LEAD: Low-Emission Adaptive last mile logistics supporting on demand economy through Digital Twins

[INSERT DATE]

[INSERT NAME OF EVENT]

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 861598

THE CIVITAS INITIATIVE IS CO-FINANCED BY THE EUROPEAN UNION

Context

- Rise on-demand logistics → stress last mile delivery systems
- Customer: responsive system for customised products
- Industry: instant delivery
- Cities: possible negative consequences.

Urban planner + city authorities + stakeholder =

prediction, evaluation, new business models

- **LEAD**: develop logistic solutions ↔Low emission operations, adaptive model & Digital Twins models

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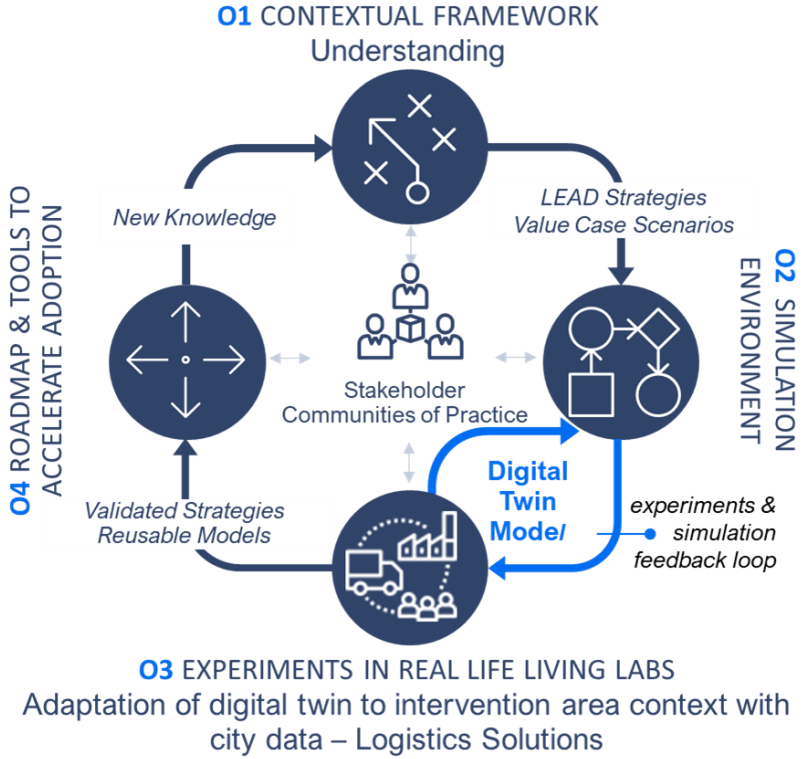
What is LEAD?

- LEAD – Digital Twins creation in 6 cities (TEN-T urban nodes)
- Solutions → case scenarios



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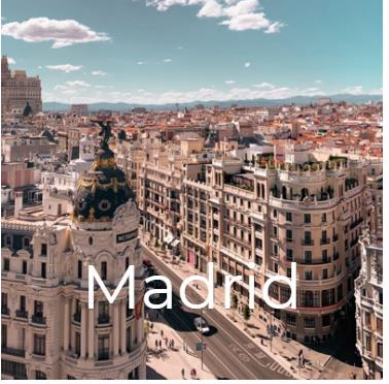

Living Lab

Transforming a Parking Lot to an Urban Consolidation Centre

Status Quo

- Madrid is an important logistics hub (between the Atlantic and the Mediterranean TEN-T corridors),
- Occasional air quality and congestion challenges,
- Madrid LEZ and current regulations (Madrid360),
- Rise of e-commerce and home delivery (even more due to COVID19 and post-COVID19 challenges).

Ambition

- Demonstrate the **better efficiencies** in using a UCC connected to the TEN-T to deliver to the city center;
- Assess flows and congestion. **Route optimization engine** in many-to-many and many-to-one scenarios, combining vehicles of different fleets. Improving of environmental indicators;
- Explore **alternative (and sustainable) business models;**
- **Public-private cooperation mechanisms**, identifying new ideas for cooperation and evaluating the costs and benefits of implementation;
- The economic **efficiency and reliability** for courier companies, and henceforth for clients, of using the LEAD strategies compared to conventional freight delivery approaches;
- Explore potential **incentives**. **Data management.**

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Living Lab

Integrated last-mile logistics with demand-supply matching platforms

Description

- Context: Central Innovation District (CID), with the re-development of nearby area with new housing, high value industry & services, in a densely used location.
- Vision for new mobility for CID
  - Use is guided by digital platforms
  - Move to a hyperconnected city under the concept of Physical Internet
  - Generate a more efficient urban freight system
- Mission: to connect **shared freight** movements via a digital freight fulfillment **platform.**

Problem statement

How to mix transport services across platforms to create a more efficient and sustainable urban freight system, by sharing resources for carriers and improve offer for consumers

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Living Lab

Turning retail stores to electric mobility nodes

Description

- The capillarity and convenience of Sonae MC stores on top of the electric mobility infrastructure that have been deployed for B2C provides a **possibility of using it also to B2B** electric charging docks for transportation/logistics services
- This creates an advantage in the expansion of such grids and sustains a **Living Lab** that mixes energy distribution, retail, logistics and transportation, leveraging & integrating synergies.

ZLC Panasonic inlecom

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Ambition

The following elements will be explored:

- The optimization of delivery **routes** for EDV's, taking into consideration the potential grid of EDV charging stations;
- EDV's take-up **projections** if the grid enables mass adoption;
- The development of **new business models** (e. g. dynamic pricing, incentives research, cost optimization, demand forecast, emissions and supply planning);
- Leveraging Sonae's digital platform to capture **additional growth**, with new services to consumers;
- Last Mile **optimization** for deliveries based on PI principles.

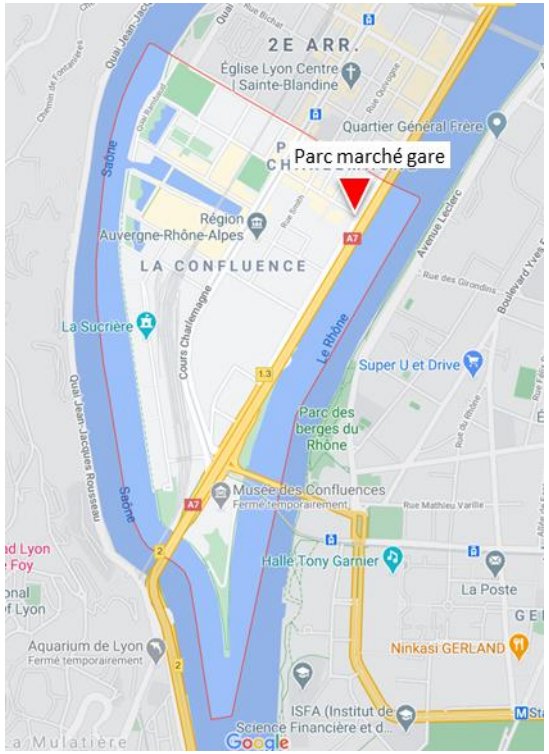
Challenges

- **High costs** of delivering
- **Local urban transport** (CO_2 emissions, congestion)
- **Lead times**
- **COVID-19**

LEAD

Living Lab

Validation of last mile distribution models

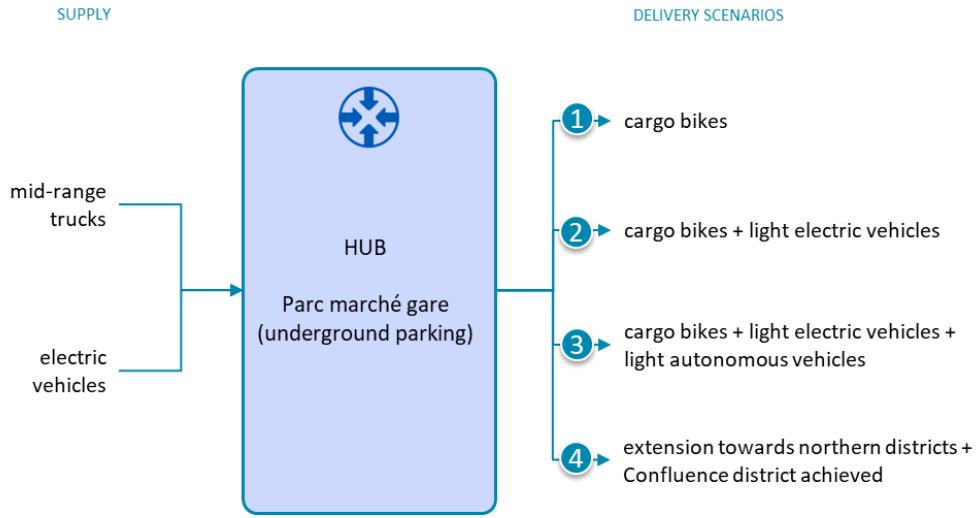


Description

- Exploration of last mile distribution models based on soft modes and/or autonomous vehicles.
- Definition of framework conditions to deploy an urban logistic platform in an underground parking.
- Freight traffic flow qualification: detection of freight vehicles through video cameras.
- Digital twin approach: synchronisation of onsite experimentations and modelling.

Ambition

- Equip the urban planning team with a decision support framework to better evaluate the implementation of various logistics;
- Reduce motorised traffic;
- Implement a robust and flexible logistic infrastructure to support innovative solutions;
- Foster sustainable and economically balanced approaches;
- Leverage public policies to cope with socio-environmental objectives;
- Promote partnership governance.



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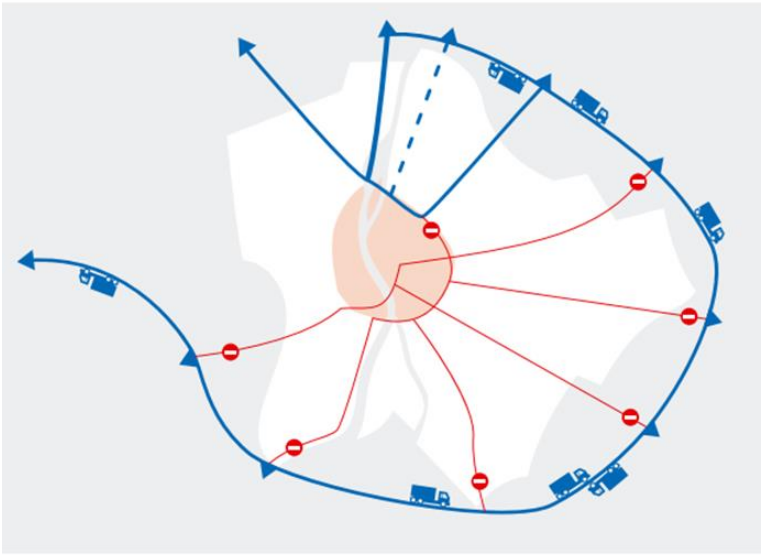
LEAD

Living Lab

Spatial Planning of Inner-City Loading Areas

Description

- Context
  - important logistics area,
  - concentrated population,
  - increased street level air pollution,
  - curfew season:
    - the spring of home delivery,
    - free parking during COVID curfew,
    - the changes in the habits of travellers
  - timing of scheduled freight deliveries to city centre,
- Objectives:
  - LL observations and framework to provide solutions and to quantify the different effects of the e-mobility to transportation scenarios.



Ambition

The following elements will be explored:

- advantages of UCCs, optimal distance from endpoint,
- Digital Twin with existing macroscopic transport model,
- impacts of UCCs on air quality,
- ways to refine and develop policies,
- impacts of freight vehicles from UCCs on the environment,

- Exploring additional means to emphasize and promote e-mobility.

Expected results

KPIs to support decision making:

- with quantifiable evidence to prove the necessity of UCCs in the city
- with quantitative assessment of local objectives

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Living Lab OSLO

Green Crowdshipping through the mass transit network

Description

- The Oslo value case concentrates on B2C and home-deliveries representing the most preferred option from a consumer's perspective.
- It uses a micro-hub located close to Lysaker, Oslo, close to the main road system and a bus station. We have developed 4 scenarios to fit with this location.
- The flexible service envisaged involves a pre-determined sequence of operators, namely: commuters, NIMBER's community members and regular logistics operators (trade-offs between costs and reliability issues).

Ambition

The following elements will be explored:

- Business models financially viable and beneficial from a social/environmental perspective;
- Senders'/bringers'/receivers' preferences for alternative delivery service concepts;
- The interplay between demand and relevant supply design of energy-friendly dedicated services and crowdshipping services;
- The role for parcel lockers to enhance delivery/pick-up flexibility;
- The economic, financial and environmental potential for a green dedicated and crowdshipping service;
- The Integration of data modeling (Discrete Choice Modeling & Agent-Based Modeling) with real-market data to support a Digital Twin approach.
- A stronger focus on sustainable crowdshipping of larger items through the road network than intended in the first place.

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LEAD Strategies

1

Innovative business models

with a view to optimising the performance of last mile logistics (based on volatility of demand, delivery life cycles and costs) in response to the challenges posed by the on demand economy

2

Agile freight storage and distribution

Agile schemes for urban freight storage and last mile distribution, including crowdsourced shipping, capacity sharing, multi-echelon and Physical Internet inspired approaches

3

Low emission delivery vehicles

including Electric Delivery Vehicles (EDVs), hybrid and automated vehicles for freight delivery like cargo-bikes, delivery robots and droids -walkers will also be considered

4

Smart data-driven logistics solutions

for shared, connected and low-emission logistics operations, empowered by an adaptive modelling approach and Digital Twin models, applied in real-life environments

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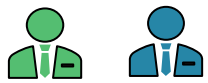
LEAD

Concept



Authorities & Business Users

Interface – Dashboard of Decision Support System (DSS)

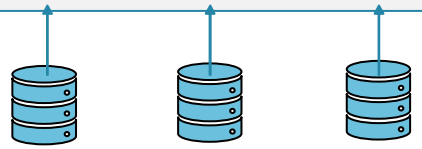
What-if scenarios - Logic - Cognitive Engine

APIs

Digital Twin Generic Models Library

ABM | Calculation of Externalities | Network Models | Freight Generation Models | Discrete Choice Modelling | ....

Data Ingestion



DATA

RESPONSE

Living Labs (Physical World)

MADRID, BUDAPEST, HAGUE, LYON, OSLO, PORTO

Living Labs (Digital Twin)

MADRID, BUDAPEST, HAGUE, LYON, OSLO, PORTO

SENSING

(CITY PLATFORMS, GEO DATA, OPERATIONAL SYSTEMS)

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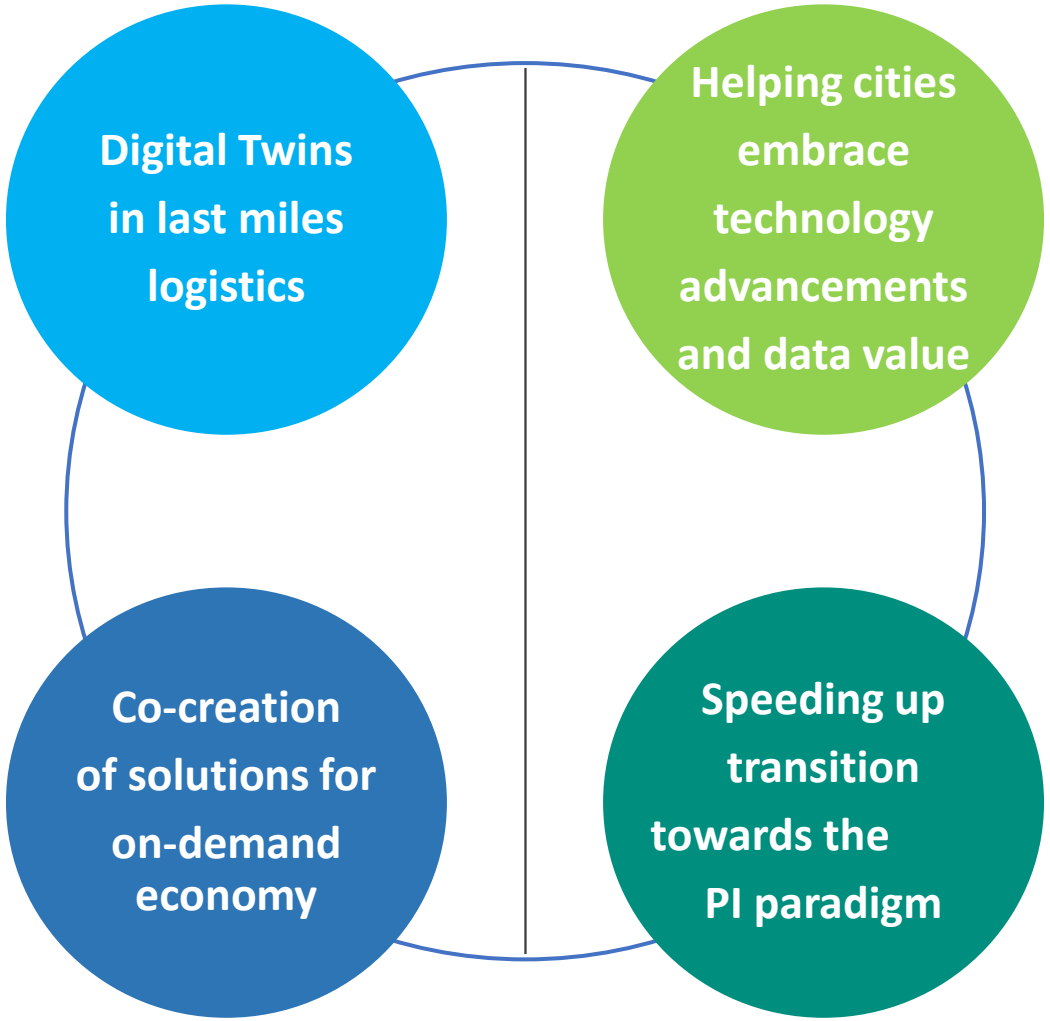
LEAD

LEAD Innovations



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Expected Impacts

Impact 1

- Clear understanding of cost-effective strategies, measures and tools to achieve essentially zero emission city logistics in major European urban centres by 2030.

Impact 2

- New tested, demonstrated practices and solutions for better cooperation between suppliers, shippers and urban/ regions policy makers (planners)

Impact 3

- Clearly provide inputs for the preparation and implementation of SULPs, SUMPs and other planning tools (big data and real-time traffic management)

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Green Deal & Strategic Transport R&I Agenda (STRIA) Roadmap

Contribution to Green Deal plan ambitions by promoting
Sustainable Mobility
Clean energy
Zero pollution

- electrification
- alternative fuels
- vehicle design and manufacturing
- connected and automated transport
- network and traffic mgt systems
- smart mobility and services
- infrastructure

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LEAD

11 cities and regions from eight countries have been selected to become members of the LEAD Transferability Platform.

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Partners

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Contact us!

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- LinkedIn: lead-h2020

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