



TOPIC GUIDE

SUSTAINABLE URBAN LOGISTICS PLANNING

Imprint

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Guide to the reader

This document provides guidance on a specific topic related to *Sustainable Urban Mobility Planning (SUMP)*. It is based on the concept of SUMP, as outlined by the European Commission's Urban Mobility Package¹ and described in detail in the European SUMP Guidelines (second edition)².

Sustainable Urban Mobility Planning is a strategic and integrated approach for dealing with the complexity of urban transport. Its core goal is to improve accessibility and quality of life by achieving a shift towards sustainable mobility. SUMP advocates for fact-based decision making guided by a long-term vision for sustainable mobility. As key components, this requires a thorough assessment of the current situation and future trends, a widely supported common vision with strategic objectives, and an integrated set of regulatory, promotional, financial, technical and infrastructure measures to deliver the objectives – whose implementation should be accompanied by reliable monitoring and evaluation.

In contrast to traditional planning approaches, SUMP places particular emphasis on the involvement of citizens and stakeholders, the coordination of policies between sectors (transport, land use, environment, economic development, social policy, health, safety, energy, etc.), and a broad cooperation across different layers of government and with private actors.

This document is part of a *compendium of guides and briefings* that complement the newly updated second

edition of the SUMP Guidelines. They elaborate difficult planning aspects in more detail, provide guidance for specific contexts, or focus on important policy fields. Two types of documents exist: While 'Topic Guides' provide comprehensive planning recommendations on established topics, 'Practitioner Briefings' are less elaborate documents addressing emerging topics with a higher level of uncertainty.

Guides and briefings on how to address the following topics in a SUMP process are published together with the second edition of the SUMP Guidelines in 2019:

- **Planning process:** Participation; Monitoring and evaluation; Institutional cooperation; Measure selection; Action planning; Funding and financing; Procurement.
- **Contexts:** Metropolitan regions; Polycentric regions; Smaller cities; National support.
- **Policy fields:** Safety; Health; Energy (SECAPs); Logistics; Walking; Cycling; Parking; Shared mobility; Mobility as a Service; Intelligent Transport Systems; Electrification; Access regulation; Automation.

They are part of a growing knowledge base that will be regularly updated with new guidance. All the latest documents can always be found in the 'Mobility Plans' section of the European Commission's urban mobility portal Eltis (www.eltis.org).

¹ Annex 1 of COM(2013) 91

² Rupprecht Consult - Forschung & Beratung GmbH (editor), 2019 Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan, Second Edition.

Executive summary

Following the official SUMP guidelines developed by the European Platform on Sustainable Urban Mobility Plans and published by ELTIS in 2013, lessons have been learned and new policy challenges have emerged] regarding the urban mobility planning in various EU-funded and/or National projects related to Sustainable mobility. Therefore, the existing SUMP concept is being updated with additional information based on practical experience, new trends and new good practices in order to form a more comprehensive guidance for SUMP development. Therefore, revised SUMP guidelines have been developed in an attempt to capitalize on the knowledge and the experience gained in recent years in developing and implementing SUMPs in European cities.

One of the issues that has to be addressed in this attempt of attempted update and evolvement is the effective and efficient distribution of goods in cities, in the context of a sustainable mobility policy. Developing Sustainable Urban Logistic Plans (SULPs), in line with the cities SUMPs, has been the solution followed by some of the cities. The need to allocate special consideration to Sustainable Urban Logistics Planning is confirmed by both public and private stakeholders. Urban Freight Transport is a main contributor to congestion and pollution of the cities city centres, but also a fast-developing industry paramount for the growth of the cities' economic activities. Urban freight transportation (UFT) planning is a complex process, and Public authorities generally have less knowledge about and capacity regarding specific issues than concerning

passenger's mobility, while private companies which are involved in organizing and implementing urban freight distribution have knowledge of the technical aspects of the subject. The complexity of a sustainable planning process is even greater since the process should a) involve a variety of private actors from a very fragmented environment with different and often conflicting needs and goals, b) achieve balance between the industrial requirement for high efficiency & and low-cost operations, and societal requirements for low CO2 and high safety and sustainability. As a result of the above factors, it is therefore challenging to achieve actors' collaboration and participation in this planning process and to conclude upon measures that can be successful and largely adopted in different urban contexts.

In the context of the above, this topic guide on SULP development aims to provide authorities with a framework for a proper implementation of actions, in the context of the SUMP development, for efficiently addressing the challenges and achieving development of a sustainable urban logistics policy and plan which will result in the future sustainability expectations of a city being met. In an effort to provide practical support to readers, this document also provides the best practices of tools, methods and techniques that can be used in several of the 7 steps of the revised SUMP process, together with the measures and interventions for best practices.

Introduction

2.1. Existing regulatory framework on sustainable and efficient urban logistics

The European Union has defined specific policies and guidelines and has begun promoting dedicated tools and platforms for addressing the Urban Freight Transportation (UFT) challenges. In the 2011 White Paper³, a clear strategy for ‘near zero emission urban logistics by 2030’ was set by the EU, which was followed by several supportive initiatives towards that direction, including the Urban Mobility Package (UMP)⁴, the Low Emission Strategy of 2016, and the three Mobility packages of 2017 and 2018.

Moving in that direction, the EU stresses, in the 2011 White Paper as well as in the Staff Working Document⁵ accompanying the Urban Mobility Package (UMP)², the significance of using Intelligent Transport Systems (ITS) for optimizing the last mile distribution, which aims at the complete digitalization of urban freight mobility. This initiative is being supported by the ITS Directive⁶, the establishment of expert working groups (WG17 on Urban-ITS, CEN/TC 278 and the Digital Transport and Logistics Forum (DTLF)).

The efficient interconnection of long distance and last mile transportation, through the implementation of urban nodes (being the starting point or the final destination - first/last mile) for passengers and freight moving on the trans-European transport network, is also one of the priorities of the EU. Moreover, the implementation of measures such as ‘off-peak hours deliveries’⁷, the deployment of alternative fuels

infrastructure⁸, and the use of clean freight vehicles^{9,10} were also recommended.

The latest initiative of the EU on tackling the main UFT challenges and providing clear assistance to the local policy makers was undertaken in 2018 with the publication of a study on urban logistics – ‘The integrated perspective’ – as it was announced in the Communication (2013) 913 final². This study provided guidelines on six different aspects of urban logistics: 1) ‘Use of Information and Communication Technologies’; 2) ‘Treatment of logistics activities in Urban Vehicle Access Regulation Schemes’; 3) ‘Engagement of stakeholders when implementing urban freight transport policies’; 4) ‘Logistics schemes for E-commerce’; 5) ‘The use of Environmentally Friendly Freight’; and 6) ‘Indicators and data collection methods for urban freight distribution’.

However, as it was highlighted by the European Economic and Social Committee (EESC)¹¹, the policy framework should focus further on the importance of urban freight transport. The EESC gave particular emphasis to the inclusion of urban logistics ‘as part of a sustainable transport policy’, while the European Parliament¹² highlights the need for introducing new business models, measures, and technologies for more efficient and effective urban logistics operations, thus anticipating the new and constantly evolving trends (Collaborative Economy, Logistics as a Service (LaaS), On-demand Economy. etc.).

³ European Commission (2011), White Paper, Roadmap to a Single European Transport Area-Towards a competitive and resource efficient transport system, COM (2011) 144 final

⁴ European Commission (2013b) Urban mobility package. COM (2013) 913 _final

⁵ European Commission (2013a) A call to action on urban logistics. SWD (2013) 524 final

⁶ European Parliament, 2010. Directive 2010/40/EU of the European parliament and of the council. Official Journal of the European Union, 50, p.207.

⁷ European Commission (2013), Staff Working Document, A call for smarter urban vehicle access regulations, Brussels, SWD (2013) 526 final

⁸ European Parliament (2014), Directive 2014/94/EU on the deployment of alternative fuels infrastructure

⁹ European Parliament (2009) Directive [Directive 2009/33/EC] on the promotion of clean and energy-efficient road transport vehicles

¹⁰ European Commission (2013), Commission Staff Working Document, Guidelines on financial incentives for clean and energy efficient vehicles, Brussels, SWD (2013) 27 final

¹¹ European Commission (2016), Commission Staff Working Document, The implementation of the 2011 White Paper on Transport “Roadmap to a Single European Transport Area – towards a competitive and resource-efficient transport system” five years after its publication: achievements and challenges, Brussels, SWD (2016) 226 final

¹² European Parliament (2015), Implementation of the 2011 White paper on transport, European Parliament resolution of 9 September 2015 on the implementation of the 2011 White Paper on Transport: taking stock and the way forward towards sustainable mobility (2015/2005(INI)), P8_TA (2015)0310

2.2. The role of Urban Logistics in the existing Sustainable Urban Mobility Plan (SUMP)

The Sustainable Urban Mobility Plan (SUMP) is a 'strategic plan designed to satisfy the mobility needs of people and businesses in cities and their surroundings for a better quality of life. The SUMP builds on existing planning practices and takes due consideration of integration, participation, and evaluation principles' (ELTIS 2013). The development and implementation of Sustainable Urban Mobility Plans has been strongly supported by the EU and the European Parliament as one of the most important tools that a city can use in order to make the transportation infrastructure and services more efficient and to improve the integration of different mobility modes in urban areas in a sustainable manner.

The official guidelines for the development and implementation of sustainable urban mobility plans were developed by the European Platform on Sustainable Urban Mobility Plans and published by ELTIS in 2013. They provided local authorities with a structured approach on how to develop and implement policies and cost-effective measures for achieving a sustainable future for their cities. Since then, however, lessons have been learned and new policy challenges have emerged regarding the urban mobility planning in various EU-funded SUMP projects. Therefore, the existing SUMP concept is being updated with additional information based on practical experience, new trends and new good practices in order to form a more comprehensive guidance for SUMP's development.

One of the issues that has to be addressed in this attempted update and evolution is the effective and efficient distribution of goods in the city. The complexity of organizing urban freight distribution is driven by the vast range of activities resulting from relationships among a variety of actors with different and often conflicting needs and goals, and by a number of negative environmental consequences and social effects, such as congestion, air and noise pollution, and an increase of safety hazards. These factors make it difficult for a policy planner to propose standard measures suitable for different urban contexts, as well as to develop a common understanding about future expectations.

In parallel with the above, the science and practice of UFT and city logistics has been developing, and

introducing novel solutions to address issues caused by UFT traffic. Therefore, the present document constitutes an additional guide to the updated SUMP cycle and aims to provide practical assistance to a city on how it should address the urban logistics aspect in the city's SUMP, and which tools, methods and techniques can be used for the successful implementation of the 7 first steps of the SUMP process.

2.3. Urban Logistics: Concept and main challenges

Urban freight transportation constitutes a fundamental component in the life of a city. Nowadays, more than 73% of the European population lives in urban areas, **while this is expected to increase to 85% by 2050. This phenomenon of urbanization has resulted in an increasingly higher demand for urban transportation, either for B2B or B2C purposes.**¹³

Apart from last-mile transportation, UFT involves a vast range of additional processes: handling and storage of goods, inventory management, waste and returns, as well as home delivery. While many of these processes, or parts of them, are undertaken outside of urban areas, they continue to have an impact on urban operations.

UFT is a for-profit activity, predominantly controlled and operated by private interests. Although essential to the functioning of urban economies, due to the fact that UFT makes goods available to **customers** located in urban areas, its for-profit character is to a large extent responsible for the fact that public authorities currently have a low understanding of the commercial dynamics of freight distribution.

However, urban freight processes simultaneously involve, not only economic, but also social and environmental issues, which may possibly result in conflicts. In fact, UFT has a number of negative effects in terms of safety, congestion, and air and noise pollution. For instance, in Europe, UFT is responsible for 25% of urban transport related CO₂ emissions and 30-50% of other transport related pollutants¹⁴. In addition, a growing urban population, combined with other trends, such as e-commerce and home deliveries development,

¹³ United Nations. Around 2.5 Billion More People Will Be Living in Cities by 2050, Projects New UN Report; United Nations Department of Economic Social Affairs: New York, NY, USA, 2018.

¹⁴ ALICE. Urban Freight Research Roadmap; European Road Transport Research Advisory Council: Brussels, Belgium, 2015.

together with an ageing population, will lead to an increase in demands for goods and services, with a consequent increase of UFT demand. This in turn will result in the necessary reduction of the effects of negative externalities. In this regard, the European White Paper has set the goal for 'near zero emission urban logistics by 2030'¹⁵. Moving towards a more sustainable urban freight system requires changes and innovations both in the public and private sectors.

However, the lack of coordination of urban logistics actors and data/information availability, contribute to insufficient urban planning and integration of urban freight into the city's operations. Within the context of the first EU-USA Transportation Research Symposium, dedicated to city logistics research (May 30–31, 2013), the research community raised the issue of the unavailability or the low quality of data on urban freight. It also stressed the need for more effective data collection methods and for the identification of the main drivers of the economic activity, which is paramount for an understanding of the actors' behaviour.

This lack of awareness on UFT activities can be a serious obstacle when determining their current sustainability and planning and implementing appropriate measures to optimize these activities in economic, social and environmental terms.

In most cities, city planning and traffic surveys are undertaken exclusively as regards to passenger transport. The most important reasons for this approach are:

- Urban freight transport is a complex system, made up of numerous activities, and it is necessary to collect data from a large quantity of economic agents.
- Shippers and transport operators are reluctant to share information about their operations.
- Local authorities are not able to understand what kind of data is needed.
- Collecting and updating urban freight data can be too costly for local authorities.

However, in recent years these gaps have been partially filled by the study on urban freight, developed and published by the EU, as mentioned above, as well as by the research outputs and significant contribution of the latest HORIZON 2020 projects¹⁶, that dealt with city logistics.

The present document aims to address the above mentioned challenges by providing specific guidelines and clear procedures to local policy makers on how to better monitor, control and manage the urban logistics activities that take place within their city.

¹⁵ European Commission (2011), White Paper, Roadmap to a Single European Transport Area-Towards a competitive and resource efficient transport system, COM (2011) 144 final

¹⁶ NOVELOG project (H2020): www.novelog.eu, U-Turn project (H2020): <http://www.u-turn-project.eu>, SUCCESS project (H2020) <http://www.success-urbanlogistics.eu/>, CITYLAB <http://www.citylab-project.eu/>

The 8 SUMP principles in the context of 'a Sustainable Urban Logistics Plan'

Local authorities engage with logistic players and local businesses to come up with innovative strategies reconciling two potential conflicting elements: a freight distribution system satisfying the market demand, and a liveable, emission-free urban environment. This has led to a wide range of initiatives in the following areas: air quality & safety, clean & alternative fleet promotion, space management and consolidation, data and stakeholder engagement.

The process of developing strategies and plan for sustainable urban logistics as part of the SUMP process is the effort of organizing initiatives of public & private stakeholders and achieving efficient & integrated approach for alleviating problems caused by urban freight transport, while respecting the SUMP principles.

City logistics planning requires additional considerations than the passengers' mobility planning. In urban logistics planning, industrial (business & logistics) stakeholders' requirements should be addressed and their mobilization in the planning process is needed since their reasoning (based mainly on profitability and efficiency) should also be taken into account during decision making. Also, the parameters defining the future vision, objectives and priorities of a plan for sustainable UFT are different than those used for passenger mobility plans. Finally, the level of stakeholders' collaboration, suggested by the SUMP process, is difficult to be achieved due to the fragmentation of the transport and logistics industry and special provisions should be implemented.

However, as city logistics is part of the city's overall mobility landscape, any attempt to study it in isolation from the general city's environment, would be wrong. Therefore, in the following paragraphs considerations related to city logistics planning are discussed in the context of each SUMP principles.

Principle 1 Plan for sustainable mobility in the functional city:

Planning for city Logistics may be defined as the process for totally optimizing the logistics and the transport activities –implemented by private companies– with the support of technologies & collaborative operations, while

considering safety and energy savings in urban traffic environment. The above should be achieved within the framework of a market economy and a city policy for sustainability.

In this context the development & implementation of a Sustainable Urban Logistics Plan aims to contribute to the SUMP's main purpose for a sustainable mobility system by defining priorities, measures and implementations of new operations for improving the effectiveness of city logistics in the entire functional urban area.

The opinion that a SULT could (depending on the size and the complexity) be developed as a separated and integrated to the SUMP document is based on the fact that SULT should include (as also the SUMP) dedicated and separated guidance on how to:

- Understand the current situation of the city's urban freight transportation and logistics
- Involve the UFT stakeholders in city logistics planning
- Identify the most appropriate Urban Freight Transportation solutions based on each city's typology
- Develop sustainable, cost effective and economic viable solutions and urban freight transportation strategies
- Measure the performance of a UFT solution

City authorities when plan for urban freight transport sustainability, should take into account that urban distribution is a facilitator of the supply chain vitality, economic development and business prospects and it is important for ensuring the continuous and stable operation of large-scale freight transport activities between suppliers and consumers in urban areas. Important infrastructure, organization capacity and the services of these operations may be located outside the city limits. Therefore, the definition of the functional area for the sustainable urban logistics planning should be based on the knowledge of the typology of the supply chains emerging in the urban area, the characteristics of freight flows and of the transport & logistics supply.

Principle 2-Develop a long-term vision and a clear implementation plan:

The city's approach to sustainable city logistics that will result from the SULP development process should be in line with the SUMP's long-term vision which needs to be customized for freight transportation. Following the definition of the city's vision, the SULP will be structured around short and medium term measures and interventions for achieving implementation of the strategy. The implementation plan will identify the resources and tools that are needed, will define the roles and responsibilities of private and public stakeholders, and will set the time-plan and budget allocation.

During the urban freight transport scenarios development and the measures selections, city authorities should consider trends for new or innovative city logistics solutions that are pursued by the transport & logistic industry. Although city logistics is a relatively new area of urban study and urban management, city logistics measures, including co-operative freight transport systems, consolidated city distribution centres & micro consolidation, advanced vehicle routing and scheduling using intelligent transport systems, load factor controls, road pricing, intelligent parking controls, pickup points for e-commerce, drones for last mile deliveries etc., have already being implemented around Europe.

Principle 3 Assess current and future performance:

Similarly to the SUMP process, the SULP development focuses on achieving the primary and secondary objectives set by a city which are aligned with the vision of mobility and urban freight transportation.

In order for the city planner to understand the progress made towards that direction, the SULP proposes specific approaches on how to assess the current and future performance of a city's UFT. Throughout the development of a SULP, the city will accumulate valuable knowledge on the current state of its UFT by defining: 1) it's current strengths and weaknesses; 2) available capacities and resources; 3) the city's UFT main characteristics and influencing factors.

The SULP proposes future performance of the city's UFT by defining measurable targets of the UFT characteristic, in future time horizons. The success of the initiatives, measures and concepts of the city logistics may be determined by comparing the performance efficiency

and the sustainability of the system before and after the measures implementation.

It should be mentioned that city logistics performance assessment might involve a number of parameters and data sources, the majority of which are usually owned by the private industry stakeholders. These are collected either by using technology for observing and managing the logistics activities (recording of loading unloading zones, GPS vehicle tracking e.tc.) or by assessing the city logistics generators and logistics providers performance.

Principle 4 Develop all transport modes in an integrated manner:

Businesses located in cities must be able to send and receive their shipments on time, and local authorities want to attract other businesses to locate in their cities, recognizing that UFT is essential to their economic prosperity^{17,18}

However, UFT is heavily based on road transport and, even though freight vehicles do not comprise the majority of road traffic in cities, they produce a significant amount of air pollution^{19,20} Freight vehicles also contribute to other problems such as congestion, road casualties, visual intrusion and noise pollution^{17,21}

In line with the primary goal of sustainable and effective urban freight transportation, a Sustainable Urban Logistics Plan aims at fostering the most appropriate modal solutions that will benefit both the UFT stakeholders and the society, balancing economic efficiency with environmental sustainability. Therefore, it embeds an integrated view of both traditional and non-traditional freight modal solutions (e.g. electric vans, cargo bikes, tricycles, waterways) but also takes into account the potential capacity of sharing synergies

¹⁷ Anderson, S., Allen, J., & Browne, M. (2005). Urban logistics – How can it meet policy makers' sustainability objectives? *Journal of Transport Geography*, 13 (1) 71-81 <http://dx.doi.org/10.1016/j.jtrangeo.2004.11.002>

¹⁸ Kiba-Janiak, M., 2017. Urban freight transport in city strategic planning. *Research in transportation business & management*, 24, pp.4-16.

¹⁹ Kin, B., Verlinde, S. and Macharis, C., 2017. Sustainable urban freight transport in megacities in emerging markets. *Sustainable cities and society*, 32, pp.31-41.

²⁰ Lindholm, M.E. and Blinge, M., 2014. Assessing knowledge and awareness of the sustainable urban freight transport among Swedish local authority policy planners. *Transport policy*, 32, pp.124-131.

²¹ Quak, H.H., 2008. Sustainability of urban freight transport: Retail distribution and local regulations in cities (No. EPS-2008-124-LIS).

between freight and passenger transportation (e.g. cargo hitching) and better exploiting for city logistics bus and rail passenger services.

Principle 5 Cooperate across institutional boundaries

Similarly, to the implementation of a SUMP, the development and implementation of a SULP requires the close cooperation and consultation with different levels of government and relevant authorities. The growing cities rely on efficient and sustainable urban logistics systems to ensure the conduction of daily activities, as well as to increase the attractiveness, the economic development, and the quality of life in them. Therefore, the policies and interventions of competent authorities and agencies in the above-mentioned domains should be taken into account and the municipal authorities should safeguard this cross institutional cooperation with these agencies when formulating the internal team that will be responsible for the SULP.

Cross institutional cooperation is also needed for the implementation of the city logistics measures that will be included in the SULP. Some examples of measures that need cooperation across institutional boundaries for being implemented are: a) use of ITS and ICT to enforce traffic regulations and establish management schemes, such as congestion charging and road pricing for heavy trucks using video cameras b) subsidies may be required to help shippers and freight carriers start new, environmentally friendly initiatives that are often costly to implement c) national governments and/or local municipalities should, if needed, provide support to help new urban consolidation centres and intermodal freight terminals get off the ground.

Finally, the geographical scope of a SULP, similarly to the general SUMP concept, will not be limited only to the municipal boundaries. As city logistics consists the last mile of a broader supply chain, with the respective infrastructure usually located at the boundaries of urban areas, the geographical coverage of the plan might need to have a strong regional dimension and cooperation with related regional & national institutions should also be considered.

Principle 6 Involve citizens and relevant stakeholders:

One of the main success factors for implementing an effective SULP is to involve all the actors that are either involved directly in urban logistics operations (i.e. Freight Forwarders, Transport Operators, Shippers, Major Retail

chains, Shop owners, Local or regional government, Industry and Commerce Associations, Consumers Associations, Research and Academia, Logistics Experts), or are affected somehow by the urban logistics externalities in the planning process. Considering the emergence of e-commerce and direct-customer deliveries, citizen or consumer organisations should be actively involved.

Since city Logistics will have a vital role in enhancing the mobility, sustainability and liveability of cities in the future, it is well-recognized the need to consider different stakeholders' perspectives on these issues, in order to achieve desired outcomes. This is necessary not only for taking into account (as mentioned previously) the different stakeholders needs and rational during the decision-making process but also for securing better acceptance and smooth implementation of the SULP propositions. For example, more efficient logistics for cities presupposes the existence of regulations and good enforcements in urban areas in order to ensure a better environment for all. But competition should not be stifled, which is one more reason why real partnerships between the private and public sectors are needed. In the end, a change in attitude among all stakeholders should be achieved in order to facilitate city logistics.

The involvement of the stakeholders should be continuous and it has to be based on a beneficial "value proposition" for each stakeholders category which should be created by the city at the beginning of the process and which will give substance to the cooperation process for SULP development.

Principle 7 Arrange for monitoring and evaluation:

During the development of a SULP or a SUMP, the implementation bodies should closely monitor the progress made towards fulfilling the initial objectives and achieving the measurable targets that have been set. This process could be based on a structured evaluation framework that will facilitate the data collection process, the identification of the most appropriate indicators, the data collection mechanisms, and the final impact assessment.

Monitoring and assessment of the SULP impact is a demanding process and the data needed in order to be implemented are mainly collected by the industrial stakeholders and are considered by them as restricted information because data on logistics operations' efficiency are considered as competitive advantage of the

logistics companies. Cities should define early the scope of the Sulp evaluation, identify the minimum set of data needed for the evaluation and secure the provision of these data by the stakeholders through the partnership agreements that will be signed for measures implementation. Usually these are data related with the evaluation of city logistics measure's (or set of measures') sustainability.

However, cities rely on efficient urban logistics to ensure their attractiveness, quality of life, and economic development while giving priority to improve safety and minimize the environmental impacts. Therefore, assessment of impact at the level of the city as a whole is also required which could be supported by Urban freight modelling tools. Finally, cities might consider the implementation of Life Cycle Analysis of the Sulp which will allow the continuous monitoring of the Sulp's performance and impact creation. It will also provide information and knowledge to the stakeholders for redefining their objectives, expectations and measures of the Sulp.

Principle 8 Assure quality:

In the same way with the Sump implementation, similar mechanisms, such as an external Quality Assurance Panel or the use of Self-Assessment Tools, can be used in order to ensure the required quality of the Sulp outcomes.

The Sulp intends to be a document which engages the Municipality and the industrial stakeholders in implementing (each one of them) a set of actions, for which they will be mutually responsible. Failure in the implementation of the actions of one party (i.e. city side) will generate failure or risk for failure at the other side (i.e. industry). It is therefore important to assure the quality of the Sulp in relation to its content but also regarding the feasibility and the strong engagement of actors to the implementation process.

The industrial stakeholders require stable and consisted UFT framework for their daily operations. The cities ask from the industrial stakeholders to trust the municipal authorities and provide the necessary data while cooperating with them in respecting city's UFT regulation and policy framework. Therefore, it is recommended to complement the Sulp with separated partnerships agreements for sealing the action plans that are included in the Sulp. In this way implementation monitoring but also quality assurance will be guaranteed.

Sustainable urban mobility planning steps for SULP development

4.1. Considerations for SULP development approach

City authorities may consider sustainable urban logistics planning as part of the SUMP development process, or may choose to differentiate the process for developing a dedicated plan for sustainable urban logistics, which, however, has to be in compliance with the policy principles and objectives of an already developed SUMP. The two approaches are equally valid when they are implemented in line with the SUMP development phases and steps shown in Figure 1. The decision may be taken at the beginning of a SUMP process, when assessing the capacity of the authority to deal with both miscellaneous topics of passenger and freight sustainable mobility in the same process. However, it is highly recommended to have separate documents: one describing the SULP and relevant strategy measures; the second outlining the agreements with the stakeholders. In some cases, it has been observed that when cities have to face severe UFT problems, or there is a strong political will to tackle sustainability of urban logistics to the city as a whole, or to a specific city area, the process of a dedicated SULP

emerges as a high priority, even before the launching of SUMP development.

The SUMP development cycle, presented in the Figure below, represents the complete set of planning steps for SUMP, which can also be applied for SULP development. However, it has been recognized from cases analysis that the aggregation of some steps could be possible in order to put in place a process which could be implemented more easily by the municipalities and more easily followed by the stakeholders. It is true that there is limited knowledge and lack of access to information for UFT on the side of the local authorities. On the other side, however, industrial stakeholders have in depth knowledge of the UFT situation and requirements, but are only able to dedicate a limited amount of time and effort to the planning process; in addition, they lack the willingness to collaborate and exchange information with their competitors participating in the same planning process. In order to cope with such situations, a learning process for SULP development could be implemented. NOVELOG project suggested a simple learning process which is in line with the SUMP steps and is presented in Annex I.



Figure 1 Updated SUMP cycle.

In the following paragraphs of this chapter, recommendations are provided for each SUMP step in order to efficiently tackle the Sustainable Urban Logistics planning in the context of the SUMP. Figure 1. below shows the SUMP cycle, and the yellow stars indicate SUMP steps and activities for which this Guide (in its current version) provides recommendations and best practices in relation to SULP development. For the implementation of the remaining steps and activities, it is recommended that the local authorities follow the general instructions that are presented in the general SUMP Guide. The recommendations include methods, techniques and tools for supporting the implementation of each step of the process.

Based on the above, it is clear that the present document constitutes an additional guide to the updated SUMP guide. The SULP guidelines aims to provide practical assistance to a city on how to address the urban logistics aspects in the context of the city’s SUMP, and relate the reader with tools, methods and best practices that can be used for the successful implementation of the 7 first steps of the SUMP process. For the activities and steps for which this Guide does not provide instructions, it is recommended that the user follow the guidelines provided in the SUMP.

Furthermore, as the SULP Guide will be integrated into the updated SUMP Guidelines, it is strongly recommended to begin the SULP’s implementation after the definition of the overall sustainable mobility vision of the city. In this way, the city’s approach for sustainable distribution and service trips that will result from the SULP development process will be in line with the SUMP vision and will contribute to the realisation of the city’s overall sustainability vision.

4.2. SULP Implementation Steps & Recommendations

Phase 1: Preparation & Analysis

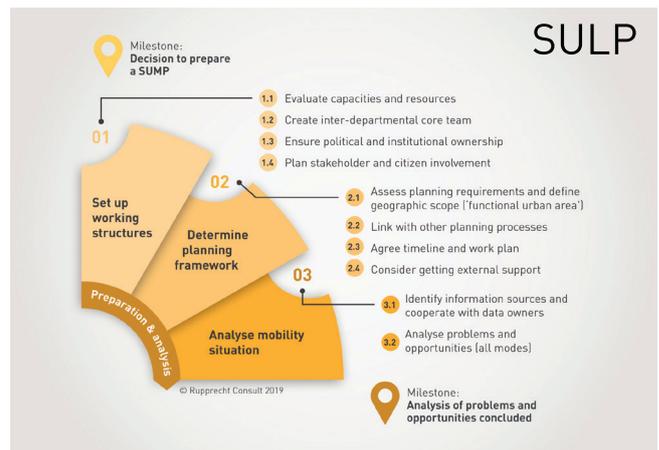
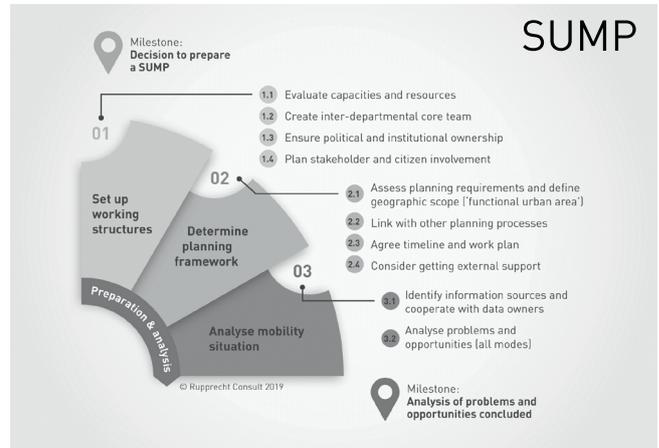


Figure 2 SULP process: Phase 1

Step 1: Set up working structures

SULP Activity 1.1: Create inter-departmental core team & consider getting external support

In the majority of European cities, in the municipalities there are no structures in place directly responsible for dealing with UFT planning and management. In some cities it was found, that the internal department responsible for the UFT had been staffed with one to two persons maximum.²² The initiation of the SULP development process requires, at minimum, the formation of a small team inside the municipality which possesses relevant expertise in the given domain,

²² HORIZON 2020 European project NOVELOG (2015), NOVELOG SULP Guidelines (http://novelog.eu/wp-content/uploads/2018/07/NOVELOG_SULP-Guidelines.pdf)

knowledge of the SUMP priorities, and familiarity with UFT policy and regulation frameworks. In the case of an absence of expertise within the municipality, a possible solution would be to contract external expertise in order to cover the corresponding skill requirements.

SULP Activity 1.2: Ensure political and institutional ownership & plan stakeholder and citizen involvement

Planning for sustainable city logistics is a participatory process requiring a stakeholder governance scheme. A key role is assigned to the Multi-Stakeholder Platform (MSP) for the development of the SULP. The MSP is considered as 'a mechanism for industry and local governments to work together in partnership to produce tangible outcome to localised freight transport problems'²³ and define a dedicated Sustainable Urban Logistics vision and set of measures, infrastructures and interventions to achieve this vision in the context of an integrated urban logistics planning. The mission of the platform is to achieve a common understanding of the problems and build a consensus towards a future vision, intervention scenarios, and measures. Due to the strong relevance of logistics industry involvement in this platform, it is recommended in the case of SULP development and in the context of the SUMP process, to organize and operate the SULP multi-stakeholder platform separately from the SUMP stakeholders' group or define it as a specialized subgroup.

Turin-Italy

- Express couriers (TNT, SDA, BARTOLINI, DHL, UPS, GLS)
- Industrial Stakeholders (ANFIA, API, Confindustria, Federauto, Unione Industriali, UNRAE)
- Association and logistics operators (AICAI, Apsaci, FEDIT, Federdistribuzione, Confartigianato Trasporti, FITA C.N.A., FAI)
- Retailers associations (ASCOM – Confcommercio, C.N.A., Confartigianato, Confcooperative, Confesercenti)
- Public Authority (Local Chamber of Commerce, Municipality of Turin, Ministry of Infrastructure and Transport, Piedmont Region)
- Technology partners (5T, Viasat, Torino Wireless)
- Freight Villages (Sito Interporto)

Figure 3 Turin's stakeholder mix of UFT's MSP

²³ Collings, S., 2003. A guide on how to set up and run freight quality partnerships. GOOD PRACTICE GUIDE 335.

Mixture & organization: A key criterion for a comprehensive and successful SULP is to identify who the relevant actors are and how to engage them in the process. The efficiency and validity of the UFT planning process is influenced considerably by the size and makeup of the MSP.

Recommendations

Based on past experiences in the development of multi-stakeholder platforms¹⁶, it is recommended to build the stakeholder platform for UFT around three main stakeholder groups with their participation as presented below:

Supply Chain Stakeholders (e.g. Freight Forwarders, Transport Operators, Shippers, Major Retail chains, Shop owners) up to 28% of the total number

Public Authorities (e.g. Local Government, regional or national government) up to 28%

Other stakeholders (e.g. Industry and Commerce Associations, Consumers Associations, Research and Academia) up to 36%

Experts up to 8% of the total number of participants in the platform.

The type of role each participant holds within the organization he/she represents (e.g. executive, CEO, distribution/logistics manager, driver, etc.) is important for the robustness and efficiency of the platform.

An important participant is the 'neutral partner', i.e. a person who seems to neither favour 'the public nor private partner' (Lindholm and Browne, 2013), and who will primarily chair and manage the partnership. Previous experience shows that Academia/researchers or 3rd party consultants can effectively function in such a role. An important issue is to ensure that inevitable imbalances in the membership of the MSP can be mitigated, for example, by ensuring that neither the public nor the private sector always dominates the discussions.

SULP Activity 1.3: Evaluate capacities and resources

The core resources needed by a Local Authority for a successful SULP development are: a) the people being

assigned the responsibility for developing a SULP; b) the legal framework assessment for enabling new UFT regulation; c) the data/information and tools required for identifying characteristics, quantifying UFT of the city, associating reasons to problems creations, and justifying alternative measures.

Because of the unavailability of people responsible for urban freight transport in the majority of public authorities around Europe, the activity of relevant working structure development (Activity 1.1.) was prompted first by the corresponding SULP process.

A very challenging issue at this stage, is the identification and gathering of data and information needed for planning and securing the availability of tools for the same purpose.

All local authorities are in a position to determine and describe passenger mobility issues in both a quantifiable and a qualitative way. However, only a relatively small number are in a position to do the same for urban freight transport, i.e. to describe the size and characteristics of these transport activities. The majority of the existing data is private, and dedicated surveys need to be executed regularly. Additionally, cities are wondering which data and with which method this data should be collected and analysed for supporting the planning process for sustainable city logistics.

The majority of data describing the UFT in the city is mainly owned by the industrial stakeholders. It is therefore important at this stage to prepare the ground and define the framework for data provisioning in cooperation with the members of the stakeholders' platform, for securing that at least a minimum set of data (please refer to activity 3.1) will be made available that is measured and calculated in the same way by different companies.

The adoption of ITS technologies by cities and logistics industry actors provides the possibility for generating UFT related data through the analysis of the ITS systems recorded information. Truck floating data, traffic

monitoring and surveillance systems data, when being analysed properly, may provide the number of freight vehicles in the city every day, their mileage, their Origin & Destinations, the routes used, the number of deliveries per vehicle, etc., all of them being important in describing the UFT situation in the city.

Finally, regarding the tools needed for UFT planning, these mainly refer to transport models which allow the quantification of transport demand, supply, as well as forecasts. Although in the majority of cases, cities have models for passenger mobility, they don't have urban freight models. Cities need to request external expertise for model development since this is a demanding exercise in terms of identifying required skills and resources (to be examined in SULP Activity 1.1.).

Recommendations

A Data collection framework for UFT:

By using a holistic data collection framework for UFT, local authorities can receive answers on how the process for gaining valuable knowledge on a city's current UFT situation should be structured, what information to collect, and how.

Depending on the planning activity cities are initiating (i.e. justification of a single measure or infrastructure development, integrated UFT intervention scheme in an area, or horizontal sector specific action, etc.) the details of data collection and analysis are also provided. Annex II presents firstly, an extensive list of data that can be collected for each urban freight transport aspect, and secondly, a summary of urban freight survey techniques.

The following have to be reviewed in collaboration with the UFT stakeholders:

1. Confirm in the MSP meeting the tools and data that are available for UFT planning.
2. Compare the data proposed in the Data Collection Framework presented with your own available data, in order to identify which further data should be collected.
3. Verify that the working structures and the contribution of each stakeholder involved in the MSP correspond to the data and resources identification and collection by conducting and signing a Memorandum of Understanding/Partnership agreement.



Figure 4 Example of ITS and planning tools in Pisa

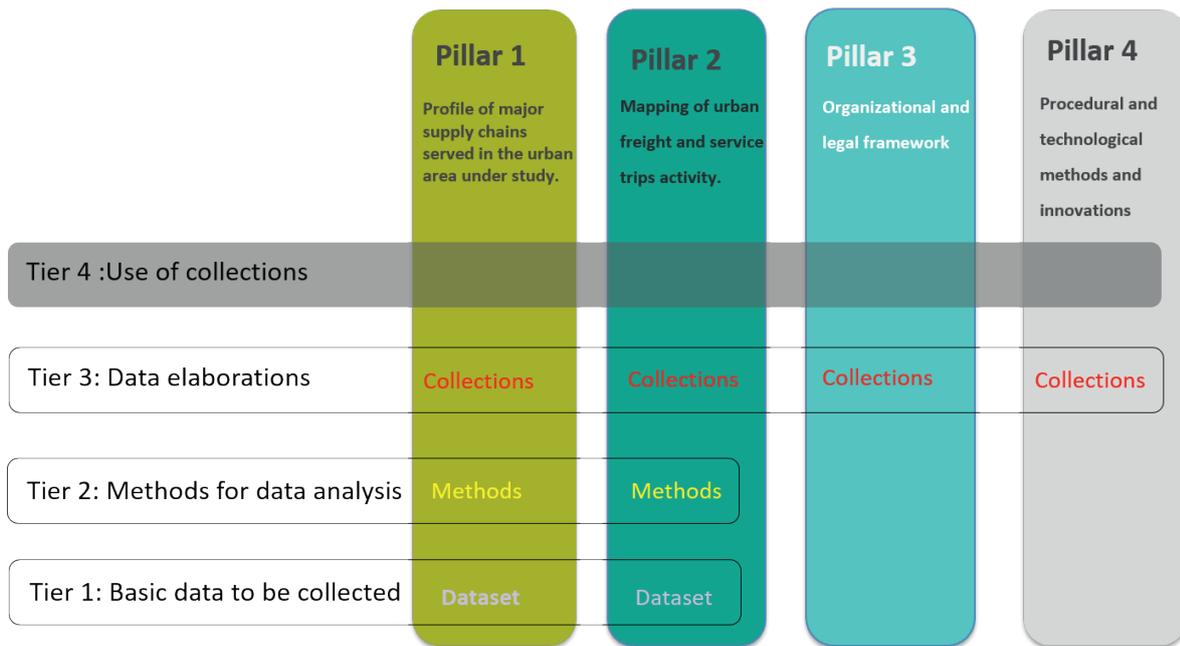


Figure 5 Example of a Data Collection Framework (NOVELOG 2015, D2.1)

Step 1 Checklist:

- The inter-departmental team formulated
- City’s UFT stakeholders identified
- Multi-Stakeholder Platform/Freight Quality Partnership created
- Capacity of resources defined and available
- Tools availability ensured
- Legal framework and interrelation to the SUMP defined
- MOU/ Partnership agreement among the MSPs participants has been signed.

Step 2: Define the development process and scope of the plan

SULP Activity 2.1: Assess planning requirements and define geographic scope (“functional urban area”)

City logistics make up the last mile of a broader supply chain, with the respective infrastructure usually located at the boundaries of urban areas. Therefore, the geographical coverage of the plan might need to have a strong regional dimension. On the other hand, the negative impact of city logistics operations may be concentrated on a specific urban area, demanding for local measures in order to be alleviated. Therefore, the definition of the territory of a SULP requires both aspects to be taken into account, and should be guided by the typology of supply chains with an origin/destination in the area.

Cities can be distinguished based on six main criteria: 1) Economic activity, Infrastructure, Gross Domestic Product; 2) Degree of integration of freight-generating activity, such as the presence of a few large employers in a city; 3) Political culture; 4) Culture; 5) Degree of logistics sprawl; 6) Legal and regulatory framework.

Recommendations

The use of tools, such as a poly-parametric city typology (Annex II) is recommended, as such tools describe and



Figure 6 Partnership agreement during the implementation of Copenhagen’s Freight Network & MSP

support the definition of the urban area on which the SULP should focus. Apart from defining the SULP reference area, City Morphology allows for comparisons with other cities in order to gain inspiration from city-relevant best practices.

SULP Activity 2.2: Link with other planning processes

As SULP makes up part of the SUMP process, linking up with other planning processes and organizations is necessary. An analysis of how the sustainable urban logistics planning process is interrelated and affects other policies at the local and regional level, should be undertaken.

Recommendations

It is recommended that the implementation of Activity 2.2. be based mainly upon the results that emerge from the corresponding step of the SUMP process.

SULP Activity 2.3: Involve the stakeholders in the planning process

Involving a variety of relevant stakeholders throughout the planning process helps in the legitimacy, quality, and cost effectiveness of the SULP’s development.

Recommendations

In addition to ensuring the involvement of the stakeholders in the planning process through their participation in the MSP, a web-based Stakeholders Governance Platform which supports stakeholders’ consensus building would significantly facilitate the participation process. Furthermore, existing consensus building tools on city logistics can be used in order to facilitate the decision-making process among several stakeholders, such as the Understanding the Cities Tool (UCT). The process embedded in the UCT, is presented in the Figure below.^{24,25}

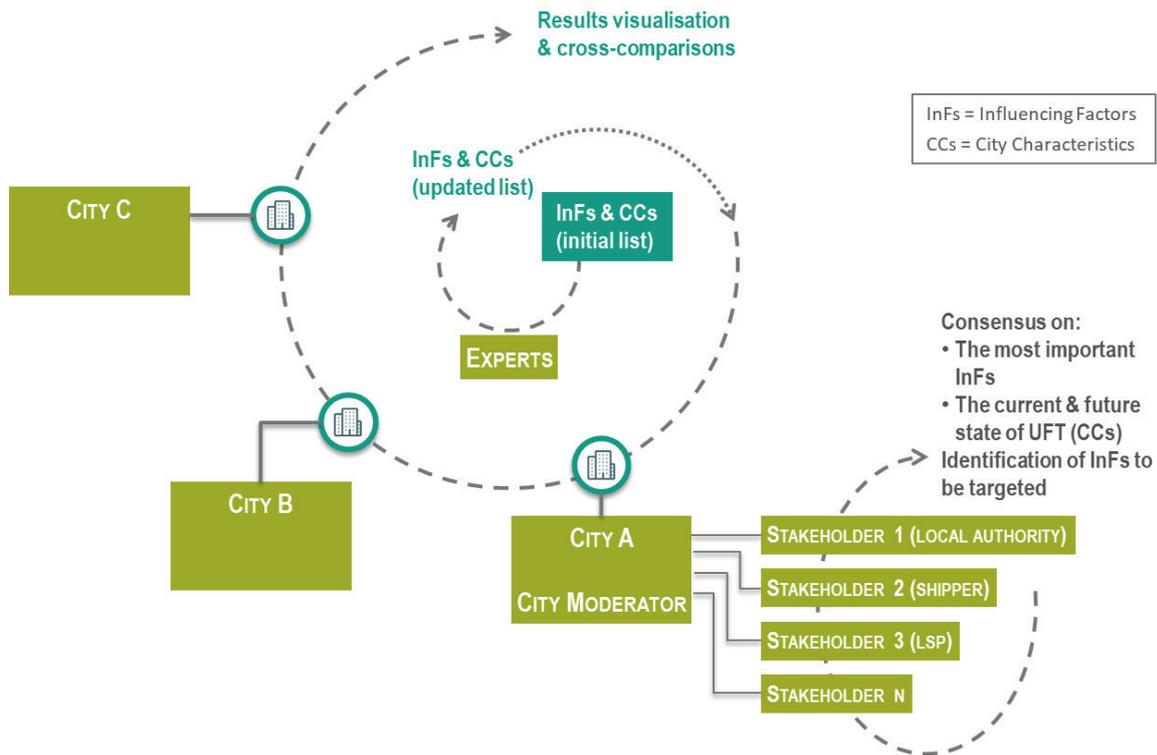


Figure 7 Example of a consensus building process

²⁴ HORIZON 2020 European project NOVELOG (2015): NOVELOG Understanding the Cities Tool (UCT) (uct.imet.gr)

²⁵ The NOVELOG UCT aims to support city stakeholders in two alternative ways. First, it can guide stakeholders to define the most important factors influencing their UFT environment today and in the future and agree on their relative importance. It can also help them reach consensus on the current and future (2020 & 2030) state of their local UFT.

SULP Activity 2.4. Agree time plan and work plan

Draft a work plan including objectives, types of procurement, and roles of the single stakeholders, activities and specific stakeholders' deadlines during the development and implementation of the SULP.

The management and implementation arrangements may be formalized in written Memoranda of Understandings among the UFT stakeholders participating in the MSP. Responsibility for specific activities can be assigned to subgroups of the MSP.

Recommendations

The identification of types of cooperation among private actors and between public and private stakeholders is recommended for the successful implementation of cooperative business models for UFT measures. The stimulation of the cooperation should start at this stage by communicating failure and success stories, as well as examples for appropriate business models per UFT measure.

Step 2: Checklist

- Geographic scope defined
- Relevant policy linkages identified (synergies and conflicts)
- Initial options for policy integration assessed.
- Initial prioritisation of integration options decided
- Consensus building activities implemented
- Work plan and time plan agreed on

Step 3: Analyse the current UFT situation

SULP Activity 3.1: Identify information sources and cooperate with data owners

Acting on UFT problems is often an urgent matter and requires quick reference to a basic description of the UFT in the city and its evolution progress over the years. Basic knowledge of a city's UFT implies knowing the magnitude of the daily urban freight transport flows (number of vehicles & vehicles-kms, tonnes & tonne-kms) and their spatial distribution (volume of freight vehicles on road network) or the average daily service trips by category, of major freight transport generators (i.e. shops in the city centre, supermarkets, commercial malls, home deliveries, etc.).

Recommendations

1) A minimum dataset of UFT activities is presented in the next Figure, which describes the UFT characteristics of a city and thus provides base knowledge of the city logistics issues in any urban area.

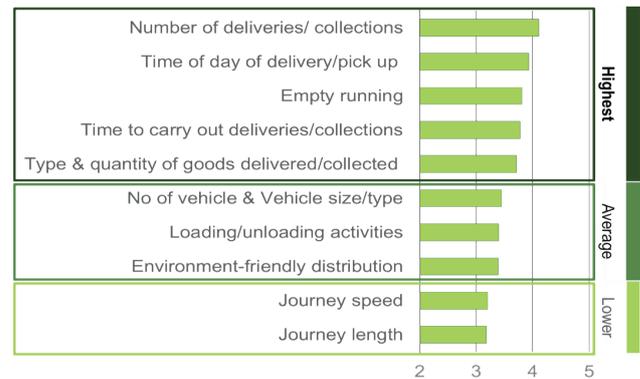


Figure 8 Minimum dataset for describing UFT characteristics (NOVELOG project, 2015)

The above (or enriched) set of data is proposed to be collected regularly by the local authorities. This can be achieved in the following ways:

- By engaging the transport and logistics industry actors in a regular data provision process. Since Municipalities provide the operational licence for the majority of activities (commercial or others) that constitute main freight transport generators, it is recommended that data provision be obligatory (i.e. twice or three times per year) as part of the operational licence maintaining procedure. In the case of a specific geographical area intervention, it was also found effective for convincing industry to provide data in order to relate data provision to area access permission.
- Through conducting experts' workshops to collect average values for the minimum data set for UFT description.

2) Use of online databases and Observatories such as the Observatory of Strategic Development impacting Urban logistics²⁶, which was developed in the frame of the EU funded CityLab project. The City-Lab Observatory provides data and analysis on some of the most important or less well known trends that will shape the urban

²⁶ HORIZON 2020 European project CityLab, Observatory of Strategic Development Impacting Urban Logistics (<https://civitas.eu/tool-inventory/observatory-strategic-developments-impacting-urbanlogistics>)

mobility of goods in the future, including: 1) *Logistics land uses, logistics real estate, and logistics sprawl*, 2) *E-commerce, e-grocery, and instant deliveries (on-demand delivery service within two hours)*, 3) *Circular economy* and 4) *Service trips*

SULP Activity 3.2: Analyse problems and opportunities

The analysis of the current UFT situation of a city is usually performed by quantifying major operational parameters, as well as impact and externalities, resulting from UFT operations. There are different descriptive approaches for the situation analysis.

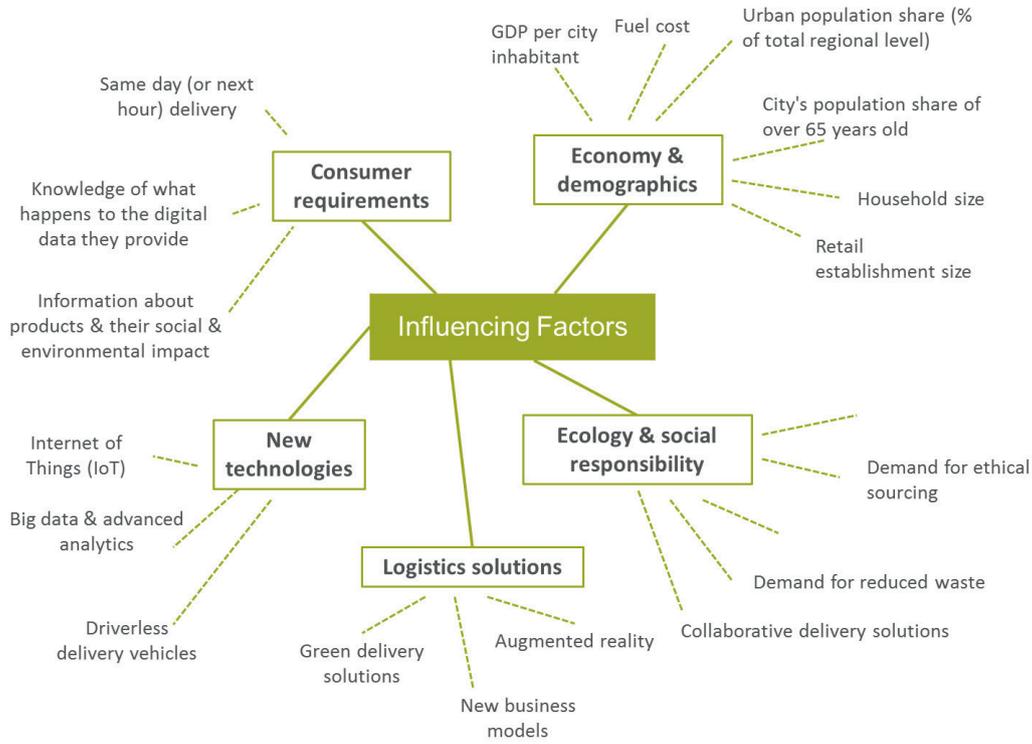


Figure 9 List of UFT influencing factors



Figure 10 List of UFT City Characteristics

Recommendations

A system of correlated UFT city characteristics parameters and key influencing factors for describing the UFT situation is suggested and presented in Figures 9 and 10^{27,28}. The first set of parameters mirror the result of the current operations, while UFT Influencing Factors refer to areas of policy baselines and intervention. As part of Step 3 of the SULP process a city should identify the main characteristics and influencing factors of its UFT.

Finally, some examples of tools that could significantly facilitate the analysis of the problems and opportunities of a city's UFT are: 1) consensus building tools, like those proposed in SULP Activity 2.3., which can serve as facilitators for understanding the current situation of a city's UFT by taking into account the opinion of several actors; 2) simulation models²⁹ and freight generation / freight trip generation models³⁰ for describing the current and future urban freight transport demand and simulating future urban freight demand based on policy and economic scenarios³¹. The simulation tools can significantly help the cities that do not have a sufficient budget to implement a plethora of UFT surveys

Step 3: Checklist

- City's minimum UFT dataset formulated
- Data collected
- City's UFT characteristics & Influencing Factors defined
- UFT problems and opportunities defined

²⁷ HORIZON 2020 European NOVELOG project's Understanding the Cities Tool (www.uct.imet.gr)

²⁸ A. Stathacopoulos, G. Ayfantopoulou, E. Gagatsi, E. Xenou, M. Vassilantonakis, (2017), Understanding UFT: moving from the "city's authority" issue of today to an integrated "city stakeholders" consideration, VREF Conference

²⁹ The model was built by the LAET (<http://tmv.laet.science/>) from the results of the French Urban Goods Movements surveys carried out during the second half of the 1990s in Bordeaux, Dijon and Marseilles <http://freturb.laet.science/>

³⁰ Holguín-Veras, J., Jaller, M., Sánchez-Díaz, I., Campbell, S. and Lawson, C.T., 2014. Freight generation and freight trip generation models. In *Modelling freight transport* (pp. 43-63). Elsevier.

³¹ FP7 project TURBLOG (2011) Transferability of urban logistics concepts and practices from a worldwide perspective- Deliverable 3.1. "Urban logistics practices-Paris Case Study"

Phase 2: Strategy development

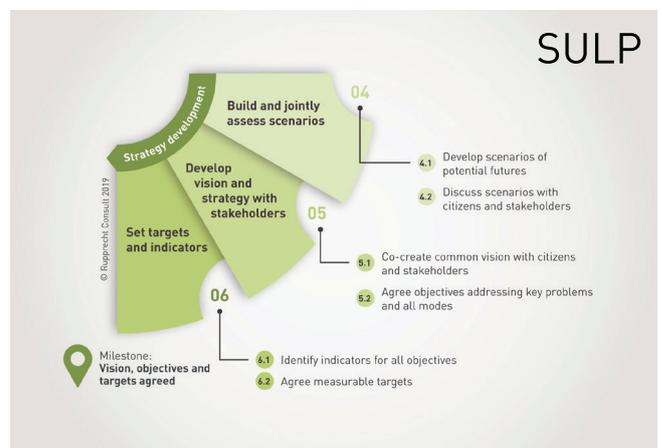
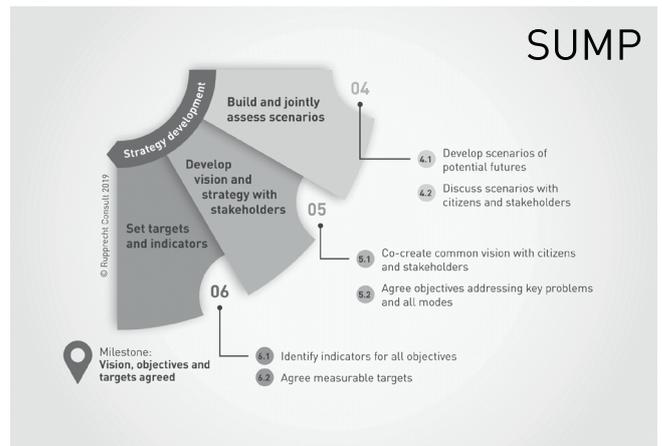


Figure 11 SULP process: Phase 2

Step 4: Build and jointly assess scenarios

SULP Activity 4.1: Develop scenarios with citizens and stakeholders

The private stakeholders, companies and enterprises involved in the MSP define their individual plans on the basis of quantified targets. It is therefore suggested that the future vision of a SULP be articulated on quantified targets for specific UFT parameters in three-time horizons.

Recommendations

It is proposed that the involved stakeholders describe the future UFT characteristics in the case of no action being taken and for the scenarios related to infrastructure development and trends (on demand, supply, disruptive technology), as well as Policy implementation.

In the meantime, a 3-step consensus building process for the development of future scenarios and the common vision of a city is proposed:

- In the first round involve city authorities, local experts, and stakeholders with the aim of developing three scenarios (current, 2030, 2050), with three levels of intervention (minimum, medium and maximum) based on the previous tasks' results (i.e. the analysis of the city's UFT situation).
- In the second round, brainstorm the ideas internally on the scenarios developed in the previous round.
- In the third round, if necessary, address the suggestions of the experts to the local stakeholders and examine the possibility of integrating suggestions in each scenario that has been developed in the previous rounds.

An example of the results following the implementation process mentioned above is presented in Figure 12.³²

For the successful implementation of the consensus building process mentioned above, the city authorities should take into consideration the following:

- Implement training actions and coordinated activities at a city's authority level before implementing the consensus building process on the scenario development.
- Arrange personal meetings with the stakeholders.



Figure 12 Example of Graz's results on building scenarios on the areas of future intervention following the 3-step consensus building process

³² HORIZON 2020 European project NOVELOG (2015), Deliverable 2.4. Urban freight and service scenarios (www.novelog.eu)

SULP Activity 4.2: Discuss scenarios with citizens and stakeholders

The next step following the outputs of Activity 4.1. is the capitalization of those to the participants of the city's MSP. Similarly to the general SUMP process, the main aim of this Activity is to achieve a common understanding on: 1) the possible options for intervention; 2) the difficulties and obstacles that need to be overcome in order to implement the defined scenarios; 3) the possible interdependencies and trade-offs between different policies and; 4) the potential conflicting interests among the involved actors.

Step 4: Checklist

- Future UFT scenarios co-created with stakeholders
- Scenarios validated by MSP's participants

Step 5: Develop vision and objectives with stakeholders

SULP Activity 5.1: Co-create common vision with citizens and stakeholders

Following the identification of the city's vision in the framework of the SUMP process, the city planners together with the stakeholders should proceed to the definition of concrete objectives that are considered feasible in a relatively short period of time. The outputs of this step will be included as input for the corresponding Activity 5.2 of the SUMP process as the main objectives set related to urban freight transportation and logistics.

SULP Activity 5.2: Agree objectives addressing key problems and all modes

It is strongly recommended that the SULP is implemented in parallel with the SUMP procedure, and after the definition of the overall sustainable mobility vision of the city. In this way, the city's approach for sustainable city logistics that will result from the SULP development process will be in line with the SUMP vision and will focus on serving the sustainability objectives set by the city. Therefore, the output of the SULP Activity 5.1. depends entirely on the output of the SUMP Activity 5.1.

Step 5: Checklist

- SULP objectives defined and agreed on with stakeholders

Step 6 Set targets and indicators

SULP Activity 6.1: Identify indicators for all objectives and Agree on measurable targets

Similarly, to the process proposed in the SUMP concept, following the identification of concrete and feasible objectives, a set of achievable targets should be defined, accompanied by a clear set of assessment indicators.

Recommendations

This process can be facilitated by the use of a comprehensive Evaluation Framework³³ which would incorporate an exhaustive list of primary and secondary objectives and associated indicators for measuring the expected impact of the overall SULP, as well as of an individual implementation of UFT measures.

The proposed Evaluation Framework consists of four modules, namely: impact assessment, social cost-benefit analysis, adaptability and transferability analysis, and risk analysis. In addition, behavioural modelling is also integrated in order to support the modules in the qualitative data collection (indicators and weights), as well as to enable measuring potential behavioural change related to UFT operations.

The 'diamond' in Figure 13 reflects the four modules and the behavioural modelling, from which life cycle sustainability assessment components originate, and,

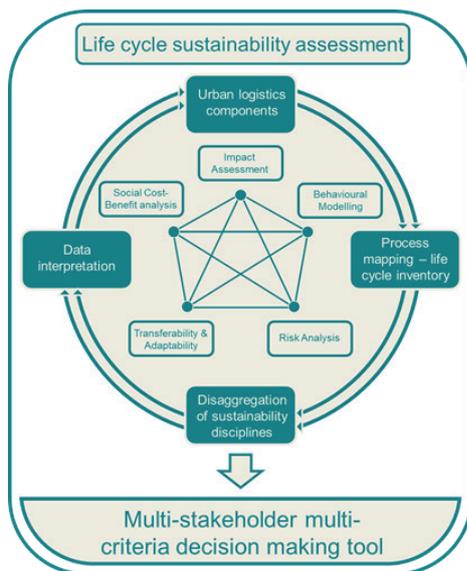


Figure 13 Example of the process followed in the correspondent Evaluation Framework

³³ HORIZON 2020 European NOVELOG project (2015), Deliverable 3.1. "Evaluation Framework"

additionally addresses the interrelation among these components³⁴.

Step 6: Checklist

- Measurable targets and assessment indicators defined
- Evaluation Frameworks defined

Phase 3: Measure planning

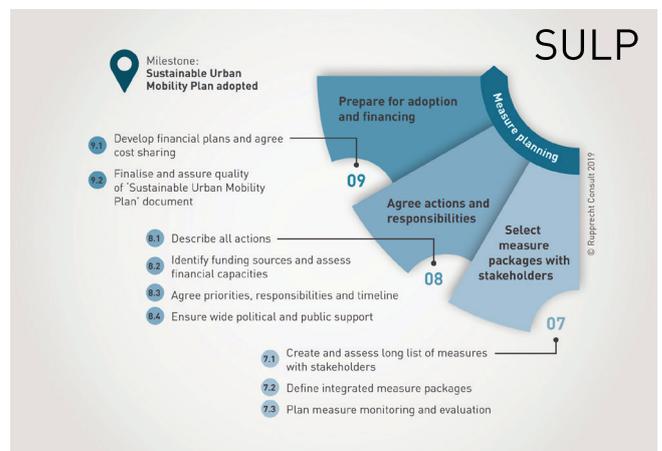
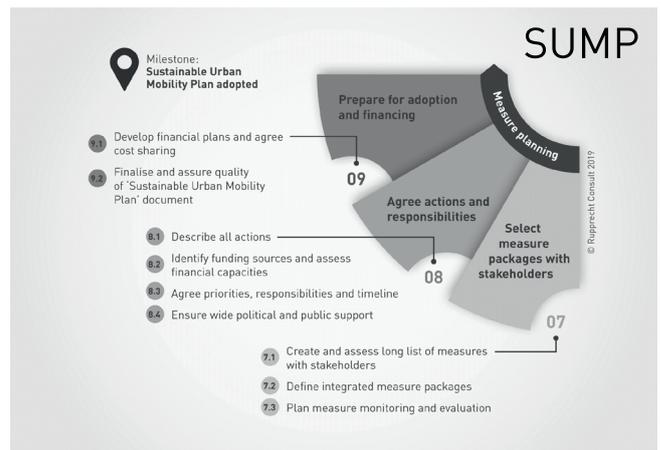


Figure 14 SULP process: Phase 3

Step 7: Select measure packages with stakeholders

SULP Activity 7.1: Create and assess measures with stakeholders & Define integrated measure packages

Selecting measures or a package of measures for completing and integrating a SULP approach is mainly

³⁴ Nathanail, E., Adamos, G., Gogas, M., (2016a). A novel framework for assessing sustainable urban logistics. 14th World Conference on Transport Research, Shanghai, China, July, 10-15, 2016.

influenced by the ability of the measure, either isolated or combined with other measures, to achieve the desired impact (efficiency, CO2 reduction, etc.) The level of success of each measure depends on the characteristics of the urban environment in conjunction with the UFT characteristics. In addition, the readiness of the area of intervention (infrastructure, policies, cooperation level, etc.) for the adoption of the respective measure further defines the level at which the measure might be proved appropriate for implementation. The first step for identifying the most appropriate measure, based on the unique typology and morphology of each city, is to learn from past experiences and results.

Recommendations

The following methodological approach is recommended:

1. Follow a grid methodology for comparing the performance of the last experiences on the implementation of the measures identified based on each city’s typology. Annex III presents a detailed example of a city’s typology.
2. Use tools that can match measures and interventions with city typologies, as well as city logistics observatories³⁵. Annex III presents a tool that has been developed in the frame of EU funded project which constitutes a concrete and up-to date database of UFT measures that have been implemented in Europe, together with their impacts
3. Discuss outputs with stakeholders. For enabling the simultaneous evaluation of alternative policy measures, technologies, etc., while explicitly including different stakeholders’ opinions at an early stage of the decision-making process, tools such as the Multi-Actor Multi-Criteria Analysis (MAMCA) Software³⁶ could be great facilitators.
4. Finalize the SULP package of measures.

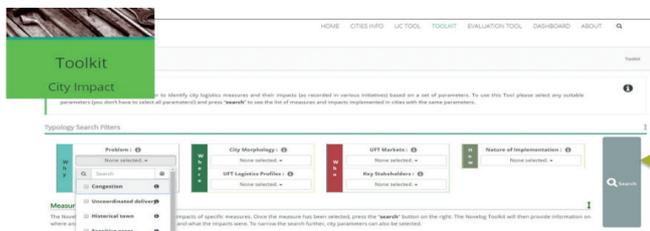


Figure 15 Example of UFT measures Databases

³⁵ HORIZON 2020 European NOVELOG project’s Toolkit (<http://www.uct.imet.gr/Novelog-Tools/Toolkit>)

³⁶ Interreg IVB project, Nisto (2013), Multi-Actor Multi-Criteria Analysis (MAMCA) Software (<http://www.mamca.be/en/>)

Annex IV presents a list of indicative UFT measures, as well as measure packages that have been implemented in the frame of EU funded projects.

SULP Activity 7.2: Plan measure evaluation and monitoring

Assessing and monitoring the implementation of the measures is crucial for the successful development and implementation of a SULP. Therefore, this Activity refers to the calculation of the key performance indicators, which were identified in Activity 6.1., before and after the implementation of the selected measure. The ex-ante and ex-post assessment process will reveal whether or not an adopted measure was actually able to achieve the desired outcome.

Recommendations

The use of web-based tools, such as the Evaluation Tool³⁷ and the PLAN³⁸ tool, is strongly recommended. The use of such tools could help the persons responsible for decision making at the strategic, tactical and operational levels in two ways: firstly, by helping conduct an integrated investigation and comparison or ranking of all the possible alternative solutions, by assessing their effectiveness, and supporting and justifying their decision making through the quantification of each alternative solution’s impact on economy, environment, energy, transport and social acceptance; and secondly, by analysing the upcoming decisions using optimisation methods.

Step 7 Checklist

- Relevant past experiences considered
- Supporting tools for potential UFT measures identification available and used
- Package of measures defined & agreed on with the MSPs stakeholders
- Suitable set of measure indicators selected
- Monitoring and evaluation arrangements for all indicators developed

³⁷ HORIZON 2020 European project Novelog (2015), NOVELOG Evaluation Tool (EVALOG) <http://www.uct.imet.gr/Novelog-Tools/Evaluation-Tool>

³⁸ HORIZON 2020 EU project Optimum, PLAN: Efficiency and Economy through appropriate Mathematical Modelling (<https://civitas.eu/tool-inventory/plan-efficiency-and-economy-through-appropriate-mathematical-modelling>)

Step 8: Agree actions and responsibilities

SULP Activity 8.1: Describe all actions

For the implementation of this step, the city or any interested party can follow the SUMP's instructions related to the corresponding SUMP Activity 8.1.

SULP Activity 8.2: Identify funding sources and assess financial capacities

The implementation of sustainable UFT measures/solutions incorporates specific risks and challenges in terms of their implementation. This is mainly due to the

lack of critical mass and the need for additional mode change that is usually required by some of the measures. In this context, the cooperation of the private stakeholders for increasing load factors and decreasing the number of freight vehicles entering the city centre is important. Similarly, win-win cooperation schemes between public and private stakeholders for allowing innovative UFT measures (micro consolidation, lockers, bike logistics, Urban consolidation centres, etc.) need to be examined in order to secure the long-term sustainability of the measures.

Table 1: Example of different types of UFT Business Models

Consolidation scheme	Customer (offering)	Value proposition	Reduced value proposition	Revenue stream	Cost structure
Urban consolidation centre (UCC)	LSP (UCC services)	Green branding Responsiveness to delivery (due to proximity) Value-added services	Additional fixed costs Additional handling	Subscription model	Existing UCC to be renovated Operational costs
	LSP (EV renter solutions)	Green branding EV rental (and recharging)	Additional transport costs	Subscription model	Purchase of vehicles and charging system
Micro-consolidation centre (MCC)	LSP (Light goods delivery)	For receivers - higher availability and therefore convenience Reduced transport cost Access to restricted area Pick-up point for parcels	Additional handling	Long-term contract with LSP No extra cost to receiver Charged for parcel pick-up	Investment and operational costs for MCC Real estate (provided by municipality) Investment and operational cost for cargobike deliveries
	(Other) LMO (Bicycle servicing)	Bicycle repair, recharge	None	Per use	ICT fleet management system
	City council (Delivery/transport data)	Understand UFT flows for e-commerce	None	-	
Receiver-led consolidation (RLC)	Retailers in shopping (replenishment with consolidate transport)	Delivery flexibility Delivery reliability and punctuality "Basic" transport service cost reduced Value-added services	None	Base service - paid by shopping centre owners Extra services - paid by tenants	Use of existing UCC/warehouse - no new investment cost Operational costs
Automated locker system (ALS)	LSP (Light goods delivery)	Reduced failed deliveries Reduced costs for transport Access to city Green branding	Extra costs for usage	Pay-per-use charged to LSP	Real estate (fully funded by municipality) Installation of lockers Operating costs (maintenance, surveillance, energy, ICT system)
	Receivers (Light goods delivery)	Reception flexibility Reception accessibility No extra cost	May not fit every receiver due to travelling	None	

Recommendations

A proposed methodological approach for identifying the viability of the proposed measures in the framework of a SULP/SUMP is as follows:

1. Adapt the city logistics Business Model Canvas for mapping the value of cooperation for the different stakeholders
2. Revise the cooperative business model for increasing robustness and resilience of cooperation
3. Evaluate the Business models for assessing the impact in the UFT measures' financial viability.

SULP Activity 8.3: Agree priorities, responsibilities and timeline

The next implementation step is to agree on the priorities, responsibilities and timeline of the measure that will be developed. This can be achieved by signing a Partnership Agreement or Memorandum of Understanding among the stakeholders involved. The city, or any interested party, can follow the SUMP's assistance (SUMP Activity 8.3.) for implementing this step, as the managerial/administrative procedure in the implementation of any type of measure (on city logistics or mobility) is the same.

SULP Activity 8.4: Ensure wide political and public support

For the implementation of this step, the city or any interested party can follow the SUMP's instructions related to the corresponding SUMP Activity 8.4.

Step 8 Checklist

- Responsibilities and budget for monitoring and evaluation agreed on
- All actions identified, defined, and described
- Relationships between actions identified
- Financial analysis and financial resources secured
- Timeline defined
- Political support ensured

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Annex I: Aggregated SUMP process for SULP

The high UFT problem complexity is attributed to the existence of multiple industrial stakeholders and the fragmented environment of their business operation. Depending on each city's context particularities, i.e. magnitude of the problem, desired level of intervention (city holistic plan or area level action, available time until intervention implementation etc.) local authorities may find it useful or necessary to merge some SUMP activities when developing a SULP. In other cases, the priority in

implementing the actions within a SUMP phase might need to change.

Figure 16 shows a SUMP step aggregated approach for SULP development, the subsequent table matches this lean process steps with the full SUMP process.

Figure 16 SULP cycle integrated within SUMP



Checklists

Step 1	Step 2	Step 3
<ul style="list-style-type: none"> The inter-departmental team formulated City's UFT stakeholders identified Multi-Stakeholder Platform/Freight Quality Partnership created Capacity of resources defined and available Tools availability ensured Legal framework and interrelation to the SUMP defined MOU/ Partnership agreement among the MSPs participants has been signed. 	<ul style="list-style-type: none"> Geographic scope defined Relevant policy linkages identified (synergies and conflicts). Initial options for policy integration assessed. Initial prioritisation of integration options decided. Consensus building activities implemented Work plan and time plan agreed 	<ul style="list-style-type: none"> City's minimum UFT dataset formulated Data collected City's UFT characteristics & Influencing Factors defined UFT problems and opportunities defined
Step 4	Step 5	Step 6
<ul style="list-style-type: none"> Future UFT scenarios co-created with stakeholders Scenarios validated by MSP's participants 	<ul style="list-style-type: none"> SULP objectives defined and agreed with stakeholders 	<ul style="list-style-type: none"> Measurable targets and assessment indicators defined Evaluation Frameworks defined
Step 7	Step 8	
<ul style="list-style-type: none"> Relevant past experiences considered Supporting tools for potential UFT measures identification available and used Package of measures defined & agreed with the MSPs stakeholders Suitable set of measure indicators selected. Monitoring and evaluation arrangements for all indicators developed. 	<ul style="list-style-type: none"> Responsibilities and budget for monitoring and evaluation agreed on. All actions identified, defined, and described. Relationships between actions identified. Financial analysis and financial resources secured Timeline defined Political support ensured 	

Table 2: SULPs Implementation Steps. Comparison with the SUMP process

SUMPs Implementation Steps	SULPs Implementation Steps - in relation to the SUMP Methodology
Phase 1: Preparation & Analysis	
Step 1: Set up working structures	Step 1: Set up working structures
Activity 1.1: Evaluate capacities and resources ○	SULP 1.1.SUMP Activity 1.2.: Create inter-departmental core team & SUMP Activity 2.4. Consider getting external support ○
Activity 1.2: Create inter-departmental core team ○	SULP 1.2.- SUMP Activity 1.3. Ensure political and institutional ownership & SUMP Activity 1.4: Plan stakeholder and citizen involvement & ○
Activity 1.3: Ensure political and institutional ownership ○	SULP 1.3.-SUMP activity 1.1. Evaluate capacities and resources ○
Activity 1.4: Plan stakeholder and citizen involvement ○	
Step 2: Determine planning framework	Step 2: Determine planning framework
Activity 2.1: Assess planning requirements and define geographic scope (based on 'functional urban area')	SULP 2.1.-SUMP Activity 2.1: Assess planning requirements and define geographic scope (based on 'functional urban area')
Activity 2.2: Link with other planning processes	SULP 2.2. – SUMP Activity 2.2.: Link with other planning processes
Activity 2.3: Agree timeline and work plan ○	SULP 2.3.- New Activity: Involve the stakeholders in the planning process
Activity 2.4: Consider getting external support	SULP 2.4.-SUMP Activity 2.3: Agree timeline and work plan ○
Step 3: Analyse mobility situation	Step 3: Analyse UFT situation
Activity 3.1: Identify information sources and cooperate with data owners	SULP 3.1.- SUMP Activity 3.1. Assess & improve City's knowledge on its UFT profile
Activity 3.2: Analyse problems and opportunities (all modes)	SUMP 3.2.- SUMP Activity 3.2: Analyse problems and opportunities (all modes)
Phase 2: Strategy development	
Step 4: Build and jointly assess scenarios	Step 4: Build and jointly assess scenarios
Activity 4.1. Develop scenarios of potential futures	SULP 4.1.-Activity 4.1. Develop scenarios of potential futures
Activity 4.2. Discuss scenarios with citizens and stakeholders	SULP 4.2.-Activity 4.2. Discuss scenarios with citizens and stakeholders
Step 5: Develop vision and objectives with stakeholders	Step 5: Develop vision and objectives with stakeholders
Activity 5.1: Agree common vision of mobility and beyond	SULP 5.1.- SUMP Activity 5.1.- Agree common vision of mobility and beyond ³⁹
Activity 5.2: Co-create objectives for all modes with stakeholders	SULP 5.2.-SUMP Activity 5.2.- Co-create objectives for all modes with stakeholders

*The coloured circles show the interrelation among the SUMP and the SULP steps



³⁹ It is strongly recommended, that the SULP Activity 5,1 be based on the main outputs of the corresponding SULP Activity 5.1. in order to avoid any inconsistencies.

SUMPs Implementation Steps	SULPs Implementation Steps - in relation to the SUMP Methodology
Step 6: Set targets and indicators	Step 6: Set targets and indicators
Activity 6.1: Identify indicators for all objectives	SULP 6.1.-SUMP Activity 6.1: Identify indicators for all objectives
Activity 6.2: Agree measurable targets	SULP 6.1.-SUMP Activity 6.2: Agree measurable targets
Phase 3: Measure Planning	
Step 7: Select measure packages with stakeholders	Step 7: Select measure packages with stakeholders
Activity 7.1: Create and assess long list of measures with stakeholders	SULP 7.1. – SUMP Activity 7.1. & 7.2.: Create and assess long list of measures with stakeholders & Define integrated measure packages ○
Activity 7.2: Define integrated measure packages ○	SULP 7.2.- SUMP Activity 7.3., Plan measure evaluation and monitoring ○
Activity 7.3: Plan measure evaluation and monitoring ○	
Step 8: Agree actions and responsibilities	Step 8: Agree actions and responsibilities
Activity 8.1: Describe all actions	SULP 8.1.-SUMP Activity 8.1. Describe all actions (Follow the instructions of SUMP Guidelines)
Activity 8.2: Estimate costs and identify funding sources	SULP 8.2. -SUMP Activity 8.2., Estimate costs and identify funding sources
Activity 8.3: Agree priorities, responsibilities and timeline	SULP 8.3.- SUMP Activity 8.3. Agree priorities, responsibilities and timeline
Activity 8.4: Ensure wide political and public support	SULP 8.4.-SUMP Activity 8.4.: Ensure wide political and public support
Step 9: Agree actions and responsibilities <i>Follow the instructions and recommendations mentioned in the updated SUMP Guidelines</i>	
Phase 4: Implementation and monitoring <i>Follow the instructions and recommendations mentioned in the updated SUMP Guidelines</i>	

Annex II: UFT Data & Surveys

Annex II provides guidance on how to implement a comprehensive urban freight data collection⁴⁰ by presenting: 1) an extensive list on all type of urban freight data that could be collected per type of urban freight

aspect (Table 3) and 2) all the types and different techniques that exist in literature which on how this data can be collected.

Table 3: Data to be collected per UFT aspect (Allen and Browne, 2008)

Aspects of urban freight transport	Specific topics about which data can be collected
Vehicle delivery/collection trips at establishments in the urban area	Type of establishment Size of establishment Employees at establishment No. of deliveries/collections Delivery/collection frequency Size/type of delivery/collection No. of waste collections Other deliveries/collections Time of day Variation by day of week Variation during year Type/size of vehicle Whether vehicles deliver and collect jointly Type of vehicle operator (own account, logistics company, parcels carrier etc.) Whether vehicles based at establishment Vehicle types/sizes Deliveries/home deliveries made by vehicles at the establishment
Goods flows to/from establishments in the urban area	Type of establishment Size of establishment Employees at establishment Type and quantity of goods delivered/collected Frequency of goods flow Time of day Variation by day of week Variation during year
Service trips to establishments in the urban area	Type and number of service trips Time of day Variation by day of week Variation during year Type/size of vehicle Time taken to carry out service

⁴⁰ For more information and detail please refer to the NOVELOG D2.1."Framework for Data, Information and Knowledge Collection for Urban Freight and Service Demand Understanding (<https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5a5d21478&appld=PPGMS>)

Aspects of urban freight transport	Specific topics about which data can be collected
Trip details and patterns of goods/service vehicles in the urban area	Type of operator Vehicle type Vehicle weight Type of goods carried and delivered/collected Type of establishments/land use served Type of vehicle round (single / multi-drop; deliveries / collections) No. of stops per round No. of rounds per day Distance between stops Journey time Vehicle speed Driving time: stationary time Journey length Vehicle crew size Vehicle load factor Empty running Vehicle time utilization Start and finish time Origin and destination/s Type and quantity of goods/equipment carried Fuel consumption
Loading/unloading activity of goods vehicles in the urban area	Type of vehicle Time of day Load/unload/ location (on- & off-street etc.) Time taken to load/unload Dwell time of vehicle Number of deliveries/collections by driver from vehicle without moving it Legal: illegal loading activities Type of contravention during loading
Parking activity of service vehicles in the urban area	Type of vehicle Time of day Parking location (on- & off-street, etc.) Time taken for service Dwell time of vehicle Number of servicing task by driver without moving vehicle Legal :/ illegal parking activities Type of contravention during parking
Movement of goods between vehicles and establishments in the urban area	Method of goods handling from vehicle to establishment Type of delivery packaging used Proximity of location to delivery/collection point Quantity of goods End destination for delivery (shop floor, stock room etc.) Whether staff from establishment need to be present Whether signature is required Whether goods have to be checked by receiver
Origin location of goods flow/vehicle trip to establishment in the urban area	Origin of goods Origin of delivery journey Type/land use of establishment vehicle dispatched from
Ordering and stockholding arrangements at urban premises	Whether stock is held Size of stockholding space Order lead times Ordering system
Supply chain management between establishments, their suppliers and freight transport operators	Type of supply chain No. of dispatch points to establishment Whether delivery/collection is regular or ad hoc Who organizes delivery/collection time Who resolves delivery/collection problems

Table 4: Urban freight survey techniques (Allen and Browne, 2008; Allen, Browne and Cherrett, 2012)⁴¹

Survey technique	Establishment survey
Explanation	Main method used in studies to collect data about total goods vehicle trips to/from particular establishments, and variation by time, day and month. Can also be used to capture data about type of goods delivered/collected.
How it is conducted	Face-to-face, telephone or self-completion
Which aspects of urban freight it is most suited to addressing	Vehicle delivery/collection trips at establishments in the urban area Goods flows to/from establishments in the urban area Service trips to establishments in the urban area Loading/unloading activity of goods vehicles in the urban area Movement of goods between vehicles and establishments in the urban area Origin location of goods flow/vehicle trip to establishment in the urban area Ordering and stockholding arrangements at urban establishment Supply chain management between establishments, their suppliers and freight transport operators
Key strengths and weaknesses (+ depicts a strength; - depicts a weakness; = depicts a neutral point)	+ Can provide both goods flow and vehicle activity data + Links goods flow and vehicle activity to business sector/land use/supply chain - Respondents often not very knowledgeable about goods vehicle type, loading/unloading locations and times - Relies on knowledge and recall of respondents - Response rates can be adversely affected if survey takes too long to complete - Does not provide insight into vehicle rounds - Surveying relatively expensive on a per establishment basis
Survey technique	Commodity flow survey
Explanation	Similar to establishment survey, but used to collect detailed information about type and quantity of goods flowing to/from particular establishments rather than focusing on goods vehicle trips.
How it is conducted	Face-to-face, telephone or self-completion
Which aspects of urban freight it is most suited to addressing	Goods flows to/from establishments in the urban area
Key strengths and weaknesses (+ depicts a strength; - depicts a weakness; = depicts a neutral point)	+ Links goods flow to business sector/land use/supply chain - Only collects basic information about vehicle activity = Mostly used as an input to freight modelling
Survey technique	Commodity flow survey
Explanation	Provides the opportunity for collecting wide ranging data about the pattern of the companies' goods vehicle activities in the urban area. Allows opportunity to obtain data about the entire fleet rather than a single vehicle or round (as in vehicle trip diary – the two types of survey can be used in conjunction). Can be used to collect data about loading/unloading activity and movement of goods from vehicle to establishment but this is usually best gathered via a driver survey or vehicle observation survey.

⁴¹ Source: Allen and Browne, 2008; Allen, Browne and Cherrett, 2012

How it is conducted	Face-to-face, telephone or self-completion
Which aspects of urban freight it is most suited to addressing	Trip details and patterns of goods vehicles in the urban area Loading/unloading activity of goods vehicles in the urban area Movement of goods between vehicles and establishments in the urban area Origin location of goods flow/vehicle trip to establishment in the urban area
Key strengths and weaknesses (+ depicts a strength; - depicts a weakness; = depicts a neutral point)	+ Provides data about an entire goods vehicle fleet and its activities + Can be especially useful if studying fleet productivity or fuel efficiency - Does not provide the same level of detail about individual goods vehicle trips and activities as a driver or vehicle observation survey
Survey technique	Driver survey
Explanation	Used to gather data about the driver's overall trip pattern, as well as information about the loading/unloading/servicing activity in the street in which the survey takes place and in general (including time taken, loading/parking locations, methods of moving goods from vehicle, etc.). Usually conducted at establishments receiving collections/deliveries, with driver intercepted after carrying out work before they drive away.
How it is conducted	Face-to-face or self-completion
Which aspects of urban freight it is most suited to addressing	Trip details and patterns of goods vehicles in the urban area Loading/unloading activity of goods vehicles in the urban area Movement of goods between vehicles and establishments in the urban area Origin location of goods flow/vehicle trip to establishment in the urban area
Key strengths and weaknesses (+ depicts a strength; - depicts a weakness; = depicts a neutral point)	+ Provides data about the kerbside and loading/unloading issues as well as the overall trip pattern + Can be used to obtain drivers' views on problems encountered in delivering to a particular area - Does not provide details of the total goods vehicle activity/goods flow associated with a particular establishment = Can be carried out in conjunction with a vehicle observation survey or establishment survey
Survey technique	Roadside interview survey
Explanation	Normally involves working with police or suitable law enforcement agency to pull over moving vehicles/drivers and interview them at the roadside about their current trip. Typically used to capture data about origin/destination, trip purpose, goods carried, and vehicle type. Usually a relatively brief survey so as not to disrupt drivers and avoid causing unnecessary traffic congestion. Far less frequently used than it used to be due to cost and need for other agency involvement.
How it is conducted	Face-to-face

Which aspects of urban freight it is most suited to addressing	Trip details and patterns of goods vehicles in the urban area Origin location of goods flow/vehicle trip to establishment in the urban area
Key strengths and weaknesses (+ depicts a strength; - depicts a weakness; = depicts a neutral point)	<ul style="list-style-type: none"> + Produces goods vehicle trip matrices for traffic modelling purposes - The practicalities and legalities of stopping goods vehicles en-route can make this difficult to organize - Survey costs tend to be high - Given limited time available for interviews, drivers are usually only asked about previous and next stopping points rather than the entire round - Driver may not be aware of products carried, especially if boxed or containerized, and may not know about the type of land use served - Tend to take place on major roads only, so contains a bias against vehicles using minor roads
Survey technique	Vehicle observation survey
Explanation	<p>Involves surveyor/s being positioned on street at establishments to record data about total goods vehicle trips to/from establishments by time of day (and can be used to study variation by day of week). Can also capture information about vehicle type, time taken for delivery/collection/servicing, methods of moving goods from vehicle etc.</p> <p>It is difficult to capture details of all goods delivery/collection trips using this technique if more than one location is used to access the establishment (e.g. rear or side access as well as frontage). Also, it only captures data for as long as surveyors present so usually misses activity outside the normal working day (so can be combined with establishment survey to capture all delivery/collection trips).</p> <p>Can prove difficult to determine the establishments at which delivery/collection is taking place if vehicle/driver visits several establishments without moving vehicle.</p> <p>Can provide better quality information about vehicle activity on the street than establishment survey.</p>
How it is conducted	Survey or observation either in real-time or at a later date using film/camera footage
Which aspects of urban freight it is most suited to addressing	<p>Vehicle delivery/collection trips at establishments in the urban area</p> <p>Service trips to establishments in the urban area</p> <p>Loading/unloading activity of goods vehicles in the urban area</p> <p>Parking activity of service vehicles in the urban area</p> <p>Movement of goods between vehicles and establishments in the urban area</p>
Key strengths and weaknesses (+ depicts a strength; - depicts a weakness; = depicts a neutral point)	<ul style="list-style-type: none"> + Can provide both goods flow and vehicle activity data + Links goods flow and vehicle activity to business sector/land use/supply chain + Can provide detailed data about goods vehicle type, loading/unloading locations and times (unlike establishment survey) - Does not provide as detailed data about type of goods delivered/collected and trip purpose compared to an establishment survey - Difficult to capture details of all goods delivery/collection trips if establishments accessed via more than one location - Only captures data for as long as the surveyors are present - Does not provide an insight into the overall trip pattern of vehicles



Survey technique	Parking survey
Explanation	Similar to vehicle observation survey but only used to capture information about vehicle loading/unloading/parking activity, (such as vehicle type, time taken, illegal activity etc.) rather than total delivery/collection trips at establishments, and method of moving goods from vehicle. Can also be used to study use of space allocated for goods/service vehicles by other road users.
How it is conducted	Surveyor observation either in real-time or at a later date using film/camera footage
Which aspects of urban freight it is most suited to addressing	Loading/unloading activity of goods vehicles in the urban area Parking activity of service vehicles in the urban area Parking activity of other road users in space used by goods and service vehicles
Key strengths and weaknesses (+ depicts a strength; - depicts a weakness; = depicts a neutral point)	+ Provides a detailed insight into the use of kerb space by goods vehicles and other road users + Can provide detailed data about goods vehicle type, loading/unloading locations and times + Can be used to assess the suitability of parking/loading infrastructure - Does not provide an insight into goods flow/goods vehicle activity levels for individual establishments or overall trip patterns of vehicles
Survey technique	Vehicle trip diaries
Explanation	Used to collect detailed information about the activities of a single vehicle (usually over a single day or a few days). Can provide data about exact locations served, route, arrival and departure times, time taken for delivery/collection/servicing, type of goods/service etc.)
How it is conducted	Self-completion by driver or other suitably informed employee of freight operator
Which aspects of urban freight it is most suited to addressing	Trip details and patterns of goods vehicles in the urban area Trip details and patterns of service vehicles in the urban area Loading/unloading activity of goods vehicles in the urban area Parking activity of service vehicles in the urban area Movement of goods between vehicles and establishments in the urban area
Key strengths and weaknesses (+ depicts a strength; - depicts a weakness; = depicts a neutral point)	+ Can provide detailed information about vehicle trips and rounds - Driver may not be aware of the products carried especially if boxed or containerized - Can place a lot of work on the respondent and affect driver productivity, resulting in low response rates unless made compulsory = Surveyor can travel in-vehicle with the driver to record trip data to reduce the survey work for the driver, but some companies are not keen on permitting this and can result in very high survey costs
Survey technique	GPS survey
Explanation	Equipment can provide data on vehicle location at frequent intervals (thereby providing route information), as well as speed. Can also be used to record stops for loading/unloading/parking.

How it is conducted	Equipment / transmitter fitted in vehicle
Which aspects of urban freight it is most suited to addressing	Trip details and patterns of goods vehicles in the urban area Trip details and patterns of service vehicles in the urban area Loading/unloading activity of goods vehicles in the urban area Parking activity of service vehicles in the urban area
Key strengths and weaknesses (+ depicts a strength; - depicts a weakness; = depicts a neutral point)	+ Can provide information about vehicle trips and rounds without placing additional work on the driver or company—can give a detailed insight into speeds and travel times on different roads and routes + Can provide detailed routing information - Automatically captured data does not usually provide the same level of detail possible through vehicle trip diaries about type of goods, reason for stopping, quantity delivered unless the driver manually inputs data = Can be cheaper to analyse than data collected by a vehicle trip diary (as manual data input not required) but obtaining permission to access data (and potential purchase costs) can be problematic and prohibitive
Survey technique	Suppliers survey
Explanation	Used to gather information from suppliers about the goods they dispatch to urban establishments and the vehicle activity that supports this goods flow. If used, then typically used in conjunction with establishment survey (with establishments identifying key suppliers). Can provide more detailed information about vehicle activity if supplier operates goods vehicle to make deliveries (if so then similar to information captured by freight operator survey).
How it is conducted	Face-to-face, telephone or self-completion
Which aspects of urban freight it is most suited to addressing	Goods flows to/from establishments in the urban area Trip details and patterns of goods vehicles in the urban area Loading/unloading activity of goods vehicles in the urban area Movement of goods between vehicles and establishments in the urban area Origin location of goods flow/vehicle trip to establishment in the urban area (Transport-related data above usually only available from suppliers operating their own vehicles)
Key strengths and weaknesses (+ depicts a strength; - depicts a weakness; = depicts a neutral point)	+ Provides data about the goods supplied and the vehicle activity that supports this (either for a specific customer or for the entire fleet (if operated in-house)) + Helps to provide the upstream goods flow/vehicle activity link in the supply chain including information about the geographical location of the goods flow/vehicle trip - Quite difficult to organize as suppliers are usually identified by receivers during an establishment survey



Survey technique	Service provider survey
Explanation	<p>Similar to freight operator survey, providing wide ranging data about the pattern of the companies' service activities and supporting vehicle activity in the urban area. Allows opportunity to obtain data about the entire fleet rather than a single vehicle or round (as in vehicle trip diary – the two type of survey can be used in conjunction).</p> <p>Can be used to collect data about vehicle parking activity.</p>
How it is conducted	Face-to-face, telephone or self-completion
Which aspects of urban freight it is most suited to addressing	<p>Trip details and patterns of service vehicles in the urban area</p> <p>Parking activity of service vehicles in the urban area</p>
Key strengths and weaknesses (+ depicts a strength; - depicts a weakness; = depicts a neutral point)	<ul style="list-style-type: none"> + Obtains data about a service providers' vehicle fleet and its activities + Can be especially useful if studying fleet productivity or fuel efficiency - Does not provide the same level of detail about individual vehicle trips and activities as a driver or vehicle observation survey
Survey technique	Vehicle traffic counts
Explanation	<p>Road vehicle traffic is counted and disaggregated by vehicle type. This can provide details of types of goods vehicles on selected roads or route, or crossing specified cordons by time of day and day of week. The area covered by the traffic counts can range from a single road up to an entire urban area.</p>
How it is conducted	<p>This can be achieved either by manual counts (i.e. the use of surveyors positioned at the road side who count vehicles as they pass by) or automated counts (which can use either sensors in the roads or camera technology in conjunction with computing software). The extent of the vehicle type disaggregation is dependent on the needs of the study, and the method used for collecting the traffic data. In manual counts the extent of disaggregation may be limited by the degree of expertise of the surveyors. In automated counts disaggregation may be limited by the sophistication of the technology. For instance, road sensors that quantify vehicle length cannot easily distinguish between vehicles of similar length such as cars and light goods vehicles.</p>
Which aspects of urban freight it is most suited to addressing	<p>Only provides data about goods vehicles travelling on the selected roads/ in the selected areas surveyed. Does not provide information about trip purpose (i.e. whether the vehicle is being used to make goods deliveries, collections, to provide a service), whether the vehicle will visit establishments in the survey area or is just passing through, or the origin or destination of the trip.</p> <p>Only provides insight into the spread of goods vehicles traffic flows by time, day, and month and the proportion of total traffic flow they account for.</p>
Key strengths and weaknesses (+ depicts a strength; - depicts a weakness; = depicts a neutral point)	<ul style="list-style-type: none"> + Gives an insight into the total goods vehicle traffic and vehicle mix over time on surveyed roads + Relatively cheap method for obtaining a lot of data - Disaggregation of goods vehicle types can be problematic especially in terms automated counts - Does not provide information about trip purpose (i.e. whether the vehicle is being used to make goods deliveries, collections, or to provide a service), whether the vehicle will visit establishments in the survey area or is just passing through, the loading/ unloading operation, or the origin / destination of the trip

Annex III: UFT City Typology & Toolkit for finding UFT measures

Annex III aims to present a best practice implemented by the EU funded Novelog project regarding the development of, both a clear City Typology, and a tool that facilitates the matching of measures and interventions with city typologies in a publicly-accessible platform.

The main purpose of the typology is the development of a toolkit which allows the user to search the database for measures implemented by cities with similar UFT dimensions (City Typology) and rank them based on their performance.

In spatial research, typology-approaches are used to describe, model, analyse, benchmark, and monitor the built environment with respect to buildings, (transport) infrastructure, and the urban structure (Blum and Gruhler, 2011). The Oxford English Dictionary records usage as “The study of classes with common characteristics; classification, esp. of human products, behaviour, characteristics, etc., according to type; the comparative analysis of structural or other characteristics; a classification or analysis of this kind.”

From past experiences and research outputs, it was determined that in UFT research and innovation at an EU and local level, typologies have been both single and multi-tiered, often with a variety of parameters making up an overall typology, and each parameter having

attributes which define them. In some cases the attributes are subdivided into sub clusters.⁴²

Therefore, the typology that is presented in Annex III was developed as poly-parametric, made up of one or more parameters, each parameter defined by attributes which may also be further divided by sub clusters as illustrated in the following Figure. The main content of the typology was based on 30+ years of UFT research, the database collected from all previous R&I work, and the typologies that have preceded it (i.e. Hesse City Morphology⁴³ (Hesse, 1995), EU project TURBLOG’s land use typology⁴⁴, CIVITAS Measures Typology , UFT Markets Typology & Impacts typology⁴⁵, C-LIEGE project’s UFT typology⁴⁶ etc.).

However, Where, What, How and Why’ (including who/ to whom) are a key part of urban freight; the Novelog City Typology consists of the following dimensions:

- **Why**, which is related to the problems and the primary and secondary objectives of the SULP
- **Where**, which refers to the City Morphology at the place of intervention and UFT Logistics Profiles
- **Who**, which is related to the UFT markets and stakeholders involved in the planning process
- **What**, which refers to the typology of measures
- And finally **How**, which relates to the nature of the implementation process, as well as the Nature of the Business Models.

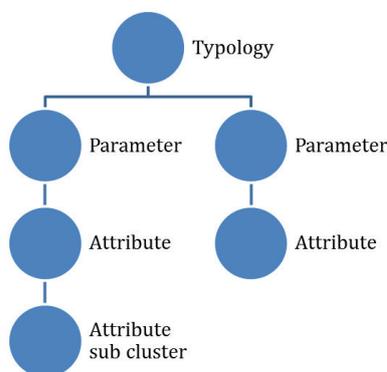


Figure 17 Structure of a poly-parametric Typology

⁴² HORIZON 2020 EU project NOVELOG (2015) D4.1. “Integrated inventory of urban freight policies and measures, typologies and impacts”

⁴³ Hesse, M. (1995), “Urban space and logistics: on the road to sustainability?”, World Transport Policy and Practice, Vol. 1 No. 4, pp. 39–45

⁴⁴ FP7 EU project, TURBLOG. (2011b), Deliverable 2 Business Concepts and Models for urban logistics, Lisbon

⁴⁵ CIVITAS WIKI consortium. (2015), Making urban freight logistics more sustainable, CIVITAS POLICY NOTE, [www.eltis.org, available at: http://www.eltis.org/resources/tools/civitas-policy-note-making-urban-freight-logistics-more-sustainable](http://www.eltis.org/resources/tools/civitas-policy-note-making-urban-freight-logistics-more-sustainable).

⁴⁶ C-LIEGE. (2012), IEE C-LIEGE Deliverable 4.2 C-LIEGE Toolbox for the establishment of the city logistics manager.

Tool for identifying the most appropriate city logistics measure based on the city's typology



Figure 18 Dashboard of NOVELOG Toolkit's Database

The NOVELOG Toolkit was developed in order to provide a single window on into city logistics and enable information and experience sharing, advising and reporting. It utilises a pool of UFT measures with reference to the specific city where they have been implemented, and their known impacts, and helps cities identify the most suitable measures for a unique city based on the Why, Where, Who, What and How dimensions of urban freight.

The Toolkit's database consists of more than 250 UFT real cases grouped in 26 UFT measures and 7 clusters of UFT measures, which were implemented in approximately 40 countries and 154 cities around the world. The majority of the policies/measures that are included are measures that have been tested and implemented in EU funded city logistics projects such as: BESTUFS I & II (2000-2002)⁴⁷, CITYFREIGHT (2002,2004)⁴⁸, SMARTFREIGHT (2008 - 2011)⁴⁹, SUGAR (2008-2011)⁵⁰, SMILE (2013-2015)⁵¹, CO-GISTICS (2014-2016)⁵², U-TURN (2015-2018), CITY-LAB (2015-2018) NOVELOG (2015-2018) etc.

⁴⁷ FP 5 & FP6 EU project BESTUFS I & II (2000-2008) <http://www.bestufs.net/>

⁴⁸ FP 5 EU project CITYFREIGHT (2002-2004), <http://www.transport-research.info/project/inter-and-intra-urban-freight-distribution-networks>

⁴⁹ FP7 EU project, SMARTFREIGHT (2008-2011), <http://www.smartfreight.info/>

⁵⁰ EU-INTERREG IVC programme, EU project SUGAR (2008-2011)

⁵¹ EU-MED PROGRAMME EU project SMILE (2013-2015), <http://smile-urbanlogistics.eu/>

⁵² EU Competitive and Innovation Programme (CIP) EU project CO-GISTICS (2014-2016) <http://cogistics.eu/>

Annex IV: UFT Best Practices

The measures typology that was followed in the framework of the NOVELOG City Typology and the NOVELOG Toolkit was aligned with the CIVITAS urban freight measures typology⁵³ which consists of seven main clusters of UFT interventions and twenty-seven sub-clusters:

1. Stakeholder engagement
 - a. Freight Quality Partnership
 - b. Freight advisory boards and forums
 - c. Designation of a City Logistics Manager
2. Regulatory measures
 - a. Time access restriction
 - b. Parking regulation
 - c. Environmental restrictions
 - d. Size/load access restrictions
 - e. Freight-traffic flow management
3. Market-based measures
 - a. Pricing
 - b. Taxation and tax allowances
 - c. Tradeable permits and mobility credits
 - d. Incentives and subsidies
4. Land use planning & Infrastructure
 - a. Adapting on-street zones
 - b. Using building code regulations for off-street delivery areas
 - c. Nearby delivery areas
 - d. Upgrading central off-street loading areas
 - e. Integrating logistics plans into land use planning
 - f. Collect points
 - g. Urban consolidation centres

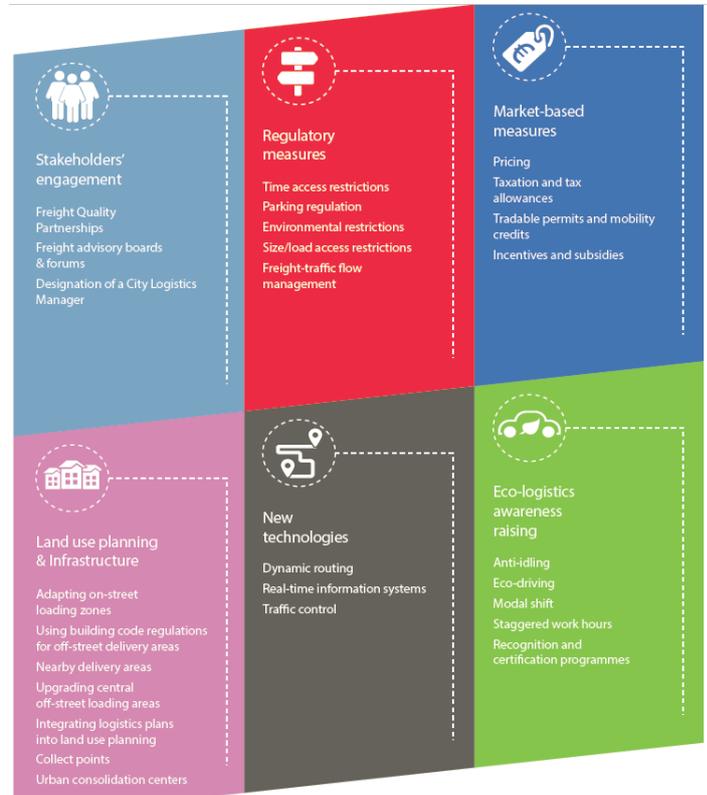


Figure 19 CIVITAS UFT measures typology as illustrated in CIVITAS Wiki consortium (2015)

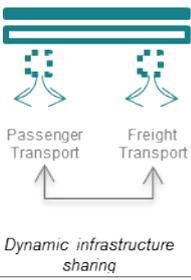
5. New Technologies
 - a. Dynamic routing
 - b. Real-time information systems
 - c. Traffic control
6. Eco-logistics awareness raising
 - a. Anti-idling
 - b. Eco-driving
 - c. Modal shift (water, rail, cycle, walk)
 - d. Staggered work hours
 - e. Recognition and certification programmes

Indicative EU funded examples of UFT practices and pilot cases that have been implemented in European Cities are presented in the following Tables:

⁵³ CIVITAS WIKI consortium. (2015), Making urban freight logistics more sustainable, CIVITAS POLICY NOTE, www.eltis.org, available at: <http://www.eltis.org/resources/tools/civitas-policy-note-making-urban-freight-logistics-more-sustainable>.

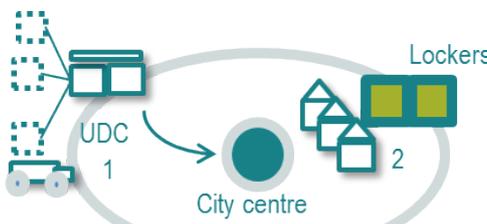
Title of Case 1: LOGeco-Innovative approach to public-private decision making process	
City: Rome	EU funded project: BESTFACT
Clusters of Measures: Stakeholder Engagement	Sub-clusters: Freight Quality Partnership
<p>Brief Description: The LOGeco case deals with design and validation of a new model for urban logistics solutions that entails innovative and sustainable actions. The innovative aspect relies on the adoption of an unconventional public-private decision making process towards city logistics solutions. The aim is to reduce the impact of freight entering the historical area of the city of Rome without penalizing economic activities, but rather creating business opportunities for companies in the area.</p>	
<p>More information at: <i>BESTFACT - Rome pilot case</i></p>	

Title of Case 2: Off hour delivery Project	
City: New York	EU funded project: TURBLOG
Clusters of Measures: Regulatory measures	Sub-clusters: Time access restriction
<p>Brief Description: The off-hour delivery (OHD) program was a voluntary program which provided a financial incentive to receivers in exchange for their commitment to accept off-hour deliveries (between 7 PM and 6 AM) in the borough of Manhattan in New York City (New York, New York.). The pilot test of the program showed improved travel speeds and service times in Manhattan for the carriers. The improved travel speeds also benefited all road users by reducing the average trip time by five minutes per trip. Overall, the program could provide benefits of more than \$250 million per year depending on the extent of the implementation.</p>	
<p>More information at: <i>New York City Off-Hour Delivery Project</i></p>	

<p>Title of Case 3: Package of measures: 1) Sharing of public transport reserved lanes , 2) Booking of loading & unloading docks, 3) LTZ entrance, 4) ITS for sustainable access control & data collection in Planning</p>	
City: Turin	EU funded project: NOVELOG
<p>Clusters of Measures: Regulatory measures; Market-based measures; New Technologies; Land use planning and infrastructure</p>	<p>Sub-clusters: Environmental restrictions; Tradeable permits and mobility credits; Real-time information systems; Traffic control;</p>
<p>Brief Description: The City of Turin has designed and has already been running a soft, 'pull' measure dedicated to stimulating the replacement of highly polluting vehicles since June 2016. New measures have been tested to share existing infrastructures dedicated to public transport, also with goods delivery, considering freight transport as a public service. New permission schemes encourage available logistics operators to replace their vehicles with a clean vehicle, equipped with an on-board ITS system.</p>	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Dynamic infrastructure sharing</p> </div> <div style="text-align: left;"> <ol style="list-style-type: none"> 1. Sharing of public transport reserved lanes 2. Booking of loading/unloading docks 3. LTZ entrance </div> <div style="text-align: center;">  </div> </div>	
<p>More information at: <i>NOVELOG Cities & Regions Factsheets</i></p>	
<p>Title of Case 4: Logistics Hotels</p>	
City: Paris	EU funded project: CITY-LAB
<p>Clusters of Measures: Land use planning & Infrastructure</p>	<p>Sub-clusters: Urban consolidation centres</p>
<p>Brief Description: The main concept of this pilot was to assess the (environmental, social, economic and regulative) impacts of two urban warehouses, called "logistics hotels", at different stages of implementation, with different partnership structures and functions: Beaugrenelle Urban Distribution Space at operating phase; Chapelle International Logistics Hotel at construction phase. It provided a framework and guidelines to assess costs and benefits of (re)introducing logistics terminals in dense urban areas while assessing regulatory, technical and economic challenges when constructing logistics buildings in cities.</p>	
	
<p>More information at: <i>CITY-LAB-Paris Pilot case</i></p>	

Title of Case 5: Identifying opportunities for farmers to collaborate with each other to transport food products into Milan	
City: Milan	EU funded project: U-TURN
Clusters of Measures: Land use planning & Infrastructure & Eco-logistics awareness raising	Sub-clusters: Collect points & Eco-driving
<p>Brief Description: Focusing on the farms located around Milan, the objective of the pilot was to optimize the transport distribution flows from the farms to the city centre through collaborative logistics solutions. Farm businesses took part in an assessment to define existing business models. The collaborative logistics solutions pointed out the opportunity to cut down travel distance, decrease the number of vehicles and their environmental impact, allowing the farmers to save time for their core business activity.</p>	
<p>More information at: <i>U-TURN-Milan Pilot case</i></p>	

Title of Case 6: Growth of consolidation and electric vehicle use	
City: London	EU funded project: CITY-LAB
Clusters of Measures: Eco-logistics awareness raising	Sub-clusters: Eco-driving
<p>Brief Description: This pilot case identified the best possible management solution for inner city distribution, consolidation and clean vehicle use, considering the perspectives of a local authority, a large carrier, and a small carriers' carrier (a freight carrier that only works for other carriers rather than directly competing for freight flows from customers). The aim of this action was to understand the conditions for future growth, with focus on business models for clean deliveries by electric vehicles and bicycles. The lab was implemented in cooperation with TNT and Gnewt Cargo.</p>	
<p>More information at: <i>CITY-LAB-London Pilot case</i></p>	

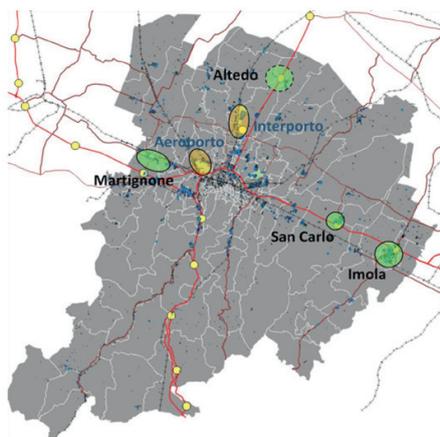
Title of Case 7: Package of measures 1) Lockers for Home delivery 2) Bike deliveries	
City: Mechelen	EU funded project: NOVELOG
Clusters of Measures: Land use planning & Infrastructure & Eco-logistics awareness raising	Sub-clusters: Collect points; Modal shift
<p>Brief Description: The city of Mechelen demonstrated two pilot cases within the framework of the project. The first one is the development of an urban distribution centre to operate bike services for last-mile deliveries. The second one is the development of a parcel lockers system for pickups and deliveries in the inner city. Close cooperation between the City of Mechelen, logistic service providers, and business stakeholders proved crucial to achieving the success of both pilot actions.</p> <div style="text-align: center;">  <p>1 -- Bike courier 2 -- Lockers for Home delivery</p> </div>	
<p>More information at: <i>NOVELOG Cities & Regions Factsheets</i></p>	

Title of Case 8: Data Collection & Urban Freight Modelling	
City: Paris & French cities (Marseille, Bordeaux, and Dijon, Paris)	EU funded project: TURBLOG & National Programme for Freight in Cities
Clusters of Measures: Regulatory measures	Sub-clusters: Freight/traffic flow management
<p>Brief Description: This case study presented an in-depth analysis of the City of Paris' urban freight situation. In 1993 under the National Programme for Freight in Cities, urban freight surveys were implemented in different cities around the country. The first freight data collection initiatives were taken in 1995-1997 with large scale surveys organised in three different cities (Marseille, Bordeaux, and Dijon). A second phase of the data collection work started in 2010, with a major survey currently being prepared for the Paris region. Following the comprehensive data collection process, a simulation model was designed called FRETURB. By using this tool, the public authorities gained a clear view on the current state of urban freight flows, the UFT's externalities and main characteristics, while the main problems and opportunities were identified.</p>	
<p>More information at: <i>TURBLOG Paris Case Study FRETURB simulation tool: http://freturb.laet.science/</i></p>	

Title of Case 9:
Specialised logistics settlements and Green Logistics certification

City: Bologna FUA	EU funded project: SULPiTER
Clusters of Measures: Regulatory measures	Sub-clusters: Freight/traffic flow management

Brief Description: Proposal of specialized logistics settlements and Green Logistics certification. In order to facilitate the economies of scale deriving from the creation of logistics cluster, some areas dedicated to different specialization (distribution, e-commerce, etc...) and based on the optimization of the mileage of transport operators and employees (also through the use of local public transport, preferably railway) were identified. The establishment of new logistics cluster includes a "green logistics" certification aimed at helping companies to understand good practices related to transport and logistics activities.



More information at: <https://www.interreg-central.eu/Content.Node/SULPiTER.html>

www.eltis.org