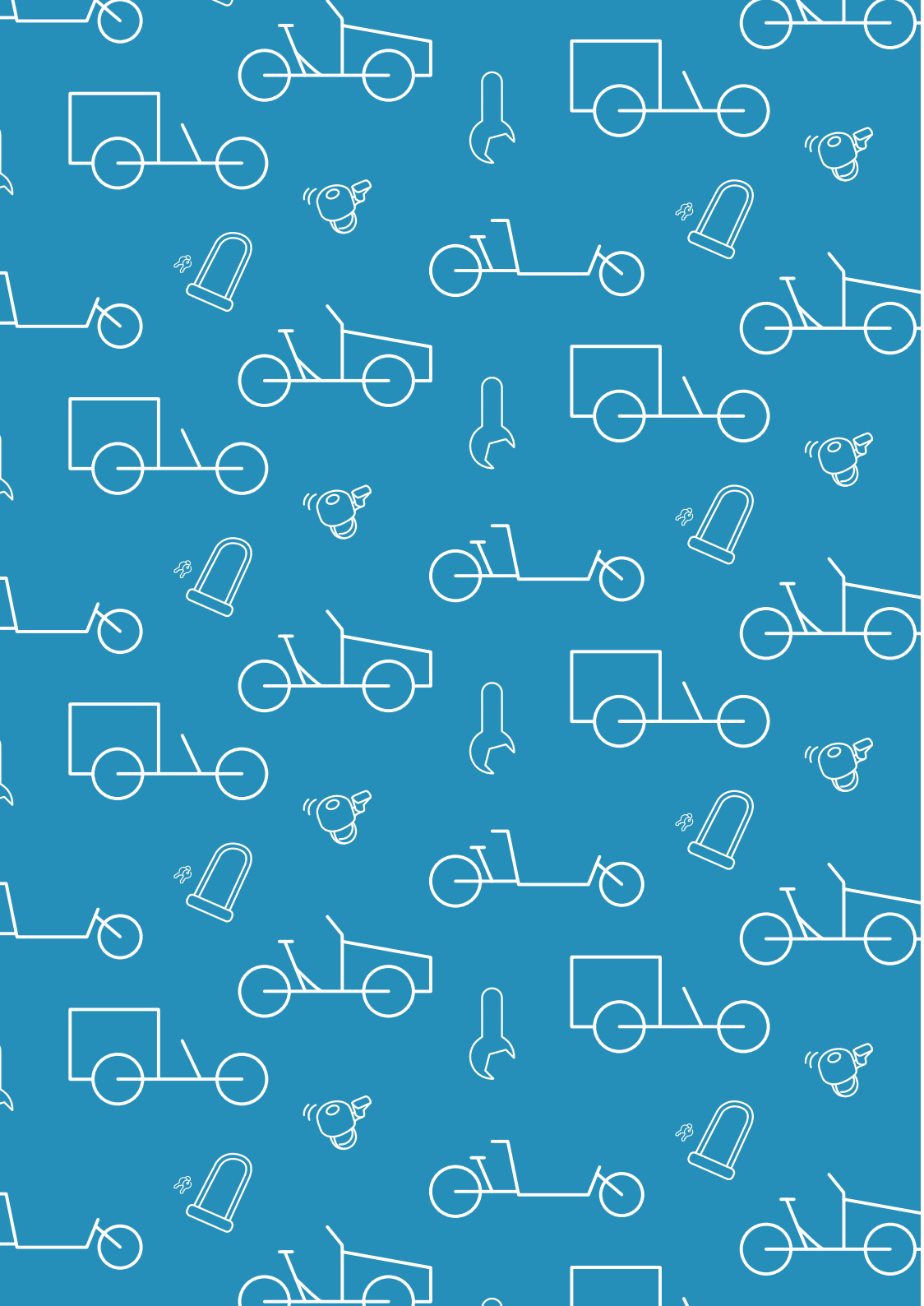
A Guide to Planning Cyclelogistics Hubs

cyclelogistics
City Changer Cargo Bike



A Guide to Planning Cycle Logistics Hubs
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An Interpretation of *Planning of Cargo Bike Hubs* by
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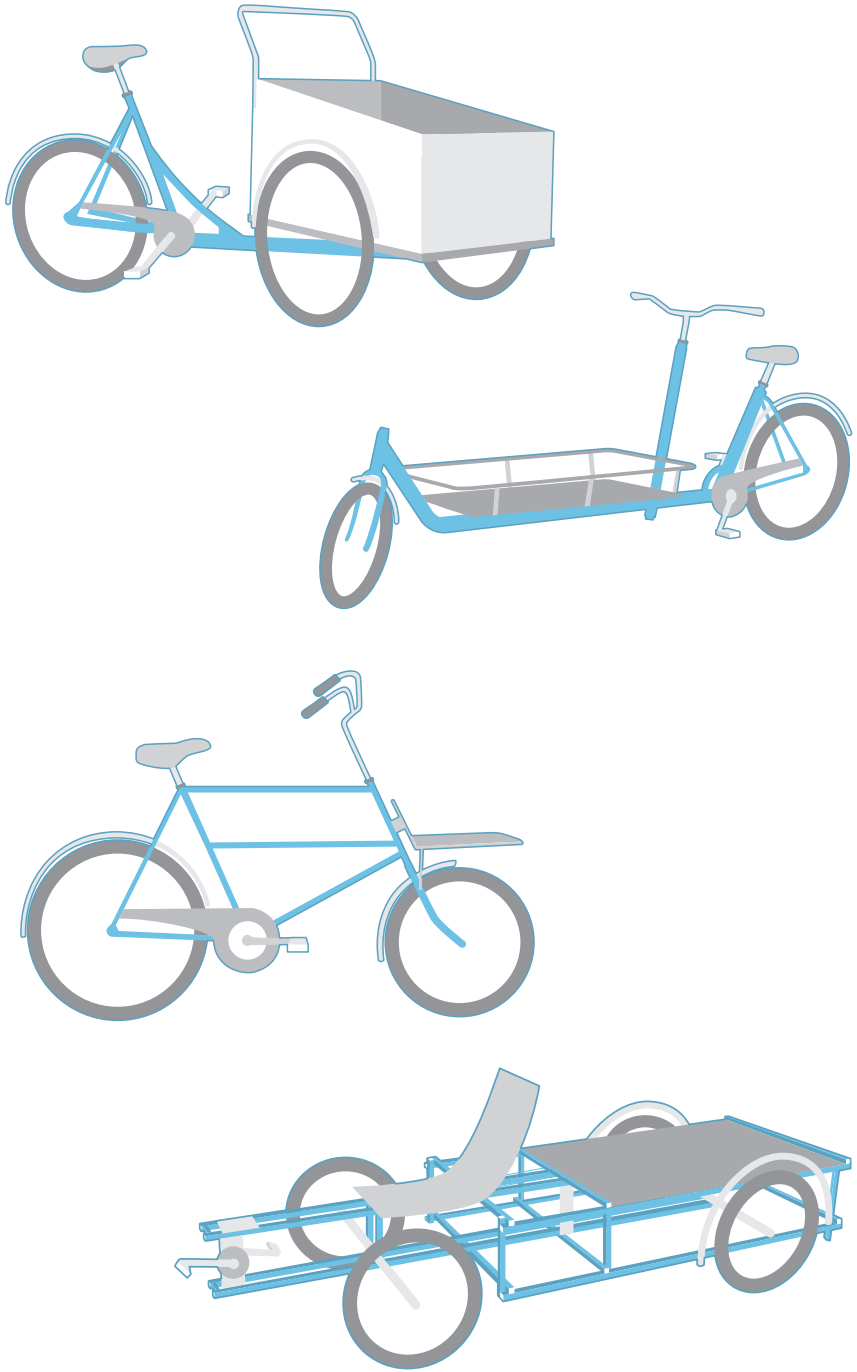
About Us

City Changer Cargo Bike (CCCB) builds on the limitless potential of cargo bikes, promoting their usage among public, private, and commercial users. Through support of the Horizon2020 programme, CCCB brings together a team of 20 partners from Norway to Greece, the United Kingdom to Bulgaria.

Learning from best practice across Europe, the initiative will raise awareness and support the uptake of cargo bikes and cargo bike initiatives. In doing so we will foster exciting developments that, among other things, offer more sustainable logistics operations, improve public spaces, engage citizens, and reduce traffic congestion.

Executive Summary

This guide equips readers with a newfound inspiration for moving cities towards cyclelogistics cargo bike hubs. Though there's nothing particularly new about cargo bikes, the world has seen a growing trend in using them for a plethora of different purposes, one of these being for deliveries around cities. Their relative ease, affordability, and accessibility make them an increasingly popular choice for CEP services in big and small cities. With the help of research from the University of Magdeburg, this guide details the steps that can be taken to develop cyclelogistics hubs, and what each stage of planning looks like.



What is a Cargo Bike?

Cargo bikes are bicycles that have been specifically designed to carry cargo, be it heavy or light, big or small. Cargo bikes take many forms, ranging from the traditional short john, to the three-wheel cargo-trike models, to custom built four-wheel frames with electric pedal assist motors for specific commercial needs. And while cargo bikes have been in use for more than a century, recent design and battery innovations have made contemporary models much more efficient and accessible.

Load capacity and prices of these bikes vary greatly as well, with lighter bikes priced at €1000-€2000 managing a load up to 80 kg while heavier bikes ranging anywhere from €2000-€12000 being capable of moving up to 350 kg. These bikes have the potential to tackle the environmental, logistics, traffic and social issues facing many European cities, all while providing a new perception of mobility, transport and quality of life.

What is a Cyclelogistics Hub?

A cyclelogistics hub is a center typically located in a dense urban area that houses one or multiple courier services. In these hubs, parcels are sorted and redirected on cargo bikes throughout the city. As opposed to conventional delivery structures, cyclelogistics hubs offer a model that alleviates traffic congestion by effectively replacing motorized vehicles. Deliveries suitable for cyclelogistics hubs are often small and time-critical shipments, a delivery type that is quickly growing in dense residential neighborhoods. Cyclelogistics hubs are not a universal solution and don't suit all delivery types, but as this guide demonstrates, the planning process and hub structure can be flexible and adaptable to any city.

TYPES OF CYCLE-LOGISTICS HUBS

Cyclelogistics hub types vary, and each type should be considered when searching for an area and determining a hub's needs. One key determining factor when choosing a hub type is choosing how many CEP (courrier, express, parcel) services the hub will house. Hub types can be divided into two rough categories: semi-stationary hubs, and stationary hubs. Semi-stationary hubs include swap bodies and trailers and can be used for pilot projects. Stationary hubs can be further divided into two types, container hubs and property hubs. Each of these types offer a variety of qualities, and present significant differences in equipment, requirements and effects on the cityscape. Depending on the number of CEP servies and the type of hub, between two and five cargo bikes are used at each individual location.

Semi-Stationary Hubs

Swap Bodies
A swap body is an interchangeable container, and is most often used as a freight container for road and rail transport. It is recommended that this type of semi-stationary hub is used for pilot projects.

Approx dimensions: 7.4m x 2.6 x 4m
Package quantities: 250-500

Advantages: One of the primary advantages of the swap body is it's fast-realization nature. It can be designed to fit into its environment, and is mobile. These factors make this hub type ideal of trial projects.

Disadvantages: The primary downside of the swap body is it's large space requirement. The area must also be accessible by truck for the swap body's transportation on and off the site. Additionally, these hubs are generally aesthetically unattractive, making usage limited to acting as an interim solution. This type also offers no changing rooms, sanitary facilities, social rooms and rest rooms for riders

Requirements: A swap body requires a delimited area such as a closed off parking space, and an additional shunting area.

Trailers
A trailer is an unpowered vehicle towed by another, often in the form of a rear section of a truck. Like the swap body, trailers should be used as pilot projects

Package quantities: 150-200

Advantages: As a temporary solution, the advantages of trailers as cyclelogistics hubs include their usability as quick solutions and easy parking space use. Theoretically, the site can also be used at all times.

Disadvantages: The primary disadvantage of trailers is the relatively low capacity. This type also offers no changing rooms, sanitary facilities, social rooms and rest rooms for riders

Requirements: Like swap bodies, trailers require an established open area such as a parking space. They also require some form of delimitation and space for shunting.

Stationary Container Hubs

Stationary Shipping and Office Containers
Stationary container hubs are similar to swap bodies, but because of their different nature in size and weight, they are considered stationary. The two most common types of stationary containers are standard shipping containers, and office containers. Both of these solutions, despite their stationary nature, should be used as interim solutions.

Approx dimensions: 2.4m x 2.6m x 6-12m

Advantages: Stationary containers as cyclelogistics hubs are fast solutions, cost effective, flexible and designable. For the most part, these hubs are a simple and flexible solution.

Disadvantages: Stationary containers do present certain disadvantages, the primary one being it's aversion from city centers, as they require a relatively large open site and are aesthetically unattractive. Therefore, these should be viewed as interim solutions.

Requirements: This hub type requires space for loading and parking facilities for cargo bikes, and shunting areas.

Stationary Property Hubs

Shop
This hub type most often resembles a storefront or a shop. Stationary property hubs are the most fixed hub type, and these should be strongly considered after the completion of a pilot project.

Advantages: The largest advantage of a shop hub is it's immediate and easy integration into the city and street's fabric (if an appropriate site is found).

Disadvantages: The primary disadvantage of stationary property hubs and store fronts in particular, is the high cost.

Requirements: A stationary shop hub requires ramps, shuntin areas, loading and parking facilities, and road accessibility for cargo bikes. This permanent hub type must also plan for changing rooms, sanitary facilities, social rooms and rest rooms for riders.

Car Parking compartment

Approx dimensions: 4.6m x 1.9m x 5m

Advantages: Car parking compartments offer inherent easy vehicle access, and easy integration in the city's fabric.

Disadvantages: If larger vehicles such as vans are considered in the structure of the cyclelogistics hub, these vehicles may face some difficulties with height restrictions within the facility. Planning of this type of hub must also consider certain particular regulations (such as fire protection requirements.

Requirements: This hub type requires parking and loading facilities for cargo bikes, and if necessary, possible entry for vans and trucks. This permanent hub type must also plan for changing rooms, sanitary facilities, social rooms and rest rooms for riders.

Hub Management Models

Generally speaking, there are three common ways of structuring cyclelogistics hubs: singular hubs, cooperative hubs, and concessionary hubs. A **singular hub** caters to one single logistics provider. In **cooperative hubs**, multiple CEP services share one space and its facilities. However, the flow of goods, means of transport, employees and information flows remain strictly separate.

Cooperative hubs must be structured in a way that allows for an easy change in actors, as this will facilitate the transition from pilot phase to permanent operations. Additionally, involving local cyclelogistics providers can improve operations, particularly in the opening stages. It is important to note that when considering areas for cooperative hubs, the space will not equally suit every actor and logistics service provider. Therefore, the implementation of the hub project should not rely on independent services and companies. When examining the option of cooperative hubs, existing territorial protection of established service providers should be considered.

Shifting from a "standard" delivery model to a cyclelogistics model entails a shift in the supply of parcel volumes. It has been observed that for multiple singular hubs, the combined number of cargo bikes used across all hubs were high, whereas the sum of the parcel deliveries were relatively low. On the other hand, the cooperative hubs showed that fewer cargo bikes were demanded for the same amount of parcel deliveries. The higher capacity of cooperative hubs is one of the reasons for why they are generally recommended, if the appropriate space and network is available.

Concessionary hubs follow a structure whereby logistics companies deliver their consignments to the logistics hub, and a delivery company delivers them to the end customers. This concept is frequently favoured by cities but often rejected by logistics companies. Not only is the potential for traffic reduction considered to be low with concessionary deliveries, but there is additionally a lack in legal frameworks for this structure.

PLANNING STAGES

Though the reality of planning a cyclelogistics hub is different for each case and city, understanding the basic necessities of the model is vital for successful implementation. Evident steps such as identifying funding, stakeholders and an appropriate space are immediate considerations when developing the idea, but certain aspects such as the type of hub, logistical details and public participation play an equally vital role. The recommended 10 stages below offers an approach to hub development that considers all actors and allows for many possible scenarios.

Initiation of Planning

In the initial planning phase, stakeholders typically approach actors having identified a certain problem situation and a rough idea for solutions. Initiating actors generally include local authorities and municipal administrations, CEP services, cyclelogistics companies, research institutions and businesses. The involvement of municipal bodies is highly recommended throughout the development of the project, as local cooperation and political will help in streamlining the planning. Logistics providers, cyclelogistics companies, research institutions and businesses vary by city, and must be evaluated and involved from the initial stages of planning.

A concrete relationship between all actors involved must be established as soon as possible so as to ensure that positions are assumed and a comprehensive network is formed. In this initial stage of planning, it is also important for the network to decide the extent to which the public should be involved, and how this should be facilitated. To tie the operation together, contact persons should be appointed, most importantly on the municipal level.

Identifying Stakeholders

Identifying stakeholders and assigning roles to the appropriate actors is one of the first stages of planning. Though certain actors and bodies naturally become part of the network, certain stakeholders such as research and development organizations, citizen groups and architect firms must also be considered.

- Economic development offices
- Communal logistics planners
- Public Officials
- Municipality
- CEP services
- Service partners
- Trade associations
- Logistics associations
- Research and Development bodies
- Citizens
- Associations
- Architects
- Real Estate Industry

Public Participation

An important step in the planning of the hub is considering the residents and businesses in the vicinity of the area. If the identified area was previously used by the public, a parking space for example, it can be expected that there will be reactions to the planned new use. If the residents can actively participate from early stages, are valued as key actors, and actors practice transparency, the hub likely will be better integrated.

To successfully integrate public participation, actors must clarify the structure of participation, determine how to most effectively select participants, and evaluate the extent to which participants will be involved. With this, the following questions should be considered: What criteria ensures that participants are heard? For which planning stages should the public be engaged? How will the results be processed? What specific vulnerable groups (e.g. elderly people or children) should be included?

Defining Targets

Defining targets should be conducted on a strategic level and with appropriate decision-makers. Key targets should include: an in-depth analysis of the problem situation at hand, an agreement on who will participate, a solidified definition of all objectives across the network, the determination of evaluative criteria, and an agreement on respective responsibilities. It is essential when defining targets that objectives are clear for all the actors involved. Lead figures should organize as many rounds of conversation as necessary, so as to ensure that a unanimous understanding of the project is achieved. Essential goals to be specified include the intended effects (e.g. CO_2 reduction) and the planning trajectory (e.g. pilot projects, permanent solutions, holistic logistics concept). It is highly recommended to begin with simple solutions and pilot projects. In this stage of planning, it is important to also push for innovative and new solutions alongside the consultation of relevant actors.

Concept Planning and Requirements

With targets secured, two central points must be addressed in the concept planning stage: identification of a hub space, and definition of the hub type. Most CEP services are open to cooperative hubs, but this hub type requires an appropriate, larger space. If such a space is not available, then actors should consider several single hubs. To reach these decisions, service partners should be solidified.

Here, urban areas must be examined to determine what the delivery catchment area around the hubs will measure out to. This requires the internal shipment data from private suppliers. Depending on the CEP services involved, these catchment areas typically range between 500m and 1.2km. If the zone is larger than 1.2km, it is advisable that several hubs are considered. Another consideration when examining the option of cooperative hubs is the existing territorial protection of service providers.

Staff areas, parking spaces for bikes, shunting spaces, holding spaces, charging stations, and sanitary rooms should also be defined in this step. In order to determine the size of the area, the individual parcel volume shares of all the CEP services must also be considered.

Finally, present infrastructure for cargo bikes in and around the area should be evaluated. It should be decided in this stage weather alternative delivery vehicles such as vans are to be used. If this is the case, there must also be available infrastructure for these vehicles. All of these elements play a key role in determining the space and cost of the hub/hubs.

Siting

The search for suitable areas is at the core of the planning process. This step is complex due to the potential scarcity of suitable sites and the diverse demands of the city. To fulfill baseline requirements, the area must be usable all year round and accessible during the day. For a long term hub, the site must be available for at least 2-5 years. A few recommendable steps when searching for areas with baseline requirements include: consulting service partners and municipal actors for suitable properties, analyzing aerial photographs and GIS data, and in-person site visits.

When considering the **logistical suitability** of the site, there are certain elements that are crucial. Is the site economically feasible? Is the site fulfilling basic logistical suitability requirements such as accessible roads? Is there enough space for all necessary equipment and facilities? Are the necessary supply connections available?

Additionally, the area must be in line with **city and property regulations**. Who is the owner of the prospective site and would this area be usable under this owner? Is the space zoned as special use and is rededication possible? When and for how long can this area be made available? Are there any claims or conflicts of use due to environmental protection, preservation of historical monuments, etc.? Would this project be permitted by traffic authority?

Evidently, within a city, different areas suit different types of hubs. Inner city areas with a high residential concentration are viewed as highly suitable, as they often have high “delivery stop density” within a radius of under 1.2km around the transhipment hub. Areas with poor motorized vehicle access are also preferable, as this is an open opportunity for cargo bikes. In the city area, it is recommended to place hubs on main roads, arterial roads or on the edge of neighbourhoods. Preferably, the chosen vehicles should have good manoeuvrability without having to disturb quiet streets, all whilst keeping out emissions.

Site Examples

Commercial Real Estate Hub

Hub Type: Stationary (property)

Advantages: For shops and commercial spaces, there is generally no municipal approval necessary. This hub site also offers immediate integration into the cityscape.

Disadvantages: Generally, acquiring this space is highly competitive and expensive. It is also common that landlords of the space are relatively unenthusiastic to lease the space to cyclelogistics hubs because of perceived disturbances.

Comments: This hub type should ideally be on the ground floor for accessibility's sake

Parking Garage

Hub Type: Stationary (property)

Advantages: Parking garages are most often video monitored, which is a major advantage for cyclelogistics hubs. This hub type is also often less competitive than finding available shops

Disadvantages: In a residential environment, the occupancy in a parking garage can be crowded. This hub type often also comes with fire safety requirements. If vans are considered for the hub, actors need to ensure that these vehicles are not too large to access the garage.

Site Examples

Parking Spaces

Hub Type: Stationary (property)

Advantages: Parking garages are most often video monitored, which is a major advantage for cyclelogistics hubs. This hub type is also often less competitive than finding available shops

Disadvantages: In a residential environment, the occupancy in a parking garage can be crowded. This hub type often also comes with fire safety requirements. If vans are considered for the hub, actors need to ensure that these vehicles are not too large to access the garage.

Storage Complexes

Hub Type: Stationary (property)

Advantages: If vans are considered for the hub, storage complexes offer easy access as they accommodate these larger vehicles.

Disadvantages: The primary disadvantage of this hub type is that it is often located in peripheral locations.

Modification and Iteration

An inevitable process in planning cyclelogistics hubs is the modification and iteration of original plans. The availability of a suitable space often represents the main barrier to implementation.

Upon examining all the necessary requirements for a space, if an appropriate one is not found, certain elements of the plan may have to be reconsidered. Firstly, actors should consider searching for spaces outside the initial ideal position. A change in delivery vehicles may be necessary depending on the available infrastructure. Design modifications of the envelope hub, and reconsidering the hub type can also open new potential areas. Down-scaling parcel volumes to fit smaller space requirements would also ease the search for areas, which can be done by re-evaluating the number of CEP partners.

Additionally, iterations may lead to reconsidering the financial framework, in which case cities should examine the availability of public funding and special user fees. Finally, a modification in the timeline may be necessary.

Implementation Planning

The implementation step is carried out with the confirmation of a suitable space for the hub. Typically, this phase requires the preparation of permits by the city, drafting contracts, commissioning the necessary equipment, and commissioning the necessary logistical additions (electricity, infrastructural changes, security, etc.). To successfully conduct this phase, there must be a focus on the coordination of responsibilities and a clear understanding on monetary allocations, as this step involves investments and long-term expenditure. Additionally, binding schedules must be put into place so as to ensure the development of planning, including the recruitment of cargo bike riders and employees.

Evaluation

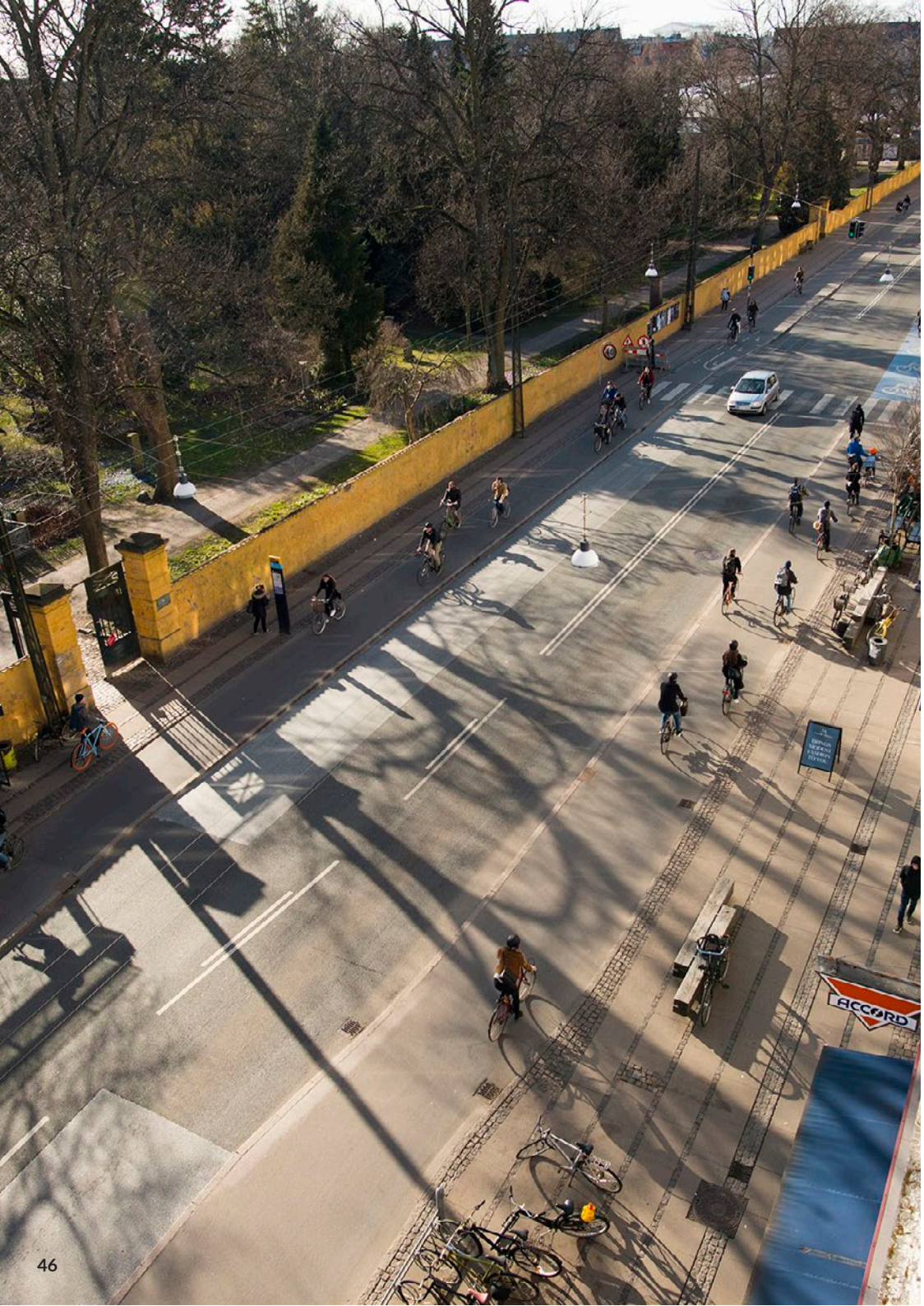
The evaluation step of planning is essential and serves to evaluate the effect of the cyclelogistics hub. Essentially, the evaluation determines whether or not intended goals and targets have been achieved. To determine this, a before-and-after comparison is often carried out alongside criteria developed in the initial planning phases. Additionally, logistics providers and primary actors evaluate the project by carrying out an evaluation of the economic efficiency evaluation, and from there determine if certain elements of the hub project must be reevaluated. The criteria also underlines the importance of evaluating what the final CO2, air pollution and traffic outcomes would be given the final structure of the hub.This evaluation can be carried out by either internal actors, external experts or research institutions.

Consultation

If the evaluation is positive and criteria is met, it is then possible to convert the pilot project or temporary hub into a long-term, integrated hub. Converting to the latter could mean switching from temporary structures such as trailers and containers, to more long-term building types, and will also require partial re-planning including the search of a new area. With the stabilisation of one well-structured hub, it is possible to then consider extending the project across other areas of the city or different urban areas, so as to create a functional network. With the initial planning stages, evaluation and experience established by this hub, other similar hubs can be developed and conducted on a faster timeline. Creating a long-term network of hubs is recommendable for cities.

SUPPORTING COMPONENTS

Along with the planning of the hub itself, there are various supporting elements that affect the final outcome of the hub. The **infrastructure** within the hub's catchment area largely affects the ease and efficiency of deliveries. Developing a hub often calls for identifying a space with adequate surrounding infrastructure, but alternatively, it could also inspire a bicycle-friendly infrastructural change for the city at large. **Project support** by means of monetary subsidies, traffic restrictions and emission regulations, equally plays a role in determining the trajectory of the planning process, and the hub's final functionality within the city.



Cycling Infrastructure

The development of bicycle-friendly infrastructure is conducive to cyclelogistics. Infrastructural improvements include the expansion of parking areas and loading zones for cargo bikes and widening cycling paths without straining pedestrian flows.

In general, it is recommendable that streets offer a minimum of 2.25 m cycle lanes. On wider streets, cycle lanes and paths can be created by rebalancing car parking, or narrowing and removing car lanes. If cycle lanes are physically impossible, then it is advisable to use a 30km/h speed limit on mixed use roads.

When unloading a delivery, a parked cargo bike feels much safer than a parked van, as a cargo has more maneuvering flexibility and doesn't obstruct a view on the street. If necessary, cargo bike loading zones can be recommended at dropoff points, which require less space than conventional loading zones.

Project Support

Along with infrastructural developments, cyclelogistics can be promoted by means of monetary subsidies, traffic restrictions, and emission regulations. Monetary support is a strong instrument, and is regarded as a sign of political will. Financial drivers create incentives for local service partners, as the subsidisation of land can mitigate the difference between market prices and the available budget.

In the case of bans and regulations, general entry bans and diesel driving bans can be beneficial. On the other hand, bans and regulations specifically aimed at CEP logistics are complex and almost impossible to implement legally and will likely receive pushback. Overall, the creation of a car-free city centre or a car-free urban area is more of an urban planning measure but can promote cyclelogistics.

The Ideal Cyclelogistics Hub

Evidently, it is nearly impossible to generalize what an ideal Cycle Logistics hub looks like, as the ideal hub is one that fits the needs and structures of the city, the service providers and the citizens. This being said, there are certain elements that generally make a hub more efficient and integrated:

- ❒ The cycle logistics hub is stationary
- ❒ The hub is structured for cooperative usage
- ❒ Appropriate cargo bike equipment such as ramps is readily available
- ❒ The implementation process of the hub was conducted with transparency for all actors, particularly for citizens
- ❒ Citizens were offered participation from early planning stages
- ❒ The hub is located in a dense, mixed area, with an abundance of small-scale delivery opportunities
- ❒ The hub's location is on an unobtrusive and set back street, or within an existing building
- ❒ The space has a minimum of 2-5 years of usability
- ❒ The hub has access to appropriate infrastructure such as unloading and shunting areas, cycle paths suitable for cargo bikes, and road access for possible trucks and vans
- ❒ Facilities such as power supply for electric assist cargo bikes, and overnight loading and storage spaces are consistently available
- ❒ The hub and enclosure is aesthetically pleasing, and blends well into the existing urban fabric
- ❒ Bike-friendly street furniture is well integrated into the surrounding area and is a positive addition for affected citizens

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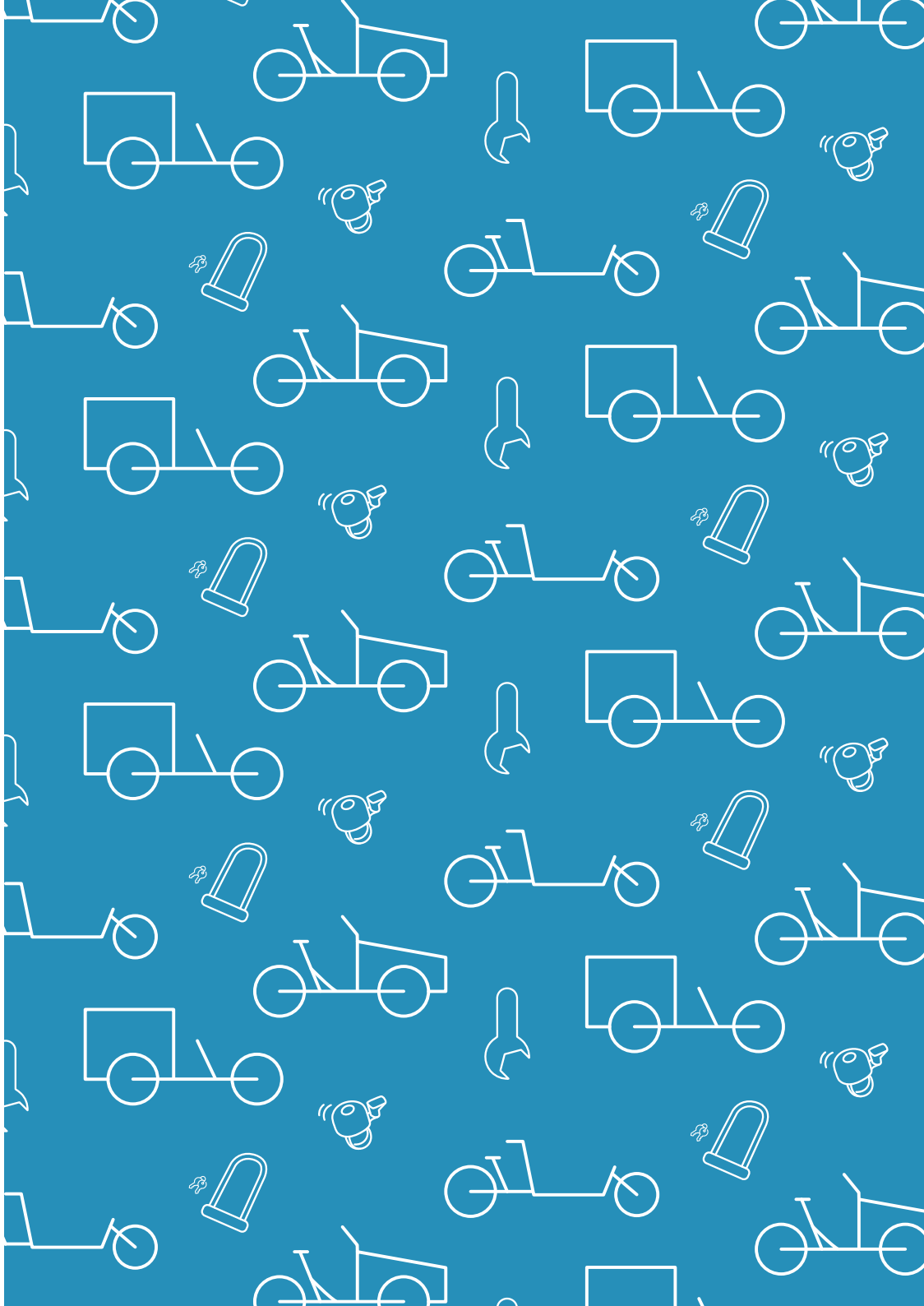

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