the system dedicated to the access control of residents and authorized persons.



Relevant maintenance costs for the devices at peripheral and central levels accompanied by operating and management costs.



Organization to be shared with the Municipal Police Department



Significative commitment of the municipal structures both for the feasibility and for the management of the procurement process, as well as for implementation



Risk of opposition by transport operators and shopkeepers (interested to own transport without control rules)



Requirement of an adequate organizational and operational structure for the system management and updating

Concept

- The Access Control System (ACS) is the basic ICT system to monitor the access of vehicles and to implement control policies at the level of the overall urban area or town, for residents and goods transits.
- Usually, the ACS are realised for controlling/limiting the entrance to some specific urban areas (limited traffic zone-ZTL, Low Emission Zone-LEZ, pedestrian areas, historic centre, etc.). Few European towns have implemented the ACS both for controlling the entrance and the exit from specific areas.
- The applied control policy, in general, is based on static parameter (type of vehicle, resident address, etc.) but also on dynamic parameters (number of entry/exits, permanence time, etc).
- Even if the system architecture/logic schemes are similar, the realization can employ different technologies or devices (OCR-plate recognition, RFID, etc).
- The National rules of Italy and the European legislations are being modified to allow the management of data (under GDPR criteria) collected from the peripheral level (on street or on wall gate as implemented in Lucca by Aspire) to the control room usually placed in the Municipality police department).
- Efforts of the European Union focused in the definition of a common Urban Vehicle Access Regulation (UVAR) framework and the standardization of related data (see the UVARBox Project www.uvarbox.eu).

Opportunities and recommendations



Monitoring of compliance with the time windows by transporters. Reduction of violations (if the control is implemented also at the exit)



Reduction of the need for roadside control by the urban police



Capability to control the permanence time of commercial vehicles within the controlled area (in case of equipment also exits)



Possibility to fine the offenders (only with OCR system certified for this task) but also to implement awarding policies (as made in Life-ASPIRE in Lucca)









Possibility of interface with the procedures for issuing permits in compliance with the European directive of NAP-National Access Points that will be activated in the next years

Cargo bike & transhipment point



Cargo bike sharing station, Lucca






Challenges

-  Investment cost of cargo bikes and related setting up in sharing mode (eg lock / unlock of the box) and of infrastructures (pick-up and recharging stations, if pedal assisted)
-  Overall service management costs. Need for a specific web-ICT platform (including app) and related investment and management costs
-  Insurance issues, with respect to freight transport by professional operators
-  Need the transhipment from the van to the cargo bike
-  Need of dedicated freight stalls associated with cargo-bike stations to allow transhipment, with the risk of improper occupation by the other commercial vehicles
-  Management of different complexities (similar to bike sharing services) such as eg. maintenance, roadside assistance, vandalism, etc

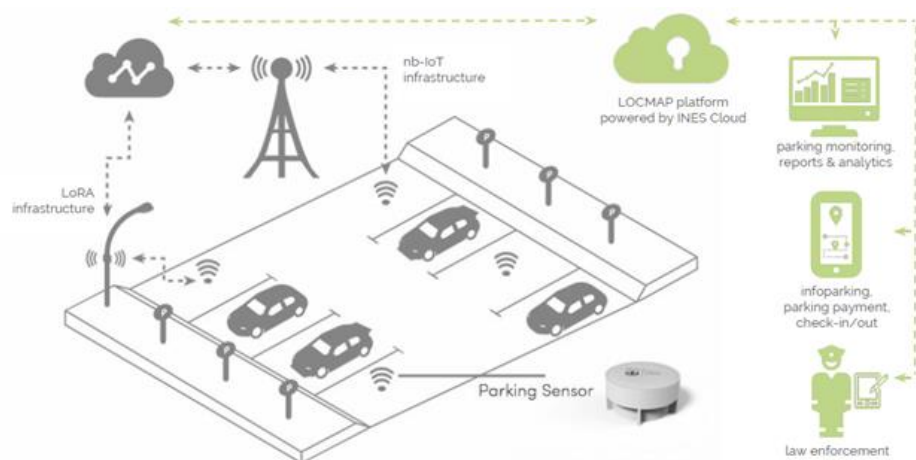
Concept

- Shared cargo bike service which enables freight transporters to deliver goods within the ZTL (or other UVARs), with zero-emission vehicles, during not allowed time windows.
- The service could be also extended to shopkeepers (e.g., own transport) or citizens who need to move goods / packages inside-outside the area.
- The service can be implemented with various degrees of complexity (operational, technological, maintenance, etc.) similar to the bike sharing system based on multiple stations with related app indicating the available cargo bikes, allowing the pick-up / return of the vehicle by the opening / closing the box.
- The cargo-bike service developed in Lucca by Life-ASPIRE is one of the most recent and success experience carried out in Europe.

Opportunities and recommendations

-  Guaranteed entry for last mile transport operators to access the controlled areas even outside the permitted time windows)
-  Guarantee of use of the cargo bike service also for shopkeepers (own transport)
-  Possibility to use the services also by Extension to use by citizens or other actors (eg public offices, etc)
-  Possible occasional use by shop client to carry heavy goods (with the obligation to bring the cargo bike back to the pick-up station)
-  Possible base element of a strategy of rewarding policies towards transport operators, in which users could be rewarded in case of use of cargo bike sharing services

Control System of Loading/Unloading areas



Concept

- It is an ICT solution for checking the presence of a vehicle on the Load/Unload bay and for knowing the related permanence time in the bay
- The system allows to monitor and assess the compliance of rules established for parking areas dedicated to loading and unloading process. Usually, these areas are close to the shop with high risk to be occupied by the shopkeeper's car.
- The Parking control system presents a certain level complexity in technology (sensors for each bays, communication network, control platform, etc) and realization (places of the sensors, construction works, etc).
- Usually, this system is implemented as an extension of an existing system for the control of blue stalls (Parking System). In Life ASPIRE, the system was realised for controlling a set of L/U bays placed in different sector of the inner centre of Lucca.

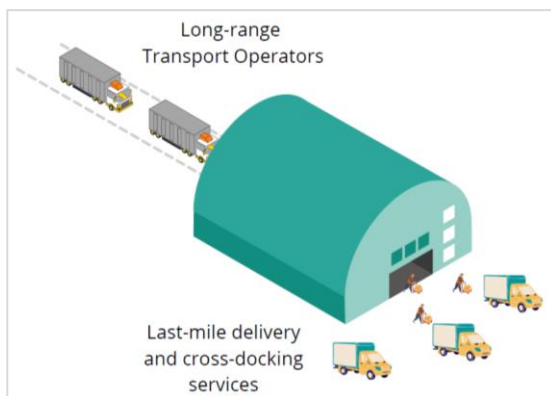
Challenges

- Relevant investment both for the periphery (sensors), communication devices and control center)
- Management and maintenance costs. These could be reduced significantly in the case of integration with an existing control system for the resident parking areas
- The Presence of Municipal Police is required for any fine possibility (to be verified on the basis of national road regulations
- Possible opposition of the last mile transporters especially for the control of permanence
- Management of different complexities (similar to bike sharing services) such as eg. maintenance, roadside assistance, vandalism, etc

Opportunities and recommendations

- More availability of each L/U areas thanks to the control of each stall performed by the system
- Real time Information to transporters on the status of the single stall (free / occupied) via app reducing the passive traffic related to the search for free L/U stalls
- Support to the control activities of the Municipal Police in contrasting violations (abusive occupations, permanence time beyond what is allowed, etc.).)
- In any case the first task to be carried out is the , it is the review of the layout and road sign signage of the L/U bays.)

Urban Consolidation Center (UCC)



The general UCC concept

Concept

- The Urban Consolidation Center (UCC) is a transshipment center for the consolidation of goods coming from long range transport and their "last mile" delivery in restricted traffic areas by zero-emission vehicles.
- Usually, the UCC is realised by municipal administrations or other public bodies. The UCC is entrusted through a specific procurement.
- Operationally, the regional (national and regional) transport operators, upon agreement, deliver the packages/goods to the UCC which, with its own fleet of commercial vehicles (electric or low-emission), carries out the final delivery.
- From the experiences underway (or recently concluded) emerges that the UCC is one of the solutions for optimizing "last-mile" deliveries, as it increases the load factor, reduces the number of circulating vehicles and uses "green" vehicles.
- Recent experiences indicate that direct management by the Municipality or by public companies with other missions (e.g., parking companies) should be avoided.

Challenges

- 🔊 A strong political will is necessary.
- 🔊 High investment costs for the construction of the infrastructure (depot) and the purchase of the vehicle fleet (higher if the objective includes the management of the fresh supply chain).
- 🔊 Finding a manager with adequate experience, also with business capacity to implement any additional service
- 🔊 Relevant operational and vehicle management costs and administrative costs
- 🔊 There is the need for a regulation pushing medium-long range operators to use the UCC, so that they derive effective benefits from it
- 🔊 The experience (concluded) of LuccaPort in Lucca can be a useful reference to understand the real problems of the UCC with a Top-Down approach

Opportunities and recommendations

- 👍 Reduction of traffic levels due to freight distribution in controlled areas and on the network. Reduction of pollution levels
- 👍 Possibility of introducing other services beyond "last mile" deliveries (packaging collection / reverse logistics, management of Pick-up-Points, luggage service to hotels, etc.) and operate in other urban areas and not only in the center
- 👍 Possibility to offer a remote warehouse to the shopkeepers; warehouse / shop deliveries take place with the same fleet and in a "near just-in-time" mode)
- 👍 Possibility of implementing the storage / delivery of the "fresh" supply chain, and of specific agreements with subcontracts with small local transport operators
- 👍 The UCC management should be entrusted to a specific company by a procurement procedure, with specific service parameters
- 👍 UCC productivity is linked to the urban access rules: the more stringent they are, the greater the convenience to use the UCC services

4.3 Demand aggregation by engagement and agreements

The above interventions are based on physical and/or digital solutions with the primary responsibilities due to the Local Authority (in primis the regulation) and the last mile transport operators (for the clean vehicle or for the compliance of the time window rules for accessing/entering to the limited traffic zone or low emission areas). Another approach, carried out especially in the small towns, involves the aggregation of the demand of shopkeepers and HORECA subjects, especially the owners of bars and restaurants of a defined area, usually of the historic center, by setting up engagement strategies.

Within this approach, the real investment is not related to the provision and installation of specific control devices or platforms, but rather on the involvement and the set up of constructive dialogues and agreements among the different HoReCa stakeholders (e.g. bars, restaurants), operating in the same area, for the adoption of the same supplier of some basic products and influence the behaviour of the last mile transport operators. In practice, this engagement policy could allow common specific requests that can bring environmental benefits and at the same time qualify the delivery service.

In particular, this demand aggregation could affect the optimization of loads by last mile transporters and influence the delivery time window among the shopkeepers. Moreover, this aggregation could enforce the transport operator to use, for the last mile delivery, low emission vehicles

as e-vans or cargo bike) and / or the use of time windows in soft-demand hours.

This agreement among the shopkeepers could also facilitate and reduce the impacts of own account delivery thanks to the definition of common rules for space and time and for sharing some assets as a van sharing scheme. As an example, in Lucca, one of the results of the demonstration regarding the cargo bike service is the request of the shopkeepers to use the cargo bike for the trips to and from the market or other destinations. So, this service designed for last mile operators also meets the needs of own account delivery.

This agreement therefore could potentially achieve the reduction of number of vans circulating with load factor and increase the bargaining power of the shopkeepers in a specific areas wrt the suppliers/last mile operator, making more feasible also the incentives for clean vehicle.



Possible barriers for a successful realisation of this approach could be synthetized as follow:

- Need for strong involvement and coordination by the Municipality.
- Possible opposition by the operators of the HoReCa sector due to the change in commercial habits (and relationships) consolidated over time due to a non-immediate understanding of the possible benefits (especially in pedestrian areas).
- Possible opposition of suppliers and / or transporters.
- The feasibility of the agreement also depends on the existing local regulation.

4.4 Smart use of digital tools

Public Authorities have the possibility to implement specific IT-Systems/solutions to manage the urban logistics services/ monitor the number of vans and delivery vehicles within target areas, and in turn, offer relevant information and services to freight operators.

In Life ASPIRE, the Digital platform LOCMAP was developed in order to control the behaviour of the last mile transport operators and manage the reward criteria of the mobility credit-based control policy adopted by the Lucca town Administration.

The decision to develop a digital solution rather than an infrastructure-based solution (such as the UCC) was born to enable the set up of a credit-based control policy to enhance the air quality and reduce the traffic congestions level.

In particular, with the implementation of the rewarding policy (and the Aspire project) the Municipality of Lucca aimed to decrease the total number of commercial vehicles involved in the last mile deliveries operations within the inner historic center of Lucca (and in particular in pedestrian and limited traffic zones). Consequently, it aimed to reduce the current levels of environmental pollution, noise and vibration due to commercial vehicle emissions.

Starting from the current mobility and regulation context and taking into account the existing logistics services and the role of the Urban Consolidation Center (LuccaPort), the credit-based access policy, defined and developed by Life Aspire, allows the flexible road pricing criteria related to the last mile goods delivery. For managing this innovative policy, a digital Logistics Credit Management Platform (LOCMAP) was developed and integrated with two other services (Loading/Unloading Parking lots and Cargo-bike Sharing) and with the existing access control system dedicated to controlling commercial vehicles entrance/exit in the LTZ/LEZ (OCR + RFID technology).

Therefore, the digital platform integrates "dynamic" data related to each last mile transport operator provided by the access control systems (no. entrances in the controlled areas, entry and exit time, permanence in the area, etc.) and by the L/U parking control system (use of each bay, duration of the parking, etc.). Beyond these data, the platform acquires also the dynamic parameter from the cargo bike services (use of each cargo bike, duration, location, etc.).

Moreover, the platform also collects the "static" data related to the permission of each operator (e.g., type of vehicle, emission category, etc.), interfacing with the permit release software.

The different data and parameters, elaborated by specific criteria established in the awarding policy, allow the acquisition of "eco-points" (the credits managed by the platform) which determine specific behavioural rankings to each transport operators, with the assignment of "prizes" of various kinds (e.g. free tickets or discounts of permits, eco-label and media visibility, etc).

The **relevant aspects** of awarding platform can be summarised in:

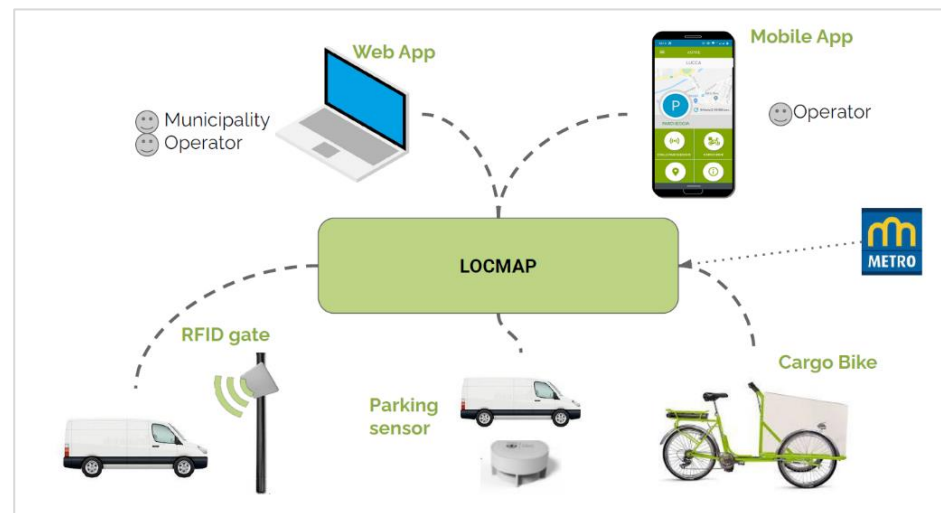
- implementation of a new approach for urban freight distribution management, and in particular for last mile deliveries, addressing the issue of a nearly-zero emission by the adoption of soft measures (RFID & SW enforcement), eco-sustainable logistics services (Load/Unload Parking lots and Cargo-bike Sharing) and effective/innovative rules (incentive by credits, etc.).
- possibility to manage reward policies based both on the type of vehicle and on the "virtuous" behaviour of last mile transport operators collecting and assessing specific mobility parameters (e.g. no. Entrances / day, use of non-peak time windows, compliance with exit, use of the monitored airconditioned pitches, etc.).

- integration of permit data and use of city by freight vehicles in order to understand its role in traffic composition and to define suitable measures at mobility planning level
- representation of real alternative solution to the UCC measure and related physical support conditions with the involvement of the main freight transport stakeholders in the definition of awarding criteria and in applying proper good consolidation schemes in deployment the delivery services.

To ensure a proper implementation of the rewarding policy and related measures, all relevant stakeholders and target groups have been involved. In particular Local and Regional policy makers were involved especially for the regulation definition and initiatives. Local Trade, Craftsmen, Commerce Associations and Transport Operators have been involved in

order to collect suggestions and indications for evaluating the overall awarding criteria and related measures both in feasibility and after implementation evaluation phase with also citizens associations and goods distribution system direct end-users. The "credit access policy" approach has been positively evaluated also from transferability and replicability both at large city level (Stockholm) and small town

Figure 7 The Architecture of the LOCMAP Platform



(Zadar) in order to support the European policy/directive for the Freight Urban Transport (FUT).

The **main barriers** can be indicated as the following ones:

- complexity of the platform realization (despite being a sw solution) and management
- the operation of the platform (specially the credit module) is in any case linked to other systems and services. The rewarding approach at a conceptual level is in any case linked to a peripheral system level (set of IoT tools) which feeds the platform, therefore it is structurally necessary with all the impacts of technological integration.
- Consequently, for the awarding approach implementation, relevant investments are necessary
- one of the strict requirements, among the others, is to interface with the permits management software usually provoking the need appoint the same supplier for the two sw platform.
- Uncertainty about the financial sustainability of the platform; a careful cost-benefit analysis is necessary.

These digital solutions could also allow dynamic management of access permits, by web/app (notice board) for booking a temporary permit, enabling access and permanence within the RTZ for a target time. It would also make it possible to monitor the traffic both from remote and on the road. This would limit the number of vehicles in a given area (usually pedestrian or low emission zone) for a specific time slot. However, in parallel to these digital aspects, we should not forget the strong necessity of involvement and coordination by the Municipality and

the difficulty in finding full availability of the shopkeepers for an agreement that modifies their supply habits. Furthermore, the constant control by the Municipal Police (or in any case a certain level of integration with existing technological systems) is also necessary entailing a certain organizational complexity.

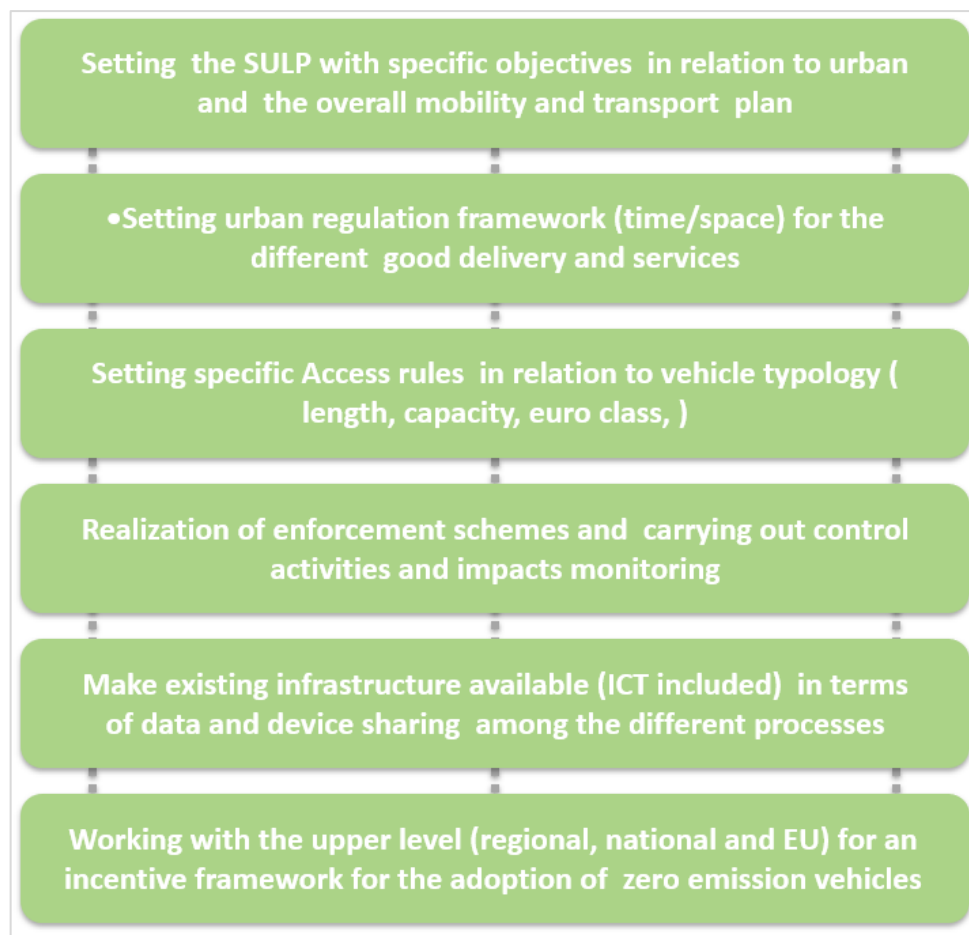
5. Public Authority overall responsibilities

As already mentioned the role of Public Authority, especially at the Municipality level, is relevant both at the planning level for identifying the measures and facilitating the engagement and dialogue among the different stakeholders and at the day by day operation level for controlling the urban logistics processes and the compliance with the defined rules assessing also the related environmental impacts (in primis, congestion, and pollution situation).



The main tasks and responsibilities of Local Authorities involved in the relevant issues of Urban freight Policy, Rules, Measures are summarised in the Figure 7 below.

Figure 8 Main tasks and responsibilities of Local Authorities



All the above are only some of the aspects and tasks to be carried out by the Local Authority. Usually, these are planned and realised for the

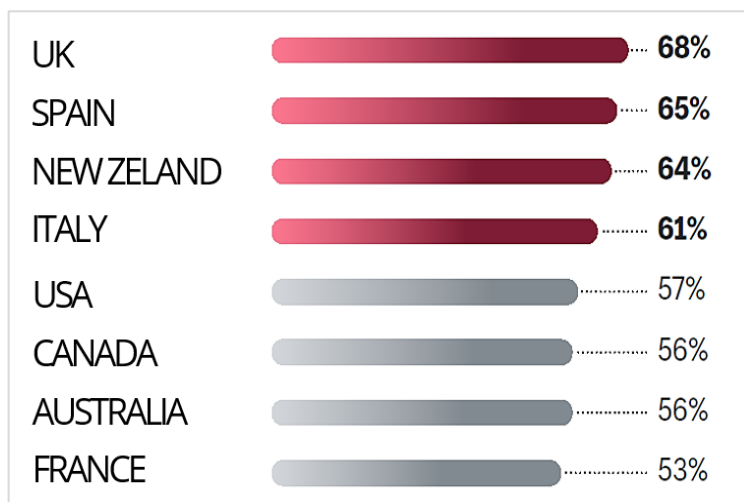
inner center/central district where the main commercial and services are concentrated. Nevertheless, after two years of COVID-19, one of the main needs that emerged at the urban level is related to space management not only for the inner urban areas but also for the other districts of the same town. This is motivated not only for the competition for the road usage among the different services (i.e., bike/scooter sharing, home delivery) but also for the increase of the on-line delivery transforming all home addresses in destinations or origin of the logistics services provoking the same usual problems of historical centers and pedestrian areas. Therefore, the Public Authority should carry out and tune the above framework of measures avoiding shifting the problems between the different areas or districts guaranteeing at the same time the control of compliance of the rules in each affected area. It is a “new” task for the Municipality, that adds to all the current responsibilities and tasks, that has to be carried out in an administrative scenario characterised by few resources for investment and for management, despite the last recovery resources/interventions defined at European level. This means to for the local political stakeholders to engage the different Logistics actors and stakeholders for discussing the possible solutions acting more a role of “facilitator” with close relation with the upper-level Authority especially the Region.

The “facilitator” role involves great Capability/skills for the Municipality staff in planning/evaluating the solutions and engaging the different stakeholders.

On the above, we should consider the impacts of the increase and consolidation of the ecommerce market pushed still more by the COVID-19 that has boosted some existing trends, as the following ones:

- Teens and young adults are more and more preferring to shop online
- Alternative options for collection and delivery are spreading rapidly (Pickup Points, Automated Parcel Lockers, Smart Parcel Box, Drones, etc.)
- Increased number of shops offering 'free delivery' and 'convenient/free return options'
- Growing confidence in shopping online for grocery products that is expected to develop into a lasting behavior for the majority of consumers

Figure 9 Share of consumers which states that COVID-19 has changed their shop's habits. Source: Shopify, 2021



The rise of e-commerce stands not only to fundamentally reshape how consumers purchase products, with deep implications for supply chain management – not to mention policymaking. In fact, the e-commerce is changing the urban space, curbside management, congestion situation and also the road safety, making the traffic flow more erratic with more different control requirements

Finally, after COVID-19, e-commerce forced not only increasing demand for last-mile services, but also a pushed deregulation in the sector (through the false claim of delivery at no cost) which must be appropriately managed. All the above push to offer to Transport Operators a consolidated reference framework about rules, incentives and control criteria in order to reduce the overall uncertainty and allow the industrial investments. Therefore, authorities should involve the transport operator in the Sulp consultation and decision by creating a permanent forum among the different social/economic actors and with the other Authority level chaired by the Municipality.

5.1 Towards integrated and clean urban logistics

In this context, it is more and more necessary that Municipalities come back to a central role about planning and control of mobility services in an integrated scenario, in which:

- A new space management policy is planned to guarantee dedicated spaces to collective transport (in order to ensure frequency and commercial speed) and freight delivery (safety platform use);

- An effective control, coordination of the different processes on the network is put in place, to evaluate the performances and the impacts, using specific KPIs
- Common platform / tool device for monitoring and collecting traffic data and user information (about the different processes) are efficiently developed;

All the involved stakeholders, including freight operators, are continuously engaged.

The results of LIFE-ASPIRE push three typologies of interventions by the Local Authority for an integrated and clean urban logistics, as summarised in Figure 10

Figure 10 Typologies of interventions for an integrated and clean urban logistics

Foster zero-emissions logistics solutions

Foster zero-emissions solutions in terms of innovative last mile delivery solutions (cargo bike, micro hubs, etc); definitions and assessment of main organization and operation issues; development and consolidation of cooperation business model for last mile service.



Photo by e-cargobikes.com

Embrace a new policy framework

Embrace a new policy framework in terms of how urban space, curbside management, congestion situation and road safety can be adopted; qualitative and quantitative evaluation of the impacts of the new last-mile solutions; pathway to achieve zero-emissions freight transport.



Promote ICT-enabling solutions

Deploy and promote ICT-enabling solutions in terms of Digitalisation of logistics and freight operations; Data standards and protocols to guarantee the interoperability/ integration; Design and develop platforms for monitoring and collecting traffic data and user information.



6. Conclusion

With more than two decades of experience in sustainable urban freight operations, in 2017 the Municipality of Lucca mobilised the LIFE ASPIRE project (*Advanced logistics platform with road pricing and access criteria to improve urban environment and mobility of goods*). The project aimed to develop an innovative “credit-based” policy for rewarding freight operators in the urban area, implement new logistics service schemes to promote sustainable and smart management of urban space/environment. New eco-logistics services targeted to transport operators in last-mile deliveries have been successfully developed, managed by the innovative platform “LOCMAP”.

The solutions implemented are proving to bring an effective contribution to the improvement of the urban environment and, consequently, the quality of life for residents, visitors, and tourists. The LIFE ASPIRE Project is effectively demonstrating how new eco-logistics services (Load/Unload parking lots and e-cargo bike Sharing, both managed by the innovative platform “LOCMAP”), joined with new access rules (for restricted traffic and low emission zones), can play a major role in the “last/first-mile” freight transport solutions, as possible measures to face the increasing issues related to the e-commerce and managing the transition towards eco fleet, low emission zone, and carbon-free logistics.

From a freight transport efficiency point of view, the implementation of LIFE ASPIRE schemes has shown to reduce the total number of commercial vans entering the Lucca’s historical centre, and somewhat also the average length of trips by rationalizing loads and deliveries (e.g.,

using L/U parking lots or e-cargo bike service). This led to lower levels of freight traffic congestion in the area inside the Lucca walls, reducing the wasted time and improving also the comfort for tourists.

The main lessons learnt and recommendations for local Public Authorities can be summarised as follows:

- Gain a clear understanding of the **needs, objectives**, and **performance** required from the system and digital solutions;
- Have competences and awareness of the **complexity of solutions** and **realization process**;
- Be aware of the current **results, benefits, barriers** and **drivers** encountered by **other Cities** in developing similar practices and solutions/measures;
- **Balance** the role of **infrastructure** and **technology** respect the operation procedures and organization scenarios;
- **Undertake** a deep analysis of **investment** and **operation costs** (support service cost, staff cost, maintenance, etc);
- **Have** a realistic awareness of the **realization** timing, needed resources and **transition process**;
- Ensure the involvement and participation of target groups in developing the **Sustainable Urban Logistics Plan**, working on institutional, political and regulation levels, operation/organization issues and Business models
- Develop a **"weighted" planning** of urban spaces with respect to logistics and collective mobility services and active modes, in terms of spaces dedicated to pedestrians, cyclists (bike parking),

parcel lockers, load/unload parking, preferential lanes, and micro-mobility;

- Use traffic data collection techniques to **monitor key performance indicators**. Digital tools can support to collect and analyse data, to evaluate measure impacts on air quality, emissions and congestion levels;
- Implement regulations and policies for **preserving the liveability and air quality** of different town districts and overall city **sustainability**, considering the rise of the e-commerce and its impact on the urban space.



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