



WELCOME TO LOGISTICS CITY

WHITE PAPER OF THE NEW
URBAN LOGISTICS

N° ZERO - 2019

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CITY**

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EDITORIAL

“Urban logistics has become central to the competitiveness of large cities and the ecological transition of distribution activities.”

In just a few years, urban logistics has become a significant real estate market, and it is developing rapidly. This is in large part due to e-commerce: by drastically changing the way of consuming by enabling delivery as close as possible to the consumer, by promising instantaneity and by promoting flexibility, e-commerce has revolutionized distribution methods, from wholesale trade and mass retail to urban service industries. Cities thus began to function differently, without fully anticipating the impacts: while warehouses were moving away from the urban centers of major cities, goods started to circulate in large numbers to offices and homes, generating increased noise, visual and environmental pollution. This presents a challenge to municipal public policies, which are increasingly proactive in relation to climate change and the improvement of air quality.

While balancing economic growth with ecological regulations, the urban logistics sector has increased its competitive advantage, resulting in a double revolution: that of transport first, with the (very) gradual transition to cleaner vehicles that are better adapted to cities; but also that of real estate, with the development of a new market for urban warehouses, integrated into the urban core and linked to the logistics built environment that now surrounds centers of major cities.

This real estate (r)evolution is still poorly understood. However, it is central to the competitiveness of large cities and the ecological transition of distribution activities because through the built environment, we are able to influence this developing market's operating conditions. It is all the more essential as urban logistics has now changed. The need to use a scientific approach, to count, to compare, to analyze, is necessary to understand the development of this new logistics; building bridges between business and academia is more urgent than ever as a new subject matter emerges before our eyes, its understanding essential to the functioning of more sustainable cities. Comparing the Paris region's situation with those of other major world cities is increasingly relevant to better appreciate the dynamics at work in Greater Paris.

It is with these convictions in mind that SOGARIS has joined forces with the University Gustave Eiffel (UPEM / IFSTTAR) to create the Chair “Logistics City”. This white paper is the first of its kind: it summarizes current knowledge and research concerning the emergence of a new type of urban logistics and presents the Chair's recommendations based on operational empiricism and scientific knowledge in hopes of positively influencing the development of urban logistics.”



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— **Jonathan Sebbane**
Chief Executive Officer of Sogaris

“New concepts, new urban logistics companies have emerged over the past decade in Asia, Europe and the United States, and more recently in all urban regions of the world, driven by digital revolutions.”

Urban logistics concepts aim to meet the demand of urban companies and consumers for new services (being delivered within a day, or even instantly, becomes commonplace in major world cities), while providing solutions to cities' concerns about the environmental and social impacts of current urban deliveries. However, the rate of an effective introduction of innovative logistics in urban areas is slow and varies considerably from one city to another. For cities with efficient urban logistics (such as Tokyo) that integrate logistics facilities in very dense urban areas, or neighborhoods displaying “smart” logistics such as in the historic centers of European cities where cleaner, quieter, more consolidated deliveries are emerging, there are still many, less central, areas and many large cities in the world whose congestion and emissions related to freight transport remain at far too high levels, while social issues (jobs and working conditions) are becoming more acute.

These subjects are explored by scientists in many laboratories around the world and in France. The Chair “Logistics City” is part of this academic movement, with a specific twofold ambition: to pay particular attention, through the discipline of urban planning, to the location of logistics facilities such as warehouses; and to explore the impact on urban logistics and on territories of new consumer and distribution trends, particularly those related to e-commerce and more generally to digital transformations. We will work in the Paris/



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the first in a series that is intended to be annual, is to describe these relationships, in the general context of the new urban logistics born of global economic and technological transformations. Through the Chair “Logistics City”, we hope that the body of research on these interactions will have an additional player, capable of bringing original and useful tools to action.”

— **Laetitia Dablanc**
Director of the Chair “Logistics City”
at the University Gustave Eiffel
(UPEM / IFSTTAR)

Ile-de-France region, from a very comparative perspective, collecting data and identifying developments in other major world cities. We aim to increase knowledge while ensuring that we provide methodological tools to public and private actors in urban logistics, in order to contribute to the development of public policies on freight mobility, the energy transition of the sector, new logistics real estate and labor.

To pursue these objectives, we are fortunate to have Sogaris as a partner, a particularly innovative player that has been helping for several years to place Paris and the Ile-de-France on the world map of cities that are seeking to transform the relationship between logistics and territories. The ambition of this booklet,

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INTRODUCTION

1. Urban logistics: what are we talking about?

The transport of goods and urban distribution is one of the major challenges facing cities today. Until recently, they were always treated as sources of pollution. These questions now appear to be essential elements for the functioning of urban spaces.

Urban logistics can be defined as any service that contributes to effectively managing the movement of goods in cities and to providing innovative responses to demand (from companies and individuals) while respecting good social and environmental conditions (Dablanc, et al., 2017). In the 2000s, it emerged as a new model for understanding urban freight transport and rethinking urban distribution. Urban logistics is concretely reflected in entrepreneurial and organizational innovations in urban logistics services, as well as in public policies, in traffic and parking management (traffic rules, delivery time windows, loading/unloading areas, low emission zones) to reduce congestion and pollution emissions. Urban logistics is based on environmental innovation, particularly in terms of vehicles (electric vehicles, electrically assisted cargo bikes), on the use of new technologies, but also on innovation in the practices and organization of freight transport (consolidation, optimization, modal shift, digital platforms). Finally, urban logistics is also based on real estate. The development of urban logistics spaces (ULS) and logistics hotels, as Sogaris has named them, constitutes a new

service provision for urban logistics (Heitz, 2017). The niche real estate supply provided by urban logistics spaces makes it possible to increase the network of available logistics facilities, particularly in the dense part of cities.

2. Complexity & heterogeneity of urban logistics

Urban logistics is a complex field of study. From small packages to pallets to river or rail containers, urban logistics relies on a wide range of products, containers, and transport modes. While road transport remains the most widely used (90% of tons in Ile-de-France), inland waterways and rail transport are also part of some logistics chains. Road transport is also far from being homogeneous, since it includes bicycles, tricycles, small vans, large vans, trucks (of very different sizes), all of which can be petrol, CNG, hybrid, electric, or even hydrogen in the future. This diversity will increase when vehicles with varying degrees of autonomy are on the streets. The regulation of traffic and parking of these vehicles is all the more heterogeneous as it is mainly local public actors (municipalities) who decide on the conditions and restrictions of circulation and delivery. **This creates a vast spatial mosaic that is not harmonized from a regulatory point of view.** The heterogeneity of urban logistics is also expressed in the operational characteristics of urban supply chains, which are very specific to each of the different economic sectors operating in the city (Toilier et al., 2018). This makes public policies complex because it must be able to take into account the disparities in the sector.

Research on urban logistics tends to focus on city centers and the dense areas of metropolitan areas. The concentration of population, businesses and jobs is very high and the difficulties and cost of delivery increase with density. **However, observing urban logistics from the perspective of dense areas only can be biased.** Due to the socio-economic composition of the urban fabric in city centers, some logistics sectors will be over-represented in the more general representation we can have of logistics, its needs and its organization within global supply chains. Food distribution or parcel transport for example are sectors very much represented and analyzed in urban logistics research. In response, the 2010s saw the emergence of work on metropolitan and regional issues, **thus making it possible to put logistics into perspective in a broader spatial context**, combining dense and less populated areas.

Understanding urban distribution requires an understanding of the heterogeneity of actors and practices. **The complexity of this activity and the challenges it poses to cities goes beyond the sectorial issue of transport and is part of a systemic reflection on the urban environment.** The distribution of goods in cities involves a very wide and heterogeneous range of actors and practices. These include shippers from e-commerce, mass retail or wholesale trade, manufacturing, but also transport and logistics service providers in the broad sense, including carriers for BtoB and BtoC¹ deliveries, which can be large international companies or small companies (which are often subcontractors to large companies and make up the majority of urban freight flows). There is also a growing number of self-employed entrepreneurs, such as bike

¹ BtoB: Business to Business (deliveries to establishments), B2C: Business to Consumer (deliveries to private individuals).

couriers connected to digital platforms (2000 micro-businesses for bike deliveries were created each month in France in 2018, according to the national statistics agency INSEE). Urban freight transport is therefore very diversified. It is a very competitive sector, complex and difficult to know comprehensively, especially by public authorities.

3. Increased scientific interest in this topic in recent years

Since the 1990s, the number of published research papers on urban freight, urban logistics and freight transport has increased considerably. These publications are often linked to research projects funded by public institutions or consortia involving private companies or research foundations. In France, the Urban Freight National Program launched by the government in the 1990s funded studies and surveys to understand how urban freight works. It generated a significant amount of methodology, knowledge and modelling efforts (Toilier et al., 2016, 2018). In 2015, a national strategy called “France logistique 2025” was announced, which was supposed to provide a framework for action to develop logistics in general and urban logistics in particular. The Chair on Urban Logistics of Mines-ParisTech is now well established in the French and international landscape, offering models, tools and experiments of logistics in urban environments in a systemic vision. A recent inventory of simulation methods in urban logistics was proposed by Jlassi et al (2018).

In Europe, the European Commission funded the BESTUFS (Best Urban Freight Solutions) (2000-2008) and TURBLOG (Transferability of Urban Logistics Concepts and Practices from a World Wide Perspective) (2009-2011)

programs, which aimed to describe and disseminate information on urban logistics and to publish best practice guidelines. They have made it possible to create a robust European network of experts, associations, companies and institutional actors, which is now well connected to international networks on the subject (the National Science Foundation in the United States has established a partnership with the European Commission on urban freight). A considerable number of projects involving urban logistics demonstrations have been funded at the European level, including the SUGAR project (Sustainable Urban Goods Logistics Achieved by Regional and Local Policies) or more recently the CITYLAB project, which have enabled dozens of cities to become aware of the subject (even though experiments in innovative city logistics have not always been successful).

In Japan, the Kyoto-based Institute for City Logistics has been organizing international meetings since 1999. The Volvo Research and Educational Foundations (VREF) have funded two research centers in the United States: “MetroFreight” and “SUFS” (Sustainable Urban Freight Systems) and in Sweden the “Urban Freight Platform.” Scientists working on urban logistics form a relatively structured community around conferences such as the International Conference on City Logistics, the I-NUF Conference or the Urban Freight Platform Conference. This non-exhaustive historical overview of the various urban logistics research programs shows the growing interest of public and private actors. **It should be noted that none of these programs has ever focused specifically on logistics real estate, the subject of the Chair “Logistics City”.** This dimension appears to be one of the most recent, still little explored.





4. Global research: Comparability and transferability of models?

Since the 1990s, many cities in France, Europe and the world have been the subject of studies on urban logistics. There are a large number of case studies and monographs, but relatively few comparative studies. **The state of research reaches a stage where it must go beyond case studies to reveal common dynamics, common phenomena or shed light on differences through arguments that go beyond the specificity of one place.** Some works such as those resulting from the CITYLAB or Metrogreight projects (Dablanc et al. 2018) are part of this effort to make local cases comparable. This question of comparison also raises the question of the transferability of models. In urban logistics, many experiments have been carried out in recent years, for example on night deliveries, cargo cycles and urban consolidation centers (UCCs). Many cities in France (La Rochelle, Lille, Lyon, St Etienne) and around the world (London, Tokyo, Gothenburg, Padua) have developed UCCs since the late 1990s, trying to encourage - or even force - the consolidation of all urban delivery tours. The results of the UCCs and other urban logistics experiments are generally not very positive, mainly because of their cost, but these demonstrators have made it possible to identify the limits and bottlenecks. Other experiments, particularly those carried out by the private sector in response to requests linked to the spectacular increase in e-commerce deliveries, have developed rapidly (click and collect points, delivery lockers, smart phone apps for instant delivery). Are these experiments exportable in all situations in all cities? This is the question that needs to be asked today at this stage of research on the comparability of cities.

5. The development of new technologies

New technologies are changing the prospects for urban logistics and urban freight more or less rapidly (Dablanc et al., 2017). In the logistics sector, big data or connected objects (Internet of Things) have already transformed services (product traceability) and delivery driver practices (traceability to optimize routes). The innovations also concern warehouses, which are becoming increasingly automated, changing the configuration of the buildings themselves. Research on electric vehicles, connected, even autonomous, occupies the forefront and questions the capacity of cities to respond to technological developments. Regularly, advances in land robots or air drones for deliveries make the headlines in the specialized press. The question of new technologies is part of this acceleration that affects urban logistics. It is a rapidly changing sector, which also complicates urban planning. **The temporality of urban projects or that of the urban form is not always the same as those of innovations in logistics chains, changes in consumption patterns, and ultimately transformations in urban logistics.**

PRESENTATION OF THE CONTENTS OF THE BOOKLET

The purpose of this booklet is to present the state of research on urban logistics and freight transport in cities: it is a kind of white paper on today's urban logistics. It is not comprehensive, but provides the context for the Chair "Logistics City" and present the research themes that will be developed. The contribution of this Chair to knowledge on logistics serves academic but also operational purposes, in particular to inform and support public policies on mobility, urban planning, economic development and the environment.





NEW URBAN LOGISTICS

The concept of urban logistics emerged some thirty years ago, opening the way for experimentation in freight transport, logistics and urban planning. In a global economic context, a technological environment and rapidly changing environmental and social imperatives, urban logistics is evolving and adapting to provide new solutions for cities and mobility. The objective of the Chair “Logistics City” is to capture these developments and contribute to providing methods for understanding today’s urban logistics.

URBAN DELIVERY THE LAST KILOMETER

Urban logistics, that of the “last kilometers,” is part of a global flow system that results from the increasing complexity and fragmentation of production and distribution chains. **Metropolitan areas thus perform a dual logistical function.** They serve as “gateways” to globalized flows. They are also the place where local services are organized (Hesse, 2008).

Large cities concentrate the main transport infrastructures (airports, ports, motorways) which connect them with hinterlands and other regions. **They are in fact the main focus of logistics activities (warehouses, distribution centers, services) and logistics jobs.** The last kilometers, mostly urban, of freight distribution represent the most expensive portion for logistics operators and carriers. If supply chains meet the requirements of demand (flexibility, reduced storage costs, speed, adaptability), they must be able to do so at a lower cost.

E-commerce is further transforming the last mile. Operators have had to adapt to deliveries taking on completely new forms. Today almost half of urban deliveries from operators such as UPS or DHL are already destined for consumers. Other changes in consumption practices are perceptible, such as short food channels¹ that will potentially also impact supply chains.

¹ Short channels, or circuits, correspond to a method of distributing agricultural products which is exercised either by direct sale from the producer to the consumer or by indirect sale provided that there is only one intermediary.

a. Measuring and evaluating the transport of goods in cities

In urban logistics, measuring the generation of trips related to urban freight transport is an important issue. The work of LAET (Laboratory of Transport Economics and Planning, Lyon, France) and the production of the National Urban Goods Surveys (Enquêtes Nationales Marchandises en Ville - ENMV) since the 1990s now provide a good picture of B2B urban goods flows and their evolution (Toilier et al. 2016, 2018). Combined with an understanding of the spatial structure of cities (location and density of jobs, companies, populations), these studies lead to a detailed modelling exercise and constitute an important part of the data available to understand the generation of urban goods mobility linked to economic or administrative establishments.

These surveys made it possible to measure delivery or collection operations in relation to all urban activities, to quantify them and to observe the road space used by these flows. The size and nature of an economic activity are decisive for the characteristics of urban supply chains (frequency of deliveries, volume of goods, etc.). These surveys also consider vehicle size (see graph). In the densest areas, where accessibility

conditions are limited, light commercial vehicles (LCVs) may have preference over heavy goods vehicles, which raises questions about the ability to consolidate resources upstream and about the ability of urban environments to accommodate these flows. If B2B flows are better known now, knowledge of B2C flows remains partial. Some recent work such as that of M. Gardrat (Gardrat, 2018) and a recent survey comparing residential deliveries by Parisians and New Yorkers (6T, 2018), as well as some estimates for

90% OF FREIGHT
TRANSPORT IS
DONE BY ROAD

London and other world cities (cited in Dablanc, 2019), shed light on the issue. A better understanding of urban freight transport is an essential challenge for research and public action. The creation and availability of data on freight flows, transport infrastructure and logistics buildings is a key strategic challenge for the practice of logistics, real estate and urban planning professionals.

b. Density and environmental issues

Freight transport, mainly road based, appears to be in contradiction with the sustainability objectives of public policies: reduction of CO₂ emissions and local pollutants, reduction of congestion. Freight transport in cities is perceived as a source of negative impacts. This pollution is all the more greater in city centers as these areas accommodate the majority of goods movements. The example of Ile-de-France shows that 80% of goods movements are concentrated over 20% of the territory, which corresponds to the heart of the Paris region (Beziat, 2017).

However, building compact cities (“smart growth”) appears today as the dominant dogma in urban planning and development practices. This invites public authorities and private actors to reconsider the place of productive activities in cities and to promote the integration of logistics activities into the urban fabric. The problem is that density is a major constraint on logistics activities. Delivery is more complex in very dense environments and often requires the use of smaller vehicles (light commercial vehicles) whose multiplication generates, in total, more pollution than would the use of heavy trucks alone. Policies to increase the density of cities will make urban freight transport more complex, so in theory they should be accompanied by a policy dedicated to the movement of goods in cities.

c. Inefficient regulation

The regulation of logistics and goods transport was initiated, at the local level, in the planning process of the Paris region in the early 1990s (Dablanc, Raimbault, 2015) and more

generally in France with the enactment, in a short period of time, of four laws: LAURE (Law on air and rational use of energy) in 1996, LOADDT (Law on the Orientation for the Planning and Sustainable Development of Territories, known as the Voynet Law) in 1999, RSCI law (Law on the Strengthening and Simplification of Intercommunal Cooperation, known as the Chevènement Law) in 1999, SRU law (Solidarity and Urban Renewal Law) in 2000. This legislative arsenal has restructured transport planning, promoted the coherence of land use and transport, and placed sustainable urban development in the new paradigms of public action.

Despite some initiatives and measures, however, it seems that freight has been neglected for a number of years (lack of financial resources to invest simultaneously in several transport policies, prioritization of investments, lack of dedicated expertise and knowledge in the freight sector). The widespread observation that the issue of commodities is not sufficiently taken into account in local planning despite a regulatory framework that requires it to be is a clear indication of marginalization. A recent survey of twenty French cities found that the situation had not, in fact, changed much in two decades (Heitz, Dablanc, 2019). While the global approach to transport planning has evolved with the notion of “mobility”, it has not made it possible to overcome the compartmentalization that has been established (in public policies in particular) between the mobility of people and the mobility of goods. However, the evolution of consumption patterns and more generally of lifestyles in cities, particularly with e-commerce, tends to make the transport of goods more visible. The Chair “Logistics City” will be an opportunity to explore this process of reorganizing mobility and to think about logistics from the perspective of freight/passenger mobility.



2.

EXPLORING TWO SPECIFIC SECTORS: WHOLESALE AND E-COMMERCE DELIVERIES

a. Wholesale trade: supplying stores

Wholesale trade distributes to professional customers (companies, stores, pharmacies, etc.). Although often under-represented in research work on urban logistics, wholesale nevertheless accounts for 15% of B2B daily movements, and this number goes to 22% in Paris (Sirjean, Boudouin, 2017). Unlike other logistics sectors, wholesale mainly organizes its own transport and logistics, and consolidates its flows internally. Wholesale trade is a very heterogeneous sector. For example, supermarkets use wholesaler services to complement their centralized purchasing strategies (central purchasing office) (mass retail represents 12% of wholesale customers). The rest of the customers is divided between manufacturing (16%), cafés, restaurants and local shops (32%), craftsmen (18%), administrations (17%), private individuals (9%) and the tertiary sector (6%) (Sirjean, Boudouin, 2017).

Wholesale trade itself is a heterogeneous category, since it includes pharmacies, for example, which can be delivered up to three times a day. This sector is very constrained by the shape of the product itself (fresh products, medical products, construction materials, etc.). It should be noted that in the case of wholesale trade, the organization of logistics and transport depends largely on that of the customer (ope-

**IN 2019 THE GROWTH
FORECAST
OF E-COMMERCE IS
15% IN FRANCE.**

ning hours, configuration of the delivery area, available staff). In this sense, construction is a special case. The worksites are not fixed, so the delivery points vary according to the size of the worksite, its nature and its material needs. The number of heavy goods vehicles making building sites' deliveries therefore varies periodically and geographically in urban areas. Wholesale trade is therefore an important contributor to urban freight transport and enters the field of urban logistics.

b. E-commerce: supplying individuals

E-commerce has grown by more than 15% per year (by value) over the past fifteen years, and growth prospects are not slowing down in any way in the coming years, as the sector diversifies and conquers new urban regions around the world. This boom has profoundly transformed the sectors of retail, mass retail, logistics and transport. The activity itself is increasingly familiar to households, but its scientific knowledge remains insufficient, which is paradoxical since the activity, by its nature digitized, is a very large generator of big data. Highly competitive, e-commerce does not lend itself well to the dissemination of this data for research purposes.

E-commerce concerns all categories of products and population, regardless of where they live, whether dense urban, suburban, peri-urban or rural (Brajon, Ropital, 2016), but with particular importance in large metropolitan areas. Depending on the European countries, it represents 5 to 10% (8% in France) of retail trade turnover (excluding food), but because its distribution is much

less massive and less palletized than store deliveries, it represents a much larger share of the total number of deliveries in cities: from 30 to 100% (100% in New York, 30% in Lyon) (cited in Dablang, 2019). More than 200,000 online purchases are made daily to individuals in the Paris region, and there are an estimated nearly one million in New York (6T, 2019). These deliveries are mainly made by post and by express courier companies such as Chronopost or UPS, or by more specialized operators. One of the major players in the sector, Amazon, subcontracts to these operators but also develops its own delivery activity, which uses urban warehouses and (in the United States in particular) a pool of delivery agents by crowd-sourcing via Amazon Flex.



Figure 1 – A parcel locker in a residential building in Montréal, L. Dablang

Consumption is now multi-channel, i.e. households use alternately or simultaneously visits to physical stores and distance orders, and are delivered in an increasingly diversified way (at home, at a pick up point, at the workplace or at a neighbor's). This observation is not as true for grocery e-commerce. Since 2012, the emergence of “drives” (click-and-collect services), which imply a final trip of households to recover their shopping, has however allowed a strong development of online food orders in suburban and peri-urban areas. Direct delivery to consumers rather leads to a net increase in mobility in cities, because it is not necessarily accompanied by an equivalent decrease in personal shopping trips (people continue to go shopping, even if the total value of what they buy in stores decreases), but comprehensive studies on this subject are still lacking. In this context, urban logistics provides solutions to absorb and manage new flows and to try to integrate them into urban operations.



Figure 2 – Instant delivery drivers in Shenzhen, China, L. Dablang

3. THE EFFECTS OF E-COMMERCE ON URBAN LOGISTICS

a. Last meter delivery

The rise of e-commerce is accompanied by a transformation in the mobility of goods, particularly in the “last meters”, i.e. as close as possible to the consumer. These last meters are costly both logistically and financially (price, time, location). On the last few meters, services multiply, allowing customers to recover their goods in different ways. Goods can be delivered at home (two thirds of B2C receptions in France) or to alternative locations (one third of B2C receptions in France). These alternatives can be click and collect points, either neighborhood stores adding parcel reception to their activity, or automated lockers that can be located in public or private spaces.

A survey by 6T (2018) showed that 21% of Paris residents choose to be delivered at neighborhood click and collect points, compared to 1% in New York City, not to mention the recovery of certain parcels from the post office (5%) and from retail stores (4%) (6t, 2018). This low use of parcel pick up points in New York is explained by the presence of doormen, particularly in Manhattan, where the New York survey was concentrated. The presence of doormen actually offers a large time window to retrieve packages. In France,

lobby services are less widespread and pick up points are multiplying. Consumers are attracted by the flexibility of schedules and proximity to their home or workplace (for example, the points are often located in train or public transport stations), but also by a slightly lower price than in the case of home delivery. Deliveries in alternative points allow transport operators to consolidate deliveries and limit the distance covered in rounds, but also increase the number of successful first time deliveries. In fact, the impact of this service on urban freight transport and on commercial areas should be better studied. The goods can also be delivered to the workplace. Home deliveries are often made at unusual times and lead to commercial traffic in residential areas that did not know it before.

b. Instant deliveries

In addition to this increasingly complex e-commerce landscape, there is the rapid growth of “instant deliveries” (Dablanc et al., 2017), deliveries made in less than two hours and using smartphone apps to connect customers, shippers, and self contracted delivery workers. Some retailers now offer delivery in less than two hours. Amazon, for example, provides its “Prime Now” service to its customers for pre-selected consumer goods

and food products (and constantly adjusted based on the analysis of order data). Digital platforms such as Uber Eats and Deliveroo provide the delivery of prepared meals from restaurants (or specialized kitchens often located in the suburbs; e.g. Frichti). These deliveries are made by bicycle or, increasingly (and illegally in France) by mopeds in order to be faster, further increasing the number of delivery vehicles on the road. This new sector also increases risky behavior in terms of road safety and working conditions (Aguilera et al. 2018). Still poorly regulated or supervised, these services offer few opportunities for consolidation and contribute to the overall increase in the flow of goods in the city. Court decisions on the status of gig delivery workers are beginning to clarify the necessary legislative and regulatory changes that these new modes of delivery will require (California Supreme Court in April 2018, French Court of Cassation in November 2018, Madrid Social Court in July 2019).

c. E-commerce and real estate

The growth of e-commerce and the increase in the flow of goods that it generates have led to the emergence of an interest in cities’ assets and infrastructure. Pure e-commerce players are among the drivers of the logistics real estate sector, seeking to meet their growing needs for logistics space by turning to new asset categories, ranging from XXL warehouses with 100 to 200,000 m² to small urban warehouses with a few hundred or thousand m². This dual entry into the residential real estate market is particularly well illustrated by Amazon’s recent locations in France. During the 2000s, for its distribution centers, the e-commerce giant preferred a location outside the Ile-de-France region, before investing in the Ile-de-France market with the construction (nearly finished) of a 142,000 m² giant warehouse in Bretigny-sur- Orge. In the

meantime, the company has also moved closer to the dense Paris area with the opening of small warehouses: in Paris in the 18th arrondissement to ensure “Prime Now” deliveries in two hours; and in the inner suburbs in particular in the port of Bonneuil-sur-Marne, to sanctuarize land in the dense area of the region and guarantee rapid access to the center of Paris. In this case, they are cross-docking warehouses (where parcels from orders prepared in large fulfillment centers are shipped). E-commerce is a good example of this dualization of the real estate market between a suburban market and an urban market that complement each other. This urban market is still new.

E-commerce is a good example of this dualization of the real estate market between a suburban market and an urban market that complement each other.

Part of the urban real estate market relies on public support or facilitated access to land (Heitz, 2017), but the existing dynamic, with buildings such as Chapelle International logistics hotel, and projects such as the Bercy-Charenton logistics hotel, and small logistics spaces, such as Grenier-Saint-Lazare (Paris 3e) or P4 at Porte de Pantin (Paris 19e), clearly shows the potential of this urban logistics market. More generally in Europe, demand for urban warehouses, still a real estate niche today, is expected to grow strongly (Figure 3).

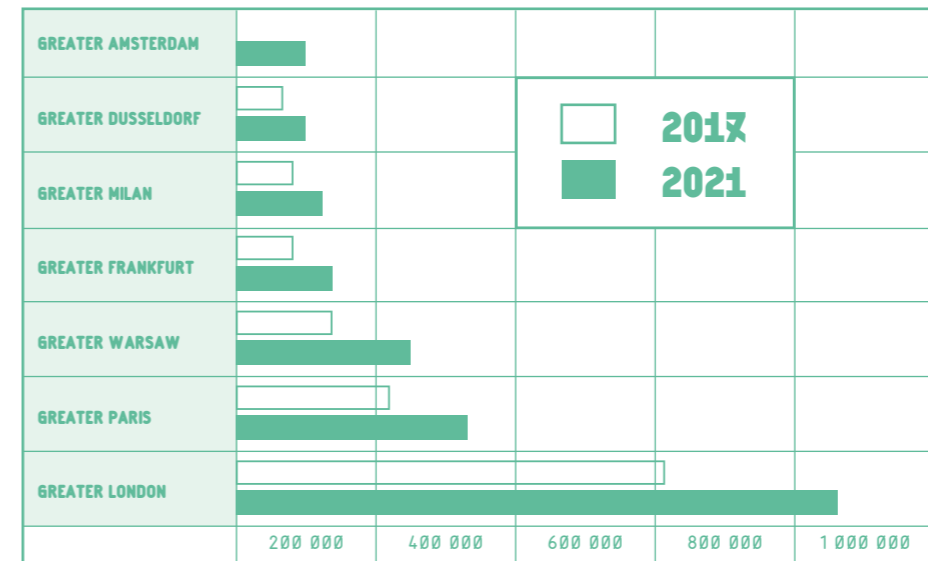


Figure 3 – Estimated demand for urban logistics spaces in European cities – Source : Cushman&Wakefield, 2018



Figure 4 – Urban warehouses in Portland, United States ©L. Dablanc



NEW URBAN WAREHOUSES

The development and growth of a strategic sector such as logistics and freight transport are based on an innovative and efficient real estate market. The analysis of changes in this market in terms of demand (shippers, carriers, logistics operators) and supply (property developers, landowners, investors) makes it possible to measure the spatial, but also economic, environmental and social impacts on urban areas. The demand for “new warehouses”, more urban and less standardized, is increasing, involving changes in logisticians’ practices but also public policies that must deal with the needs of this sector, while ensuring that their own objectives of densification and mixed land uses are met.

1. SUBURBAN REAL ESTATE MARKET

a. The spatial deconcentration of logistics real estate in major metropolitan areas

Logistics sprawl corresponds to the growth in the number of warehouses in the outskirts of large cities, particularly in remote suburban areas where the urban density is low, land is available and cheap and land parcel size is high (Giuliano et al., 2013; Dablanc et al., 2018). Urban renewal, land pressure and competition with other activities are creating a context that is less and less favourable to the development of logistics activities in dense areas (Heitz, 2017), while remote suburban areas offer logistics activities large areas and provide proximity to consumer markets and access to sufficient manpower, thanks to good road access. The availability of transport infrastructure provides good accessibility on two scales: (i) local (to delivery areas, in the center of the metropolitan area) and (ii) regional or interregional: to other cities, to other countries for logistics facilities that have an expanded hub role. Local public policies in favour of logistics also influence the location of warehouses (Mérenne-Schoumaker, 2008). Some local governments promote the implementation of logistics clusters. Others may, on the contrary, ban the development of

warehouses because logistics facilities, in their eyes, generate several types of pollution (visual, noise, atmospheric, etc.). Several case studies have measured logistics sprawl, mainly in European urban areas (e. g. Paris, Gothenburg, Amsterdam, Brussels) and North American cities (Los Angeles, Toronto, Montreal, Chicago), in addition to Tokyo, Belo Horizonte or Bogotá. They are listed in (Dablanc et al. 2018).

The lack of planning and metropolitan supervision at the outskirts of large urban areas has favoured the spatial decentralization of warehouses.

These 30 case studies (Dablanc et al. 2018) show, on the one hand, a general increase in the number of warehouses over the last two decades, including in relative terms: for example in terms of the number of warehouses per capita; on the other hand, they show that the deconcentration of logistics activities has occurred in a very large majority of cities. It did not happen in Amsterdam, Halifax, Montreal, Seattle and Toronto. Logistics sprawl seems to be negatively correlated, in the Dutch, Canadian and Seattle cases, with the existence of regional land use control policies. The lack of metropolitan planning, on the contrary, has favoured the

development of warehouses in suburban areas. This comparative analysis made it possible to show the recurrence of a dynamic in most of the cities observed that goes beyond local specificities. Other relationships between the different indicators collected for each of the cities studied seem to be identifiable. First, it appears that logistics sprawl is linked to the difference in land values or logistics rent between the center and the periphery of cities (when land value differential is small, logistics sprawl does not happen in such a huge manner). Secondly, logistics sprawl is positively linked to the availability of large land parcels in peripheral areas.

Finally, the intensity of logistics sprawl varies with the type of warehouse (higher for distribution centers, lower for cross-docking and parcel processing facilities). These assumptions now require further analysis, both empirically and theoretically. The search for additional data sets and new methods to test these hypotheses is part of the Chair's ambitions.

WHOLESALE TRADE ACCOUNTS FOR 15% OF DAILY DELIVERY/PICK UP OPERATIONS TO ESTABLISHMENTS AND 22% IN PARIS

b. The market players in the logistics real estate market

Logistics sprawl can also be explained, and perhaps fundamentally, by the evolution of the supply chain and real estate demand logistics (Hesse, 2008). The outsourcing of logistics in the 1980s created new players such as logistics service providers (3PL) who needed new buildings to consolidate the goods of the various shippers. They have themselves entrusted the production of their buildings to real estate developers involved in an "independent" logistics real estate market. The objective of these players has been to propose logistics developments that meet the needs of logistics operators (mutability, automation, need for space and large unique parcels, modern equipment) while meeting the profitability requirements of a real estate portfolio, which is particularly easy to transfer from one client to another. Logistics facilities have become financial and real estate assets that represent an increasing share of investors' portfolios (Fender et al. 2016). The emergence of a logistics real estate market and private players seeking dedicated financial returns (P3 Logistics Parks, Logisor, Logistis, Prologis, Segro, Goodman...) has greatly facilitated the development of logistics in the outskirts of large cities (Fender et al. 2016), (Raimbault, 2014). Due to the low productivity rate per m² and to be profitable, logistics real estate developers have tended to offer larger buildings to achieve economies of scale. As a result, they are building warehouses that can reach and now exceed 100,000 to 150,000m², requiring abundant land. The suburban areas appear to be the solution to this equation between financial profitability and real estate demand, thus contributing to logistics sprawl.

METROPOLITAN AREA	AMSTERDAM	ATLANTA	BELO HORIZONTE	BRUSSELS	GO THENBURG	LOS ANGELES	MONTREAL	PARIS	SEATTLE	SHENZHEN	TOKYO	TORONTO GTA
POPULATION (MILLION - MOST RECENT YEAR)	2,7	5	5,8	2,5	0,97	18,5	5,08	11,8	3,5	10,4	10,4	6,05
ANALYSIS PERIOD FOR LOGISTIC SPRAWL	2007 ↓ 2013	1998 ↓ 2008	1995 ↓ 2015	1982 ↓ 2012	2000 ↓ 2014	1998 ↓ 2009	2000 ↓ 2012	2000 ↓ 2012	1998 ↓ 2009	2008 ↓ 2012	1980 ↓ 2003	2002 ↓ 2012
EVOLUTION OF THE AVERAGE DISTANCE FROM THE WAREHOUSES TO THE CENTER OF GRAVITY (KM)	-2	4,55	1,2	2,5	4,2	9,7	0,1	3,5	-1,3	1,23	4,2	1,2
EVOLUTION OF THE AVERAGE DISTANCE FROM THE WAREHOUSES TO THE CENTER OF GRAVITY (KM/YEAR)	-0,33	0,46	0,06	0,08	0,30	0,88	0,01	0,29	-0,12	0,31	0,18	0,12

Figure 5 – Some examples of case studies of logistics sprawl. Source: Dablanc et al., 2018, CITYLAB project.

2. DUAL LOGISTICS AND DEVELOPMENT OF URBAN LOGISTICS REAL ESTATE

a. Emergence of urban logistics

Long ignored by urban planning and development policies, the spatial organization of goods flows was then mainly driven by the forces of the real estate and land market. The absence of regional and metropolitan planning of logistics facilities has led to logistics developments on the margins of cities, contributing to logistical sprawl, the result of negotiations between isolated suburban municipalities and real estate developers integrated into international financial markets (Raimbault, 2014). Today, the consumption of agricultural land, the increase in delivery distances (the “last miles” have become the last 30 kilometers and more) and congestion are the main negative impacts of logistics sprawl. They contradict the objectives of sustainable cities, which include densification, functional mix, reduction of congestion and CO₂ emissions, and the fight against soil artificialization. These new sustainability objectives have led to a refocusing of the debate on the “last mile”, rather than the development of logistics in the outskirts, as a compensatory measure for sprawl. Urban logistics is an interesting lever for public actors to promote the integration of logistics activities in dense



Figure 6 – An Amazon’s urban warehouse in Los Angeles. ©L. Dablanc

areas, limit logistics sprawl and think about the organization of goods mobility. At the same time, private demand for warehouses in dense areas has emerged. Some logistics sectors related to parcel and express transport, e-commerce delivery or instant delivery (see Part 1) have started to look for new, smaller urban warehouses to shorten delivery times or consolidate delivery routes. This new real estate demand also corresponds to the public authorities’ objectives of redeveloping

logistics activities in city centers to limit logistics sprawl. Urban warehouses are a recent addition to the logistics real estate market and complete the range of buildings on offer. Thus, on the one hand, we can observe the development of decentralized logistics characterized by the development of a real estate market of large, standardized facilities, mainly intended for logistics service providers, mass retail or manufacturing (Heitz et al., 2017). On the other hand, we are witnessing the development of an urban market, made of buildings that are still largely “tailor-made” and which are the subject of particular attention in terms



of urban integration. This dualization of the real estate market shows two patterns of real estate development: a majority of suburban logistics and an emerging urban logistics, still a niche. Responding to different needs, these two markets, far from opposing each other, are very often complementary within supply chains: from a giant fulfilment center of an e-merchant in the periphery, the cross-docking facilities in the inner suburbs are then supplied with packages in which the final delivery rounds are prepared. Or from giant fulfilment centers to urban small fulfilment centers (such as the ones from Amazon Prime Now). These several types of logistics operate as networks, covering the entire metropolitan area.

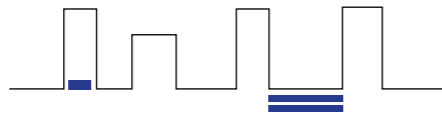
b. Strategies of Innovations and experiments

A successful development of an urban logistics activity, in addition to the intrinsic organization of an efficient service, relies on three more strategies: **an appropriate regulatory framework; access to transport modes and optimized transport organization; and the availability of urban logistics real estate.** Transport innovations have often been highlighted in research work and have been the subject of a large number of experiments: electric vehicles, the use of hydrogen or CNG (natural gas), drones, autonomous vehicles, robots, cargo-bicycles, river barges. The investment of private transport and logistics actors is an essential element in their implementation. Logistics is indeed a sector that is a source of innovation (warehouse automation, autonomous vehicles, Big data, Blockchain, etc.). But even in this case, their development requires the support of the public authorities (regulatory framework or subsidies). The same applies for many other aspects of an innovative

1 URBAN GATEWAY



1 URBAN DISTRIBUTION HUB



2 URBAN WAREHOUSE



2 URBAN MICRO-HUB

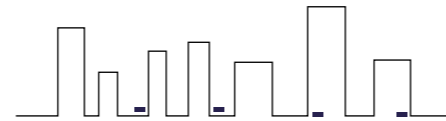


Figure 7 - Different types of urban logistics terminals. Source: AFIOLOG 2018

logistics activity serving urban activities. Thus, urban logistics requires the implementation of a governance system combining public and private actors, transport and local actors.

Since the 1990s, public authorities, through subsidies or partnerships, have tried to encourage private logistics actors to develop urban logistics spaces and urban consolidation centers. With relative success in terms of the various experiments that have been carried out, the rise of a new demand for urban warehouses in the 2010's has changed the place of public authorities in urban logistics. Public authorities are no longer project leaders, but seek more to support private leadership. Recently, traditional logistics real estate developers have begun to invest this new market in Western cities, supporting the development of urban logistics. For example, in Seattle, Prologis built a new 55,000m² three-story warehouse (Georgetown Crossroads). JLL has invested in a new multi-story urban warehouse in Brooklyn, New York to be completed in 2020 (640 Columbia Street). A 64,000 square meter two-story warehouse has also been developed

by Vailog in Gennevilliers: Paris Air2 Logistics, which hosts IKEA's logistics activities. Inspired by the Asian model, vertical warehouses, on several levels (equipped with ramps for trucks or heavy load elevators), have been developed since the 2000s in Asian cities (Tokyo, Seoul, Osaka, Singapore...). The population density is particularly high and the center-periphery differential in land prices is reduced compared to western metropolitan areas. This Asian model will be one of the fields of investigation in the Chair "Logistics City".

Urban logistics spaces can take several forms: urban warehouses, urban distribution centers, logistics hotels, urban delivery spaces, logistics microhubs (AFIOLOG, 2019). Of varying sizes, these facilities are part of the urban fabric and can in some cases be integrated into buildings with other functions (housing, offices, shops). They may also occupy abandoned city areas or buildings (underground car parks, old petrol stations). They thus make it possible to densify and diversify the uses integrated into the urban environment. However, they also make it possible to reclaim spaces formerly dedicated

to the automobile in a context of reduced presence of the private car in cities. In addition, logistics is reinvesting former sites dedicated to rail freight transport or waterway activities, making this activity part of the long history of cities.

c. The decline of traditional logistics buildings and issues of land resources

Warehouses in urban regions are not just either large and suburban or small and urban. A third market exists, particularly in large old metropolitan areas such as Paris. In the Paris region (Ile-de-France), nearly 48% of the logistics real estate inventory is composed of old, often obsolete warehouses of less than 5000m². Mainly located in the rather dense suburbs (inner suburbs), these warehouses no longer meet market requirements and are increasingly forgotten by logistics operators who prefer to rent new buildings a few kilometers away (Heitz, 2017). The demand for this "intermediate logistics market" is declining in favor of warehouses located on the periphery. In the context of urban pressure, these warehouses are vulnerable. The proximity of Paris has made these locations strategic intermediate places, attractive for office activities. In the absence of strong public policies to preserve logistics warehouses located in the Paris inner suburbs, in a context of strong land pressure and competition with other more profitable real estate markets, intermediate logistics gradually disappears in favor of the new niche urban market and the fast developing outer suburban market. A few exceptions seem to escape this general trend today. Part of the heritage of intermediary logistics, such as in Pantin North-East of Paris, is now the subject of renewed interest and a form of speculation in response to urban demand for emerging logistics land.



Figure 8 - Former petrol station at the Porte de Champerret, which is the subject of a project to convert it into a logistics site (Paris 17th arrondissement). ©Sogaris



Figure 9 - An urban logistics space will be implemented under the Paris ring road, Porte de Pantin in Paris 19th arrondissement. ©Syvil

3. GOVERNANCE AND THE ROLE OF PUBLIC POLICY

a. Local public policies as a driver in the development of urban logistics

Regulating, planning and organizing the mobility of goods is a major challenge for public authorities. Until ten years ago, academics and businesses agreed on the lack of awareness and knowledge of public stakeholders about freight transport issues (Lindholm, 2010, Giuliano et al., 2013). The level of understanding of freight issues was low at the level of local authorities. Ten years later, several European cities have embarked on a process of integrating freight transport and logistics issues into urban planning (Debie and Heitz, 2017). Public actors have also invested, through subsidies, in urban logistics projects (Feliu et al. 2014), demonstrating that they are increasingly aware of the importance of the negative externalities generated by freight and logistics in urban areas. The regulation of freight falls first and foremost within the scope of transport policies and the regulation of traffic or parking, but it also falls within the scope of urban planning, which determines land uses that can be open to logistics or commercial activities that generate goods flows. **Urban logistics is an issue that concerns both transport and the spatial organization of urban areas.** Quite often, public policies act in silos, separating the different sectors:

Urban logistics is a matter of both transport and the spatial organization of urban areas.

transport on the one hand, and land use on the other. With urban logistics, public actors are part of a joint approach to transport and urban planning issues. Moreover, because it is an economic activity, public actors rely on logistics to build a new public-private governance, by involving transport and logistics stakeholders in the production of urban space. This has given rise to requests for projects: Paris (request for proposals in “sustainable urban logistics” 2016), Nantes (request for proposals “FLUX”, 2019); Bordeaux (with the initiative “Créathon”, 2019).

b. The regional and metropolitan levels: In search of a governance for logistics

Today, local public actors, particularly municipalities, are the main authorities responsible for traffic and parking regulations. The municipality remains the authority that issues building permits. In its PLU (zoning ordinance) it can include spaces dedicated to logistics in the programming orientations (OAP, Orientations



Entrance for people delivering for "Amazon Flex", Los Angeles ©Dablanc

d'Aménagement et de Programmation) or in the regulations (article L.123-2 of the urban planning code). The City of Paris has designed areas in its PLU where it is possible to develop logistics activities (Raimbault et al., 2018). As a pioneer in this field, Paris opens up the field of possibilities in the planning and development of urban logistics facilities. With municipal coordination and the gradual implementation of PLUi (supra-municipal zoning ordinances), the question of the integration of urban logistics at the intermunicipal level arises. A new governance is emerging. The regional level, which has competence in regional transport,

of urban logistics into public policies, particularly in local and regional planning documents, is emerging, still very timid in many urban areas (Heitz, Dablanc 2019). It is still difficult to translate into implementation in urban projects. It is now a question of moving beyond the stage of raising awareness of the challenges of urban logistics to the phase of implementation and generalization (we even propose to speak of “routinization” and “standardization”) of urban planning policies in this area. Through these processes, urban logistics moves beyond the field of experimentation to become part of sustainable common practices.

IN ÎLE-DE-FRANCE, 80% OF GOODS MOVEMENTS ARE CONCENTRATED IN 20% OF THE REGION, WHICH CORRESPONDS TO THE HEART OF THE PARIS METROPOLITAN AREA

is gradually taking up urban logistics issues and can allocate funding for projects or propose, within regional master plans, objectives for preserving land reserved for logistics activities (e.g. Ile-de-France Regional Master Plan, 2013). It should be noted that the draft Law on Mobility (known as the “LOM” Law, 2019) only slightly mentions logistics issues and, more generally, the transport of goods in terms of urban distribution, and remains silent on land and property issues induced by freight mobility. Today, a gradual integration





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SCIENTIFIC PROGRAM OF THE CHAIR 'LOGISTIC CITY'

TWO RESEARCH TOPICS ARE PROPOSED. A FIRST FOCUS ON URBAN AND SUBURBAN LOGISTICS REAL ESTATE; A SECOND ON TRENDS AND NEW CONSUMER PRACTICES AND THEIR IMPACT ON URBAN LOGISTICS AND REAL ESTATE.

1. Urban logistics real estate including the analysis of new economic models of metropolitan logistics real estate and strategies for the location of logistics facilities in major cities

The objective of this topic is to analyze the interactions between changes in logistics real estate (urban and suburban) and cities. It provides a framework for updated analyses on the production of urban space. This involves proposing, based on the analysis of logistical sprawl in some 30 cities around the world, a new approach to urban production methods in relation to real estate and land markets, particularly in their global dimension of land consumption and environmental impacts. The study of changes in property and real

estate values will be an important element of the research. Logistics real estate is one of the fastest growing markets in recent years. The phenomenon of logistics sprawl is partly explained by the difference in land prices between the center and suburban areas. It is therefore interesting to study cities in which these price differentials are attenuated, in such a way that the logic of locating these activities does not necessarily take this variable into account. Large Asian cities such as Singapore, Seoul or Tokyo have a large number of logistics buildings (most of them vertical, with multiple stories) located in central areas. Comparative spatial analyses will be conducted.

Another research topic will be more Parisian and more oriented towards the analysis of public policies and the analysis of the interactions between public and private stakeholders involved in the production of urban logistics real estate. A historical

analysis will also be attempted to the production of the first modern urban warehouses, the regulatory and governance obstacles that their construction has required to overcome, and the urban integration and environmental issues that these buildings can raise in the neighborhoods where they are sited. These studies, at several scales, will make it possible to propose indicators to guide public action in its approach to sustainable logistics planning.

2. Trends and new consumption, production and distribution practices that have an impact on urban logistics and the warehouse of the future

The aim of this topic is to improve knowledge about new practices, particularly those related to e-commerce; and to estimate their potential impact on cities, on urban deliveries and on logistics real estate. The work will take two forms. On the one hand, the collection of data and indicators for several examples of large cities (including Paris) relating to the flows generated by new forms of e-commerce. On the other hand, the analysis of their potential impacts, in particular through interviews

with e-commerce and logistics stakeholders and the observation of case studies. An Observatory of Trends will be set up.

The objective is not to carry out in-depth research on each of the new consumption or distribution patterns, but to highlight the short- to medium-term impacts they may have on the mobility of goods and logistics services in cities (modes of transport, types of operators, buildings).

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UNIVERSITY GUSTAVE EIFFEL

The University Gustave Eiffel is a French university specialized in the study of smart and sustainable cities, with a strong focus on transportation. Its main location is in the Cité Descartes campus in Marne la Vallée in the Eastern part of the Paris region. Université Gustave Eiffel results from the merger of the University of Paris-Est Marne-la-Vallée and IFSTTAR, the national transportation research institute, together with the close association of three engineering schools and a school of architecture.

SOGARIS

A long-term investor, Sogaris is a real estate company specializing in urban logistics. Sogaris is deploying a coordinated network of sites for the Paris metropolitan area that meets the new needs of e-commerce and the explosion of distribution flows in the city. As a private company with public capital, Sogaris intends to invest €300 million by 2021 to promote the emergence of new, more sustainable and innovative modes of distribution in cities, at the service of its private customers and public stakeholders. Committed to the fight against climate change, Sogaris has made reducing the environmental impact of freight transport an essential objective of its strategy.



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THREE RECOMMENDED DOCUMENTS

Browne, M., Behrends, S., Woxenius, J., Giuliano, G., Holguin-Veras, J. (2019) *Urban logistics. Management, policy and innovation in a rapidly changing environment*. Kogan Page, London.

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WELCOME TO LOGISTICS CITY

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