Urban Logistics System

Vision note

August 2023

Abstract

This concise note outlines the path to an integrated, urban logistics system, using a systems approach, based on logical principles that underpins logistics and transport and starting from the current context in which city operates. The proposed logistics system is built on consolidation, decoupling, multimodality, connectivity, open access, public-private collaboration, and orchestration. By implementing this holistic approach, the urban logistics system aims to achieve efficiency, sustainability, and improved quality of life for both, citizens and businesses. Moreover, it is able to address the future challenges in city logistics.

Acknowledgements

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The authors,
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The context

City logistics is a fundamental part of city life, where cargo distribution is essential for various productive economic activities. Grocery stores, restaurants, shops, the construction industry, individual customers, among others, rely heavily on the distribution of goods to meet their consumer and business demands. City logistics is therefore **essential for a living city**.

At the same time, freight transport activities are responsible for about half of local air pollutants in cities and generate a large amount of greenhouse gas emissions (ITF, 2021). They also contribute to road trauma: heavy trucks (lorries) were involved in 4.5% of police-reported traffic accidents and 14.2% of road fatalities in Europe in 2019. In addition, logistics operations often have a large spatial footprint in urban areas, due to the large amount of space required to store, consolidate and redistribute goods entering and leaving the city.

In city logistics, the liveability of the city and of the last mile service provider is at stake

Due to the already high demand for urban space in central areas, this pressure has consequences such as increasing urban congestion and high urban land prices (ITF, 2022). City logistics is very fragmented with many different service providers and sectors (construction logistics, waste collection, catering supplies, retail, e-commerce, etc.) and is therefore very difficult to optimize. Oversized vehicles drive in and out of ports, inland terminals, distribution centers and warehouses far outside the city, criss-crossing the city with a limited number of drops and therefore a very poor drop density (Figure 1). In other words, many kilometers are covered between successive deliveries. The result is very often a low profitability of last mile service providers. This current city logistics is hardly profitable and is increasingly **hampering the quality of life in the city.**

With rapid urbanization (for example, 85 percent of the European population is expected to live in urban areas by 2050, compared to the current 73 percent (UN 2018), the demand for transport and logistics in cities both for B2B and B2C will only increase.

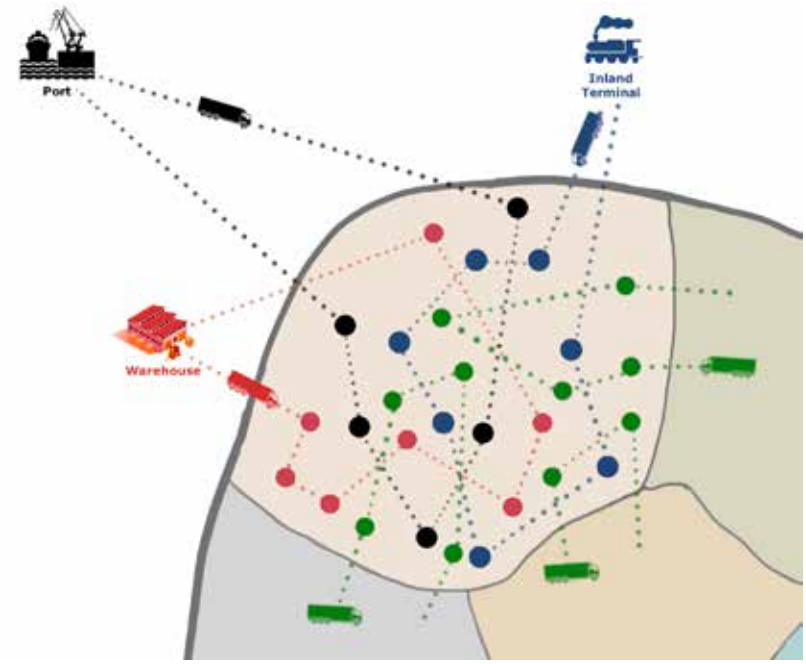


Figure1: City logistics today is fragmented and not harmonised, sometimes even chaotic.

These evolutions and impacts make city logistics an important topic and theme for government agencies as part of their **decarbonization and urban liveability agendas.** In addition to addressing the mentioned negative externalities, government agencies are also concerned about their limited understanding of the commercial dynamics of freight distribution and logistics, as city logistics have so far been mainly controlled and operated by the private sector. The limited knowledge on the public side already threatens to stand in the way of a substantive and balanced dialogue.

Sustainable city logistics entails much more than just decarbonization

The challenges towards the future

Recent trends in goods delivery, as well as increasing legal requirements, make urban logistics **increasingly complex.** This complexity is caused by the wide range of activities resulting from a variety of actors with different and often conflicting economic, social and environmental needs and goals. For example, e-commerce and end-user expectations for faster deliveries increase the complexity of logistics in cities around the world, especially in the so-called last mile. They also broaden the range of actors influencing urban logistics beyond traditional shippers, carriers, receivers, citizens and the public sector. New stakeholders are app-based companies, owners and managers of emerging logistics facilities, such as dark kitchens, dark stores, drop-off and pick-up points, click & collect facilities and collaborative logistics hubs. Local and national regulations for environmental sustainability, such as low or zero emission zones, pedestrian policies and urban densification policies, stricter vehicle emissions criteria and circular economy targets add further complexity for all stakeholders. As a result of these trends, freight forwarders and carriers face several new challenges in meeting their operational performance goals at competitive costs (ITF, 2022)

Complexity of city logistics is increasing with the variety of actors and the economic, social and environmental needs

These rapid and continuous changes in the sector pose major challenges for governments to understand the sector and **facilitate or regulate it effectively and efficiently** (ITF, 2022). The challenges for authorities differ according to the development stages of logistics activities and local characteristics. For example, in the maturing market of Western European countries, there is an increasing demand for smaller shipping quantities in urban areas. In addition, the more mature and larger the e-commerce market is, the more there is a need for diversified storage needs in urban areas. In contrast, markets in their early stages usually demand larger units with a stronger focus on new developments, combining operations mainly in shared facilities (Prologis, 2016).

Urban logistics hubs form the core of urban logistics activities. Hubs are spaces where important logistical functions take place, such as consolidating shipments coming into an urban area, sorting goods and fragmenting loads into smaller ones to ease the

transition from larger to smaller vehicles, facilitate distribution to nearby areas, the storage of goods and the processing of returns or outgoing goods are carried out. These can be areas such as inbound cross-dock facilities, fulfillment centers, sorting centers, delivery stations, local freight stations or express delivery hubs. These are often **created by private initiative** as a hub of an (individual) company's urban, metropolitan or national logistics systems. However, there might be increasing interest in whether **government agencies should play a role** in improving the sustainability of urban logistics by making such hubs open access.

The urban logistics hub should act more as a multifunctional connector

Further development of urban nodes and better connection of these nodes with the traditional transportation networks of logistic service providers can potentially improve the sector's sustainability performance while generating economic efficiency gains. By better consolidating shipments, hubs can increase vehicle load factors, avoiding unnecessary trips. Hubs can also support the modal shift, as they can bring goods close enough to final delivery points to transfer loads onto cargo bikes and other smaller, potentially "greener" vehicles. Hubs can be enabling for vehicle technology shifts by serving as charging points for electric commercial vehicles, facilitating their use. Hubs could also be seen as decoupling between different technologies, for example hydrogen for the line haul in the countryside and electric in the urban environment. Finally, hubs could facilitate reverse logistics, i.e. handling rejected or returned goods, collection and transport of packaging materials, including used packaging and other waste material, or even hosting a repair shop, in support of circular economy principles.

Lower emissions or fewer vehicle kilometers

Given the many challenges and the increasing complexity and fragmentation of urban logistics, the question arises which direction we should take to make urban logistics more sustainable. What will be the starting point? Are we going resolutely for low, even zero-emission logistics and at the same time keep heavy freight transport out of the inner cities? Or are we trying to reduce vehicle kilometers in a smart way?

The dilemma for the city is to choose between imposing zero emission and reducing cargo transport

Today, the focus is mainly on **climate neutrality and zero emission** targets. Cities include this in their policy development on city logistics. Zero emission zones are being demarcated in cities. Strict rules are imposed in these zones. Cities can set rules regarding vehicle access, traffic restrictions, loading and unloading zones and other measures to manage the impact of freight transport. Vehicles with classic combustion engines will soon no longer be allowed in these environmental or zero-emission zones. Local governments may be able to presuppose and impose this, but they should realize that with such restrictions they put the logistics sector under considerable pressure. This is a top down approach.

Only 2 options then remain for the logistics operators: either to reduce their activities in those demarcated zones and leave them to others, or to invest more quickly in new vehicles that meet the new, strict standards, but with a technology that is not yet fully developed or matured. For the logistics actor, this means purchasing substantially more expensive vehicles that cannot be made profitable, certainly in the other, peripheral zones of the city where those strict (emission) rules do not (yet) apply. Moreover, at this stage, most customers of the operators are not really prepared to pay a significant markup for an emission-free delivery.

Imposing zero-emission delivery unilaterally shifts the burden and the risk to the logistics actors

This creates a division of the urban area with more difficult route optimisation for the operator. This ultimately presents logistics players with a dilemma between leaving the city or investing heavily. Consequently, transport federations and individual service providers have already made requests to cities, urging them to somewhat postpone their plans for zero-emission districts. Some cities might consider implementing a temporary transitional regime. In summary, logistics parties find themselves in a highly uncertain situation, making it difficult to plan and posing a significant challenge when it comes to making timely and appropriate investments.

Moreover, the result of this **"cleaning operation"** could well be that the existing traffic jams, delays, congestion, all kinds of nuisance (loading and unloading, double parking,...) will remain unchanged after the installation of the zero emission zones. Then these traffic jams and congestions will be electrified or "cleaned up" and the emissions emitted in the city will drop considerably, but they will remain problematic for the liveability of the city.

An alternative strategy is to fully focus on **"reduction"** and make this the main goal of the city logistics policy. At first sight, reducing vehicle kilometers does not seem to be compatible with the intended economic progress and growth aspirations. Moreover, logistics actors often perceive this reduction as a threat to their current revenue model as contradicts their objectives

Reduction of vehicle km is beneficial for logistics operator who prioritize profit over turnover growth

of expanding market share and increasing turnover. By optimizing journeys in the city and by smartly combining, even exchanging freight across company boundaries, significant vehicle kilometers can be saved.

This optimization can lead to higher drop densities, allowing logistics operators to perform the same or even more deliveries with fewer vehicles. This shift towards profit growth over turnover growth could become the revenue model of the future for logistics operators, ultimately resulting in better returns on their investments.

Large logistics operators are of course already optimizing their journeys and vehicles, leading to full trucks entering the city. While this is already an achievement, further improvements can be made by maximizing cooperation and freight exchange among multiple operators. In this way, the pick-up and delivery density can be improved as distances between stops is decreasing. A filled distribution van, delivery van, cargo bike can ultimately be emptied in shorter distance and in shorter timespan, making it rapidly available for a next tour. This results in a higher capacity utilization. This can be easily illustrated by the case of Districting or Zoning.

Case of Districting or Zoning

The scheme below illustrates how freight exchange can lead to more effective and profitable logistics by allocating districts or zones to preferred last mile operators. The same customers are supplied with 18% to 45% fewer kilometers traveled in total (right figure compared to left figure) . In addition, mixed shipments per customer can be delivered from the common single depot (D1 + D2 + D3). Een visually it can easily be seen that the districting requires much less distance to be covered. If this is also organized in a fair way, then all stakeholders involved can benefit from those profits. Significant higher margins for logistics service providers and substantial less vehicle kilometers covered, reducing city traffic.

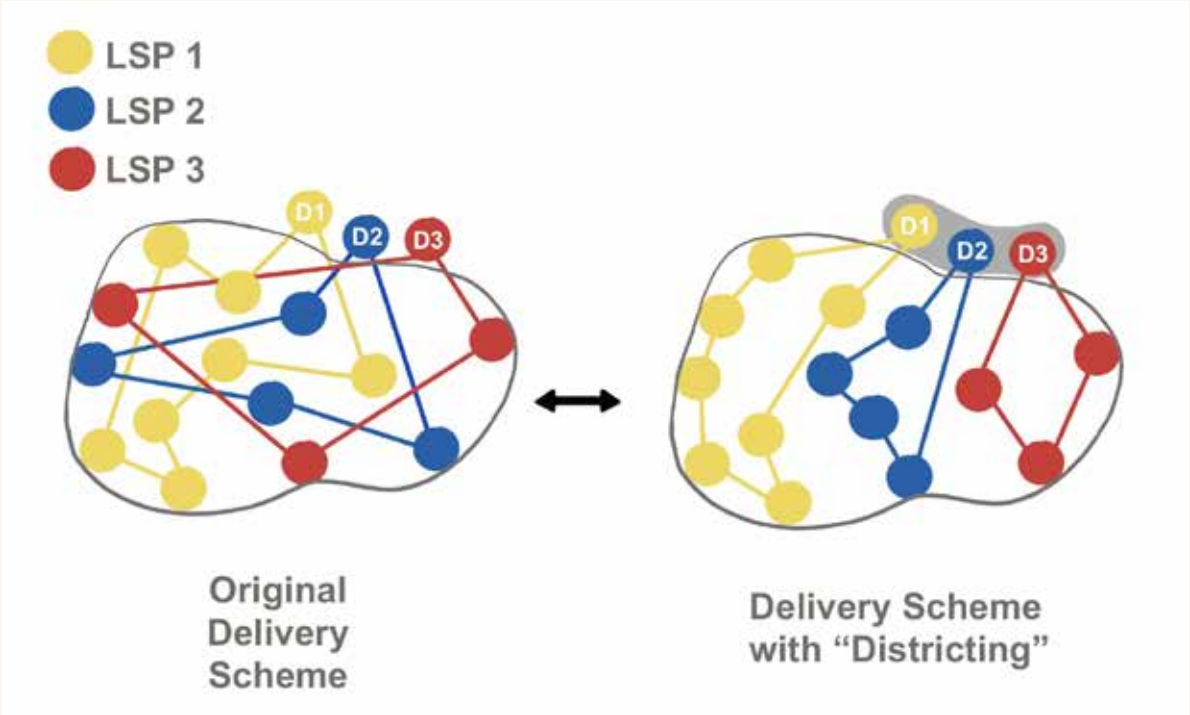


Figure 2: Smart delivery schedule for the city by division into districts (Source: TRI-VIZOR, 2023)

An integrated, urban logistics system

The most effective approach for future-proofing urban logistics relies on a robust, coherent, and integrated system. This system includes not only the hardware but also the software and organizational aspects, referred to as “orgware”. This system should align seamlessly with a strategic plan, including the mobility plan, and be effectively implemented in operations to achieve excellence in efficiency, effectiveness, and sustainability.

Distinguishing and properly integrating the three levels of policy - strategic, tactical, and operational - is crucial to ensure a cohesive and consistent approach.The following conditions should be met:

- Embedded in the policy
- Data as an essential resource
- Based on logical logistics principles

Establish a robust, coherent, and integrated system to ensure long-term viability

Embedded in the policy

A system can only work if it is embedded in a logistics policy. Today, this is often lacking in cities and municipalities. There is usually a **mobility plan**, but only focused on people. This plan should be **broadened to freight mobility**. Spatial development plans and plans for the local economy should also include a logistical component.

Mobility plans should integrate people and freight

City logistics is closely linked to **city planning**. Creating logistics hubs, distribution centers and loading and unloading zones in strategic locations can improve logistics efficiency. In addition, it is important to take into account **urban development** and the integration of logistics in spatial plans to minimize potential conflicts between logistics and other urban activities.

Ideally, the logistics policy is shaped by the most diverse and largest possible group of stakeholders. This collaboration can take the form of a Green Deal Urban Logistics or a **covenant**, where various actors pledge their commitment to specific aspects. This agreement then serves as a solid basis for the development of subsequent policies.

Strategy	**Data management**	Modeling strategies/scenarios	Clear vision and concrete plan on freight flows/ logistics - integrative, inclusive and fair
Tactics	**Standards and protocols**	Modeling design of system(s)	Holistic (multi-layer) urban logistics system - zoning and clustering - nodes and corridors - smart and obvious
Operations		Modeling optimization options	Operations excellence - efficient, effective and sustainable

Data as a resource

Data is crucial, both for an adequate policy and for optimized operations. To achieve this objective, data must be collected and integrated across various levels: strategic, tactical, and operational. However, this task is not without challenges. Actors involved are often reluctant to share their data with others. Additionally, data sharing can potentially lead to unauthorized practices and even violate competition regulations, such as the formation of cartels.

> *Stakeholders should be connected to a governed data platform*

The optimal approach is to establish a secure and efficient (data) platform to gather relevant information. All stakeholders can connect to this open platform and access the processed data according to their role and authorized permissions. It is essential that individuals can only view data relevant to their positions or those authorized for their roles. For instance, strategic and tactical levels may require more aggregated data. The platform is responsible for aggregating and translating the data for various target groups. Clearly, creating and managing such a data platform for urban logistics necessitates the right governance, structure and organization to be effective.

Based on principles that make logistical sense

The foundation of a robust system lies in several key logistical principles, which must be rational and applicable. These principles are not novel or exclusive to urban logistics; they also find relevance in other environments, like port logistics. An integrated logistics system for urban logistics should be built on the basis of the following 7 principles:

1. Consolidation
2. Decoupling
3. Multimodal
4. Connectivity
5. Accessibility
6. Public-private
7. Orchestration

1. Consolidation

Collaboration and consolidation leads to the generation of scale, and this holds true for logistics as well. If goods flows are bundled through corridors, activities are clustered in hubs or nodes, and resources are shared, then operations can be conducted on a larger scale, resulting in increased efficiency. In this way, more can be accomplished with better utilization of available capacity.

Efficiency improvement through the bundling and clustering of logistics activities has been a longstanding goal for the logistics sector. Companies often consolidate volumes within their own operations to achieve economies of scale. However, extending this consolidation across different companies and collaborating with competitors can be more challenging due to competitive considerations and potential trust issues.

2. Decoupling

The primary objective of decoupling processes is to facilitate consolidation by bringing together, regrouping, and bundling loads. Decoupling also plays a crucial role in the transition to smaller, more sustainable inner-city vehicles. Moreover, it opens up opportunities within the logistics process by allowing the integration of lean and agile strategies.

Before reaching the decoupling point at the edge of the city or district, large quantities can be efficiently supplied (lean approach). Beyond this point, flexibility and responsiveness to the wishes and needs of end customers become possible (agile approach). The last mile delivery focuses on agility and maneuverability. By decoupling in the logistics process, supply-driven operations (before the decoupling point) are combined with demand-driven logistics (after the decoupling point).

Decoupling can be effectively achieved by adopting a modular approach, streamlining operational transfers. For instance, the tractor, vessel, or locomotive can disconnect from the trailer, loading bodies, or wagons, enabling immediate return or onward journeys. Utilizing standardized modules offers greater flexibility for regrouping without the need for unloading, transferring, or reloading.

In logistics, decoupling involves creating buffers or stock points between different steps in the supply chain to reduce inter-process dependency.

Moreover, decoupling can play an instrumental role in facilitating technological transitions in urban logistics. At the preiphery of the city, people, but also logistics operators can transition from one technology, such as hydrogen-based propulsion, to another technology like electric propulsion, as they enter the city.

3. Multimodality

Meeting the growing future demand requires a collaborative and integrated effort involving all available resources. In the urban transport system, every mode of transportation will have a role to play. The key is to select the most suitable transport modality for each component in the chain, encompassing road, rail, water, underground, air, adding even on foot, and bicycle in the context of urban logistics.

This integration demands careful coordination and synchronization both within individual chains (vertical) and between different chains (horizontal), a concept known as synchromodality. It allows for real-time switching between modalities, ensuring that the most sustainable option is always chosen. As a result, the entire system becomes robust and capable of adapting to varying circumstances.

In passenger mobility, the STOP principle in the smart planning of a mobility policy is often used, emphasizing the priority of “by foot” first, followed by “by bike,” then Public Transport, and finally individual passenger or private cars. This principle can also be applied to freight mobility, aiming to enable the utilization of the most suitable transport modality for goods flows.

Where feasible, the existing public transport system for passengers can be adapted to accommodate freight, such as incorporating freight trams or using the metro for freight transport. Alternatively, dedicated underground or unimpeded logistics systems, inspired by technologies like Omniloop or hyperloop applications, can be constructed to enhance freight mobility.

4. Connectivity

Connections must be made on various levels. Disconnected processes must be reconnected. The various components in the broad system of urban logistics must be connected in an Internet of Things (IoT) concept, commonly referred to as the City of Things (CoT).

Connectivity manifests itself on three levels: the strategic level involving stakeholders, the tactical level encompassing IT systems, and the operational level dealing with logistics operations.

Logistics, also in an urban context, will be more and more embedded and integrated in a hyper-connected network of nodes (hubs) and connections (corridors). If a connection (corridor) or node (hub) encounters issues, there is still an alternative route.

5. Open access

To achieve maximum consolidation, it is essential to open up infrastructure and logistics services. The goal is to create an open access system where all interested parties can make use of the infrastructure or logistics services. This concept is often referred to as a neutral or white label system. By sharing capacities extensively, optimal utilization can be pursued, leading to the effective deployment of resources (effectivity).

6. Public-private

Urban logistics encompasses various aspects such as mobility, economy, spatial planning, quality of life, and safety. Given the wide-ranging impact, it is evident that public actors, i.e., governments, have a stake in this domain. However, an approach based solely on imposing or prohibiting measures may not be the most effective, as it can put the private sector on the side (e.g., in the case of imposing zero emission zones). Finding a middle ground and uniting the interests of both the public and private sectors is crucial. Striking a well-balanced approach between these two entities poses a significant challenge but is vital for successful urban logistics planning and implementation.

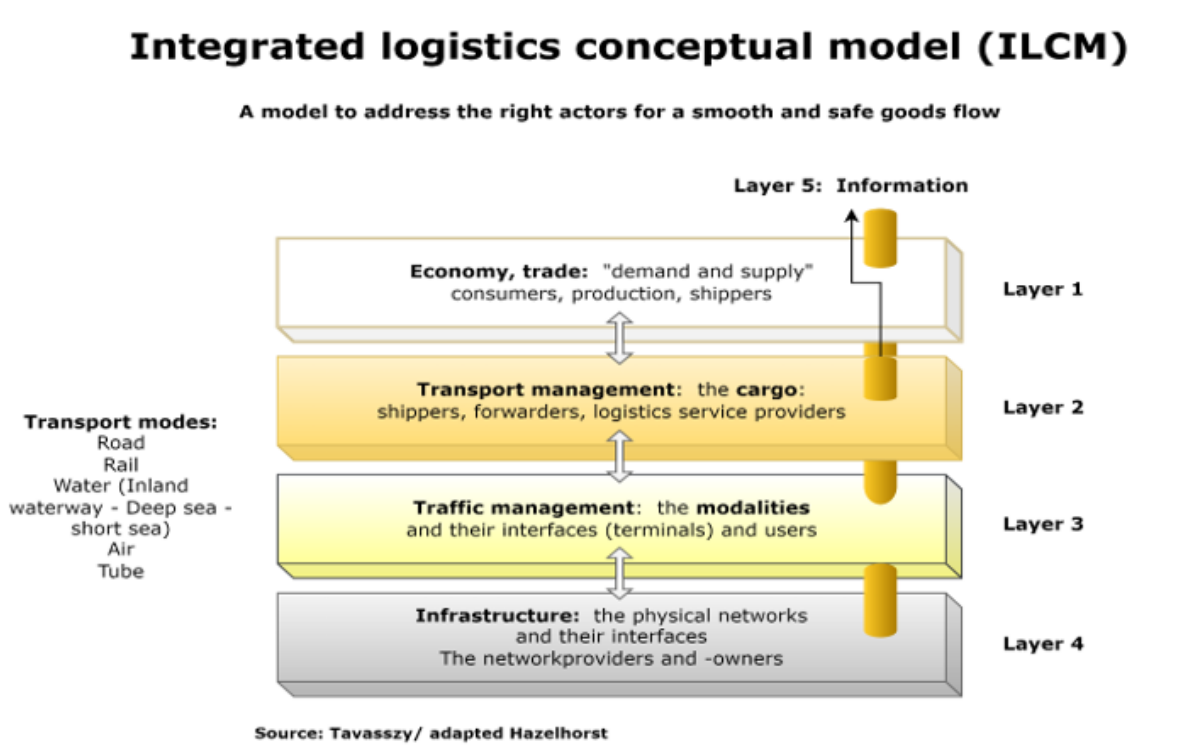


Figure 3: Integrated Logistics Conceptual Model (ILCM)

The crucial challenge is to determine which aspects of logistics should be publicly organized and which should be left to market parties.Figure 3 gives an overview of the different levels in the logistics market. The first level (layer 1: the economy, trade) logically seems to lie with market actors. The lowest level (layer 4 – infrastructure or hardware) is most often in public sector's hands. However, there is less consensus concerning the intermediate levels. Some argue that nodes, including hubs, parcel vaults, lockers, and collection points, as well as the transport system with vehicles (layer 3), should be in the public domain. The rationale behind this viewpoint is that increased access to a specific infrastructure or service by multiple actors leads to greater efficiency. Others advocate to let the market play at that level of the transport system.

7. Orchestration

In an urban logistics system, the involvement of a neutral orchestrator, sometimes referred to as a director, is crucial to ensure smooth operations. During the preparatory phase, the orchestrator acts as an architect, while in the operational phase he functions more as a trustee.

The primary responsibility of this neutral party is to ensure proper and equitable setup and smooth functioning of the entire urban logistics system. An urban logistics-wide monitoring system is useful for this purpose. Ideally, the orchestrator operates in an urbanlogistics community or ecosystem. This is a community of stakeholders that has been set up with a covenant or a multi-stakeholder agreement or commitment statement.

The orchestration role fits within the so-called **governance** of urban logistics. This encompasses a comprehensive framework of policies, rules, mechanisms, processes and structures that are applied to regulate and manage logistics activities in urban areas aiming at enhancing their efficiency, effectiveness, and sustainability.

Promoting awareness about sustainable logistics and providing educational programs to both public and private sector actors, such as logistics companies and drivers, can help to bring about behavioral change and promote the adoption of efficient and sustainable logistics solutions. This pursuit of broader support is also part of orchestrated governance. Instead of a top-down approach, the focus is on working from the bottom up to bring about positive changes.

A strong and logical logistics system for the city

The above principles come together in an urban logistics system with nodes and corridors, aligned with how logistics also work outside the city.
Setting up **urban distribution centers** (Urban Consolidation Centers - UCCs) on the periphery of the city can help reduce the number of trucks and vans entering the city centre. Goods can be brought to these strategically located centres, multimodal where possible, and then transfering them onto smaller, more environmentally friendly vehicles for the final miles to their destination.

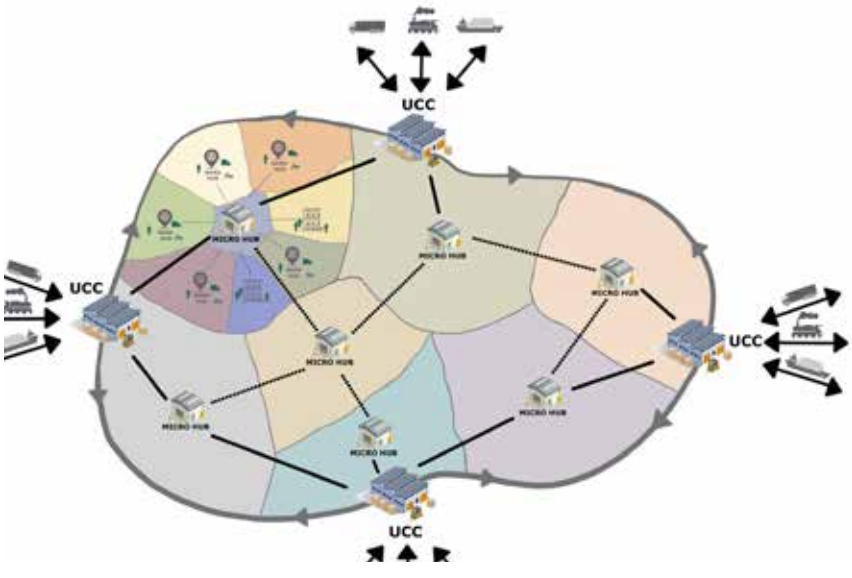
> *Use of city hubs is overall advantageous when volume effects are more substantial than extra handling costs*

Creating consolidation points where goods from various suppliers are collected and combined before transportation can significantly improve overall efficiency. This approach reduces the number of individual deliveries and optimizes routes, consequently alleviating congestion and traffic issues. Ideally, these consolidation points should be accessible to all suppliers, and they can be incentivized to utilize them effectively through advantageous conditions made possible by economies of scale. Nevertheless, it's essential to acknowledge that using a consolidation point involves additional logistical handling or operations. Therefore, a sufficient volume of goods is necessary to justify and offset these extra costs.

It might be more appropriate to refer to them as city hubs rather than distribution centers. This is because the primary focus is not on warehouse stock management but on inbound, consolidation, and outbound activities. These hubs function primarily as "cross-docks". Temporary storage to supply retail stores or construction sites on demand is an intended function.

In large urban environments, the logistics network involves not only multiple urban distribution centers (Urban Consolidation Centers – UCCs), but sometimes also various levels of decoupling. At neighborhood, district, or zone levels, micro and nano hubs are deployed as additional consolidation points to enhance efficiency. Parcel safes, collection points or lockers can also be seen as decoupling points. Promoting and encouraging alternative delivery options, such as collection points, parcel lockers and convenience stores, can alleviate the strain on the urban road network. This approach empowers consumers to conveniently pick up goods at a location that suits them best, eventually leading to a reduction in the number of individual home deliveries.

The figure below illustrates the urban logistics system with multi-echelon decoupling points. It is evident that the various logistics niches (construction, retail, e-commerce, waste, service,…) require specific interpretations of the logistics system. In short, the system is generic, the implementation can be sector-specific.



The table below provides an overview of the important principles for urban logistics.

Key principle for urban logistics	Motivation - clarification	Main goal
Consolidation	Bundling, clustering and pooling – asset or capacity sharing – collaboration - “more with less”	Efficiency
Decoupling	Transhipment – replenishment & last mile & last-last mile – modular – buffering - from supply-driven towards demand-driven	Agility
Multimodal	Combination of various transport networks (road -incl. bike and foot, rail, water, undergroud and air) – various vehicle types – integration – transhipment - synchronization	Robustness
Connectivity	City of Things (cf. IoT) – hub & spoke – hyperconnected network – data sharing – community or ecosystem design	Integration
Open-access	Standards and harmonization – protocols - infrastructure on public domaine - neutral assets – white label – common assets	Effectiveness
Public-private	Urban logistics deal – alignment – multilateral agreement – multi-stakeholder covenant	Equitability
Orchestration	Governance – organization of collaboration – community or ecosystem building and management - monitoring	Fairness

Connectivity as a common thread

The concept of the Internet of Things (IoT) or City of Things (CoT) is based on data exchange and communication, but its foundation lies in connectivity. Connectivity is the common thread throughout the development of a future-proof, urban logistics system. It is also the underlying principle of the 15-minute city. It is considered the critical success factor. Without strong connectivity, achieving smooth, streamlined, efficient, effective, and sustainable logistics becomes challenging, if not ipossible!

Conclusion

Organizing urban logistics requires a **holistic approach** and a combination of different actions. These actions can only form a robust framework if they start from an unambiguous vision, translated into a policy plan. By doing so, cities can mitigate the negative impact of logistics on the environment, traffic congestion and air quality, while at the same time creating new opportunities for the local economy and delivering quality to customers through the smooth and caring delivery of goods and services.

A holistic approach entails breaking down barriers and demolishing the proverbial silos. The advice is often given to start small, with a clear scope and focus. This does not detract from the fact that it is best to look across borders in good time at related logistics activities that may well be complementary and reinforce the whole story.

A next step could be to put the various logistical pieces of the puzzle together. Logistics in the city is currently far too fragmented. At first glance, parcel deliveries and construction logistics, for example, have little in common. However, synergies may also be discovered here. Work needs to be done on **integration**.

Instead of imposing matters from the government and thus regulating and directing the logistics operation, solutions can also be worked out together with the stakeholders. The first and compelling approach is rather easy, top down and the market participants have no choice but to follow. It puts considerable pressure on the sector, logistics becomes even more chaotic and also makes urban logistics substantially more expensive. This increased cost ultimately also translates to the (end) customer. Only losers.

Working together with the stakeholders according to a **public-private deal** means that the logistics system can be substantially changed and this from the bottom up. By bundling smartly and making maximum use of synergies, capacities (space, infrastructure, vehicles, loading units, personnel, etc.) can be handled much more intelligently. By organizing logistics differently, “more with less” can be achieved. Higher margins for the logistics actors and more quality of life for the people in the city. Everyone benefits from that. Only winners.

Thanks to this holistic approach with a well-considered and widely supported logistics plan based on a public-private deal, a smart and sustainable integrated logistics system and an excellent operational operation, in which all actors are connected - in every sense of the word -the City of Things (CoT)- might be all considered as **a serious step towards ‘the physical internet’ for cities (PIfC)**.

The Authors

Bart Vannieuwenhuyse

Bart Vannieuwenhuyse is MSc in civil engineering (K.U.Leuven, 1993) and master of engineering in industrial management (K.U.Leuven, 1994). He started his career as a teaching assistant at the University of Ghent (RUG). In 1997 he came back to K.U.Leuven, "Centrum voor Industrieel Beleid" (Centre for Industrial Management), where he started his PhD research in the domain of transport and logistics. In March 2002 he obtained his doctoral degree in Applied Sciences with a script titled 'Strategic Logistics Management through Rational Transport Mode Choice'. Afterwards Bart worked as senior consultant at Transport & Mobility Leuven (TML), a spin-off of the K.U.Leuven for two years. From July 2004 on Bart Vannieuwenhuyse works as expert (2004-2007) and as Research Manager (2007-2008) at the Flanders Institute for Logistics (VIL). He has coordinated the research in the fields of Multimodal Transport and Extended Gateway. Bart Vannieuwenhuyse is the author of several publications on logistics, multimodal transport and decision support systems. He is also a frequent speaker at various conferences and a lecturer at several Belgian universities, high schools and knowledge institutes. In November 2008, he has co-founded TRI-VIZOR NV, as a spin-off company of the University of Antwerp. As the World's First Cross Supply Chain Orchestrator®. Its mission is to offer specialized knowledge and solutions to create, support and orchestrate flow bundling and horizontal partnerships in transport and logistics, along the supply chain from port to city. With TRI-VIZOR, Bart has been involved in various projects over the past decade in both industry and the public sector. Given his role at various universities and colleges, he is very adept at a triple helix approach. Beside improving the utilization of current logistics capacities, Bart is preparing the future as one of the initiators of future proof transport initiatives (FPTI).

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As a professional, but also as an academic, Alex's key experience is in Supply Chain Management (SCM) and Logistics. He was former partner and practice leader SCM at KPMG, a worldwide leading consultancy company. He acquired exceptional experience in the setup of supply chain strategies and the conception and implementation of decision support systems. Subsequently in his job as independent advisor, he was hired by major companies to supervise and to provide expert guidance for their Supply Chain strategy and logistic optimization projects, most often at board room level. Alex is also co-founder of the Vlaams Instituut voor de Logistiek (Flanders Institute for Logistics). Between 2003 and 2008 he was the first managing director of that institute. Alex is also the inventor of the Extended Gateway® concept. It's an innovative and powerful concept to connect regions with natural advantages for European distribution to international gateways. The idea and the challenge behind the concept is the creation of additional logistics prime locations (i.e. minimal total cost locations) for added value logistics along the corridors of the integrated multimodal hinterland network. In 2014, he was awarded the price of Logistics and Supply Chain Professional of the year by the European Logistics Association (www.elalog.eu). As part-time academic, Alex teaches Supply Chain Management and Logistics at the Universities of Leuven and Hasselt and at the management schools AMS (Antwerp), EMLV (Paris) and IESEG (Paris).