Chaire LOGISTICS CITY

Université Gustave Eiffel

SINTEF e-commerce conference
Trondheim, Norway
17 June 2022

New ways to collect e-commerce mobility data for city planning

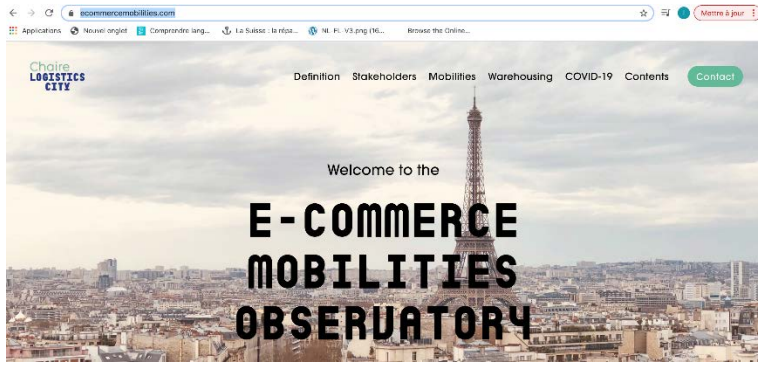
Dr. Laetitia Dablanc

Université Gustave Eiffel

- Warehouses, innovations, new trends in consumption and impacts on city logistics

Results available online:

- Observatory of ecommerce mobilities
- Survey reports on gig workers for instant delivery platforms in Paris 2016, 2018, 2020, 2021, 2022
- Logistics real estate and relationships with urban form in 74 large cities around the world



https://www.lvmt.fr/en/chaires/logistics-city/

Since Covid, city logistics closely scrutinized

Le Monde

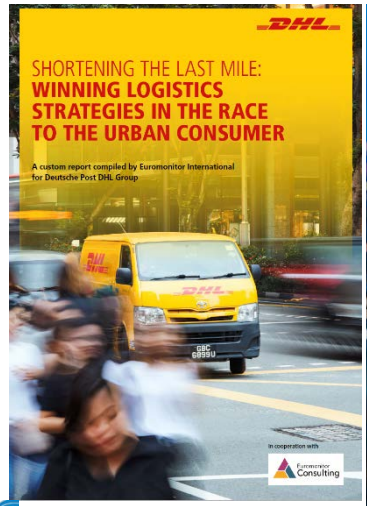
ÉCONOMIE

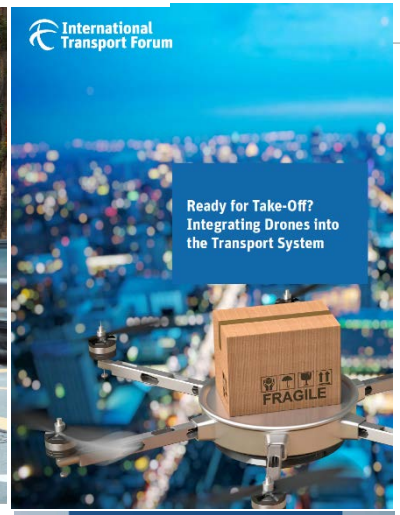
Favoris

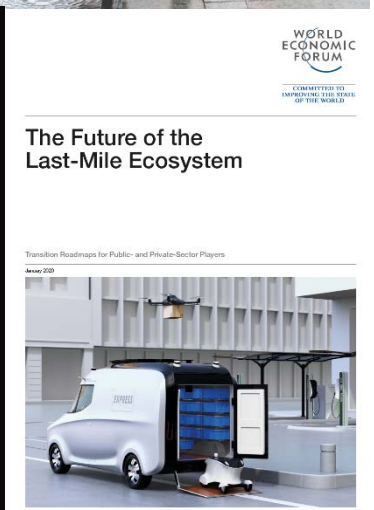
Covid-19 : la logistique, un secteur devenu incontournable

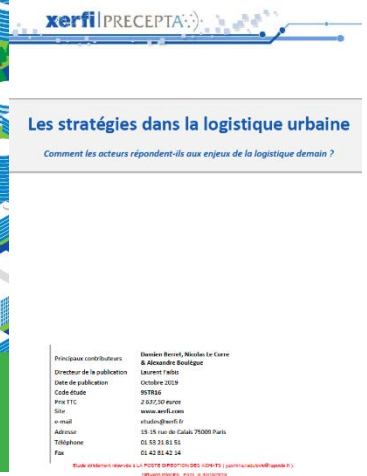
La pandémie a mis en exergue le rôle des chauffeurs et livreurs dans la bonne marche de l'économie.

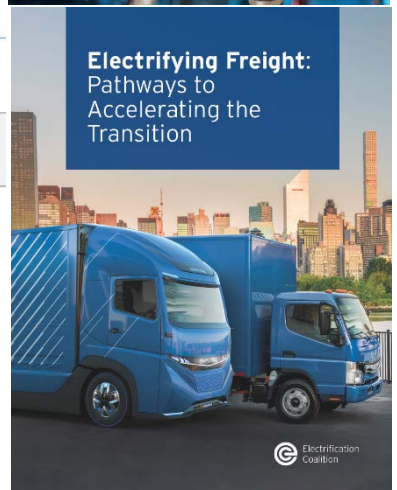
Par Eric Béziat et Julien Bouissou











Roland Berger

Logistique urbaine dans le Grand Paris - Vision Roland Berger

E-commerce mobilities: poorly quantified

- *New York Times* March 4, 2021 “Roughly 2.4 million packages are delivered in the city every day, nearly half a million more than before the pandemic, and city data shows that 80 percent of deliveries are to residential customers, compared with 40 percent before the outbreak”

  = 0.23 parcel per day per person

- *Le Monde* January 21, 2021: “According to head of Colissimo, there were one billion B2C parcels delivered in France in 2020”

  = 0.04 parcel per day per person (six times less)

B2C deliveries per capita per day: too many variations in the scientific literature

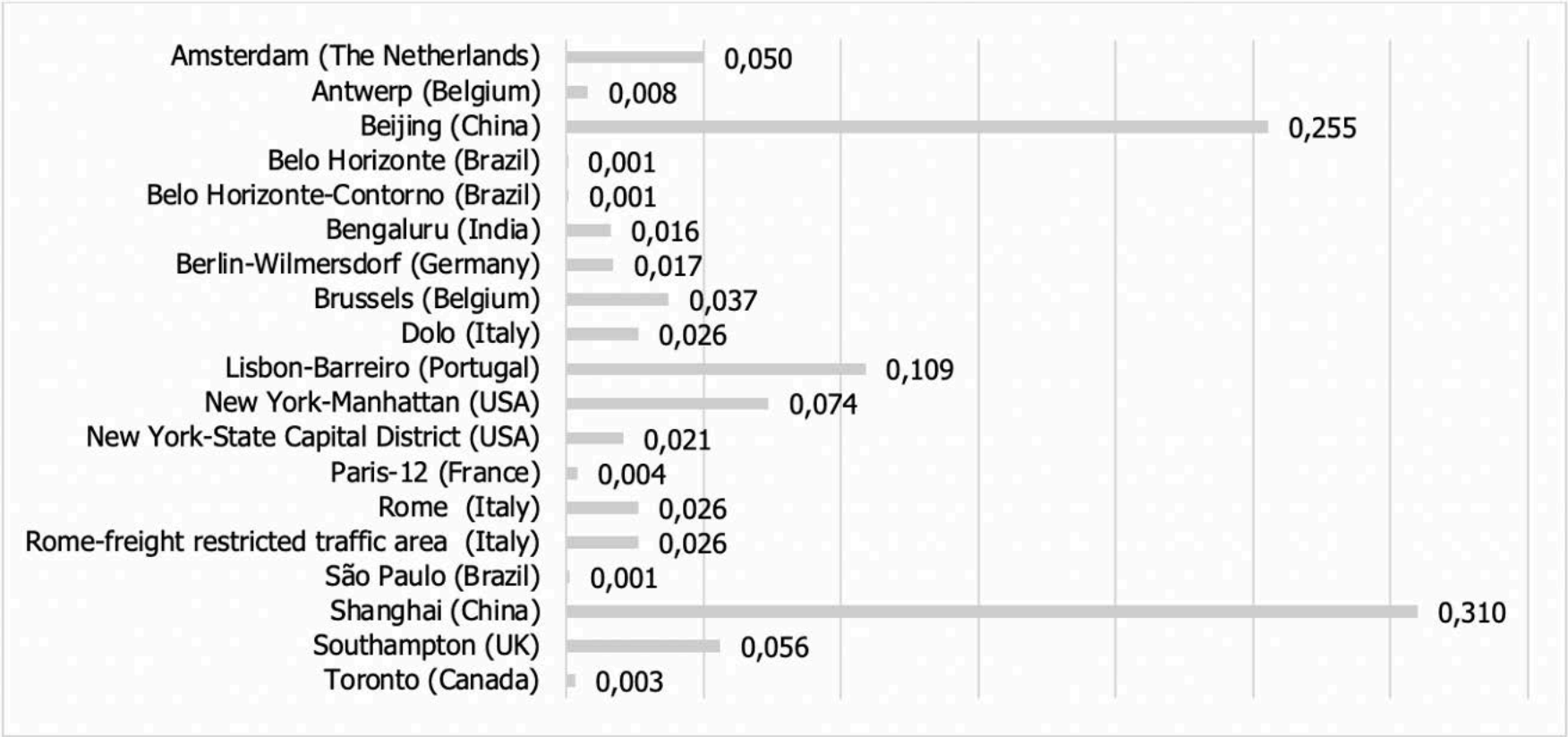


Figure 5. Daily business-to-consumer deliveries per capita.

Source: Buldeo-Rai, Dablanc, 2020

CO_2 emissions from urban freight in Paris ‘’have decreased by 18% between 2004 and 2014’’

- Stated by the City of Paris in 2016
- Attributed to ‘’the City’s urban logistics policy, especially the promotion of smart urban logistics facilities’’
- But… vans underestimated
- And motorized two-wheelers not included

Why were emissions from freight underestimated?

(Chuun and Dablanc, 2019)

Data came from:

- the LAET B2B urban freight survey which dates from 2010 and does not take into account B2C deliveries
- the national “Light Commercial Vehicle use survey”
  - latest is from 2010 with much less B2C traffic
  - represents data for whole of France thus overestimating LCVs used by private individuals
- Local "plate surveys," which do not make it possible to distinguish between the different types of LCVs (many used by craftsmen or private individuals)

How to account for increasingly diverse vehicles for urban deliveries?

- Cars, mopeds, cargo-bikes, bicycles, walking/transit: could be more than 25% of last-mile drivers already

Holguin-Veras et al., 2020

Table 3: Results for Selected Cities

	New York, NY	Los Angeles, CA	Philadel-phia, PA	Austin, TX	Washing-ton, DC	Albuquer-que, NM	Cincinna-ti, OH	Jackson City, MS	Boca Raton, FL
Population (2016)	8,560,072	3,918,872	########	916,906	672,391	556,859	298,011	172,039	91,702
Total Area (mi2)	302.67	468.70	134.09	297.89	61.05	187.72	77.92	111.04	29.33
Pop density (pop/mi2)	10,919.7	3,228.3	4,491.7	1,188.4	4,252.5	1,145.4	1,476.7	598.2	1,207.2
Establishments	245,009	69,705	27,950	33,661	21,264	15,403	21,166	4,055	11,071
Employment	3,786,192	1,032,915	555,586	629,432	511,541	269,752	492,532	76,689	140,448
B2B FTG/day	873,380	265,104	105,352	117,216	56,647	64,428	95,820	14,330	33,852
B2B FTG/est-day	3.565	3.803	3.769	3.482	2.664	4.183	4.527	3.534	3.058
B2B FTG/empl-day	0.231	0.257	0.190	0.186	0.111	0.239	0.195	0.187	0.241
B2B FTG/person-day	0.102	0.068	0.068	0.128	0.084	0.116	0.322	0.083	0.369
B2B FTG/mi2-day	2,885.59	565.62	785.67	393.49	927.88	343.22	1,229.72	129.05	1,154.23
STA/day	88,640	28,453	11,364	12,222	11,695	7,301	10,152	2,026	4,750
STA/est-day	0.362	0.408	0.407	0.363	0.550	0.474	0.480	0.500	0.429
STA/empl-day	0.023	0.028	0.020	0.019	0.023	0.027	0.021	0.026	0.034
STA/person-day	0.010	0.007	0.007	0.013	0.017	0.013	0.034	0.012	0.052
STA/mi2-day	292.86	60.71	84.75	41.03	191.57	38.89	130.29	18.25	161.96
B2C Deliveries	1,284,011	587,831	202,792	110,029	80,687	66,823	35,761	18,924	10,087
B2C Trips	183,430	83,976	28,970	15,718	11,527	9,546	5,109	2,703	1,441
B2B+B2C	1,056,810	349,080	134,322	132,934	68,174	73,974	100,929	17,033	35,293
B2B+B2C/person-day	0.123	0.089	0.086	0.145	0.101	0.133	0.339	0.099	0.385
B2B+B2C/mi2-day	3491.63	744.78	1001.72	446.26	1116.69	394.07	1295.29	153.40	1203.36

Daily number of B2C deliveries and freight trips for B2C deliveries in eight US cities every day

Specific and comprehensive surveys: the Rolls-Royces of data collection

The impact of new practices for supplying households in urban goods movements: method and first results. An application for Lyon, France.

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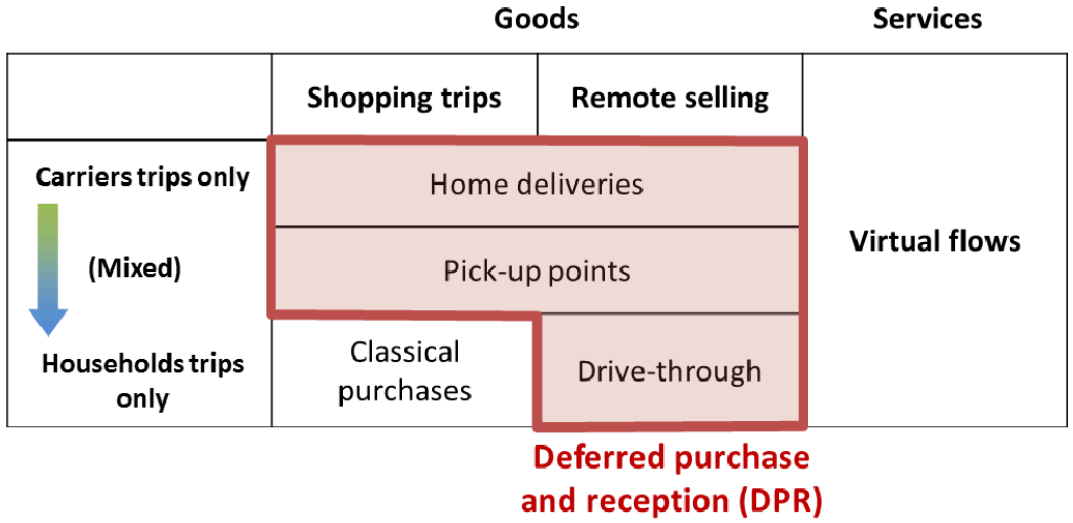
Abstract

Purpose:This paper describes an original methodology to understand the new purchasing practices of households (e-commerce, home deliveries, etc.) an its first results.
Methods: the data available for measuring the magnitude of the changes due to new purchasing practices remain partial and poorly adapted for mobility analysis. We therefore explore the data available on e-commerce and related practices, in order to discuss their pertinence and eventually propose an original methodology.
Results: a pilot survey was performed at the end of 2015 to test the methodology in order to perform a full scale survey planned for the end of 2016. This paper presents the general results of this pilot survey.
Conclusions: placing this survey in perspective with mobility surveys performed in France should reveal elements of explanation for the changes occurring in urban logistics in Lyon and more generally in French cities and towns. Thanks to this methodology of survey and its first results, we can infere on the importance of new purchasing practices in urban freight movements and households mobility.

Keywords: Survey methodology, urban goods movements, end consumer trips, e-commerce



https://halshs.archives-ouvertes.fr/halshs-01586947/document

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LAET survey in Lyon metro area, 2016: results

Type of goods	DPR frequencies (annual)	DPR frequencies (%)
Groceries and catering	7.2	38%
Clothing	3.8	20%
High tech and culture	3.1	16%
Household appliances, furnitures, others	2.6	14%
Healthcare and cosmetics	2.5	13%

- B2B deliveries and pick-ups represent 620,000 movements weekly
  B2C (DPR) deliveries represent 215,000 movements weekly
  - 55% home deliveries purchased remotely
  - 35% store-picking or pick-up points
  - 5% home deliveries purchased in shops
  - 5% others
- Home deliveries represent 17% of B2B goods movements in Lyon and all DPR 35% of B2B deliveries
- DPR in total represent 26% of all goods movements in Lyon
- DPR movements represent 7% of Lyon households' shopping trips

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Instant delivery surveys in Paris (since 2016)

Reduction in use of bicycles in Paris

2016	**2020**	**2022**
87% on bike	60% on bike	47% on bike

City Logistics Chair

- “Any use for freight transport is forbidden”
- “Forbidden to do more than 300 km per week”
- “Forbidden to do more than 70 trips per week”

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Why get better urban freight data for urban planning?

- Support traffic management and city planning through better **modeling**
- **Monitor progress** of an urban freight strategy
- Support **decarbonization** of freight through better impact assessments
- Provide tools for **cost–benefit analysis** of traffic regulations such as low/zero emission zones including positive, negative impacts on businesses
- Support better **design** of low/zero emission zones such as optimum size
- Provide **information** to the industry such as benchmark for freight companies
- Build **trust** for consultation strategies with stakeholders, based on actual diagnostic and good data
- **Simulate** impacts of alternative city logistics policies
- (Astrid and Lisa): public procurement

New methods for urban freight data collection

- Data from telecom operators
- Data from logistics operators, e-retailers, delivery apps
- Municipal data
  - Enforcement: automated plate-reading cameras
  - Management: apps for delivery drivers
  - Service provision: bike-sharing
- Any other source

Privacy statement from Transport for London on use of CCTV data

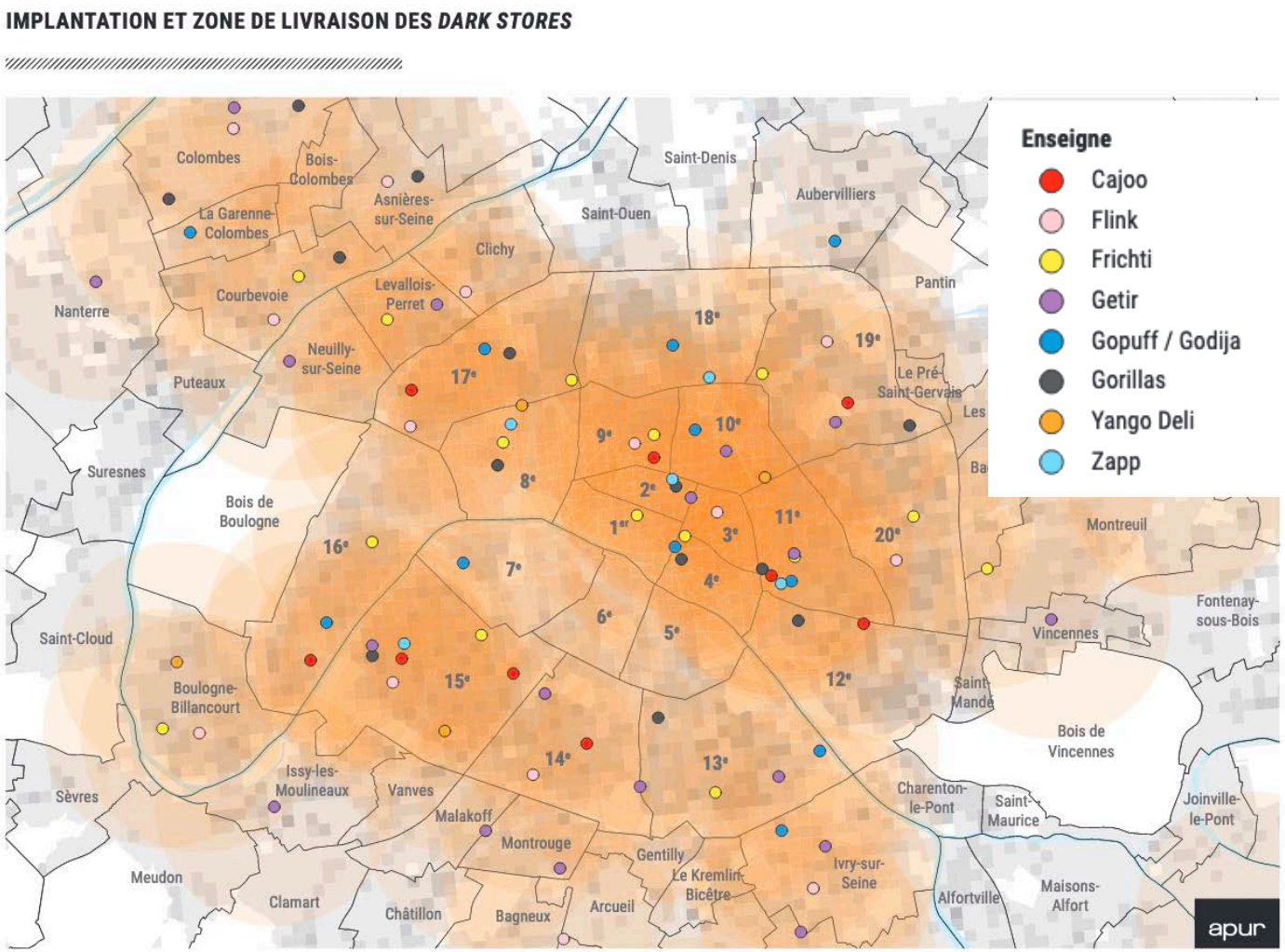
On a case by case basis we may use and share CCTV images for research and analysis purposes. For example these may be used to improve the management of health and safety incidents, or travel demand management.

CCTV images from London Underground are to be analysed by Newcastle University in the fight against covid-19 under an agreement with TfL, which is part of a wider research programme led by the Department for Transport and the SAGE subgroup on Environmental and Modelling. The research will analyse images to quantify the proximity of people and their surface contact whilst using public transport, as part of wider research to understand the transmission of covid-19. The CCTV data is encrypted and steps are taken to anonymise the footage. This research is subject to a Data Protection Impact Assessment as well as a confidentiality agreement between the University and TfL.

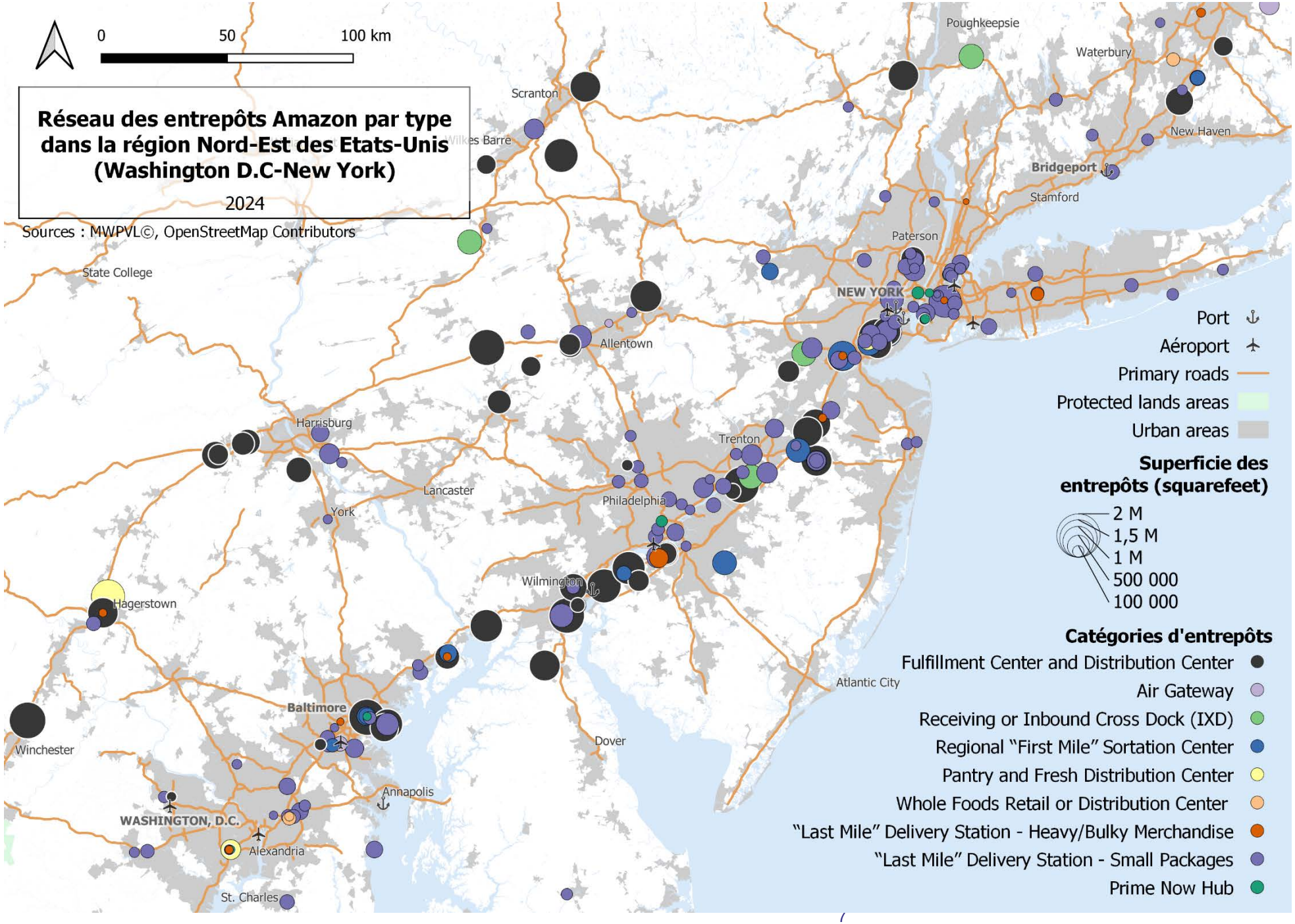
Similar research is being undertaken by University College London to understand how infection risk would vary according to different levels of crowding using encrypted CCTV data alongside data from surface and air sampling. Anonymisation techniques are applied to prevent identification of individuals and this research is also subject to a Data Protection Impact Assessment as well as a confidentiality agreement between the University and TfL.

1. ‘Any other source’: regular public or commercial databases

‘Dark stores’ in Paris: not so difficult to count and locate



- 80 in January 2022 as accounted for by APUR, the Paris planning agency
- Additional observations from Google Maps (not very good results)
- Additional observations from societe.com (trade registries+national statistics agency)



Every day from a 20,000 sq m last mile delivery station:

- 45 lorries
- 250 vans
- 795 private cars

(Jaller, 2019)

Schorung, Lecourt, Chaire Logistics City, 2021

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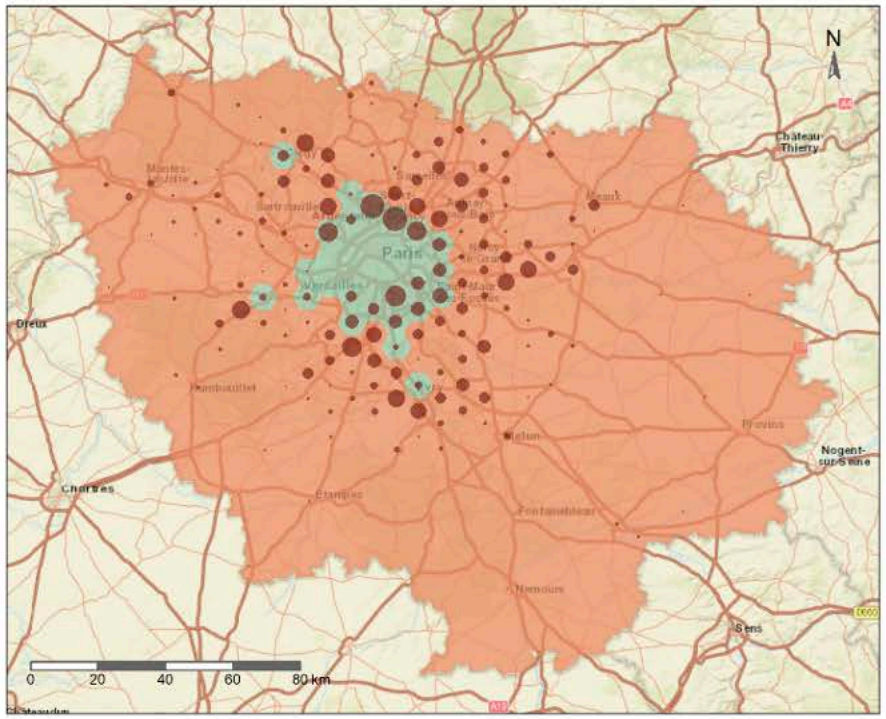
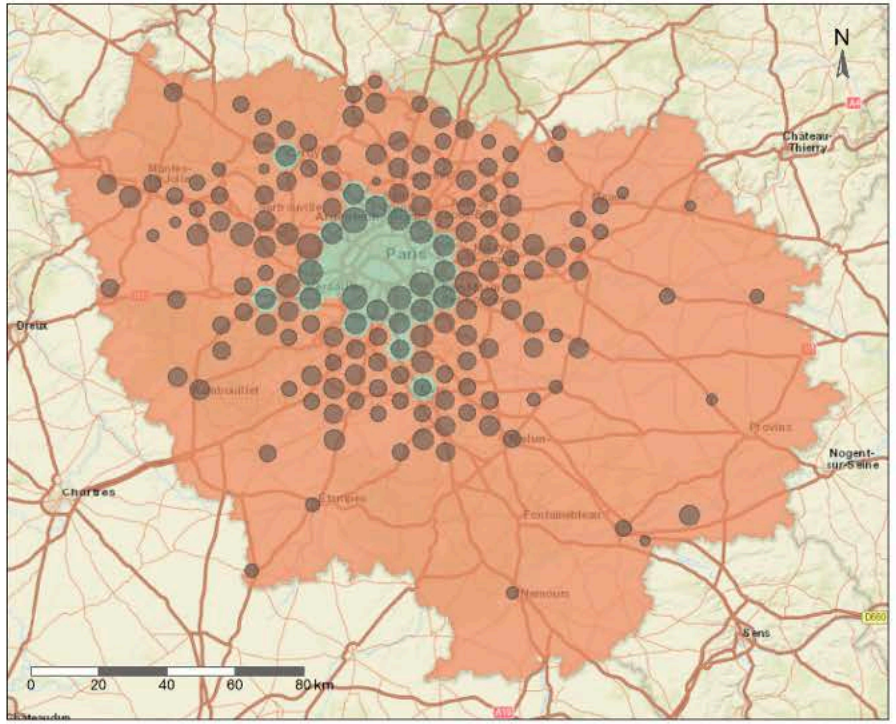
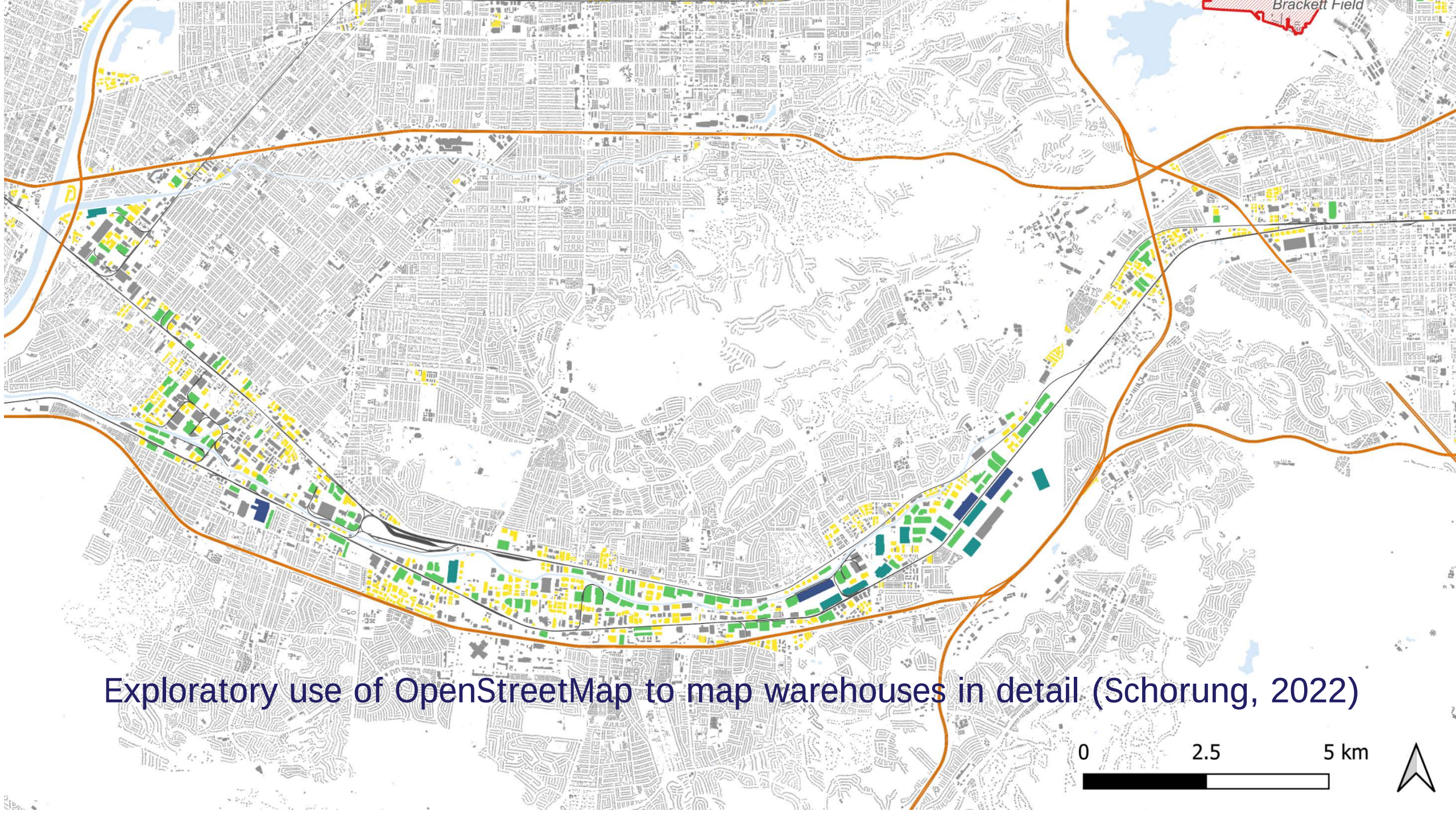
Exploratory automated data collection (Oliveira, Schorung, Dablanc, 2022)

- *Points of interest* from OpenStreetMap to identify urban v suburban areas
- Warehouse rental prices from real estate market sites

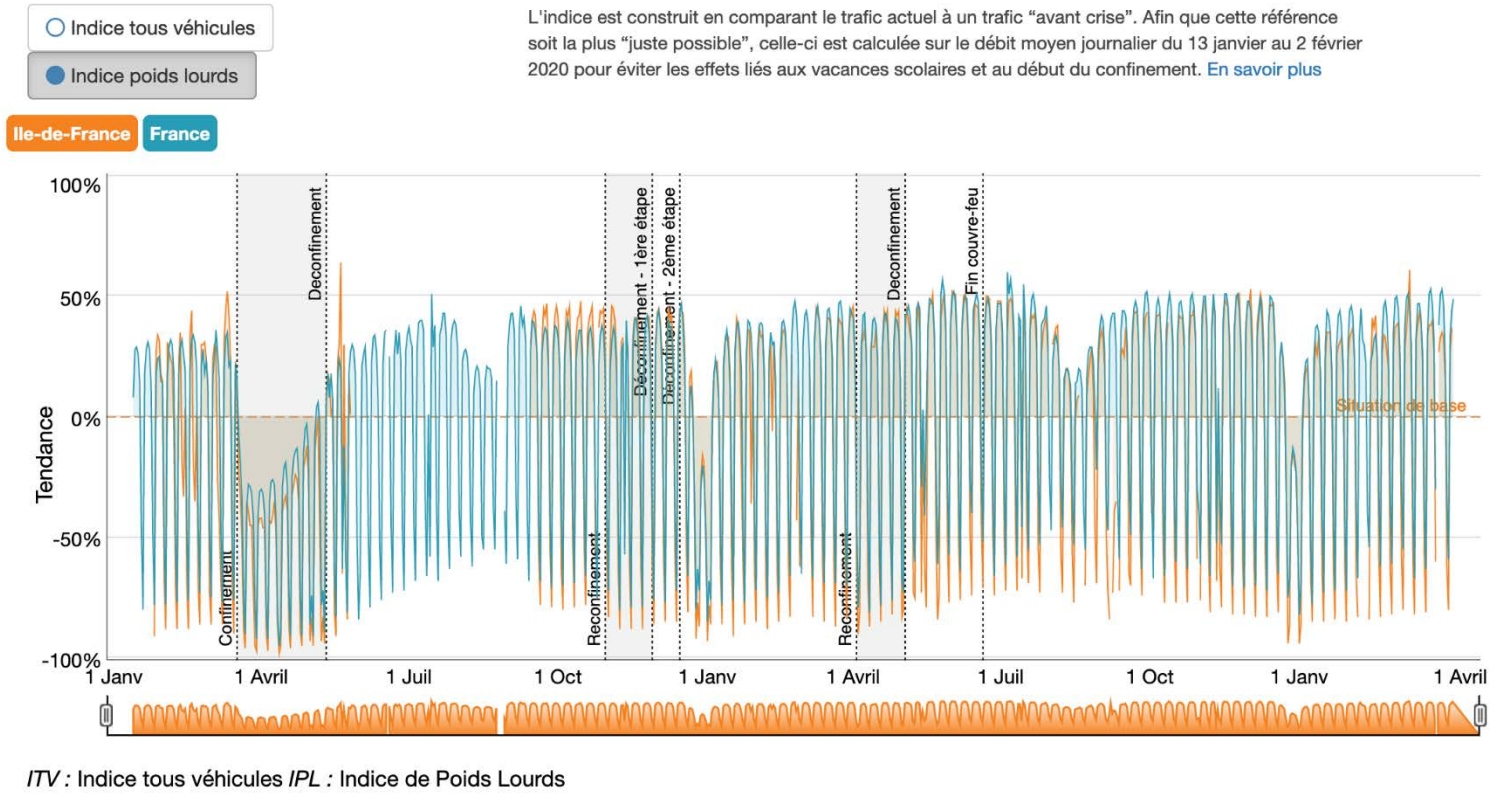






Exploratory use of OpenStreetMap to map warehouses in detail (Schorung, 2022)

Inductive loops to count vehicles, however not well maintained and their number is decreasing



ITV : Indice tous véhicules *IPL :* Indice de Poids Lourds

- CEREMA (French national administration) Dataviz on transport data
- Paris region lorry traffic count from public road network Jan 2020 to April 2022

Source: 1200 counting stations from the French national non-conceded network of roads and highways

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Lyon: 23% of registered vans are at or below Euro 4 (2010 and below)

MINISTÈRE
DE LA TRANSITION
ÉCOLOGIQUE
*Liberté
Égalité
Fraternité*

Parc automobile des zones à faibles émissions 2021

Application de visualisation des données

- Méthodologie et données
- Définitions

Zone à faibles émissions

Métropole de Lyon

Type de véhicule

- [ ] Véhicule particulier
- [x] Véhicule utilitaire léger

Vignette Crit'Air

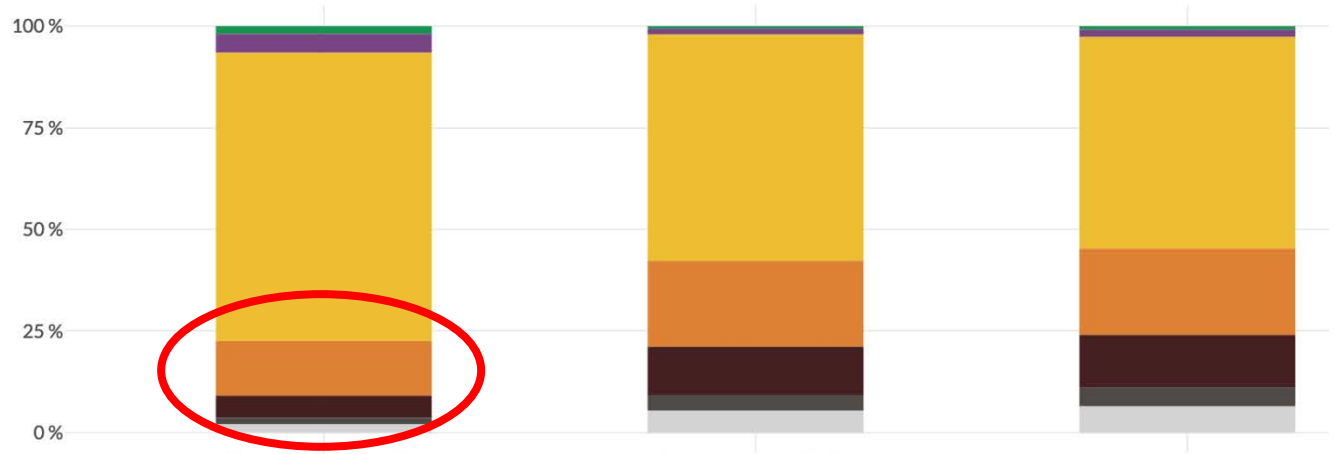
- Crit'Air E
- Crit'Air 1
- Crit'Air 2
- Crit'Air 3
- Crit'Air 4
- Crit'Air 5
- Non classés ou inconnus

Télécharger les données de ma sélection

Graphique | Carte

Véhicules utilitaires légers par vignette Crit'Air

La Métropole de Lyon a mis en place une ZFE



Note : les intercommunalités voisines sont celles situées à moins de 20 kilomètres de la ZFE

Source : RSVERO, 2021, SDES

http://dataviz.statistiques.developpement-durable.gouv.fr/ZFEShinyAppv3/

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2. Telecom operators’ and GPS data

Data from telecom operators

Les Echos

CONNEXION

À la une | Idées | Économie | Politique | Monde | Tech-Médias | Entreprises | Bourse | Finance - Marchés | Régions | Patrimoine

Les vrais chiffres du périphérique parisien

Une étude de Roland Berger invite les élus à définir les politiques de mobilité en Ile-de-France en fonction de la demande et non plus de l'offre. Elle suggère la création d'une nouvelle autorité régulatrice et des voies dédiées au covoiturage et aux transports collectifs.

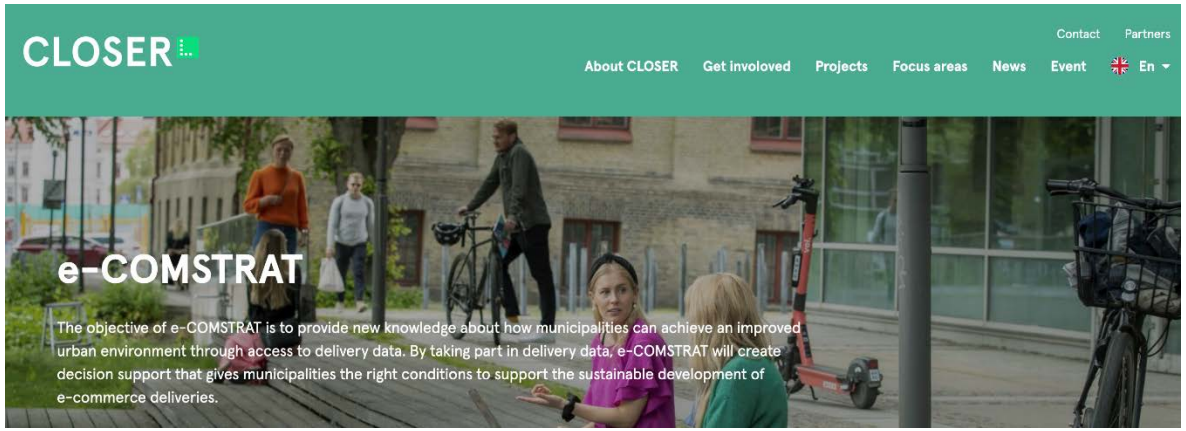
Lire plus tard | Tourisme - Transport | Commenter

- A study by Roland Berger and Kisio in 2020 using data from Orange (French main telecommunication operator)
- Huge misinterpretations due to lack of truck identification in telecom data
- Efforts to recognize ‘freight behaviors’ in mobility data

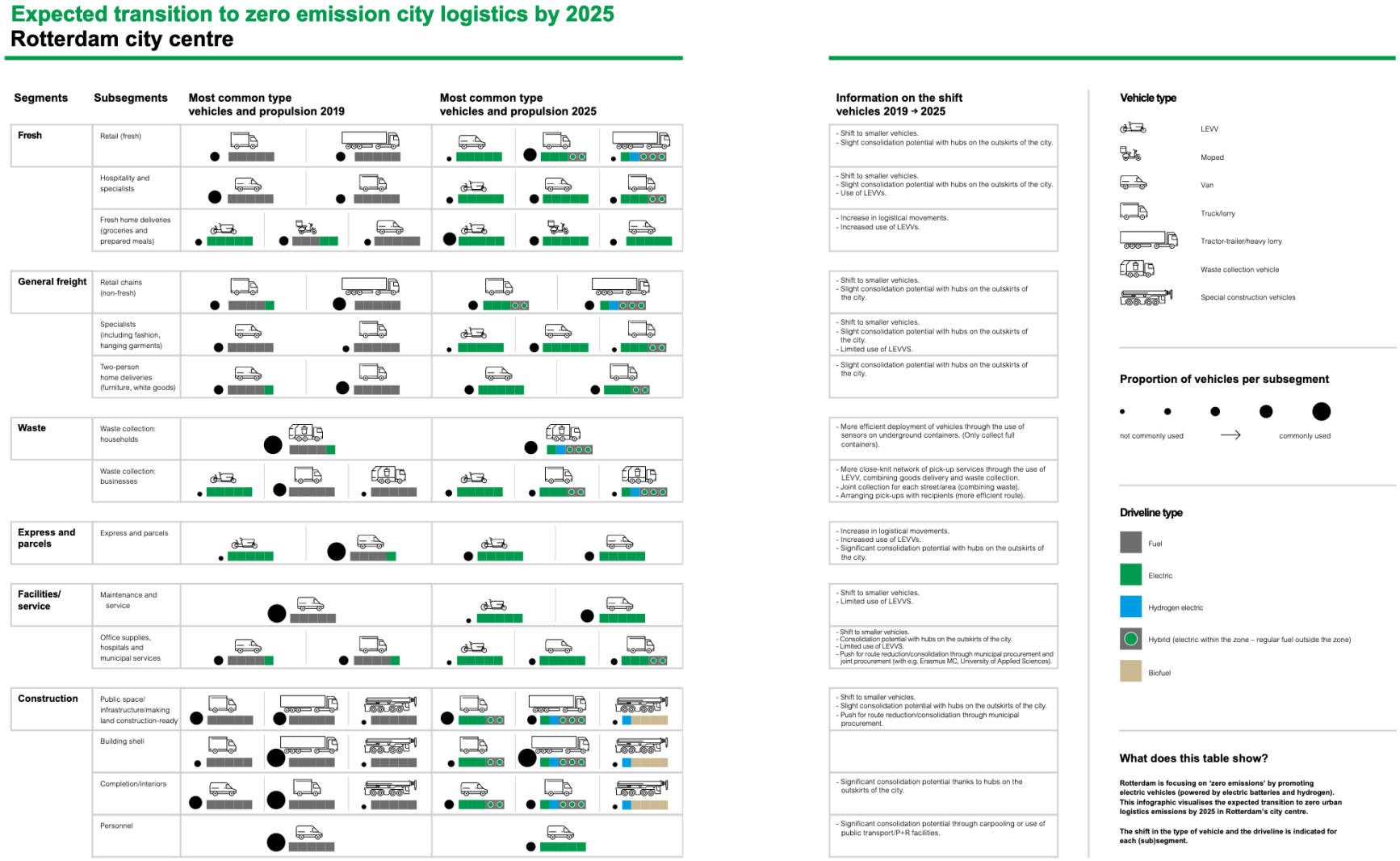
3. Logistics operators, e-retailers, delivery apps’ data

Logistics operators’ data

- Research can access operators data but for specific projects only
- Partnerships and strict MoUs
- Postnord data in Bergen: weekly numbers of deliveries, but not location
- For macro level data collections: need for even higher levels of trust



Zero emission city logistics (ZECL) roadmap, Rotterdam: an opportunity for data sharing



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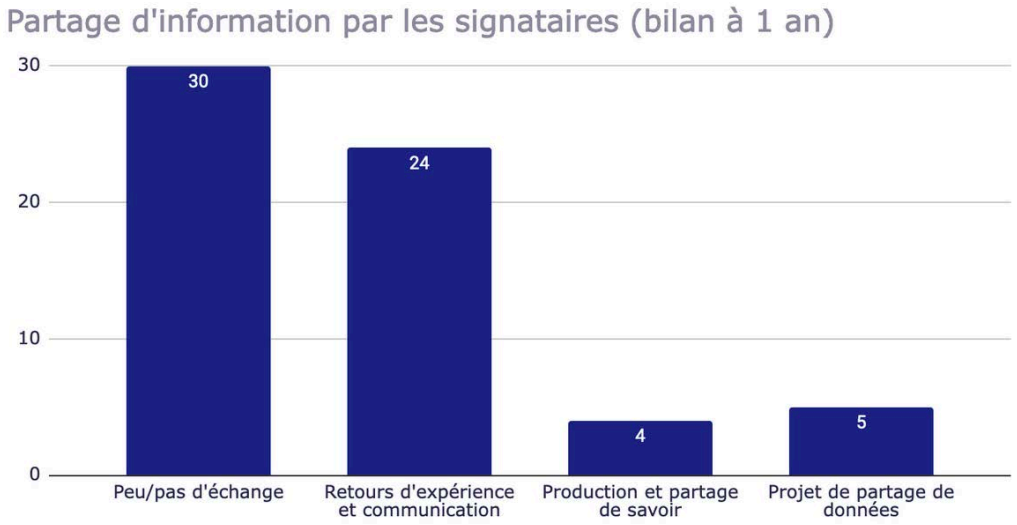
Rotterdam

- Ecostars certification (one, two or three stars) is provided to operators in exchange for an identified list of fleet indicators
- 2021 covenant between the City and 69 companies on information and data sharing

Article 4: Data exchange

1. Each party respects the other party's request to keep data confidential or not, a party's invocation of a legal requirement to keep data confidential, and pays attention to the provisions of the laws and regulations concerning the protection of personal data and freedom of information.
2. The knowledge generated during development may be used by all parties, provided it does not harm the interests of any of the participants.
3. The knowledge generated during development will remain the property of the parties who created or contributed to it, without owing any compensation to or demanding any compensation from the other parties.
4. The parties will not discuss any subjects, make any arrangements or perform any actions that are in breach of competition law.

One year after the signature: disappointing results



Adoue, Logistics City Chair, June 2022
Data from City of Rotterdam

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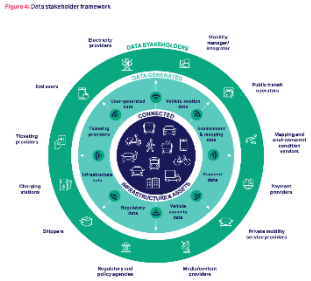
World Business Council for Sustainable Development report on mobility data sharing

"The movement of goods is increasing in importance, as the rapid growth of e-commerce and to-your door delivery has led to more carrier fleets in city streets. The combined impact is staggering – in China for example, daily parcel deliveries are on track to hit 145 million by the end of 2020, nearly tripling from 57 million in 2015.46 All of those delivery vehicles have a significant impact on congestion and emissions."



4. Municipal data

- Enforcement: automated plate-reading cameras
- Management: apps for delivery drivers
- Service provision: bike-sharing

Barcelona: data from areaDUM (phone app)

- Since 2015 all delivery drivers must register on AreaDUM app when stopping for delivery
- 30 minute window allowed
- Provides live data to municipality as well as *open access* data to research

Analyzing Last Mile Delivery Operations in Barcelona's Urban Freight Transport Network

Burcu Kolbay[1], Petar Mrazovic[2], and Josep Llus Larriba-Pey[1]

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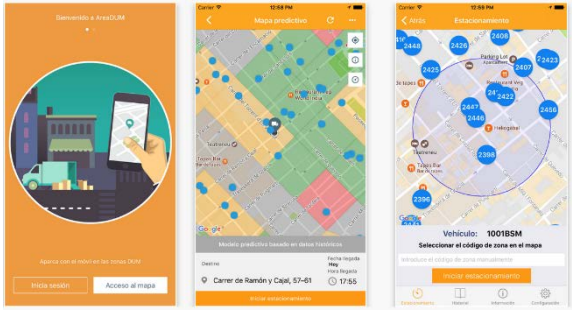
- Delivery Area ID
- Plate Number
- User ID
- Vehicle Type
- Activity Type
- District ID
- Neighborhood ID
- Coordinate, Weekday, Date, Time



ANPR (automated number plate recognition) camera data

- Cameras in 40 Dutch cities soon (zero emission zones by 2025)
  - Data restricted since GDPR (2019), processed by a trusted third party (National Data Warehouse)
  - Type, Euro standard, brand, size of vehicles
  - No data for foreign vehicles
  - No information on when where vehicles get out
  - Security cameras not included in data access
- France will allow ANPR cameras in 2023 in a very limited way and with automatic destruction of data
- “It is really a pity to not be able to use data that is actually there” (City of Gothenburg, March 2021)

ANPR: Automatic number plate …

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Open-access data available from the City of Rotterdam

- https://opendata.rdw.nl/Voertuigen/Open-Data-RDW-Gekentekende_voertuigen/m9d7-ebf2/data
- Vehicle category (M, N1, N2, N3, etc.), type of motor, Euro standard
- The municipality is using them to monitor the rate of uptake of zero emission delivery vehicles

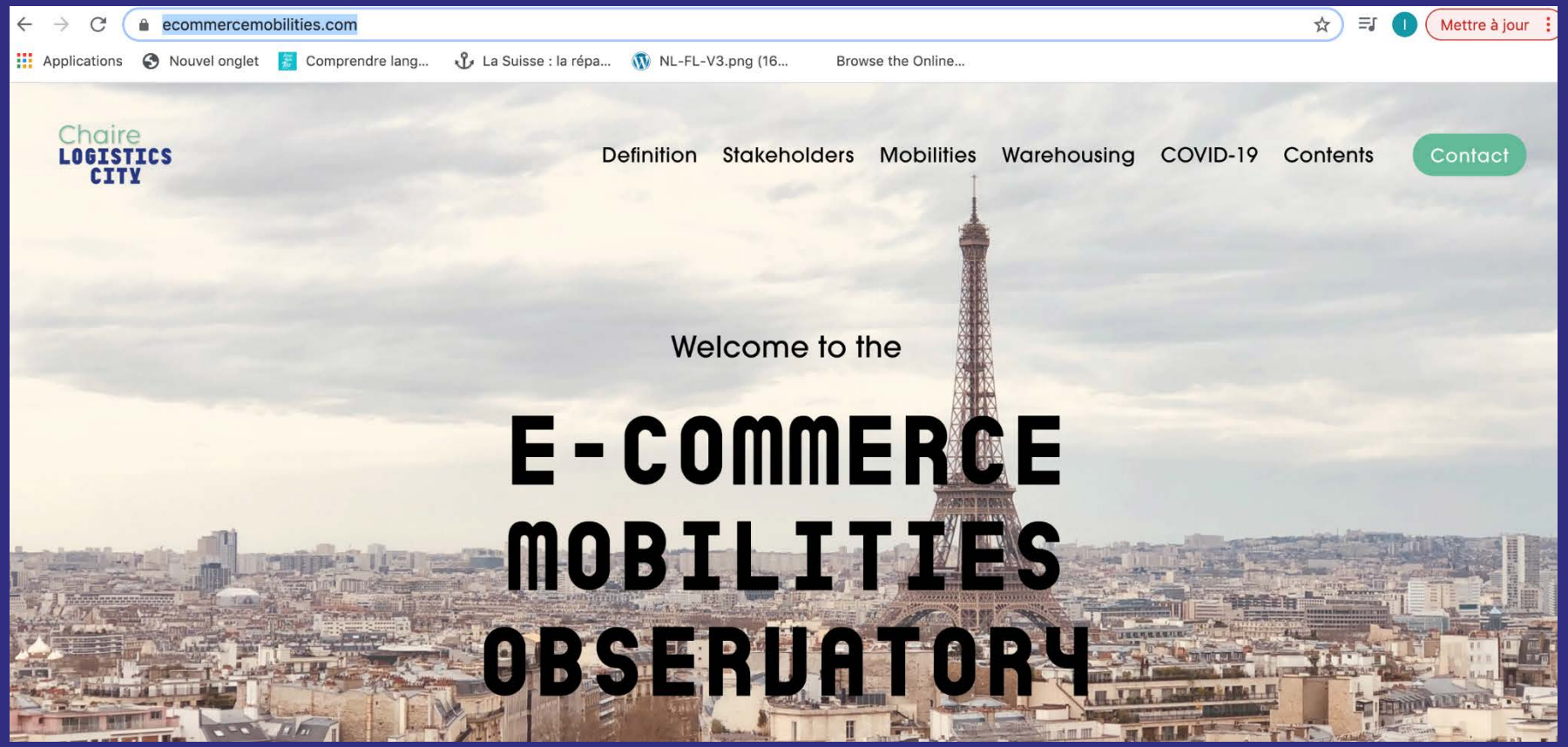
Table 3.
Number of vehicles registered by RDW in Rotterdam and the share of emission-free vehicles.

		Total number of vehicles	Number of emission-free vehicles	Percentage of emission-free vehicles
Delivery vans	Business registration	12,260	173	1.41%
	Self-employed and private individuals	10,932	11	0.10%
	Total	**23,192**	**184**	**0.79%**
Lorries	Business registration	3590	7	0.19%
	Self-employed and private individuals	373	0	0.00%
	Total	**3863**	**7**	**0.18%**

City of Rotterdam, State of ZECL (2022)

Open-access data from municipal services

- Bike-sharing public service in French cities
  - Many electric bikes now used for instant deliveries
  - Mobility pattern of delivery couriers on Velib are actually ‘’very complex to single out’’ (E. Côme, Univ Eiffel)
  - Trip routes, places of pickup and delivery, volume of activity: open access data cannot be used, and private data is not provided by the company



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