DISC

Data-driven and Dynamic Space Assets for physical internet led Urban Logistics and Planning



DISCO Policy Lessons

DISCOBAY

DISCOLLECTION

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Acronyms and abbreviations

A quick reference for the terms used throughout this brief.

Term	What it means
DISCO	Data-driven and Dynamic Space and Assets for Physical Internet-led Urban Logistics and Planning, the Horizon Europe project behind this brief (Grant Agreement No. 101103954)
DISCOBAY	The DISCO innovation covered in this brief, for shifting peri-urban freight from road to water and rail before a clean last mile
DISCOLLECTION	The companion DISCO data layer that publishes standardised hub, booking and performance data from DISCOBAY deployments
Living Lab	A real-world city site where a DISCO innovation was piloted (Starring) or adapted and tested (Twinning)
PI	Physical Internet, the interoperable-logistics principle underpinning DISCO: shared infrastructure, resource pooling and modal shift
Multimodal bay	A node, such as an inland waterway terminal, rail freight yard or trimodal platform, where freight is transferred between transport modes
TEN-T	Trans-European Transport Network, the EU's core network of transport infrastructure, including designated urban nodes
NAIADES III	The EU action programme for inland waterway transport
CEF	Connecting Europe Facility, the EU's infrastructure co-financing instrument
AFIR	Alternative Fuels Infrastructure Regulation, the EU rules on charging and refuelling infrastructure
eFTI	Electronic Freight Transport Information (EU Regulation 2020/1056), the framework for exchanging freight data electronically
GIS	Geographic Information System, software used to map and analyse where spare capacity or suitable sites exist
UFDS	Urban Freight Data Space, the DISCO platform for sharing standardised freight and hub data
CCC	Construction Consolidation Centre, a logistics hub that pools deliveries to nearby building sites
SULP / SUMP	Sustainable Urban Logistics Plan / Sustainable Urban Mobility Plan

1. What is DISCOBAY?

Shifting peri-urban freight from road to water and rail, before a clean last mile into the city.

DISCOBAY tackles the inefficiency of the first-mile and peri-urban freight segment by promoting a structural shift from road-only transport to integrated, multimodal networks. It focuses on strategically located nodes, such as inland waterway terminals, rail freight yards and trimodal platforms, typically five to twenty kilometres from the dense urban core.

Goods are consolidated at these hubs, transferred from heavy trucks to barges or trains, and delivered into the city by low or zero-emission vehicles. This directly supports the modal-shift pillar of the Physical Internet, as well as the revised TEN-T Regulation and the EU Urban Mobility Framework.



Figure 1: A multimodal freight terminal of the kind DISCOBAY aims to connect to clean last-mile delivery.

What it could look like in practice

- Underused public or private terminals become multi-tenant hubs where operators share cranes, storage and charging infrastructure.
- Barges or trains carry consolidated freight along the peri-urban segment, removing heavy trucks from city streets.
- Electric vans and cargo bikes complete the final leg into the urban core.

- Digital Twins and microsimulation test the impact of a new hub and of collaborative operations before any physical investment is made.
- Asset pooling raises utilisation and avoids duplicating capital-intensive facilities that no single operator could justify alone.

Paired with DISCOLLECTION

Hub and asset availability, booking and performance data are shared through the Urban Freight Data Space (UFDS).

Common data models and performance indicators let cities benchmark multimodal hub performance and plan collaborative operations, rather than each hub reporting in its own format.

2. Where DISCOBAY was demonstrated

DISCOBAY was explored in three Starring Living Labs along distinct pathways, waterway, rail and underused public land, with a fourth, unplanned Twinning case in Valencia that reflects the diversity of contexts a multimodal bay can serve. Ghent, Copenhagen and Thessaloniki each tested a different route out of road-only freight, whether by water, rail or underused public land; Valencia's contribution came unplanned, when the 2024 floods forced a test of resilience instead.





Figure 2 Transhipment from large freight vehicles to vans in Valencia and at a later stage to Scoobic LEV

What each Living Lab tried

Each profile below brings together, for one Living Lab at a time, the approach it took, the data it fed back into DISCOLLECTION, and its headline result.

Ghent *Starring*

APPROACH Combined water and cycling for the last mile: a cargo bike loaded onto a barge, tested against 388 real delivery trips.

DATA SHARED Stakeholder and trip data shared through a consortium.

KEY RESULT About 65 percent of trips were technically suited to a green last mile, saving 494 grams of CO2 per trip. Waterway worked best for bulk deliveries to large sites.

Copenhagen *Starring*

APPROACH Retrofitted the Hoje Taastrup terminal as a peri-urban multimodal hub for zero-emission reloading, using Digital Twin modelling to plan fleet decarbonisation for temperature-critical goods before committing capital.

DATA SHARED Fleet and emission scenarios quantified before investment.

KEY RESULT Digital Twin modelling showed a 60 percent electric fleet share is needed to reach a 40 percent emission cut, giving planners a clear investment target without spending capital upfront.

Thessaloniki *Starring*

APPROACH Mapped underused peri-urban transport infrastructure as potential freight hotels, using GIS on public assets (railway land, exhibition centre, port areas) paired with a Warehouse-as-a-Service data space and consolidation simulation.

DATA SHARED Assets digitally integrated for instant booking in the UFDS.

KEY RESULT A shared consolidation scenario predicted a 60 percent cut in van kilometres and a 30 percent smaller fleet, an approach that is transferable to cities with no existing multimodal infrastructure.

Valencia *Twinning (crisis)*

APPROACH Used the 2024 DANA floods as the test: existing multimodal and peri-urban capacity was redirected to emergency humanitarian logistics, with no new tools required.

DATA SHARED Crisis data exposing integration gaps.

KEY RESULT Crisis response using existing peri-urban capacity outperformed conventional logistics by 40 percent, proving the real-world value of keeping peri-urban capacity in reserve.

What made the implementations successful

- **Ghent —** about 65 percent of trips could technically shift to a green last-mile option, saving 494 grams of CO2 per trip, 1,235 kilograms across the sample. Waterway worked best for bulk deliveries to large sites.

- **Copenhagen —** modelling showed a 40 percent emission cut needs close to a 60 percent electric fleet share, giving planners a clear investment target without spending capital upfront.
- **Thessaloniki —** consolidating deliveries under one operator cut vehicle kilometres by 40 percent; sharing operations across operators cut van kilometres by 60 percent and fleet size by 30 percent, an approach that is transferable to cities with no existing multimodal infrastructure.
- **Valencia —** crisis logistics outperformed normal operations by 40 percent, proving the real-world value of keeping peri-urban capacity in reserve.

Challenges faced by DISCO living labs

- **Ghent —** green delivery cost 4.14 euros more per trip on average, and no business model for general (non-bulk) goods was proven.
- **Copenhagen —** a key stakeholder withdrew, and political priorities, high cost and the absence of an immediate business case stalled the physical retrofit.
- **Thessaloniki —** the biggest gains depend on operators genuinely collaborating, which fragmented current operations do not yet support.
- **Valencia —** a response that worked well in the crisis was never built into standing planning frameworks, so the lesson risks being lost once the emergency passes.

3. Results and policy fit

DISCOBAY confirmed that shifting freight away from road-only transport is technically feasible, and that collaboration between operators delivers by far the largest gains, while also showing that business viability and stakeholder readiness are the decisive constraints on scaling up.

Ghent proved a working water-and-cycling chain, and Thessaloniki's simulation indicated that shared operations could cut van kilometres by 60 percent, far beyond what any single operator optimising alone could achieve. Copenhagen's experience was a clear warning that technical and economic feasibility are not enough without a regulatory driver or an immediate business case. Because hub types are so diverse, standardisation is the least mature of any DISCO-X innovation here, and should focus first on data exchange for availability and booking, backed by common performance indicators. The key result for each Living Lab is set out in its profile in Section 2.

Best-suited policy and regulatory targets

DISCOBAY speaks most directly to policy and regulatory targets concerning multimodal freight, urban nodes, charging infrastructure and the decarbonisation of goods movement.

Framework or instrument	How DISCOBAY contributes
Revised TEN-T Regulation	Directly supports the development of urban nodes and multimodal freight terminals connecting cities to the core network.
EU Urban Mobility Framework	Advances modal shift and the reduction of heavy freight in urban areas.
Greening Freight Package	Provides evidence for shifting freight from road to rail and waterway, and for measuring the benefits.
Alternative Fuels Infrastructure Regulation	Frames the case for charging infrastructure at peri-urban hubs.
Sustainable Urban Logistics and Mobility Plans	Integrates peri-urban consolidation and resilience into city planning.

DISCOBAY is most valuable where TEN-T urban-node obligations, freight-greening targets and charging policy combine to give multimodal hubs the regulatory driver and business case they currently lack.

4. Recommended first steps

DISCOBAY's four Living Labs did not follow a single formal transition path, but together they point to a consistent, recommended sequence for any city considering a multimodal peri-urban hub. The policy lessons on the next page explain what tends to decide whether that sequence holds once a pilot is over.

Step	What it involves
1. Map hidden and existing capacity	Use open GIS data to locate underused public or private land, railway sidings, port areas and exhibition sites that could serve as a multimodal bay, following Thessaloniki's approach.
2. Simulate before investing	Build a Digital Twin or microsimulation of the candidate hub and its likely fleet mix, so a retrofit decision is based on quantified emission and cost scenarios rather than assumption, as Copenhagen did before committing capital.
3. Test modal shift on a real, bounded route	Run a contained pilot, such as Ghent's barge-and-cargo-bike chain, against real delivery trips before claiming city-wide feasibility.
4. Secure the business case and stakeholder commitment	Treat the absence of an immediate business case as the primary risk to the project, not a secondary concern; a withdrawn stakeholder or a stalled retrofit is usually a business-case failure, not a technical one.
5. Institutionalise a neutral bay operator	Create the legal and institutional basis for a neutral function that allocates slots, sets pricing and manages data access on behalf of all carriers using the bay, so the pilot can outlive the project that built it.

Practical tips for getting started

- Start with bulk or temperature-critical freight, where the business case is clearest, rather than general parcel delivery, where it is weakest.
- Treat multi-operator collaboration as a governance task in its own right; fragmented operations will not merge on their own simply because a shared hub exists.
- Write resilience value into the standing SULP or crisis plan from the start, so that a capacity that proves its worth in an emergency is not lost once normal operations resume.

5. Policy lessons

The transition pathway sets out how a city can move from first scoping to a working multimodal bay. The lessons below, drawn from DISCO's policy dialogues across all four DISCO-X innovations, explain what tends to decide whether that pathway holds once the pilot is over, for a city considering whether and how to proceed.

- **Governance comes before technology.** Living Labs that settled who convenes and who decides before building anything, such as Thessaloniki and Copenhagen, scaled faster than those that solved the technology first.
- **A neutral convening role is not the same as a single operator.** DISCO's own evidence holds two things that can look contradictory: a single, designated coordinating function is essential for continuity, while exclusive allocation of a bay to one commercial operator conflicts with the Physical Internet's shared-infrastructure principle. The two are reconciled once the coordinating role is kept neutral, open to every carrier, and separate from any one operator's commercial interest. The real complexity is institutional, not conceptual: that neutral function still has to be staffed, funded and given legal standing, which is harder than simply naming a single contractor.
- **Municipalities work best as enablers, not operators.** Where the city convened and then stepped back from day-to-day running, collaboration held; where it tried to operate the hub directly, momentum was harder to sustain.
- **Financial sustainability is the weakest link.** Business-case failure, not technical failure, explains most stalled pilots. A bay needs a funding plan for after the project ends, not only for the pilot itself.
- **Data and digital tools are mature, but depend on governance and access.** Most interoperability problems that look technical are a governance gap in disguise.

The recommendations that follow turn these lessons into concrete action at each level of government.

6. Policy recommendations

These recommendations draw on the four DISCOBAY Living Labs and on the EU and national policy instruments that already touch multimodal freight. No single level of government can make a peri-urban hub stick on its own: European action is needed to make small-scale bays eligible for the same funding and data standards as large terminals; national governments must resolve permitting and planning-code questions that sit outside city competence; and city-level action remains essential to create the neutral operating role that keeps a hub running once the project ends.

A. European Union level

Recognise DISCOBAY bays as eligible TEN-T infrastructure

The TEN-T Regulation (EU 2024/1679) requires a multimodal terminal in every urban node by 2040. The Commission should recognise smaller, sub-terminal multimodal bays as eligible infrastructure, unlocking CEF financing for cities repurposing canal, port or rail space.

Mandate a multimodal bay siting typology in SULP guidelines

SULP guidance should include a DISCOBAY siting typology, requiring cities with waterway or rail connections to assess bay potential as part of their SULP baseline.

Extend eFTI to cover cross-modal slot coordination

Rail, port and urban logistics platforms currently hold separate data systems. eFTI should be extended to support multimodal bay slot coordination, enabling real-time booking and cargo-data exchange across modes.

Align NAIADES III with urban waterway freight needs

NAIADES III should address urban-scale transhipment directly, including fast-turnaround loading standards, fairway data integration, and permitting for zero-emission cargo boats in urban canals.

Create a sub-terminal EU funding instrument for urban bays

CEF and TEN-T funding currently target large terminals only. The Commission should create a dedicated funding window for small-scale urban multimodal bays, closing the gap between pilot and permanent infrastructure.

Mandate Construction Consolidation Centres for major urban works

SULPs should require a Construction Consolidation Centre (CCC) for major urban construction contracts above a defined threshold, with public land near TEN-T nodes made available on temporary-use agreements to reduce the land-cost barrier. Member States should designate multimodal freight hub locations in TEN-T urban nodes, with joint passenger-freight governance bodies required as a SUMP or SULP condition.

B. National level

Fast-track permitting for urban waterway freight

Freight transhipment currently falls under permit regimes built for passenger vessels. National authorities should establish a joint, fast-track permit protocol aligned with NAIADES III.

Publish national waterway freight opportunity maps

National waterway authorities should publish open maps of viable routes, landing points and vessel requirements, reducing the investment risk operators face when assessing a new site.

Designate DISCOBAY bays as a planning code category

National planning legislation should create a protected logistics-space category for multimodal bays, securing canal- and rail-adjacent land against competing development.

C. City level

Establish the institutional and legal basis for a neutral bay operator

Multi-operator mutualisation is the governance challenge that operational logistics cannot solve alone. A neutral bay operator, managing slot allocation, pricing and data access on behalf of all carriers, is absent from existing city procurement frameworks. Creating this role, and keeping it separate from any single operator's commercial interest, is the single most important policy action a city can take to convert a DISCOBAY pilot into permanent infrastructure.

Map hidden capacity with open data before committing capital

Thessaloniki's GIS-based mapping of underused railway land, exhibition centres and port areas found viable sites without any physical investment. Cities should run this kind of desk-based assessment before, not after, proposing a specific location.

Build peri-urban resilience into standing plans

Valencia's crisis response outperformed conventional logistics, but the lesson was never written into a standing planning framework and risks being lost. Cities should designate peri-urban multimodal capacity as a resilience asset inside their SULP, not only as a day-to-day efficiency measure.

> *DISCOBAY is therefore most valuable where TEN-T urban-node obligations, freight-greening targets and charging policy combine to give multimodal hubs the regulatory driver and business case they currently lack.*

7. Where can cities start? The Meta-Model Suite

DISCO has created a Meta-Model Suite: a set of interoperable decision-support tools developed across the DISCO project to let planners test urban logistics interventions before committing to physical investment or regulatory change.

For planners, this means the ability to run scenario comparisons that guide a city toward the DISCO innovation that suits its local context, together with a step-by-step transition guideline and advisory.

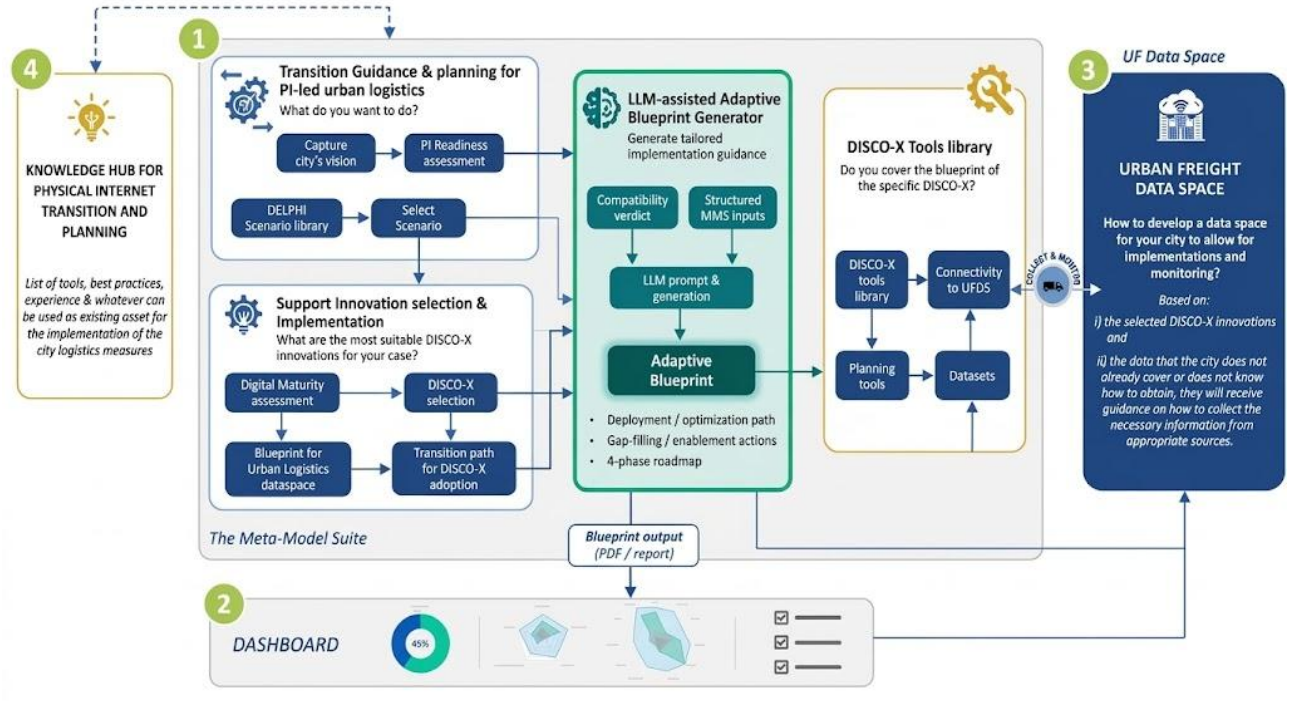


Figure 3: The Meta-Model Suite: from capturing a city's vision and readiness, through assisted blueprint generation, to a dashboard output connected to the Urban Freight Data Space.

In plain terms, the suite works in four linked parts:

- **Transition guidance and planning —** captures a city's vision and Physical Internet readiness, then helps select the most suitable scenario.
- **Adaptive blueprint generator —** an assisted tool that turns a city's inputs into a tailored implementation blueprint, complete with a deployment path, gap-filling actions and a four-phase roadmap.
- **DISCO-X tools library —** connects the blueprint to the specific planning tools, datasets and Urban Freight Data Space connectivity a city will need.
- **Knowledge hub —** a running list of tools, best practices and experience that cities can draw on when implementing any DISCO-X measure, including DISCOBAY.

Because the underlying models share a common structure across partner cities, a planner in a new context can adapt parameters from a comparable DISCO deployment rather than starting from first principles, shortening the path from policy intent to a testable local plan.

Explore the step-by-step analysis and guided feedback at metamodelsuite.imet.gr/meta-model-suite

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