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

General Presentation

CIVITAS
Cleaner and better transport in cities

THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION

Context

- Rise on-demand logistics → stress last mile delivery systems

- <u>Customer</u>: responsive system for customised products

- <u>Industry</u>: instant delivery

- <u>Cities</u>: possible negative consequences.

  Urban planner + city authorities + stakeholder =

  prediction, evaluation, new business models

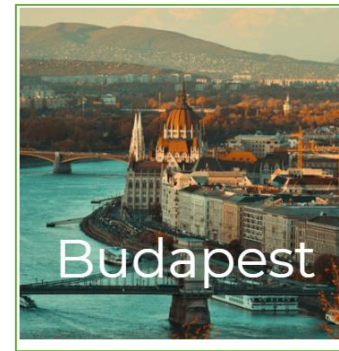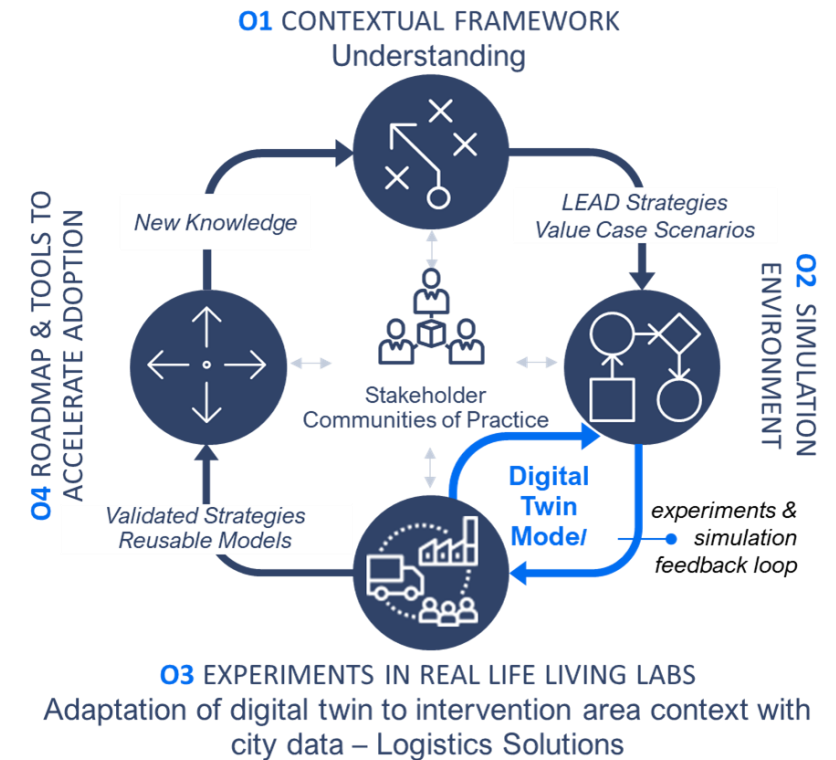- **LEAD**: develop logistic solutions ↔Low emission operations, adaptive model & Digital Twins models

What is LEAD?

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

O1 CONTEXTUAL FRAMEWORK Understanding

New Knowledge

LEAD Strategies Value Case Scenarios

O4 ROADMAP & TOOLS TO ACCELERATE ADOPTION

O2 SIMULATION ENVIRONMENT

Stakeholder Communities of Practice

Digital Twin Model

Validated Strategies Reusable Models

experiments & simulation feedback loop

O3 EXPERIMENTS IN REAL LIFE LIVING LABS
Adaptation of digital twin to intervention area context with city data – Logistics Solutions

Madrid

The Hague

Lyon

Porto

Budapest

Oslo

LEAD
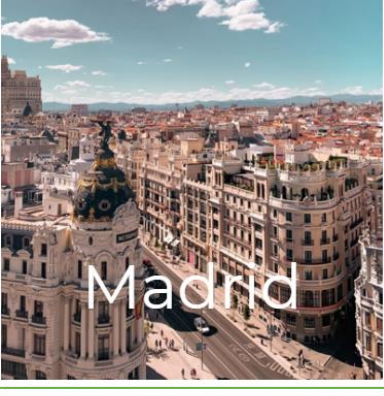
Living Lab

Madrid

Transforming a Parking Lot to an Urban Consolidation Centre

Description

- 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),

- Affected by COVID19 crisis.

Ambition

The following elements will be explored:

- 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 **economic incentives**, e.g. dynamic pricing for parking spaces?. **Data management.**

LEAD

Living Lab

The Hague

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
  - Mobility hub as guiding physical object
  - Multi-user, multi-facility point for all
  - Use is guided by digital platforms

- Mission: to connect **shared freight** movements around mobility hubs via a digital freight fulfillment **platform.**

Ambition

The following elements will be explored:

- The potential of integrating crowdsourcing in last mile urban deliveries;

- Whether crowdsourced delivery is an answer to the growing expectations of customers for a faster, more personalised and cost-efficient delivery service;

- Business models, challenges and success factors for new players in the industry;

- New digital service platforms with algorithms that allow the interconnection of crowdsourcing services.

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Turning Retail stores to electric vehicles charging stations

Porto

Ambition

The following elements will be explored:

- The optimisation 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 optimisation, demand forecast, emissions and supply planning);

- Leveraging Sonae's digital platform to capture additional e-commerce growth, with new services to consumers;

- Last Mile optimisation for e-commerce deliveries based on PI principles.

Description

- The capillarity and convenience of retail stores networks (in Portugal Sonae MC operates +700 stores), provides a possibility of using them as B2B and B2C electric charging docks. This creates an advantage in the expansion of such grids and sustains a business case that mixes energy distribution, retail, logistics and transportation, leveraging & integrating synergies from all markets.

LEAD

Living Lab

## Validation of last mile distribution models

Lyon

Description

- Exploration of <u>last mile distribution models</u> based on soft modes and/or autonomous vehicles.

- Definition of framework conditions to deploy an <u>urban logistic platform in an underground parking.</u>

- <u>Freight traffic flow qualification:</u> detection of freight vehicles through video cameras.

- <u>Digital twin approach</u>: synchronisation of onsite experimentations and modelling.
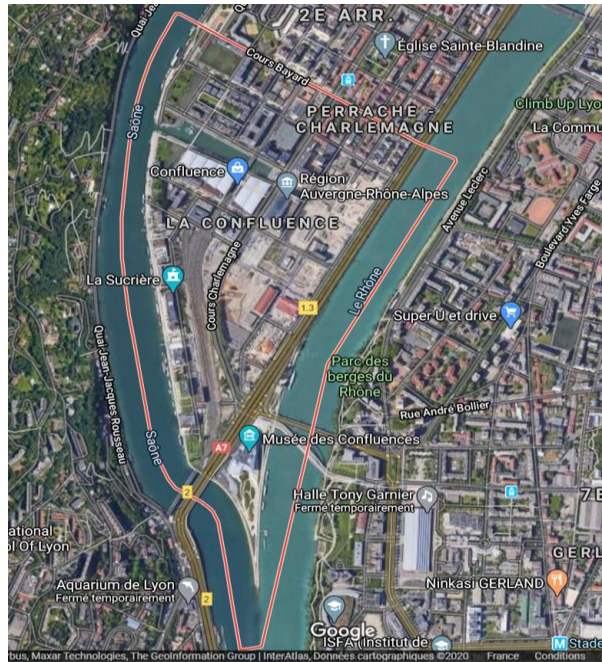
Ambition

The following elements will be explored:

- Equip the urban planning team with a <u>decision support framework</u> to better evaluate the implementation of various logistics;

- Reduce <u>motorised traffic</u>;

- Implement a robust and <u>flexible logistic infrastructure</u> to support innovative solutions;

- Foster sustainable and economically <u>balanced approaches</u>;

- Leverage <u>public policies</u> to cope with socio-environmental objectives;

- Promote <u>partnership governance</u>.

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Budapest

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,
  - 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.
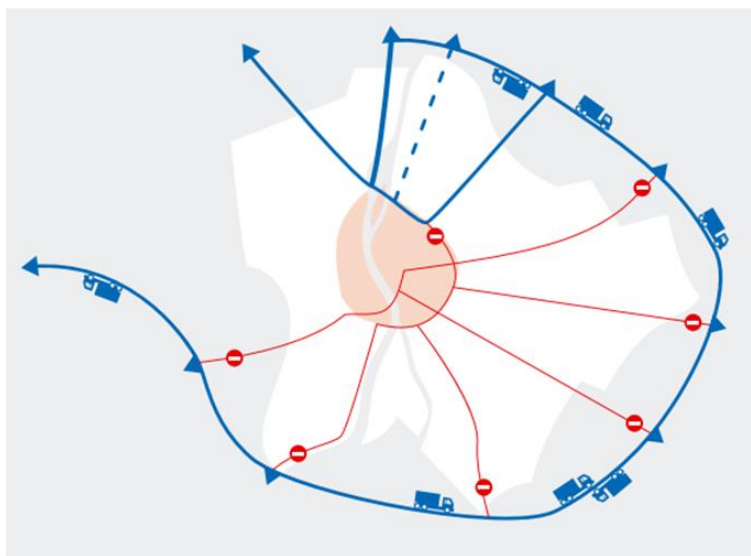
Ambition

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.

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Green Crowdshipping through the mass transit network

Oslo

Description

- The Oslo value case concentrates on <u>B2C and home-deliveries representing the most preferred option from a consumer's perspective.</u>

- It considers two locations: Skøyen Railway station and possibly Økern Metro Station. We now aim to focus our 4 scenarios on Skøyen and have Økern as plan B.

- The flexible service envisaged involves a <u>pre-determined sequence of operators</u>, namely: commuters, Nimber community members and regular logistics operators (trade-offs between costs and reliability issues).
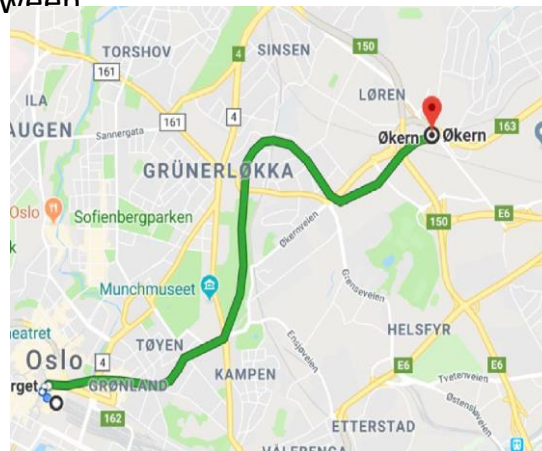
Ambition

The following elements will be explored

- <u>Business models</u> financially viable and beneficial from a <u>social/environmental</u> perspective;

- Senders'/bringers'/receivers' preferences for <u>alternative delivery service concepts</u>;

- The interplay between demand and relevant <u>supply design of energy-friendly dedicated services and crowdshipping</u> services;

- The role for parcel lockers to enhance <u>delivery/pick-up flexibility</u>;

- The economic, financial and environmental potential for a green dedicated and <u>crowdshipping service</u>;

- The <u>Integration of data modeling</u> (Discrete Choice Modeling & Agent-Based Modeling) with real-market data to support a Digital Twin approach.

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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

Concept

Authorities & Business Users

Interface – Dashboard of Decision Support System (DSS)

What-if scenarios - Logic - Cognitive Engine

APIs

RESPONSE

Digital Twin Generic Models Library

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

Living Labs (Physical World)

MADRID, BUDAPEST, HAGUE, LYON, OSLO, PORTO

Living Labs (Digital Twin)

MADRID, BUDAPEST, HAGUE, LYON, OSLO, PORTO

Data Ingestion

SENSING

(CITY PLATFORMS, GEO DATA, OPERATIONAL SYSTEMS)

DATA

D D D A S

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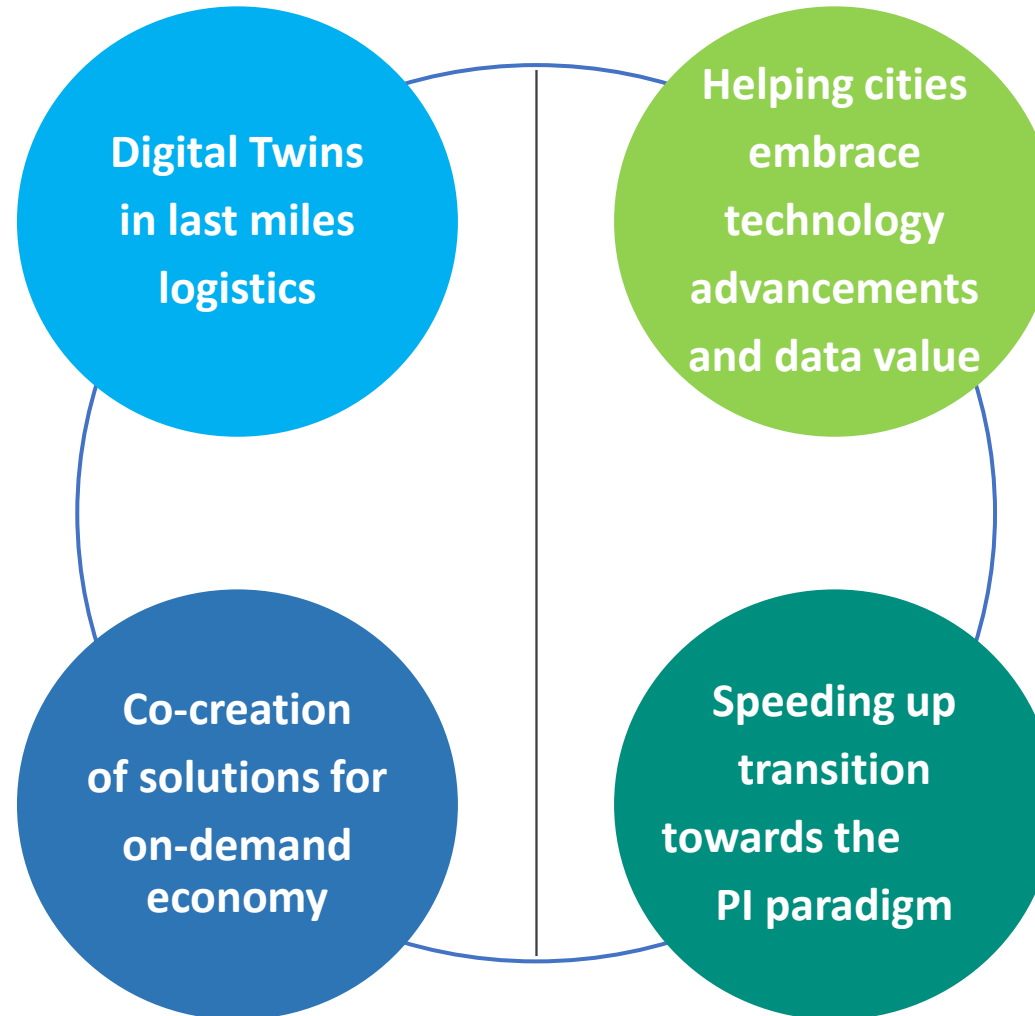
LEAD Innovations

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)

LEAD

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

LEAD

Six external local authorities will join our Transferability Platform and benefit from a tailored transferability programme building upon LEAD's results, including capacity-building, training, technical visits, interactive workshops and customised feedback.

What is in it for you?

- Interviews and surveys for the identification and analysis of the requirements and necessities of cities, and your expectations towards the LEAD solutions.
- Capacity building activities: webinars, e-training and bilateral meetings/discussions with the partners responsible for the LEAD LL and specific solutions of their interest.
- Direct access to the project's key reports and events, while your will receive tailor-made and hands-on advice on the knowledge and tools developed in LEAD.

Find out more on the call & how to apply on our website: https://www.leadproject.eu/
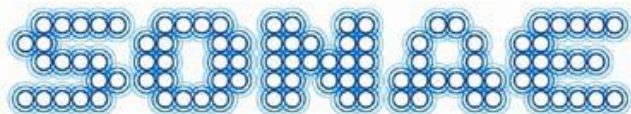
DEADLINE: 11th of December

Partners

Contact us!

- Website: https://www.leadproject.eu/
- LinkedIn: lead-h2020