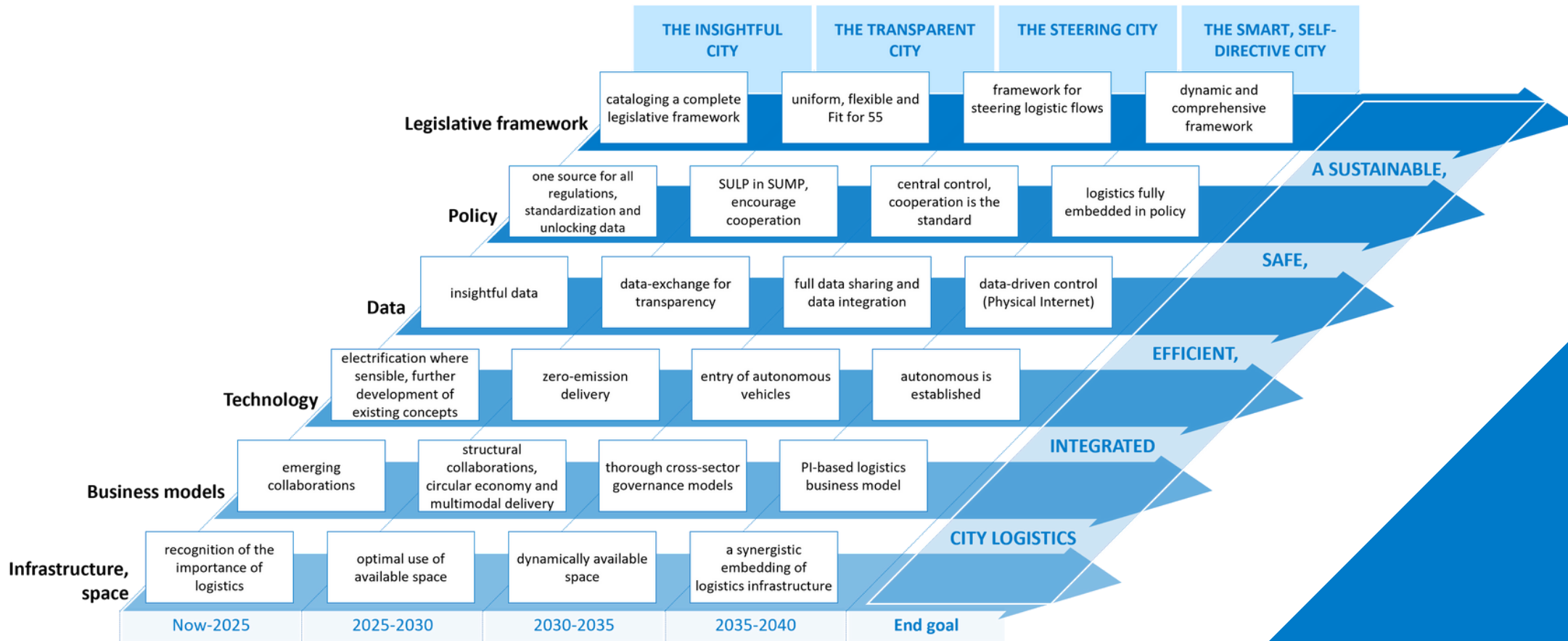


ROADMAP SUSTAINABLE CITY LOGISTICS



IMPORTANCE OF THE ROADMAP

This roadmap provides the building blocks to achieve a safe, sustainable and fully integrated urban logistics ecosystem by 2040.

It gives all stakeholders a clear overview of the ambitions, the necessary efforts and the interrelationships between the different stakeholders within the city. Cities, logistics companies, technology developers and research institutions can use the roadmap to shape their own vision and strategy.

VIL will use the roadmap as a framework for future projects, in the interest of one major common end goal: a safe, efficient, fully integrated urban logistics ecosystem in Flanders. The roadmap is a living document: over the years it can be updated, through knowledge gained both inside and outside of VIL.

VIL would like to thank all those involved in the process of creation, and in particular the members of the core group (Prof. Ben Derudder - KU Leuven, Prof. Joris Beckers - UA and Jan Adriaenssens - imec) for their cooperation on this roadmap.

READING GUIDELINES

The roadmap presents different time periods and themes that are important for a step-by-step achievement of the final objective. The six working themes are: legislative framework, policy, data, technology, business models and infrastructure/space.

The legislative framework sets the guidelines from which policies can emerge. These policies then determine the direction in which logistics stakeholders should move. This requires an enormous amount of data, as well as technological resources to facilitate this evolution.

Effective business models are needed to make this evolution sustainable. In the city itself, there must also be room for logistics activities, but as optimally and flexibly as possible. That is why all themes are important; they are inextricably linked.

The roadmap starts from where we are today and the most pressing needs, and then discusses the goals and evolutions in each theme, for every five years.

The roadmap is structured in several layers and is best read from left to right and top to bottom.

● THE INSIGHTFUL CITY (NOW - 2025)

Stakeholders (governments, researchers, and business) unanimously identify a lack of insight into urban logistics as the biggest problem today. The insightful city therefore acquires an overview of the flows entering and leaving the city. This insight is a necessity in order to implement targeted policies and make the right choices. The insightful city gives everyone clarity on what measures exist, both locally and regionally, and which affect logistics., and also consider periodic (e.g. a weekly market) or temporary (e.g. works) closures of streets, of loading and unloading areas.

LEGISLATIVE FRAMEWORK: CATALOGING A COMPLETE LEGISLATIVE FRAMEWORK

A complete overview and understanding of current legislation, regulations and practices related to city accessibility. Even cities themselves do not have a comprehensive understanding of this.

There is a demand for clarity from all parties. The necessary legal framework is created to give future city logistics insights, e.g. in data that currently is not available, but contains valuable information.

POLICY: ONE SOURCE WITH ALL REGULATIONS, STANDARDIZATION AND UNLOCKING DATA

The starting point for any future scenario, for any policy choice, is a coordination of laws and regulations, freely accessible through one source. Information on availability and accessibility of the city can make that source even more valuable.

Acquiring the right and necessary data and providing standardized access to that data is essential. With the OSLO standards (Open Standards for Linking Organizations) and the VLOCA project (Flemish Open City Architecture), the Flemish government is already taking big steps in the right direction. All players should start using them in their software applications, for structuring their data. Available government data should be made available, where necessary anonymized, to any stakeholder, e.g. researchers and governments

DATA: INSIGHTFUL DATA

Understanding what data exists, where it resides, and the accessibility of that data is a basic requirement. This accessibility enables data-driven insights into city logistics flows, making the various options clear.

To make data-sharing possible in the future, there must be sufficient data, standards that make the data insightful, as well as APIs for data-sharing (e.g. via platforms). The OSLO standards are a good base. Applying these everywhere is the next step to make the city insightful.

An analysis of necessary but still missing data, including methods to obtain this data (e.g. mobile phones, sensors, IoT infrastructure) and rolling it out paves the way to the future.

TECHNOLOGY: ELECTRIFICATION WHERE SENSIBLE, FURTHER DEVELOPMENT OF EXISTING CONCEPTS

Where it makes sense and is feasible, the electrification of urban logistics will be continued. The preconditions will be further completed, such as the necessary charging infrastructure.

For segments where electrification is not meaningful or feasible, other solutions will be examined.

Existing possibilities such as cargobikes, microhubs, parcel lockers,... will be further developed to increase scalability.

BUSINESS MODELS: EMERGING COLLABORATIONS

Ad hoc collaborations, to organize more efficient urban logistics together, are emerging. This can be e.g. a collaboration in a city hub. But also the integration of bicycle logistics for the last/first mile. This leads to new or adapted business models, both for local and international players.

INFRASTRUCTURE/SPACE: RECOGNITION OF THE IMPORTANCE OF LOGISTICS

Logistics are inseparable from daily life. Stores, restaurants, hospitals, ... must be able to be delivered, and space and infrastructure must be made available.

But there must also be room for logistics services at home, and not only for parcels: waste collection, service logistics such as plumbers, construction projects, moving services. All city plans, from street reconstruction to structural and spatial plans, must take this into account.

● THE TRANSPARENT CITY (2025 - 2030)

The step from the insightful city to the transparent city is a logical one. The insight into logistic flows and access to the city becomes transparent to everyone, e.g. also to planning systems of logistics service providers. An integrated, clear vision of logistics in the city has been developed, a vision that will be put into practice in the future.

LEGISLATIVE FRAMEWORK: UNIFORM, FLEXIBLE AND FIT FOR 55

Uniformity in terms of legislative framework, regardless of policy level, is the rule. But this uniformity still allows sufficient customization for each city to respond to specific characteristics and needs.

The European Fit for 55 program is a fact and the legislative framework is aligned with it: by 2030, net greenhouse gas emissions must be reduced by at least 55% (compared to 1990). By 2050, Europe must be climate neutral.

POLICY: SULP IN SUMP, ENCOURAGE COOPERATION

All cities, based on their policy choices, create a SUMP (Sustainable Urban Mobility Plan). Logistics is an integral part of it: the SULP (Sustainable Urban Logistics Plan).

Urban development also takes into account the needs of logistics. Ranging from accessibility for weekly garbage collection to centralized parcel services and place for delivering to businesses and individuals, including temporary sites such as construction and demolition sites or relocation operations.

Cities are actively encouraging distribution using city hubs and last mile delivery with bike logistics.

The EU Mission Cities, which must be climate neutral by 2030, are an inspiration.

DATA: DATA-EXCHANGE FOR TRANSPARENCY

Through data-sharing platforms, the various stakeholders (both cities and logistics players) share their data in order to gain insights on how to better organize urban logistics and facilitate cooperation between different players.

Data sharing platforms are static, real-time data sharing is still in the future.

Digital twins to make city logistics transparent and support the decision-making process are emerging.

TECHNOLOGY: ZERO-EMISSION DELIVERY

Zero-emission is not necessarily electric. New fuels and 'retro-fitting' of technology to non-electric vehicles will also provide opportunities for low, or possibly even zero-emissions.

The groundwork is being laid for new concepts such as "dynamic access control" and "curb side management". The technology that will enable these concepts is being developed.

BUSINESS MODELS: STRUCTURAL COLLABORATIONS, CIRCULAR ECONOMY AND MULTIMODAL DELIVERY

Ad hoc collaborations have evolved into more structural collaborations (e.g. for hubs and pickup points), but still voluntary. Cross-sector collaborations are also more common, the last and first mile are increasingly intertwined. The circular economy, with 'urban mining' as an example, has specific logistics needs, just like 'local for local' and the 'short chain'.

Wherever useful, deliveries and collections are made multimodally, via multimodal hubs on the outskirts of the city.

INFRASTRUCTURE/SPACE: OPTIMAL USE OF AVAILABLE SPACE

Space in a city is limited; the flexible activation of available space offers new solutions. Consider assigning a different function to 'parking spaces' depending on the time of day: parking in the evening and at night, loading and unloading bays during the day.

A unified approach to logistics in urban planning creates new opportunities: 'white label' pick-up points 2.0, micro- and nanohubs, eco-zones, mobility points, ... All with the aim of making optimal use of the available space.

● THE STEERING CITY (2030-2035)

Transparency in logistics flows and a clear vision, make it possible to dynamically control the various flows. Consider, for example, the full or partial use of hubs on the outskirts of the city, and parcel lockers within walking distance. This dynamic steering can limit access to the city, e.g. only zero-emission vehicles, or only full trucks with sufficient deliveries in the city. A "privilege policy" for deliveries and collections in the city becomes the rule.

LEGISLATIVE: FRAMEWORK FOR STEERING LOGISTIC FLOWS

The steering city will make concrete interventions in the logistical movements in the city; an appropriate legal framework is provided for this. This will determine the ways in which access to the city can be controlled.

Examples include the use of hubs for different product flows in the city, the inclusion of certain steering conditions in public tenders (e.g. sustainability, collaborations, etc.).

POLICY: CENTRAL CONTROL, COOPERATION IS THE NORM

Cities have a policy that not just anyone can enter or leave the city with just anything. The various flows in city logistics are controlled centrally, based on all available data, both data generated by the city itself and data from logistics companies.

Steering is based on logistics frameworks, specific per type of flow. The recipient is also included: the choice of delivery options is part of the central steering.

To enable this central, data-based steering, collaborations are the standard.

DATA: FULL DATA SHARING AND DATA INTEGRATION

The city generates data continuously, through all kinds of sensors, e.g. from traffic. Data sharing platforms can access this real-time data, as well as the data from logistics service providers. These are used for AI-driven planning/rerouting, dynamic access control and traffic management. Data sharing is done through 'data spaces'.

This real-time data is integrated with and between existing systems to optimize them.

TECHNOLOGY: ENTRY OF AUTONOMOUS VEHICLES

For the last mile and the first mile, autonomous vehicles are deployed. Goods are consolidated in (micro)hubs and guided towards other vehicles.

New concepts in charging and refueling infrastructure, e.g. inductive and mobile charging, are finding their way into cities.

BUSINESS MODELS: THOROUGH CROSS-SECTOR GOVERNANCE MODELS

The collaborations in the governing city require adapted business models. Cross-sectoral governance models are also emerging to manage the increasingly complex collaborations and to enable efficient cooperation between different systems and players.

The different urban logistics flows are being marketed in a flexible way: e.g., through hubs and last mile customization for different product flows. A split between commercial exploitation and operational execution is a possible flexibility.

Data sharing platforms also offer new opportunities, generate new business models.

INFRASTRUCTURE/SPACE: DYNAMICALLY AVAILABLE SPACE

Thanks to omnipresent data, available space can be made dynamic.

'Dynamic curb side management' is the rule and allows dynamic control of the use of public space, according to the needs at a given time, including logistical needs.

● THE SMART, SELF-DIRECTIVE CITY (2035-2040)

This is the ambition: the smart, self-managing city. A city where infrastructure is provided for optimal logistics (e.g. hubs, parcel lockers, dynamic loading and unloading locations), where data exchange between all players has become self-evident, in order to ultimately make the city smart and self-managing enabling the realization of the ultimate goal: sustainable, safe, efficient, integrated urban logistics.

LEGISLATIVE FRAMEWORK: DYNAMIC AND COMPREHENSIVE

In the smart, self-directive city, logistics will be organized entirely differently.

Creating the legislative framework for this is challenging, especially since it must be comprehensive.

POLICY: LOGISTICS FULLY EMBEDDED IN POLICY

A smart, self-driving city requires a holistic approach, well thought-out policies and a framework for an integrated logistics ecosystem that leads to optimized logistics.

Data exchange, flexible use of space and time, these are just a few aspects necessary for a holistic approach. T

he framework and concrete policies have been developed in collaboration with all stakeholders, at all levels.

DATA-DRIVEN CONTROL (PHYSICAL INTERNET)

Decentralized, self-steering "control towers" monitor access and optimize logistics movements. The control towers are the data-driven brains behind the smart, self-directed city and the basis for resilient logistics.

The 'Physical Internet' is also the backbone for smart, urban logistics marketplaces, bringing all actors together.

TECHNOLOGY: AUTONOMOUS IS ESTABLISHED

New technology will allow a different form of logistics in 2040.

Autonomous delivery to the city is established, e.g. from city hubs. New modes of transport are also making their appearance and offering new solutions for specific flows.

LOGISTICS BUSINESS MODELS: BASED ON THE PHYSICAL INTERNET

The smart, self-directive city requires adapted business models.

E.g. for the operation of urban control towers, the flexible use of space and time, Physical Internet marketplaces.

INFRASTRUCTURE AND SPACE: A SYNERGISTIC EMBEDDING OF LOGISTICS INFRASTRUCTURE

Logistics without worries: the city and logistics needs are in balance.

The logistics perspective is an integral part of city planning, spatial interventions and infrastructure decisions.

MORE INFORMATION?

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