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Accelerating data-driven systemic transition in urban logistics at four Living Labs

lessons from the DISCO Project

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Introduction

The DISCO Project

DISCO Key Facts

THE DISCO MISSION «PACKAGE»

- Support the European Smart Cities in achieving their climate goals by 2030 scaling digital maturity in urban logistics and planning
- Drive urban logistics private and public players towards a Physical Internet (PI) – led approach with an optimal and strategic use of urban space and horizontal collaboration
- Accelerate the twin transition by 2050, promoting smart sustainable logistics planning

- Topic: HORIZON-CL5-2022-D6-02-02
- Type of action: Innovation Action (e.g., TRL7)
- Total Co-funding: 8.000.000 euro
- Project starting date: 1st of May 2023
- Project duration: 42 months
- Partners: 47
- Granting authority: 

AMBITIOUS LIVING LABS

- **4 Starring LLs:** Thessaloniki, Ghent, Helsinki, Copenhagen
- **4 Twinning LLs:** Barcelona, Valencia, Zaragoza, Padua
- **4 Early Adopters:** Prague, Piacenza, Aarhus, North Hesse



Fig. 1. Partners of DISCO.

Towards digital Planning

Objective:

Updating of Sulp topic guides upon the Physical Internet approach

Input:

- Results from Innovation Readiness UL tool
- SUMP/SULP assessment
- DISCO-X requirements
- DISCO-X transition paths

Output:

- Adaptive Blueprint
- Update Sulp guidelines
- Strengthen the topic of urban logistics for climate neutral Smart Cities by 2050

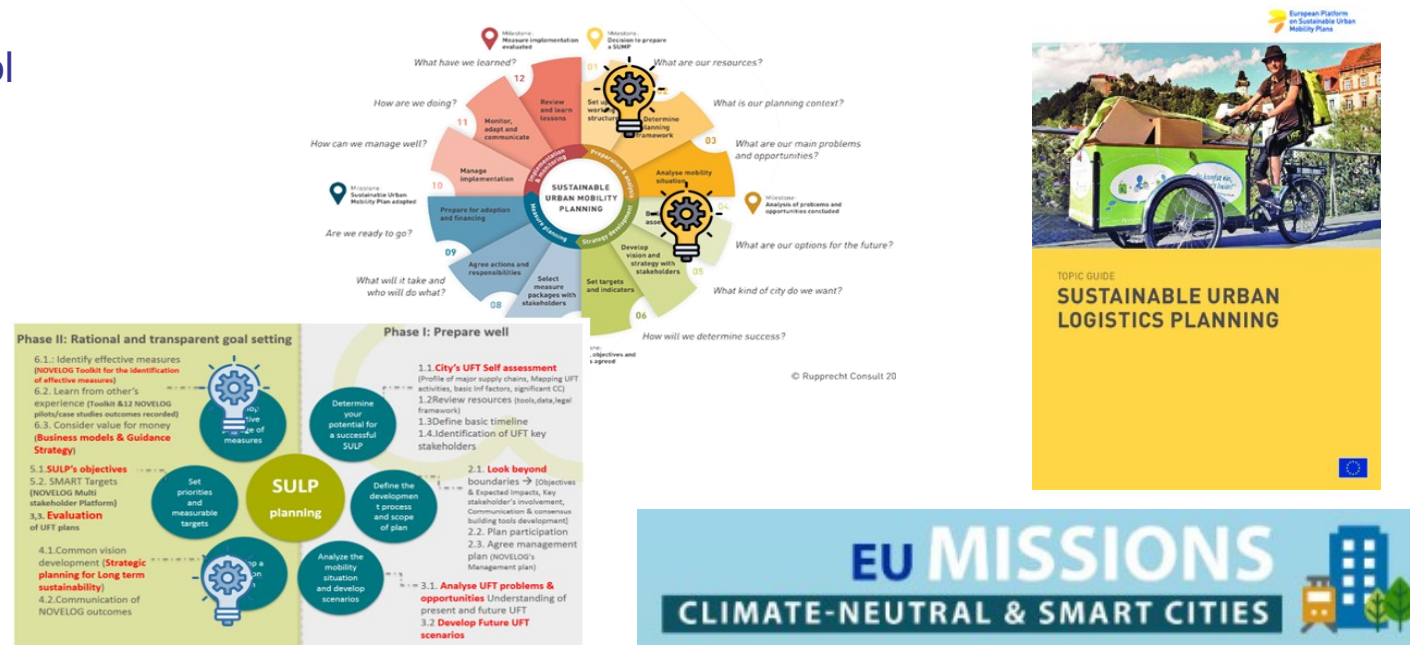
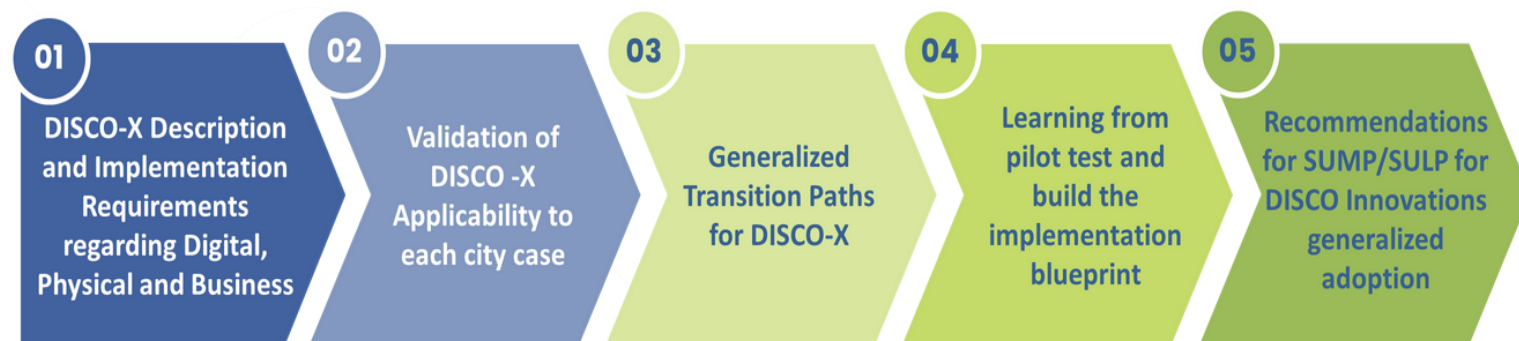


Fig. 2. DISCO approach towards Twin Transition.

Overview of Measures across SLLs

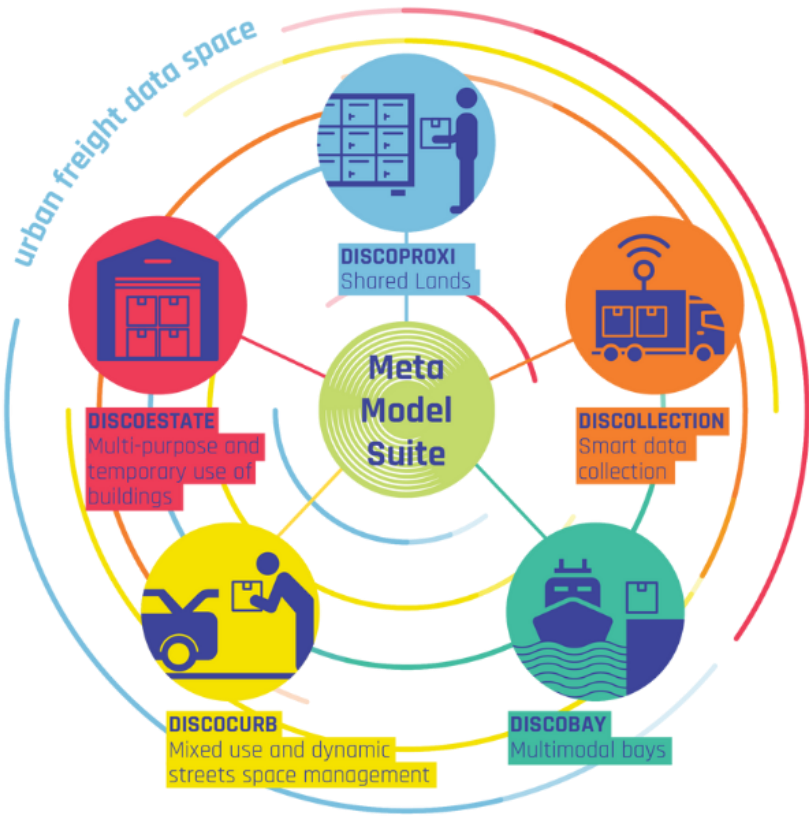


Fig. 3. The Meta Model Suite of DISCO.

Impact domain -> Typology	Shared Solutions	Connected Logistics	Smart Logistics	Urban Network Management	Agile Storage and Last Mile
Digital	TESSALONIKI (PROXI)	TESSALONIKI (COLLECTION) GHENT (PROXI) COPENHAGEN (COLLECTION)	GHENT (COLLECTION) HELSINKI (COLLECTION)		HELSINKI (CURB) COPENHAGEN (CURB)
Physical	TESSALONIKI (ESTATE)	COPENHAGEN (BAY)			
Business	GHENT (BAY)	COPENHAGEN (PROXI)		HELSINKI (PROXI)	TESSALONIKI (BAY)

Fig. 4. Distribution of measures across Living Labs.

Methodology

KPI-Assessment within
the DISCO Project

Methodological Elements of the KPI-Assessment

The goal of this assessment is to measure the effects of the implemented DISCO-X measures based on a defined set of 25 KPIs. The assessment contains of the following elements:

1

Living Lab Perspective

The importance of each KPI is in two-steps:

1. Clustering all 25 KPIs according to their importance for a positive city development
2. Rating of the KPIs within the four cluster regarding their specific rank

2

Data-driven Perspective

The evaluation focuses on the KPIs before and after the Living Lab implementation period. The change in data points per KPI between the first and second survey is compared and displayed as a percentage increase or decrease.

3

Evaluation Perspective

Based on the previous assessment the achievements made due to the implemented measures are weighted. This assessment allows the KPI changes to be compared across the Living Labs without showing the exact value of the change.

4

System Perspective

As a result of the three previous steps (perspectives), a specific KPI Value for each of the 25 KPIs can be derived by using the results from perspective 1 and 3.

Results

Thessaloniki Living Lab

Overview of Thessaloniki LL Measures



DISCOPROXI:

To demonstrate innovative business models for utilizing vacant space via smart contracts. This involves integrating blockchain into the WareM&O (Warehouse as a Service) platform to further support its fair pricing algorithm and facilitate WaaS agreements. [Business]



DISCOLLECTION:

A proof-of-concept for a local urban freight dataspace, jointly developed and managed by the Municipality and CERTH/HIT. By integrating data from logistics operations, surveys, and sensors, the platform delivers real-time insights for urban planning. It aims to optimize freight flows, ease congestion, and shape Thessaloniki's Sulp. [Digital]



DISCOBAY:

To map underused infrastructure for freight hotels and integrate other municipality-managed vacant land into the WaaS data space, creating a comprehensive space availability observatory for Thessaloniki. [Digital]



DISCOESTATE:

To utilize strategically positioned buildings at the TIF HELEXPO Exhibition Centre as a temporary logistics hub during non-event periods. The hub integrates shared facilities like freight hotels, driven by smart optimization tools and green last-mile solutions. [Physical]

Measurable results Thessaloniki Living Lab (2023 vs. 2025)

Significant Efficiency Gains (KPI 1, 2): Driven by relocating the main courier depot to the TIF-HELEXPO site.

Fewer Failed Deliveries (KPI 3): Resulting from the successful expansion of the smart locker network (35 units).

Digital Infrastructure Leap (KPI 21, 22): Integrated data sources and utilization of UFD enable evidence-based policymaking.

Stronger Collaboration (KPI 23): Public-private partnerships increased, successfully turning underused public spaces into 24/7 logistics hubs.

Trade-off in Costs (KPI 6, 8, 9): Despite fuel savings from reduced mileage, increase in cost per parcel due to dominance of fixed labor and rental costs.

Slight Increase in Delivery Time (KPI 5): Reflecting the initial adjustment of routes to the new depot and the broader locker network.

Table 1. Thessaloniki Living Lab KPI Assessment.

KPI	Cluster	KPI (before)	KPI (after)	Change	Weight	KPI Value (Integrated)
1 - Traffic Flow	C	26	22	-14.62%	2	2
2 - Distance Travelled	A	0.19	0.16	-14.63%	2	6
3 - Failed Deliveries	A	17.9%	14.3%	-20.21%	2	6
4 - Delivery time	A	24	25	2.55%	-1	-3
5 - Delivery Density	A	3.52	6.05	72.11%	3	9
6 - Cost per parcel	C	6.42	7.41	15.48%	-2	-2
7 - Operational Cost per day	A	€ 4,959	€ 4,890	-1.40%	1	3
8 - CO2 Emissions per km	B	19.04	15.71	-17.50%	2	4
9 - CO2 Emissions per parcel	B	0.07	0.04	-41.90%	3	6
17 - Transport infra offer	B	-	4,415	-	3	6
18 - Warehouse offer	C	-	16,819	-	3	3
19 - Lockers Volume	A	6%	25%	316,7%	3	9
20 - Microhub Cap. Utilisation	A	21%	34%	61,9%	3	9
21 - Data sources used	B	1	7	-	3	6
22 - Data Utilisation	A	1	3	-	3	9
23 - Partnerships for logistics	B	1	2	-	2	4
24 - Investment plans	C	0	1	-	1	1
25 - SULP	C	0	1	-	3	3

Qualitative Results from Thessaloniki Living Lab (selection)



Repurposing Event Venues: Successfully transformed the TIF HELEXPO spaces into a 24/7 logistics hub, easing city congestion and providing a safe, fine-free operational area.



Paving the Way for Public Lockers: Gained City Council approval for shared public locker networks based on data-driven advocacy and citizen surveys.



Fostering Public-Private Dialogue: Built a strong, active network engaging the Municipality, over 50 logistics companies, and 1,000+ shop owners for future joint initiatives.



Establishing Lasting Digital Assets: Deployed tools like the blockchain-enabled WareM&O platform to integrate data sources, allowing for transparent resource management and evidence-based municipal planning.



Proving Spatial Feasibility: Simulations confirmed that activating dormant infrastructure (e.g., unused rail warehouses) significantly cuts emissions, reduces travel distances, and enables shared last-mile operations.

Conclusion

Lessons learned &
reflections

Lessons learnt & Reflections: Stepping Stones to the Physical Internet

Sustainability vs. Efficiency Trade-offs: Transitioning to green fleets and microhubs significantly reduces CO₂ emissions but can temporarily compromise operational logistics efficiency.

Digital Maturity as a Prerequisite: Implementing advanced solutions like dynamic access control requires a high baseline of digitalization and real-time data readiness.

Data Integration & Quality Hurdles: While broad data collection supports evidence-based planning, merging diverse data streams reveals significant challenges in consistency and technical costs.

Persistent B2B Data Sharing Barriers: Trust, legal complexities, and high costs hinder dynamic data sharing; private actors require clear short-term benefits to participate.

Need for Context-Appropriate Evaluation: Restricted data access and analytical resources underline the necessity of selecting tailored, realistic KPIs for reliable assessments.

Crucial Stepping Stones: These use cases are not yet fully holistic Physical Internet (PI) implementations, but vital foundational steps that align with findings from other EU projects (e.g. URBANE, GREEN-LOG).

The Way Forward: Realizing the full potential of a PI-led system demands overcoming data harmonization barriers, early stakeholder engagement, and strategic collaborative resource use.

**Thank you very much for
your attention!**



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