

Urban logistics faced with economic and environmental challenges

FM > LOGISTIC

Roland
Berger 

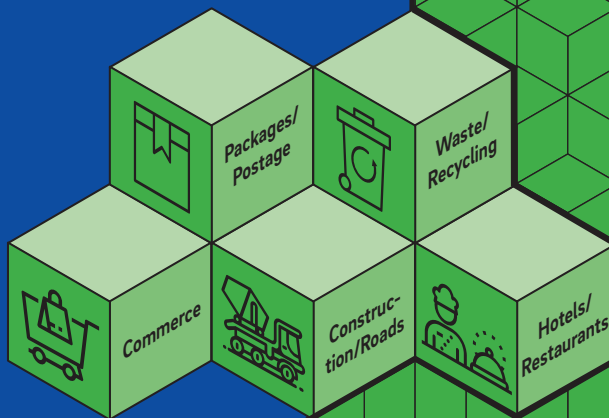
**Consumers and citizens
are adopting much more
responsible purchasing
behaviors when it comes to
products and, increasingly,
their transportation –
therefore, it is the
responsibility of
transportation logistics
stakeholders to provide
optimal solutions.**

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The urban logistics ecosystem

Source: Roland Berger, Topsector Logistics, Civitas



≥8%

Annual expected growth for the urban logistics market between now and 2030

30%

of pollution generated by logistics

20%

of city traffic generated by logistics

Urban logistics in a few figures

30%

failure rate for the initial B2C delivery

0.1

delivery/person/day

300 to 400

loads/
1,000 people/day

Polarized actors

From the self-employed deliverer to transporters with large vehicle fleets

Introduction

The Covid-19 crisis has undeniably brought the public's and politicians' attention to supply chains: making the supply chain safer – specifically in terms of food and essential products – has become, rather quickly, a vital issue for many countries. This imperative is added to the numerous transformations already at work in "urban logistics" – within traditional logistics industries: preparation, storage, transportation, product deliveries to urban environments, a place that is, by nature, constricted in terms of space and time as well as requiring specific processes.

If B2C flows strongly increased during lockdown, other basic ongoing trends have also accelerated: adoption of e-commerce (between +40% and +200% increase during the lockdown period depending on the category, specifically in terms of food¹), reinforcing local distribution networks (provision of supplies and local delivery), B2C client expectations regarding speed and virtually real-time tracking of deliveries (with, however, disparities between Paris, large cities and regions), innovative delivery methods (e.g.: lockers, pedestrian drives, click & collect, etc.), inclusion of small businesses in the at-home delivery chain, etc. – and with all this, their consequences: flow management, returns, waste, packaging, combined with new sanitary restrictions.

Overall, urban traffic strongly decreased during lockdown, freeing up space for the transportation of goods. Nevertheless, the fact remains that the latter is integrating an urban space that has now become saturated (dense and congested cities), with issues such as insistent noise and air pollution. Moreover, the current economic model, based on silo-centric management (each distributor – and some manufacturers, having their own logistics infrastructure and transportation organizational strategies), which leads to smaller and

non-optimized deliveries, is not economically sustainable or environmentally satisfactory.

Consumers are looking for more responsible consumption – not only in the products that they buy, but more and more in their transportation as well – and it is incumbent upon us to provide solutions. Consumers are even more sensitive to the drawbacks of urban logistics since the latter affects them directly (pollution, congestion).

A new model, and closer cooperation between logistics transporters is necessary. This needs to include a portion of B2B customers (which must encourage ethical consumer trends and investments in green solutions with service providers) as well as public authorities (who legislate), in order to rapidly change urban logistics towards a model that serves the end customer.

¹ Interviews / FM Logistic

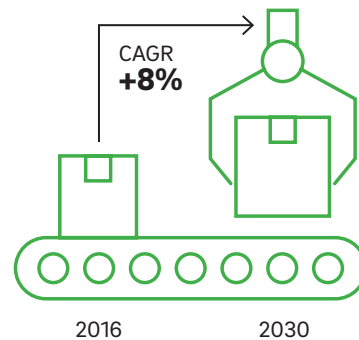
1. Transportation and logistics faced with saturated urban spaces

Our society has grown accustomed to immediate results. Effectively decreasing the amount of time for deliveries in urban settings is a major challenge for logistic stakeholders. Each day, one out of ten people receive a package². Furthermore, flows continue to grow: the overall logistics market increases by +5% per year³. This trend is not going to run out of steam anytime soon since worldwide urban road cargo is going to increase by +2% between now and 2050 and the sector's annual growth is going to increase by at least +8%, according to the different scenarios envisioned in 13 countries⁴. However, these statistics require further nuance, since signs are appearing in certain consumer surveys [source: Institut du commerce / Generix], indicating that the customer could forego "immediacy," either for certain product ranges, or in exchange for other advantages (example: more environmentally-friendly delivery). On the other hand, lockdown shifted usage – specifically due to new loaders (for example: small local businesses) – towards scheduled deliveries, which should be more widely promoted in the future by logistics transporters in order to position themselves within a model that is more economically viable. → A

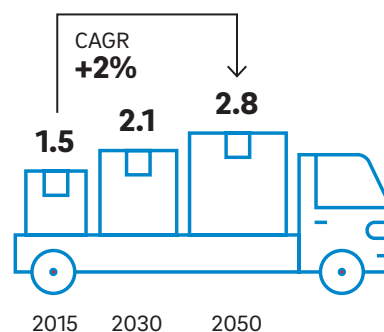
If the B2B sector represents most of the logistical flows to dense urban areas in France (approximately 80%), B2C, led by the growth of food-based and non-food-based e-commerce (development of marketplaces, etc.) is changing norms, specifically in terms of waiting time, since this is one of the major expectations for final customers. From now on, e-commerce – in large cities in any case, and with non-standardized strategies between food and non-food products – is defining the needs of logistics more than B2B.

A: The growth of urban logistics is going to strongly accelerate in the years to come

Expected shipments in 13 countries [billions]¹



Expected worldwide urban road cargo in kilometers [tr]



² Roland Berger

³ Roland Berger

⁴ Combined values for shipments to dense urban areas in 13 countries: United States, Canada, Brazil, Germany, France, Italy, the Netherlands, United Kingdom, Norway, Sweden, Australia, China, Japan and India.

¹ Combined values for package shipments in 13 countries: United States, Canada, Brazil, Germany, France, Italy, the Netherlands, United Kingdom, Norway, Sweden, Australia, China, Japan and India.

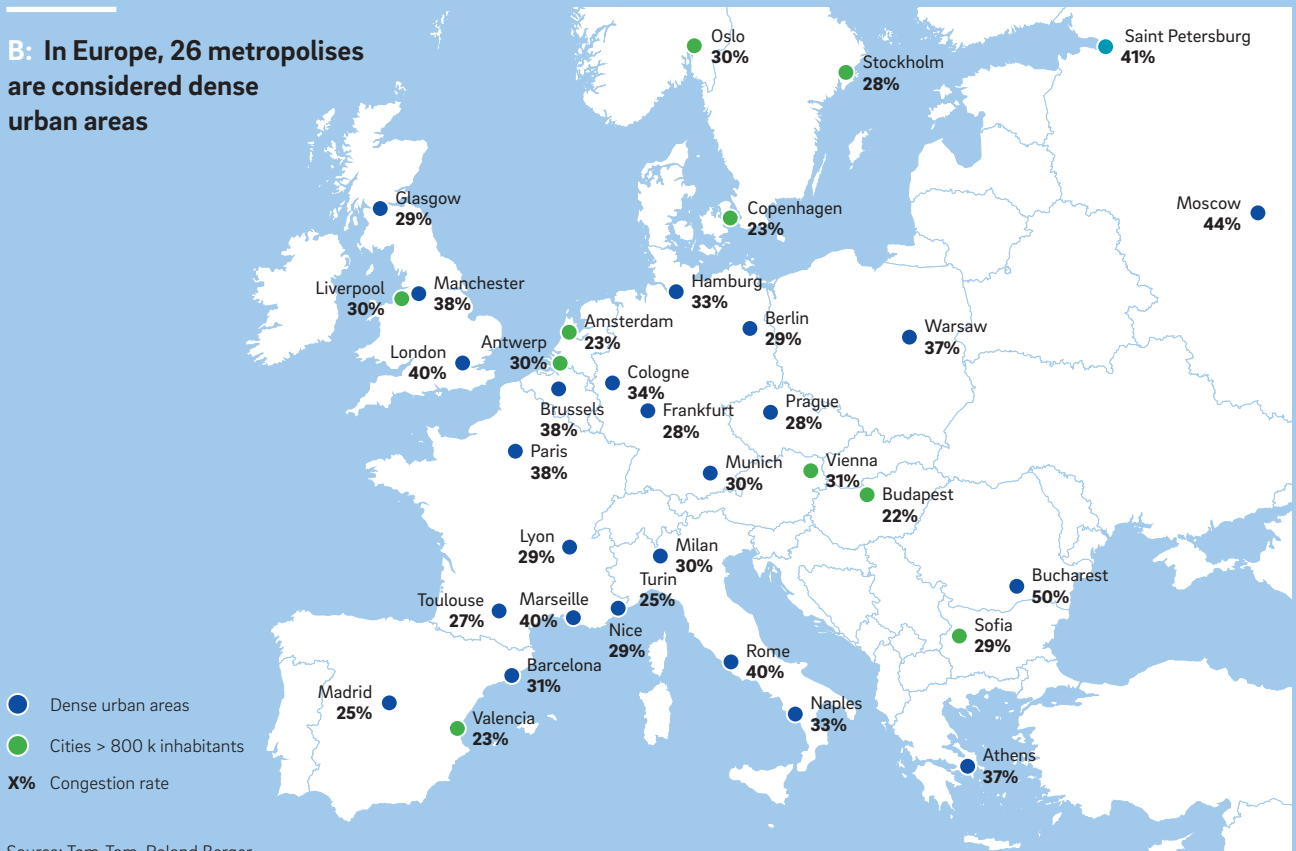
Source: Roland Berger; Pitney Bowes Parcel Shipping Index ; ITF

Defining dense urban area logistics

Urban logistics includes all of the physical and information flows making transportation possible under the best conditions for goods going to or coming from cities. This includes, among other things, consumer or construction goods (and waste) for local authorities, companies, businesses and individuals. Its major challenge is to guarantee the "first/last kilometer" (delivery to the final customer), as well as optimize local transshipments in confined areas (rarity/costliness of surfaces/cost of transshipments). Urban logistics needs to incorporate the density of flows and environmental, visual and noise restrictions in cities.

In France, within "the urban" category (cities), dense urban areas represent 5% of the population (3 million people), and less than 1% of the area around five large cities (Paris, Lyon, Marseille, Nice and Toulouse). These areas are, on average, 4.4 times denser than other large French cities and display a higher congestion rate (+30%), combined with a per inhabitant revenue over the national average. This description also concerns 26 other cities in Europe. → B

B: In Europe, 26 metropolises are considered dense urban areas



Source: Tom-Tom, Roland Berger

C: Customer demands put pressure on logistics stakeholders

LOW COST

Unlimited "free deliveries" or perceived as such
Memberships (for ex. Amazon Prime)

MULTIPLE DELIVERY OPTIONS

From 4-day to 1-day, and 2-hour, even 30-minute deliveries

TRANSPARENCY

Track deliveries in real time:
• Tracking and tracing
• Delivery progress



FLEXIBILITY

Increased desire to get more precise and extended delivery times (for example: evenings, weekends)

RETURNS

Easy/free returns for goods

PRACTICAL

Several delivery options:
• At home or the office
• Pick & go
• in stores (pickup points)
• in automated lockers

Increased environmental expectations

Source: Documentary research, Roland Berger

Logistics stakeholders are confronted with increasing complexity in customer expectations: each individual becoming a fully-fledged logistics customer

Purchasing power higher than the national average, limited motorization, time restrictions, etc. Due to its own characteristics, dense urban populations are the #1 target for at-home delivery services. In Paris, more than 60% of the population chooses to have their food delivered, compared to 37% throughout the rest of the country⁵.

⁵ Harris Interactive

Customers expect companies to make significant efforts in terms of costs, lead times, practicality and flexibility. This includes receiving deliveries at the lowest price, and even for free (or perceived as such), with minimum waiting periods, and delivery times adapted to a person's schedule, so that they can receive packages wherever they want (home, office, pick-up drives and lockers on the way to work/home, etc.). Customers also want to be informed in real time of their deliveries. → C

This trend is exacerbated by the one-upmanship of stakeholders, including Amazon Prime, which had up until now the most aggressive offer, obligating large French brands to offer new delivery services.

Shorter waiting times was, up until the Covid-19 crisis, the crux of the matter for consumer good companies.

"Superfast" delivery services changed the frame of reference for waiting times. It is now possible to have your purchases delivered in under two hours, compared to one day previously. For example, Carrefour proposes a one-hour delivery service (1,000 catalogue references) in five major metropolises (Paris, Lyon, Bordeaux, Toulouse and Montpellier). The Casino group, through its Cdiscount express subsidiary, offers 1.5-hour delivery service in Paris and twelve neighboring cities, and at the end of May 2020, launched a partnership with Deliveroo for 30-minute deliveries (Deliveroo already being a partner of Franprix and Monoprix). In order to respect their commitments in terms of waiting times, traditional food-processing brands opened logistics centers at the gates of Paris in order to reduce delivery distances as much as possible, without actually creating higher costs. → [D](#)

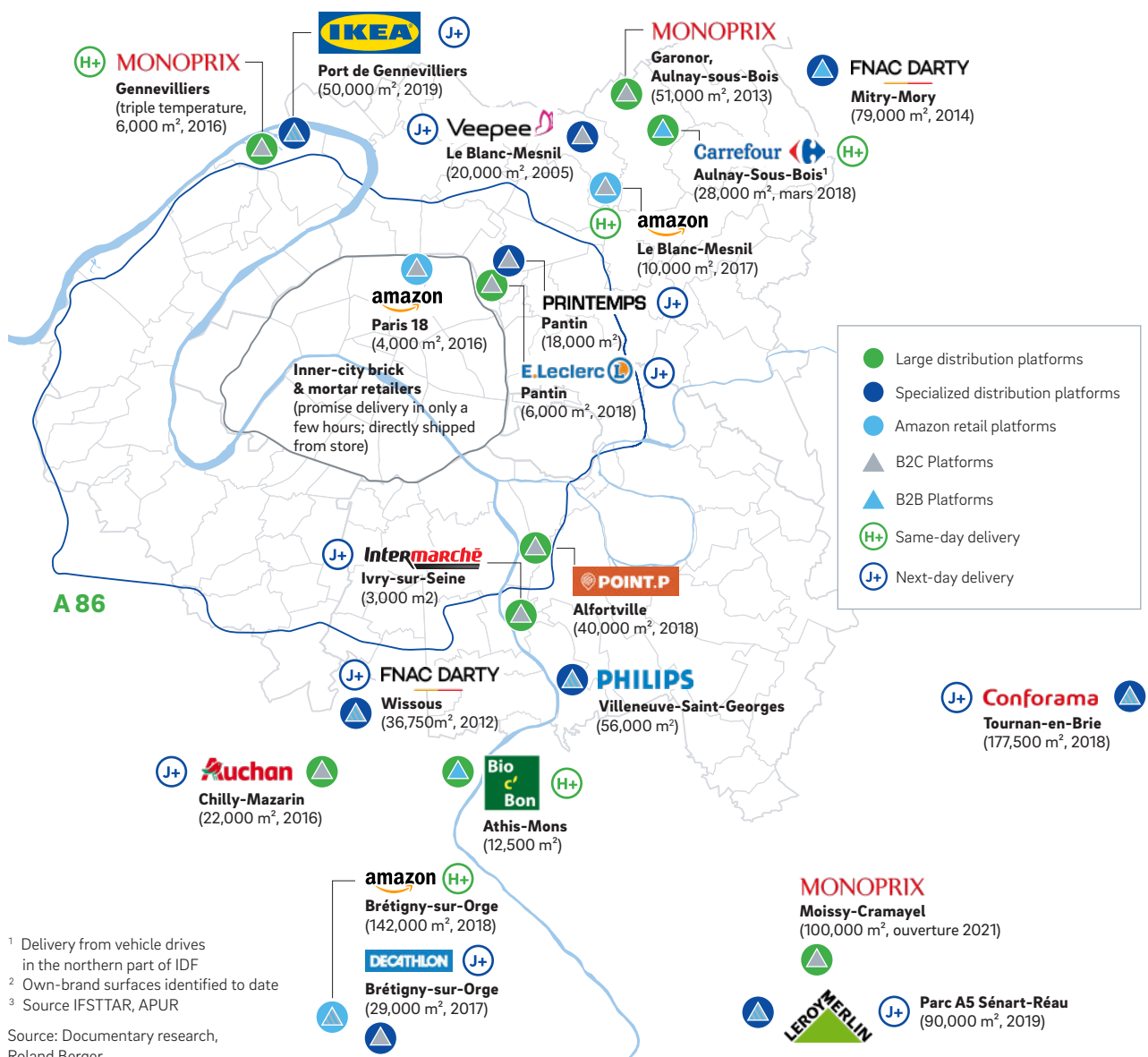
Furthermore, the Covid-19 crisis accelerated the reach of online food business, which doubled its market share over certain weeks (from 5 to 10 points) – a trend that, to date, has been relatively confirmed post-lockdown – and gave prominence to alternative reception methods for at-home deliveries like drives, lockers and pickup points. Consequently, the 2,500 least performing drives in France saw their revenue multiplied by 3, while the 500 pedestrian drives in France reached 35,000 euros/week in average revenue (source Nielsen Fevad). Lockdown also encouraged the emergence of a new figure in urban logistics: local businesses. The latter – to alleviate the impossibility of receiving customers – largely turned towards carryout and/or at-home deliveries. Restaurants (including those with Michelin stars), wine merchants, florists, confectioners, chocolatiers, etc. were thus added to the transporter list of customers for "super local" deliveries, condensing flows even more.

How changes in e-commerce standards intensified delivery flows

The demanding standards for non-food e-commerce products, specifically in terms of delivery speed, information and flexibility, has increased customer expectations. These standards have progressively transferred over to food retail and the logistics that it uses.



D: Map of the e-commerce and B2B spaces and storage units for large distribution brands and producers in the Ile-de-France region [illustrative, non-exhaustive; 2020]



Reducing traffic jams, air and noise pollution for urban logistics

In these circumstances, the increasing intensity of logistic flows causes harmful collateral effects for populations. Logistics vehicles represent 20% of urban traffic and are responsible for 30% of pollution in cities⁶. A percentage that is explained in part by the use of older vehicles, belonging to artisans or small stakeholders, who have a much bigger impact in terms of air pollution than recent vehicles. These vehicles are often small in size, and barely optimized, which impacts congestion in cities and, furthermore, contributes to noise pollution. In parallel, the management of returns and waste (specifically, single-use and reusable packaging) also represents a considerable challenge and new professional possibilities for logistics coordinators (co-packing, bulk packaging, cleaning, etc.). Consequently, the logistics network is confronted with even more demanding legal and environmental restrictions. Its regulation is a major issue for public authorities, both at the city scale as it is for European authorities.

For cities, implementing traffic restrictions in certain areas, converting utility vehicles to less polluting energies, establishing urban tolls for freight, as well as defining time frames for deliveries, are all possibilities for regulating flows. In parallel, some municipalities have launched calls for proposals in order to develop logistics solutions. Many cities have also started to produce overall strategies for urban logistics and develop a component dedicated to the transportation of urban goods within their Urban Transportation Plans. These initiatives are moving towards the better consideration of urban logistics issues in city policies.

Above and beyond sharing expertise, local authorities and private stakeholders sometimes partner up to

Local authorities and private stakeholders sometimes partner up to test innovative industrial solutions, whose challenge is often standardization, at a time when professionals must keep transportation costs under control.

test innovative industrial solutions, whose challenge is often standardization, at a time when professionals must keep their transportation costs under control. Consequently, each city or urban area could develop their own logistics model, since a single model seems inconvenient in terms of the profile, culture and geography of each metropolis. However, a model to be integrated regionally would make it possible to limit the risks of having to fulfill contradictory local regulations: several models could emerge, but they must be comprehensive, widespread and coherent over the same region.

⁶ Roland Berger, VCÖ, Civitas, JLL

The intensification of French and European legislative frameworks

Furthermore, urban logistics stakeholders are faced with major changes in regulatory frameworks, accelerating the migration of their fleets to vehicles that are more environmentally friendly. In France, the Mobility Orientation Law, announced in 2019, specifically plans to make "mobility greener," ending the sale of "fossil fuel" vehicles between now and 2040 (gasoline and diesel). Some municipalities have already decided to limit, and even prohibit, diesel vehicles between now and 2025. Paris City Hall has adopted a "climate plan," which plans to end the circulation of diesel vehicles in 2024 and ones that use gasoline (combustion engines) in 2030. As for Strasbourg and Grenoble, they have decided to progressively prohibit the most polluting vehicles in order to head towards a total ban on diesel vehicles in 2025. Other cities have defined low-emission zones so that they can definitively remove these vehicles, like Marseille, Lyon, Montpellier and Rouen.

In Europe, other cities have initiated similar approaches. Since January 1, 2020, diesel vehicles have been prohibited in the streets of Copenhagen and Oslo. In Germany, Berlin, Stuttgart, Frankfurt and Hamburg have banned older diesel vehicles. In London, owners of the most polluting diesel vehicles pay a tax equivalent to 15 euros per day, in addition to an urban toll (approximately 14 euros).

A pool of jobs to professionalize

The Covid-19 crisis obviously accentuated the essential contribution of logistics to the country's economy as well as the importance of urban logistics for city businesses. Urban deliveries create jobs, which are often

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controversial given the precarious nature of their contracts and the background of those working in these kinds of jobs. A recent study⁷ conducted on the population of delivery personnel in the east of Paris showed a significant proportion of men, mostly foreigners, nearly half of whom do not have any kind of degree and for 40% this represents their primary employment. One of the issues associated with the explosion in volume of urban deliveries is the regulation of these jobs so that these individuals receive a minimum amount of protection. Nearly a third have already been victim of an accident and 40% are not covered by any insurance. In addition, B2C deliveries must focus on customer experience, which rhymes with quality delivery services, even premium, in certain cases. These requirements go hand-in-hand with the necessity to invest in more sustainable contracts and the training of drivers-deliverers.

⁷ Survey on self-employed "instantaneous delivery" workers, May 2020, Université Gustave Eiffel

2. Intensification of logistical flows: metropolises are rethinking the way they approach logistics

Faced with traffic congestion and collateral environmental damages, cities are finding themselves obligated to change their regulations and make stakeholders continually modernize, and find, for example, new structures for storing their goods. In order to respond to this new paradigm, stakeholders have created their own solutions that seldom interface with other environments. It is now necessary to incorporate all aspects of urban logistics for the purpose of collaboration in order to increase the efficiency of networks. → **E**

Establishing common standards: Merging the interests of the public with those of logistics coordinators

Logistics professionals have often created solutions specific to their sector – like is often the case in most industries – while neglecting to integrate their entire ecosystem. This "compartmentalized" way of thinking must now be replaced by genuine overall cooperation between different stakeholders. With this overall view it will be

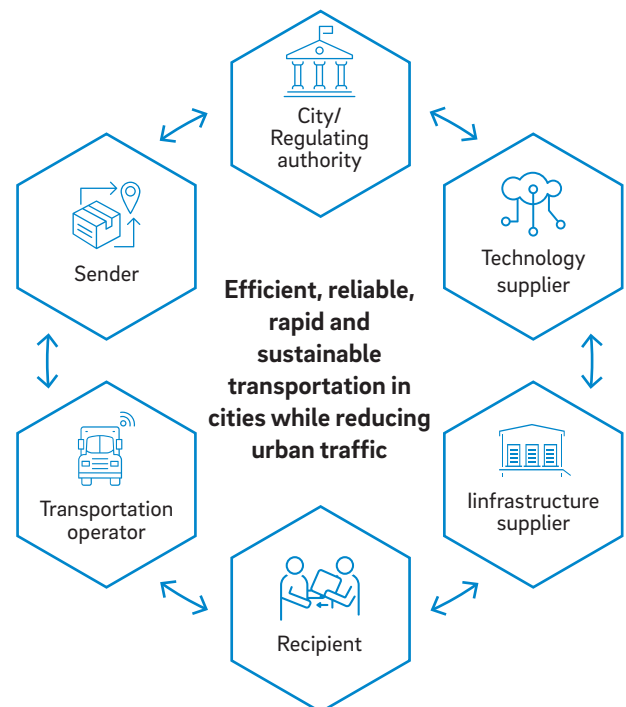
E: From "compartmentalized" ways of thinking to efficient collaboration

COMPARTMENTALIZED THINKING AND DIFFERENT OBJECTIVES



COLLABORATION TO REACH AN OBJECTIVE

.....○



easier to identify current obstacles and the ways to overcome them.

Establishing common standards is an essential condition for successful cooperation, whether it entails rules related to package sizes in order to facilitate their organization, defining a common data usage policy, standardizing norms at the European level so as to define the rules of the game (zero emissions for urban logistics between now and 2030 and decarbonized transportation in 2050) or incentivizing the pooling of resources between transportation logistics stakeholders. The objective, in the end, is to transport goods efficiently and transparently anywhere in the EU, while ensuring economic equilibrium for its stakeholders. "The internet of logistics" – supported by the Alice organization – promotes collaboration between logistics stakeholders and loaders with this in mind. → F

Strengthening cooperation between stakeholders to create a more efficient logistics ecosystem

As soon as the entire ecosystem functions according to common standards, new collaborative approaches are likely to come to light without actually breaking up competition within the logistics sector. Examples of a few minimum standards would be: facilitating the drop off and reception of packages by customers (first and last kilometer), technology suppliers and transportation operators joining forces to inexpensively develop innovative solutions, like using the trunks of individual vehicles for the shipment of packages to city centers, as well as taking advantage of the extended hours of public transportation, specifically at night, to create new flows (e.g. RATP freight trams). → G

Examples of a few maximum standards: pooling storage space and transportation by rethinking logistics strategies for large distributors, retailers and

manufacturers. A shared ecosystem between transporters and logistics coordinators, loaders and regulators will make it possible to decongest cities by limiting flows, and maximizing the use of resources (infrastructures, packaging management services, etc.). The organizer – a trusted third party – could be, depending on the local specificities, the logistics coordinator, the city or partnerships between one another.

Rethinking scarce and saturated logistics spaces

The increase in freight transportation methods and the arrival of new players (Cargomatic, Uber, Amazon Fresh, etc.) contribute to the saturation of urban spaces and local logistics warehouses. Consequently, it is important to use existing infrastructures more intelligently by exploiting verticality, or their temporary availability, in a context where cities struggle to free up property due to their demographics and development.

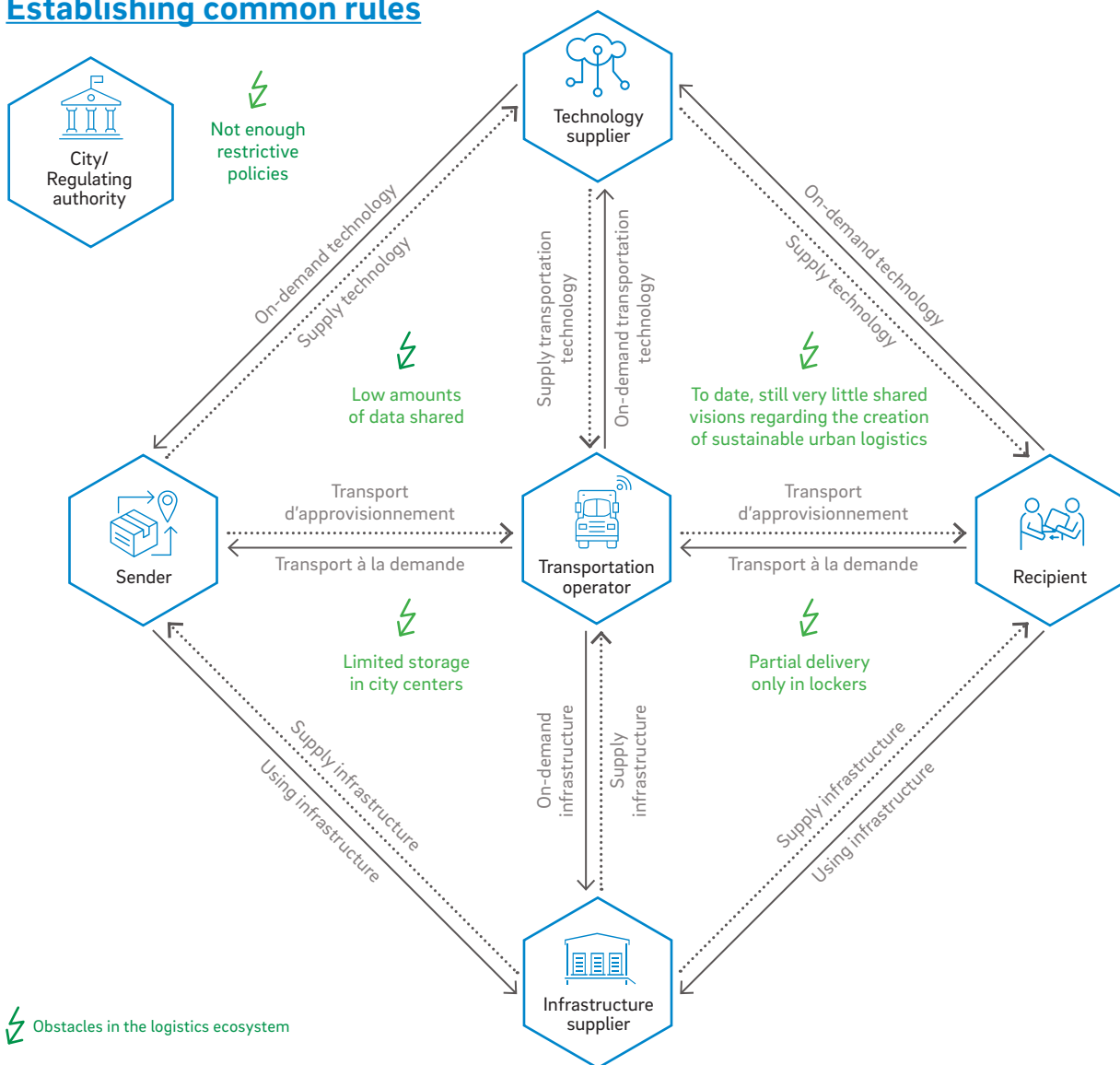
Solutions to improve logistics are many and vary according to the amount of investment allocated. For controlled budgets, logistics companies could develop mobile distribution centers, borrow unused bus lanes at night to unload cargo, as well as develop self-service collection points in order to reach the urban center.

As such, FM Logistic, along with the "Plume" initiative (*Plateforme Logistique Urbaine Modulaire et Ecoconçue*) intend on meeting the challenges intrinsic to dense urban areas: scarcity and cost of surfaces, the negative perception of warehouses and transportation flows by neighboring populations, necessary modularity in order to adapt to a change in needs and environmental imperatives.

Joining forces with Novaxia, a specialist in real estate transformation, FM Logistic proposes utilizing urban spaces that are temporarily available (for example, pending a building permit), by proposing pop-up warehouses

F: Structural obstacles to efficient collaboration between different logistics stakeholders

Establishing common rules






















located in vacant areas and integrating different complementary modules: "cross dock" base module (ending flows between the back warehouse and last-kilometer deliveries), packaging, lockers, facilitation of returns, etc. In addition, this model would provide logistics jobs in urban environments for people in professional integration programs, such as order preparation or co-packing.

Previously, the transportation of goods required sizeable investments in order to expand, among other things, river and rail freight lines. Across the Channel,

the Greater London Authority is currently developing marinas on the Thames River to improve access to London's center. In Lille, a multimodal platform was created on the banks of La Deûle, so that freight trains, boats and vehicles arrive to one single area. As for Franprix, it set up shop in Paris on the banks of the Seine. "Franprix en Seine" uses the river to make deliveries to 300 stores throughout the capital. According to the brand, the goal is to "save themselves from 450,000 km of road per year, e.g. 14,000 hours of heavy trucks in the Ile-de-France region."

G: Innovative collaborative approaches

Stakeholders can work together using different collaboration methods

	Collection/delivery to the first or last kilometer For example, using trunks in individual vehicles for delivery purposes		Customer		Technology supplier		Transportation operator
	Combined methods Use, for example, public transportation at night in order to transport goods to cities		Technology supplier		Transportation operator		Regulator
	Private-public-private partnerships Public administrations provide data on public traffic to logistics service providers (for example, Novelog)		Transportation operator		Regulator		Technology supplier
	Infrastructure / vehicle sharing Sharing warehouses or vehicles to improve usage and coordinate planning		Technology supplier		Transportation operator		
	Cooperation for innovation Shared innovation laboratory, sharing non-competitive data		Transportation operator		Regulator		Technology supplier

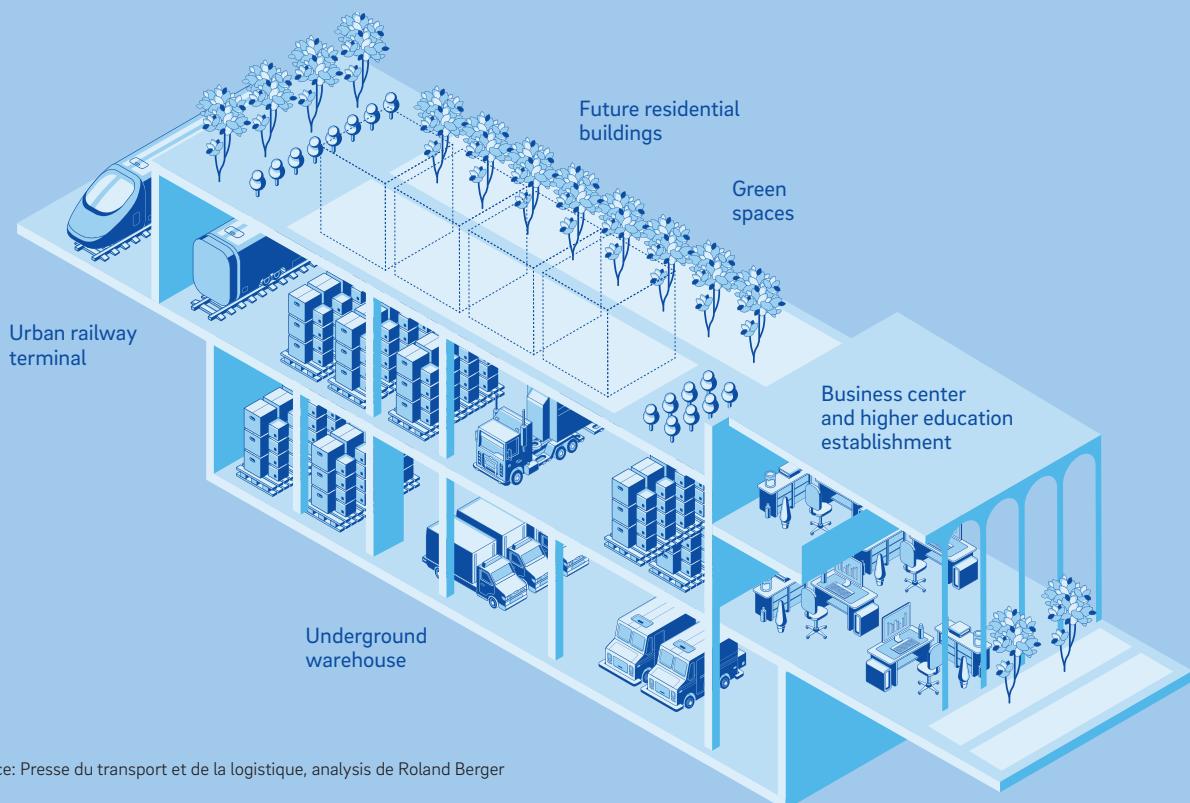
A new generation of urban warehouses: Chapelle Internationale

What will urban logistics platforms of tomorrow look like? A new generation in logistics platforms was inaugurated in Paris in June 2018: Chapelle Internationale. Located on 7 hectares of former train tracks in the 18th arrondissement, it represents a new Parisian neighborhood with 150,000 m² of converted surfaces, including 56,000 m² of housing, 33,000 m² of offices, 8,500 m² of work spaces for smaller companies, many public facilities as well as spaces dedicated to urban agriculture and businesses.

The multimodal logistics building allows for the proper delivery of goods to the heart of Paris, thanks to a rail shuttle, which links to the platform in Dourges and the port in Bruyères-sur-Oise. Goods are then distributed to neighborhoods in the capital by electric, natural gas-powered or

hybrid vehicles. This innovative system makes it possible, in practice, to decrease the annual number of heavy trucks on the roads in Paris and the Ile-de-France region by 44,000. The operational and economic viability of this multimodal approach will be confirmed over time, and will enable this project and others to adapt infrastructure and their own logistics strategies.

This site also includes a company incubator dedicated to sustainable mobility, underground logistics spaces and a data center, whose outgoing heat is recuperated to heat several other buildings. On the building's 10,000 m² of roof, the City of Paris chose to build athletic fields and a vast agricultural farm of 7,000 m² so as to develop different urban agricultural techniques.



Furthermore, vertical extensions are now being envisioned to increase available surfaces in logistics platforms, which allows warehouses to be closer to final delivery areas and therefore comply with shorter and shorter waiting periods. For existing structures, this entails utilizing vacant multipurpose or underground centers, and for new structures to build logistics buildings with floors accessible via ramps.

Technology in the service of urban logistics of tomorrow

Optimizing logistics spaces is not sufficient enough to improve the ecosystem's efficiency. The latter must also be connected so that it can be predictable and, therefore, optimized. The latest technologies offer a whole new horizon for logistics thanks to an intelligent environment, even if it requires companies to carry out significant investments to acquire or develop and then deploy them. → [H](#)

Emerging technologies, in their development and understanding, highlight the pressure on logistics stakeholders to improve the management of flows and the transparency of costs. The fact remains that they appear essential in responding to customers' demanding expectations, both for B2B and B2C.

Transportation is a major vector of technological development. In the future, traditional vehicles will be replaced by electric and autonomous transportation, assisted by drones and robots used both in warehouses as well as metropolises in the interests of the overall integration of the "Smart City." This connected ecosystem highlights the decisive role of artificial intelligence (AI) as well as security and certification systems in information exchanges (e.g.: via Blockchain) and, therefore, the crucial issue of data, its sharing and real-time processing.

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Given the circumstances of an overloaded municipal network shared between passenger and freight transportation, shrewd planning incorporating both of these components is necessary and can be achieved through technology. France has the expertise in these subjects, for example with Systra, whose organizational tools based on data analysis makes it possible to optimize transportation networks by modeling the impact of changes on network performance indicators (e.g. operational costs, new vehicle purchases, etc.).

H: Technology at the service of urban logistics of tomorrow



3. New technologies and green transportation: investment priorities for logistics stakeholders

The importance of sharing data

Within this new paradigm, the centralization of data processing has proven to be the sector's new focal point. Collection, today largely controlled by professionals over the entire supply chain, must nevertheless be shared so as to improve foreseeability and identify any mishaps likely to disturb flows.

The issue of sharing data also concerns municipalities. Currently, cities are not able to collect data on freight traffic due to financial constraints and the absence of technological resources. In addition, logistics operators do not divulge data related to traffic to municipal authorities. For example, several municipal administrations have unsuccessfully asked Uber to divulge their geolocalization information in order to analyze pickup and drop-off spots for carpooling services. Consequently, the urban space is not analyzed in its entirety and can therefore not be optimized effectively since its outlook remains divided up between different stakeholders.

In order to fix this, open data platforms could be accessible to all stakeholders with a standardized approach to collecting and processing data. This collaborative method could result in the improved foreseeability of urban merchandise flows, as well as the real-time tracking of the transportation of goods and thus the better organization of logistics vehicles in urban environments.

Furthermore, the issue is not just the sharing of data, but also predicting the volume of deliveries in accordance with consumer methods, city typologies, etc. Models are in the process of being created, specifically by researchers tasked by the OCDE, but they remain marginal and unfinished.

This transformation of logistics in urban environments requires considerable investments by professionals. The latter must not only incorporate new

technologies (automation, data, IT, etc.), but also make fleets more environmentally friendly and better optimized.

Single-channel and automated platform management

The automation of stock is a strategic and chief objective for companies. Until now, urban warehouses had a degree of limited automation due to the uncertainty of the economic model and the constraints related to infrastructures. In other words, the tightness of storage spaces and the lack of long-term visibility regarding customer expectations (volumes, references, etc.) slowed down the adoption and deployment of technological solutions. Whether it is the warehouses of major international stakeholders or those of Chronopost, the sorting and loading of trucks is still rarely automated. And yet, the priority given to rapidity, reliability and achieving economic equilibrium for stakeholders – set against a background of a strong increase in urban flows – can only occur through the adoption of automated technologies, more concise and agile, supported by powerful Order Management Systems (OMS) – an automated and single management system for real-time orders and stock, integrated with systems for logistics transporters and loaders – which must include interoperability to guarantee that the whole operates correctly.

The dark store is a concrete example of adapting urban surfaces. If this usage method for existing installations was already used before the pandemic, during lockdown Franprix also transformed four of its stores into order preparation warehouses to strengthen its delivery capabilities.

Lack of maturity and expensive investments: alternative transportation methods on the testing block

Above and beyond issues related to stock, and in order to respond to all of the challenges of urban logistics, it is also imperative to find new methods for innovative and more environmentally friendly transportation (natural gas, electric, hybrid, etc.) so as to solve issues related to noise and air pollution found at the heart of metropolises. → I

The optimal choice for transportation in cities depends on a balance between environmental impacts (carbon and pollution), the solution's autonomy and costs. From an environmental standpoint, the electric solution (and by extension hydrogen) is the one that emits the lowest amount of CO₂ and polluting gases, as long as the electricity used is low in carbon, which is going to depend on its production method. On the other hand, the autonomy of electrical propulsion methods is the weakest (around 150 km). Natural gas-powered vehicles make it possible to drastically decrease polluting emissions, which are one of the major issues in cities, but they are still going to emit CO₂. However, their autonomy is greater and their cost more affordable. Lastly, hydrogen energy, in theory, enables greater autonomy, but the availability of vehicles is still too scarce for logistics and, consequently, presents a price that is still prohibitive (excluding subsidies). → J

In this sector, innovation specifically comes from e-commerce companies. For example, to improve its ecological footprint, C-discount, implemented strong initiatives, by making the decision to use recycled materials and vegetable-based ink for its packages, limiting empty space in vehicles and packages thanks to the deployment of several packaging machines capable of adapting the box to a product's three dimensions (in partnership with Neopost), managing its unsold items

responsibly (zero destruction) as well as its used products (second life thanks to a partnership with Envie) and utilizing alternative transportation methods⁸.

FM Logistic, through its subsidiary "Citylogin" dedicated to last-kilometer delivery in dense urban areas and local micro-logistics, decided on a mixed solution using electric, natural gas and hybrid vehicles in order to serve large European metropolises.

The robotics department at Domino's Pizza joined up with Starship Technologies to develop a completely autonomous delivery robot that can reach a speed of 18 km/h on sidewalks. It is controlled by AI, which manages its maneuvers, as well as its interactions with customers (payments). Tests are ongoing in Germany, the United Kingdom and the United States.

Boeing recently unveiled a drone capable of delivering goods of up to 250 kg in weight within a radius of 32 kilometers. While the legal aspects related to the use of drones in urban areas are still not defined in most countries, South Korea authorizes long-distance night flights for goods under 25 kg.

⁸ Source : Fevad

I: Natural gas, electric, hybrid: what are the alternative energy technologies?

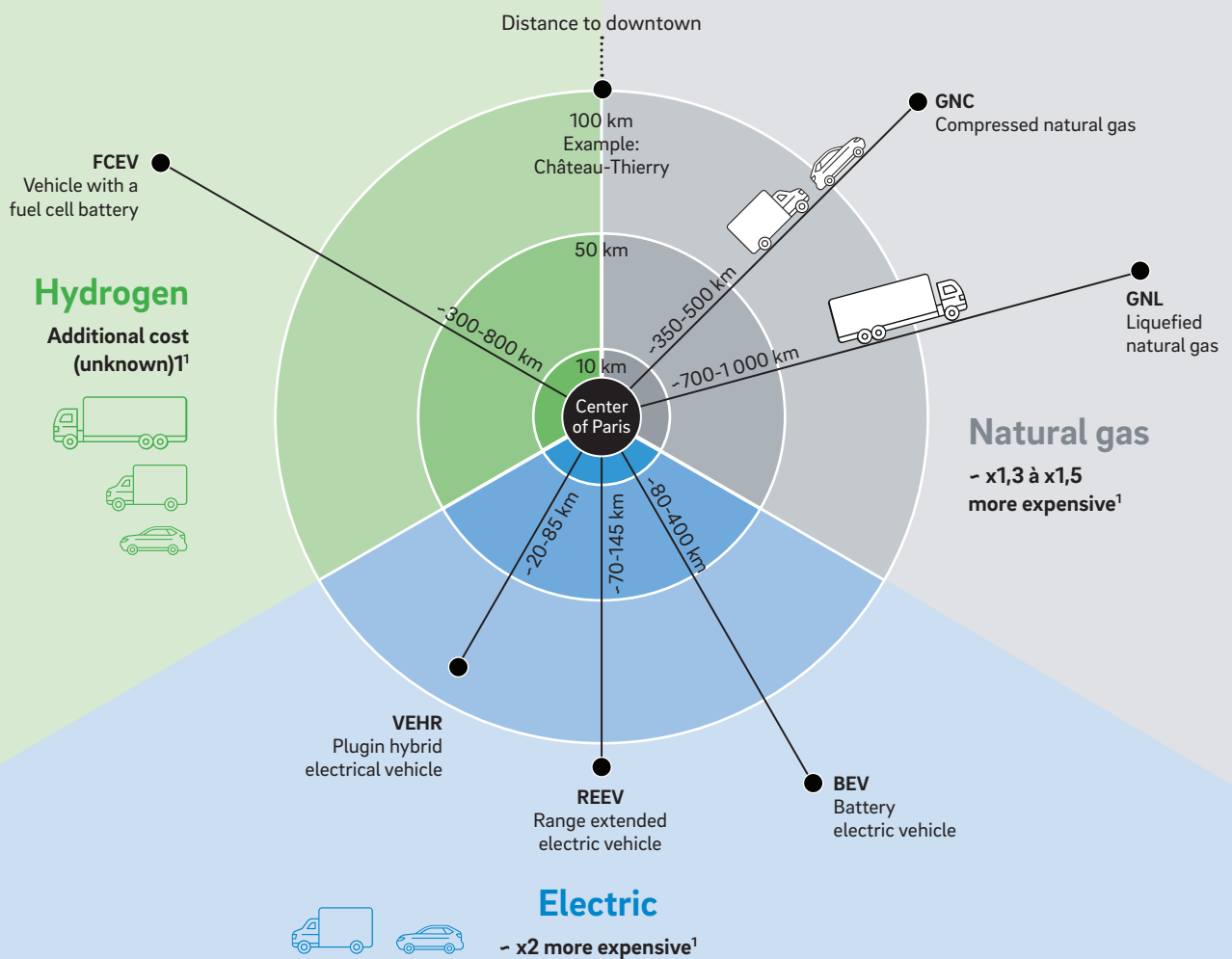
	Technology	Advantages	Drawbacks	Manufacturer
CNG: Compressed natural gas	Compressed methane gas (200 bars)	Fewer greenhouse gas emissions and -96% fewer polluting particles Safer	Methane emissions Decreased energy efficiency	Iveco Renault Trucks Scania
LNG: Liquefied natural gas	Liquid methane that must be maintained at -160°C	Fewer greenhouse gas emissions and -96% fewer polluting particles	Methane emissions Higher cost and environmental impact from production	
RNG: Renewable natural gas	Methane from renewable sources or biomethane Same technology as CNG	75% less CO ₂ , 50% of NGVs in the gas grid in 2050	Limited technology and infrastructure	
BEV: Battery electric vehicle	Powered by an electric engine and a battery (Li-ion) with pluggable charge	0 emissions from cars -28% -72% fewer greenhouse gas emissions in its lifecycle Quiet engine motor (30 dB)	Environmental impact from the production of batteries Refueling takes time Increase in infrastructures	
PHEV: Plugin hybrid electrical vehicle	ICE ⁷ supplemented with an electric engine/battery with pluggable charge	Zero emissions when the battery is fully charged	Short capacities with a higher cost /kWh batteries Technological complexities	Renault (Master ZE) VW (E-crafter) BYD (Chinese)
REEV: Range extended electric vehicle	Electric engine and pluggable battery, with an auxiliary ICE used only to supplement the battery's charge	Zero emissions when fully charged Uses the existing fuel infrastructure	Complexity and additional costs compared to a BEV	SAIC (Chinese) Nissan Voltia Daimler (E-Fuso) Tesla....
HEV: Hybrid electrical vehicle	ICE and a small electric engine/battery charged by braking, energy harvesting or the engine	Fewer emissions Uses the existing fuel infrastructure Similar to ICE	Low autonomy Higher emissions over longer distances Expensive batteries Louder engine noise	
FCEV: Fuel cell electric vehicle	Combustible battery that creates electricity on board by using compressed hydrogen and oxygen from the air	Zero-emission cars. More efficient More high-end Several minutes to refuel	The production of hydrogen (mainly natural gas) requires a lot of energy. Currently limited infrastructure	Renault (Kangoo Maxi Z.E. H2)

■ Natural gas ■ Electric ■ Hydrogen

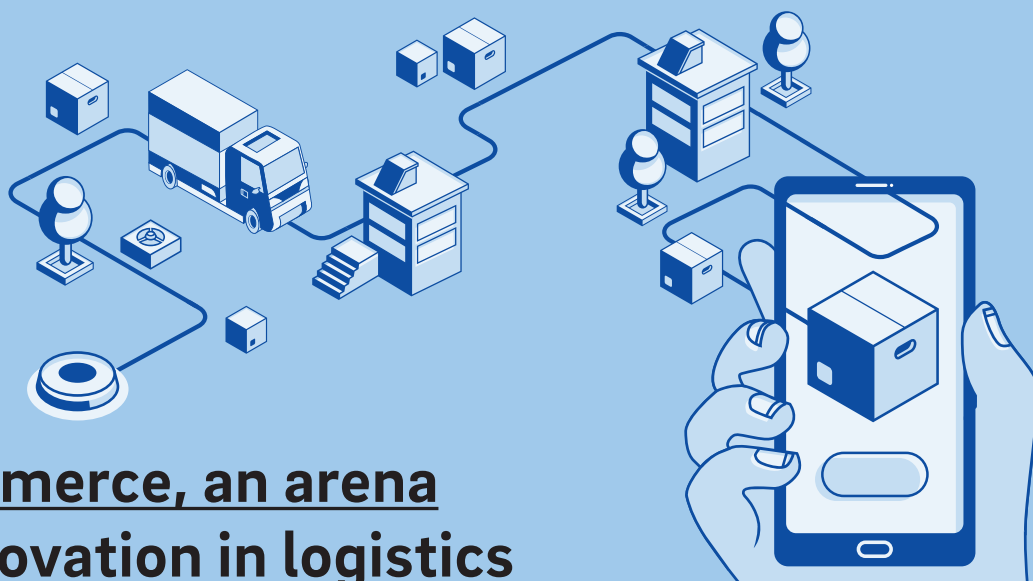
⁷ Internal combustion engine (gas/diesel)

J: Service range and cost of alternative vehicles

Autonomy of trucks and green vehicles (LUV)



⁷ Comparison with a 40-ton B7 diesel truck on the basis of 100km/day over 5 years



E-commerce, an arena for innovation in logistics

New stakeholders are arriving onto the urban logistics market by providing services with high added value, mainly dedicated to retail and e-commerce. The pioneer, Amazon, proposes an all-inclusive logistics service through its offer "Fulfilled-by," only open to referenced sellers on its website, which entails full coverage of logistics chains, e.g. from the warehouse to the final customer, for these smaller stakeholders.

Other companies serve as interfaces between the different links in the value chain with on-demand urban delivery services, connecting companies with independent suppliers. That is the strategic choice made by Stuart, GogoVan, Amazon Flex, as well as Senden 24. The latter, meant for B2C customers, collects all of a customer's orders from a variety of pickup points in the city to then deliver them to their home.

Companies have chosen to dedicate themselves to the single-channel organization of shipping goods to B2B or B2C customers. Like Everoad (ex-Covargo), a digital platform that allows senders to find the best transporter according to two criteria: the price and the volume to deliver, from a simple palette to a full truck, across all of Europe.

As for Uber, it has diversified by experimenting with UberCargo in the streets of Hong Kong. Its operations remain identical to that of Uber for individuals, with deliveries that can be monitored in real time through the mobile app. The user can also choose to travel with their cargo. The delivery site can be shared with the recipient and prices are calculated according to the travel time and the distance traveled.

Lastly, Cubyn and Wing have decided to tackle the "first kilometer" issue on behalf of small and midsize e-commerce companies. The offer includes product pickup, packaging, transfers to the transporter and the organization of transportation at competitive prices (1 to 2 euros per package). Cubyn now has 300 customers and has shipped 200,000 packages. The startup concluded a partnership with Priceminister to develop its activity with marketplaces and its service range, which is currently limited to the Ile-de-France region.

Mostly new stakeholders contributed to the innovative approach of these different logistics solutions, even if Amazon continuously develops new offers on the subject. Nevertheless, major traditional stakeholders are absent due to their lack of digital maturity. In other words, the progressive digitalization of the logistics sector requires them to modernize, either by internalizing these new skills or purchasing specialized companies.

4. Towards the emergence of new models for logistics coordinators

Reinventing one's self in order to meet customer expectations while guaranteeing economic equilibrium, against a background of saturated urban spaces and ever more restrictive legislation, is the central challenge for urban logistics stakeholders. This state of affairs requires them to rethink their economic model around three fundamental pillars: infrastructure, technology and collaboration.

Creating new multimodal spaces (e.g. from the FM Logistic Plume project), using existing infrastructures for preparation (e.g.: dark store, store picking) and new delivery points (e.g. click & collect, pedestrian drives, lockers, package pickup spots) provides certain agility when managing the flow of goods. In warehouses, technology could turn out to be a precious ally when optimizing preparations (e.g.: micro-optimization) and guarantee real-time monitoring – even predictive – of stock, while outside warehouses, it can be used to better understand user behaviors and the environment, thanks to the collection and processing of data on customers and the entire logistics chain. This new context will be possible once effective collaboration comes to light.

For the moment, logistics stakeholders are faced with a schizophrenic strategy. They are developing large automated and multi-channel platforms on the one hand, while multiplying the number of smaller logistics surfaces so they can deliver to small urban spaces, as well as individuals. An approach from stakeholders, like FM Logistic, with a multi-flow and multi-customer (B2B and B2C) hybrid highway, which supplies the city through a local urban hub, followed by a daisywheel of services in downtown locations (pickup stations, pedestrian delivery, deliveries to mobile lockers as well as offices and private places, out-of-home dining deliveries, etc.) intends to break up the compartmentalized approach. With a unified strategy based on "one process" (compatibility of processes between products, making it possible to process any type of product and B2B or B2C

An approach from stakeholders like FM Logistic, with a multi-flow and multi-customer hybrid highway, which supplies the city through a local urban hub, followed by a daisywheel of services in downtown locations (pickup stations, pedestrian delivery, deliveries to mobile lockers as well as offices and private places, out-of-home dining deliveries, etc.) intends to break up the compartmentalized approach.

customer for these products), "one roof" (pooling customers from one industrial vertical within a warehouse) and "one network" for all flows, FM Logistic addresses urban logistics with an adapted and unifying tool for mass markets, while focusing on the development of a sustainable solution for the environment.

How to maximize value creation

However, it is by combining infrastructure, technology and collaborations that value creation can be augmented, specifically in the hopes of defining a sustainable economic model. The introduction of technological solutions within infrastructures makes their utilization more effective and ultimately improves fluidity in cities. Furthermore, when companies collaborate within the same structure, they share workforce-related costs.

When technological innovation and infrastructure are put in the service of corporate collaborations, value creation is optimal because each channel reaches its maximum potential. By distancing themselves from the existing ecosystem and encouraging more collaboration so as to limit compartmentalized approaches, it will be possible to better mass market flows and limit the negative impacts of poorly organized urban logistics (pollution and low economic profitability), through a trusted third party (transporter, and/or city, for example). In parallel, breakthrough solutions – albeit costly – are already being tested, which herald the "Supply chain" of the future at the service of cities. In the United Kingdom, Mole Solutions inaugurated a "freight pipeline" in the city of Southampton to respond to "last kilometer" issues by creating new underground flows for goods. These pipelines have economic and environmental advantages as well as contribute to freeing up urban traffic. This network connects major suburban roads with strategic locations downtown. Goods are transported in specially designed capsules thanks to an electric induction system. China and the United Arab Emirates are already studying this type of transportation solution.

This example of an innovative model is the culmination of the future of logistics. If it requires significant budgetary efforts and time to be deployed, it responds to each current challenge for the sector.

When technological innovation and infrastructure are put in the service of corporate collaborations, value creation is optimal because each channel reaches its maximum potential.

This solution was able to emerge thanks to long-term collaboration with local public authorities, on the one hand, and technological innovations in the service of a vast infrastructure network, on the other. From now on, it is up to logistics stakeholders to determine their economic model and the manner in which they can use infrastructure, technology and collaboration in the service of the logistics of tomorrow.

For more information

ROLAND BERGER

Founded in 1967, Roland Berger is the first European general management consulting office. Established in France since 1990, the Paris office, with nearly 300 employees, advises major international companies as well as public institutions, on all of their issues, from strategic consulting to operational implementation. It endeavors to propose innovative solutions, with particular attention paid to obtaining concrete and measurable results.

FM LOGISTIC

A major figure in supply chains, FM Logistic continues to grow internationally with revenue of more than 1.43 billion euros in 2019/20. Its activity is spread out over 14 countries on 3 different continents.

Recognized for the quality of its offer, specifically in the logistics of large consumer goods and their shipment to consumers in city centers, FM Logistic helps its customers meet the needs of their own clients by utilizing a single-channel strategy and digitization. Attentive to its ecosystem, the company strongly invests in sustainable development, continually tries to strengthen workplace safety and reduce its environmental footprint. Its status as an independent family company provides it with both the means to build over the long term as well as demonstrate its reactivity. Major international companies, in sectors ranging from food to healthcare, trust in its approach and ability to work together hand-in-hand, under any circumstances.

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WE WELCOME YOUR QUESTIONS, COMMENTS AND SUGGESTIONS

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