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Data-driven, Integrated, Synchro-modal, Collaborative and Optimised urban freight meta model for a new generation of urban logistics and planning with data sharing at European Living Labs

DISC⊙

A time for a change in urban logistics ☼

- E-commerce is mostly **focused on time**. This is leading to an over- or under-allocation of space
- Policies should provide space to vehicles so that they can move quicker, optimising **the use of available space for logistics**, making it flexible and dynamic: maximize the use of space **over a span - 24 hours a day, 7 days a week, 52 weeks a year**.
- There is an **abundance of data available everywhere**. We all contribute to it on a daily basis buying online and updating our personal whereabouts, **leaving a digital footprint** every time we navigate on the Internet.


Sorting packages for delivery on a New York City sidewalk. Photo

- **Cities provide infrastructure** (roads, rail, waterways, pipes, etc.) in a manner analogous to the way cloud service providers provide compute resources.
- Cities provide **platforms of services** (public transport schedules, routes, etc.) to infrastructure users that enable them **to create service and management applications.**
- Cities provide certain **software applications "as services"** to citizens and infrastructure users.
- However, users of city services provide only limited information to the city for planning and load balancing leading to **inefficient use of city infrastructures with negative social and environmental impacts.**
- Many infrastructure users are reluctant to collaborate, which results in **further sub-optimization of city resource use.**
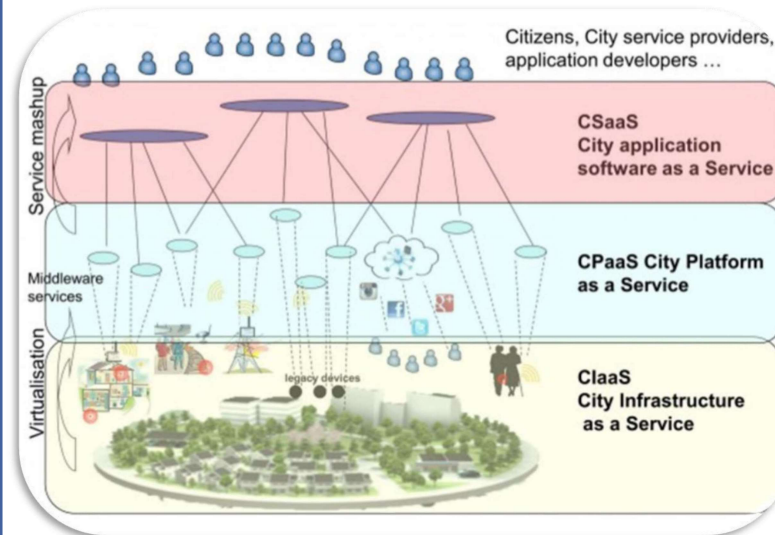
Source: ClouT FP7 project

DISC○

- **Silo operations** inhibit a **city's ability to address cross-silo issues** to its **citizens**, businesses, and administrators.
- **A lack of integration of data flows** hamper **discovery of interesting and exploitable opportunities for improving city services.**
- **Separation of city data into silos** ignores the complex multi-layered network structure of cities and can lead to **unexpected failure cascades.**

Managing the flow of city services in an integrated and optimal manner is not possible when individual silos control fundamental data

Knowledge requires both belief and truth.
Without the ability to verify
the truthfulness of a belief
THERE CAN BE NO KNOWLEDGE

H. Frankfurt (2005), On Bullshit

- **Space uses needs to be deconflicted**: **data sharing and trust** can facilitate proper understanding on how space and assets are used, and how cities should regulate guaranteeing sustainability, safety and supply chain efficiency.

- **Local authorities** and **urban planners** should map, design and **dynamically manage urban space,** in collaboration with service providers, technology and business models innovators, for and with local players and communities.

- **Logistics providers** should drive competitive advantage and generate/share new value with data-driven and smarter services for customers and communities

- **Balanced and fair governance has more potentials** to set foundation for a **data economy** in which people and businesses can trust while considering demand priorities.
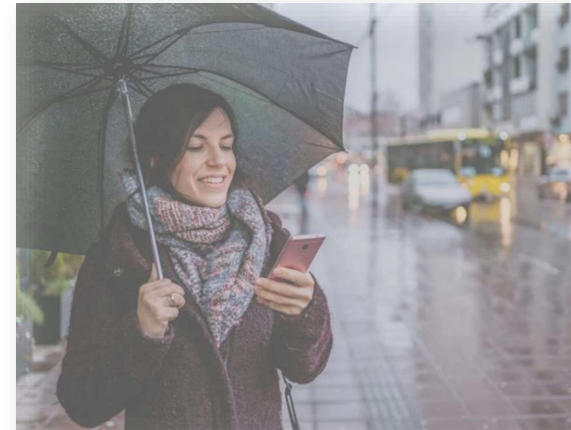
New data economy, horizontal collaboration and neutral, protective and fair governance empower business, individuals and communities and promotes trusts and accountability, to responsibly address the challenges we face today as a society

"*When you send an email to someone across the world, it is usually received quickly and seamlessly. Your message passes through a network of servers until it reaches its destination. But you would not be aware of the route it took.*

A Physical Internet would work in a similar way. Transport / logistics companies would be able to access a network of routes connected by hubs, and involving different modes of transport, which would allow them to streamline how goods are shipped from one place to another" (H2020 project MODULUSHCA).

"…The PI builds on the extensive and systemic consolidation of flows and the network of networks concepts. A full consolidation of logistics flows from independent shippers (e.g., extended pooling) in logistics networks. The PI proposes to pool resources and assets in open, connected, and shared networks (i.e., connecting existing networks, capabilities, and resources) so they can be used seamlessly by network users and partners. By pooling demand and resources to answer that demand, it is expected that the usage of resources is more efficient. …." Roadmap to PI – SENSE H2020 project

DISC

The «as a service» evolution,
empowering citizens
and business services
for smarter cities

Extract from the European Urban Mobility Framework (2021)

Voluntary urban freight data sharing for optimal and strategic use of space to generate new value propositions and sustainable decision making.

Digital transition in urban logistics to support Europe to become trustworthy, data-empowered and decarbonized continent.

New generation of sustainable urban logistics plans (SULPs) integrated in urban planning (SUMPs), co-der Adaptive Cities

The challenge is to accompany
the Physical Internet - like digital transition process
in urban logistics and land use planning.

This transition can be analogue to the
discography industry evolution:
from vinyl to streaming,
with music supplied as commodity and mass
adoption (uberization) by digital devices –
"Music-as-a-service".

DISCO
overall approach

Meta Model Suite

DISCOPROXI — Shared Lands

DISCOESTATE — Multi-purpose and temporary urban logistics

DISCOCOLLECTION — Smart data collection

DISCOCURB — Mixed use and dynamic streets space management

DISCOBAY — Multimodal bays

urban freight data space

Urban logistics ecosystem

Urban logistics data space

International Data Spaces soft infrastructure

Stakeholders & beneficiaries

Data

IDS Connector

Example: Freight operator as a data consumer

Based on: Boris Otto, Data Spaces Dialogue: Design Principles for European Data Spaces
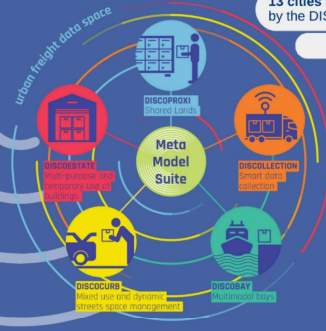
13 cities and regions committed in demonstrating and adopting 23 Physical Internet-like zero-emission urban logistics solutions supported by the DISCO Meta Model Suite

Showcase replicability of > 15 implementation cases, accelerating transferability and adoption in the DISCO Knowledge Hub

Enable > 50 cities and business players in voluntary data sharing by adopting an UF Data Space

Engage > 50 collaborating urban logistic communities with a ready-to-use UF Data Space

Citizens' participation > 1000 people actively involved in urban logistics innovations at Open Days
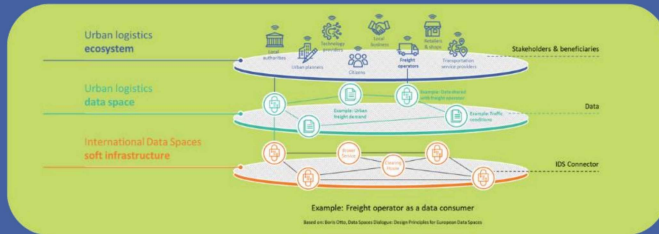
Best value-for-money with higher impact and shorter time-to-market of solutions, supporting the Green Deal, Urban Mobility Package, and Cities Mission targets, built on EU projects like URBANE, NOVELOG, SENATOR, TOKEN, and many other

DISCO-X: a super-hero supporting cities in going fast and innovate in optimal and strategic use of space

Pooling resources of the logistics industry, city planners and decision makers has potentials to accelerate a vibrant economy, **making urban space well managed and equally accessible.**

New urban warehouses concepts and «proximity logistics» can turn the historic trend of locating logistics warehouses on the outskirts of cities.

Dynamic decision-making, by real-time data, can effectively perform with less resources and negative impacts, enabling different users and uses, planned the day and night, and by priorities, thinking to **«urban corridors of value».**

THE DISCO BLUEPRINT FOR PI-LIKE URBAN LOGISTICS AND PLANNING

01 Conceptualisation of PI – like urban logistics and planning

02 Baseline impact assessment and performance measuring digital maturity

03 Define and communicate digital strategy and plans

04 Implement, track, and manage the progress

NEW UPDATE!

EUROPEAN LIVING LABS AND ...

GHENT 🇧🇪

HELSINKI 🇫🇮

COPENHAGEN 🇩🇰

THESSALONIKI 🇬🇷

PADUA 🇮🇹

SPANISH CLUSTER — **VALENCIA** · **BARCELONA** · **ZARAGOZA** 🇪🇸

PRAGUE 🇨🇿

PIACENZA 🇮🇹

AARHUS 🇩🇰

NORTH HESSE 🇩🇪

DISCOPROXI · DISCOBAY · DISCOCOLLECTION · DISCOCURB · DISCOESTATE

Starring Living Labs

Twinning Living Labs

Follower Cities and Regions

DISCO-X: a super-hero supporting cities in going fast and innovate in optimal and strategic use of space

DISCOCURB - Mixed use and dynamic streets space management - Smart and flexible use of curb side, for parking slots, pick up points and network management

DISCOPROXI - Shared Lands - Urban corners or lockers for nearby deliveries and omnichannel shipments, to optimise multiple collection and delivery solutions

DISCOESTATE - Multi-purpose, flexible and temporary use of building space - Retrofitting building space for multi-tenant and temporary logistics use and enhance the reliability of last mile deliveries.

DISCOBAY - Multimodal bays - Mutualised and multimodal (e.g., rail/waterborne) distribution centres pooling green last mile delivery

DISCOLLECTION - Smart data collection methods - Advanced access control and real time routing for optimised and prioritized, incentivised and dynamic access permission enabling smart network management upon priorities and functional areas.
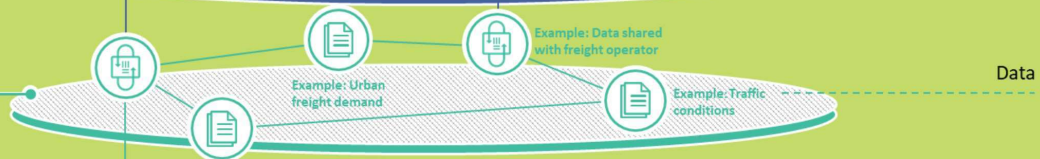
DISCO

Demonstrators Living Labs and their impact

13 DISCO cities and regions supported in reaching 20% reduction in CO_2 emissions, by demonstrating 23 zero-emission and data-driven urban logistics solutions

Showcase replicability of **> 15 implementation cases**, accelerating transferability in the Knowledge Hub

Enable **> 50 city authorities and business stakeholders** within the course of the project to take well-informed and dynamic decisions by adopting their UF Data Space

Engage **> 50 collaborating urban logistic communities** with a ready-to-use UF Data Space

Citizens' participation and inclusion **making > 1000 people actively involved** in urban logistics innovations

Best value for money with higher impact and shorter time-to-market of solutions and achievement of the EU Green Deal, and Mission targets, built on EU projects such as SPROUT, URBANE, NOVELOG, T-MAAS, SENATOR, TOKEN, etc.

GHENT
BE MOBILE
IMEC
VIL
CITY OF GHENT
OHB

#Public-Private cooperation for dynamic and data driven and automated communications, incentivising effective and zero-emission operations in last-mile deliveries

HELSINKI
FVH
A2B
ROLAN

#Multifunctional micro-hubs with network management and flexible use of space promoting use of zero-emission freight transport modes (bikes and vans) to implement Dynamic Low Emission Zones

COPENHAGEN
CITY OF COPENHAGEN
CAPITAL REGION OF DENMARK
IRTX

#Use of shared transport facilities as urban micro-hubs and open consolidation hubs by real time data collection from LSPs

THESSALONIKI
CITY OF TESSSALONIKI
TIF/ HELEXPO
ACS

#Multipurpose, multi-tenant and temporary use of building as a logistics hub, supported by optimally located smart data collection via road sensors, to help detect freight flows and zero-emission freight transport

SPANISH CLUSTER

VALENCIA
VALENCIA PORT FOUNDATION
LAS NAVES
T-BOX

BARCELONA
UPC
CITYLOGIN
BARCELONA CITY COUNCIL

ZARAGOZA
ALIA
ZARAGOZA CITY COUNCIL
CITYLOGIN
ZARAGOZA CITY OF KNOWLEDGE FOUNDATION

#Boosting advanced B2C/B2B last-mile for local commerce valorising micro-hubs in underused spaces, powered by smart predictive models, and operated by zero-emission vehicles and smart curb side use, generating green business opportunities.

PADUA
PADUA MINUCIPALITY
VIU
NEXT

#Dynamic urban space re-allocation adopting modular lockers and coordinated network in real-time with logistics service providers

Let's envision
how DISCO concretely works

1

Influential market players, from big carriers to cargo-bike couriers, register last-mile delivery capacities in an UF Data Space (IT platform) and establish trusted data sharing with planners for smarter, effective, functional, and real-time planning.
Operators can benefit of dynamic (on-demand) and optimal use of (underexploited or strategically positioned) lands/space and adoption of zero-emission vehicles (e.g., e-bike to LEFV) and roll out of sustainable modes (waterborne / rail).

2

The Meta Model Suite delineates optimal paths to achieve concrete transformation in LL acting as PI networks, running packages of innovative digital, physical, and business DISCO-X, co-designed and enabled by multi-stakeholders' connectivity between.

Digital maturity is measured by Assessment Toolkit so that measures are widely accepted, scaled and to be considered in SULPs, harmonised within the urban plan process.

3

All involved actors comply with certain IT standards and protocols, and ideally also on shipment sizes that are modular enough so that they can be flexibly and dynamically combined to allow a certain interconnection of the different parties to perform efficiently.
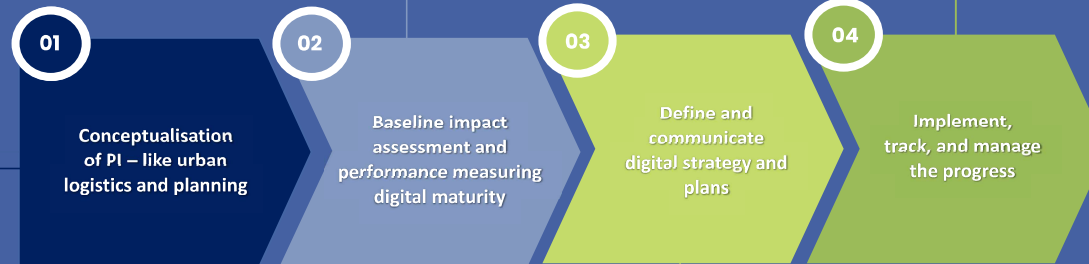In UF Data Space, DISCO will know (stream) all freight transport capabilities and space available in the city (e.g., freight hotels), in real-time and, in advance and will support operational efficiency, dynamic planning, optimal use of available infrastructures, network and asset and better user experience, from inner cities to large urban areas.

The **DISCO Blueprint** for PI-like urban logistics and planning

(1) Market analysis, (2) Competitor analysis, (3) Measure performance, (4) SWOT summary of the key insights, (5) Digital maturity model - Baseline state

(1) Governance rules, (2) Digital transformation strategic objectives and KPIs status, (3) Digital transformation plan status, (4) Detailed status of each measure, (5) Change management strategy and plan status, (6) Communication strategy and plan status, (7) Digital transformation lessons learned and definition of Implementation Cases for the Knowledge Hub

01	02	03	04
Conceptualisation of PI – like urban logistics and planning	Baseline impact assessment and performance measuring digital maturity	Define and communicate digital strategy and plans	Implement, track, and manage the progress

SUSTAINABLE URBAN LOGISTICS PLANNING

NEW UPDATE!

1) Local ecosystem definition (EG Dynamic Gaps Enablers), (2) Physical and digital infrastructure prerequisites, (3) Existing sharing collaborative models & PI-LED technologies in LLs, (4) Specifications & data sharing needs

1) Digital maturity model - Target state, (2) Strategic objectives, (3) Technologies for digital transformation strategic objectives, (4) Potential initiatives to reach our strategic objectives, (5) Business cases and financial models, (6) Digital transformation measures prioritization, (7) Digital transformation plan, (8) Implementation plan for each measure, (9) Change management strategy and plan, (10) Communication strategy and plan

Central to this vision is a genuine integration of data-driven, multilayered users and uses, by cities shaping a digital revolution

Flexicity: Modular structure comprising changing 'loose-fit' infill that can be adapted as required (Ackroyd Lowrie)

Pooling resources of the logistics industry, city planners and decision makers has potentials to accelerate a vibrant economy, **making urban space well managed and equally accessible.**

New urban warehouses concepts and «proximity logistics» can turn the historic trend of locating logistics warehouses on the outskirts of cities.

Dynamic decision-making, by real-time data, can effectively perform with less resources and negative impacts, enabling different users and uses, planned the day and night, and by priorities, thinking to **«urban corridors of value».**

Thinking to a paradigm shift in using space for urban logistics, we can think to available hyperconnected spaces like «as-a-services assets and places».

A wide range of users ans uses can be hosted in the same space, sustainably and optimally embracing urban logistics in the city context, in a strategic fully-fladged planning.

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CIVITAS
Sustainable and smart mobility for all

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