Disruptive technologies in logistics and smart cities egeniouss – ALE-HOP - Plagedilog

Gisèle Muñoz Alsina

Director of Innovation and Development

CEL

Centro Español de Logística

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CEL – Centro Español de Logística

- **First Logistics Association since 1978, 45 years ago**
- **A benchmark for the logistics activity and profession at a sectorial and institutional level**
- **We add value to partners through knowledge and innovation in the sector**

Innovation and Projects

Analysis of new trends

Creation of Know-How

Definition of good practices

Communication

Transmission of experiences and debates

networking

Publication and dissemination of ideas and knowledge

Training

Professional development

Skills for managers

International certifications (ELA, ASCM, CCBCL)

CEL represents the whole supply chain

40% Shippers and Retailers **25%** Carriers and Logistics Operators **25%** IT Companies and Intralogistics
10% Consultancies and Outsourcing Companies

Members

Students

Contacts

#Soylogística

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CEL Board Members

CEL - Why Smart Cities and Last Mile Projects?

- The **eCommerce market in Europe** is projected to **grow by 9.34% (2023-2027)** resulting in a market volume of US$906.20bn in 2027*. - This means – **Saturation of the cities**
- **National and international transport already contributes 20% of global greenhouse gas (GHG) emissions.** As populations, economies and the need for mobility grow, emissions from transport could increase by up to 60% by 2050** if left unchecked.
- **Double challenge:**
  - ensuring that everyone has access to **efficient, safe and affordable mobility**
  - achieving this goal with a **much smaller climate footprint.**
- It is necessary to find alternatives that **reduce the current saturation** of land logistics transport, thus allowing to increase the **quality** and **agility** of the **delivery service** and, in turn, promote the use of less polluting logistics transport alternatives that **reduce the carbon footprint**.
- There is a **need to reduce the climate impact of the transport sector** and That is why CEL is actually working in 3 projects related with technology, drones, collaboration, simulation and digital twins that will help to improve the citizens life and reduce the carbon footprint.
  - egeniouss
  - ALE-HOP
  - Plagedilog within GameLabsNet

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egeniouss – a novel positioning technology for high accuracy and reliability in cities

egeniouss
the better where

Funded by the **European Commission** in Cluster 4 **Digital, Industry and Space**

Seven partners from **4 + 1** countries

42 months

€3.4M funding

Technische Universität Braunschweig

geonumerics

Crayon

OPENGIS.ch
MOBILE · QGIS · POSTGIS

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AIT AUSTRIAN INSTITUTE OF TECHNOLOGY

CAT UAV

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GNSS time provides the pulsating heartbeat for the backbone of our industry by synchronizing telecom networks, banks and the power grid. A single day of GNSS outage is estimated to cost $1 billion U.S. dollars alone.

Jamming and **spoofing** are additional threats to Global Navigation Satellite Systems

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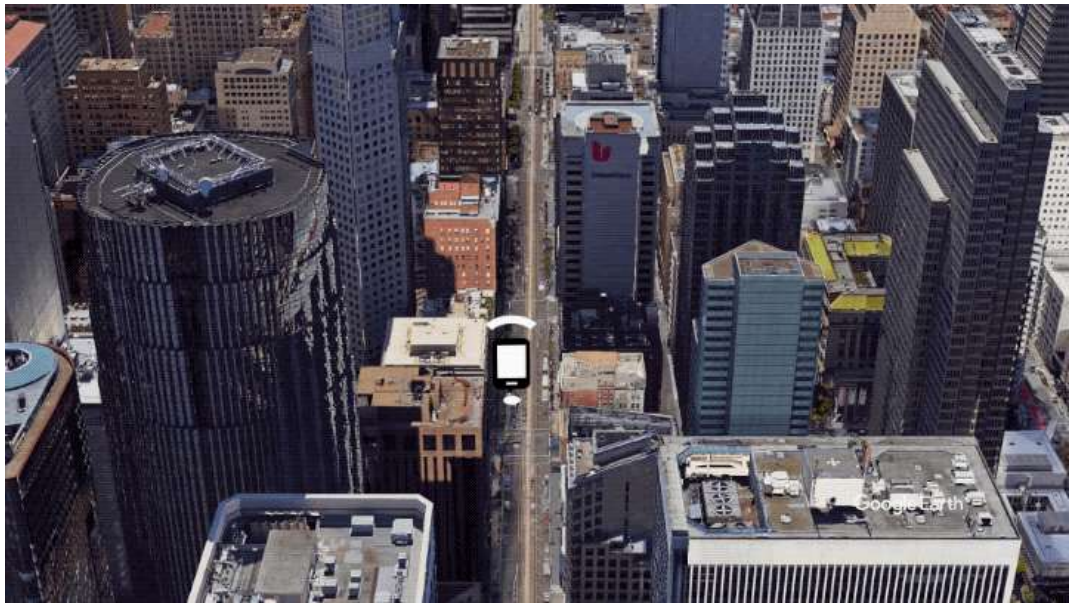
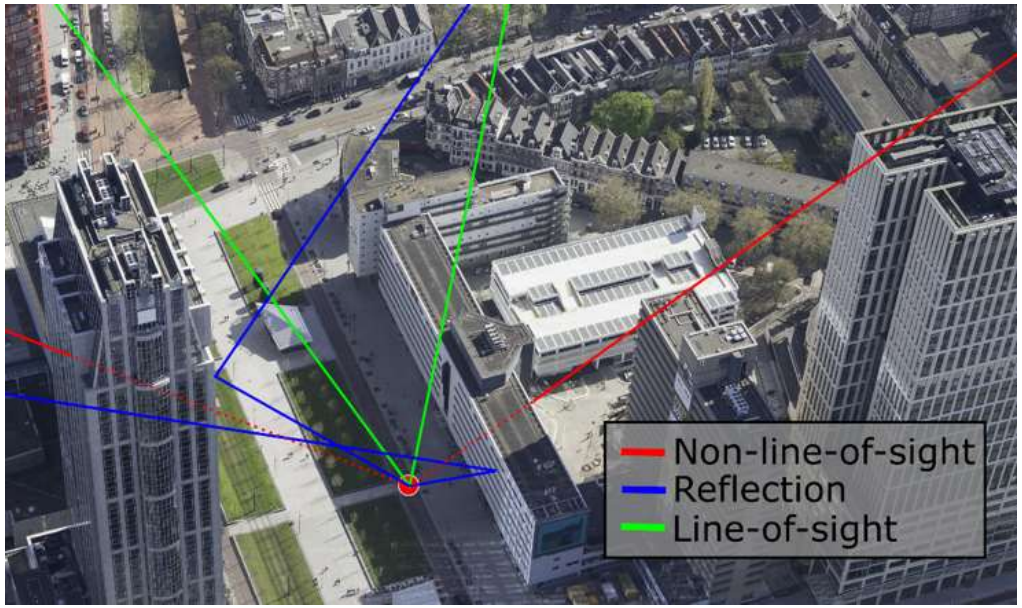


Satellite-based positioning is prone to **multipath** and **non-line-of-sight** effects



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	Intentional		Nonintentional	
Effect	**GNSS Jamming**	**GNSS Spoofing**	**Multipath**	**Non-line-of-sight**
Consequence	**No position fix**	**False position fix**	**False position fix**	**No position fix**
Occurrence	**Locally constrained**	**Locally constrained**	**Situational, depending on the receiver environment**	**Situational, depending on the receiver environment**
Mitigation strategy	**Null steering, directed antennas**	**Signal authentication & encryption (e.g. Galileo OSNMA, CSA), detection (e.g. CSAC) aiding sensors**	**Shadow matching, directed antennas, new GNSS signals, signal combinations**	**Aiding sensors, RX DSP, pseudolites**

Current compensation methods are **unreliable**, **expensive** and **incomplete**

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Egeniouss offers a **Visual Localisation** as an integral component of advanced **multi-sensor navigation** approaches

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Inertial Navigation

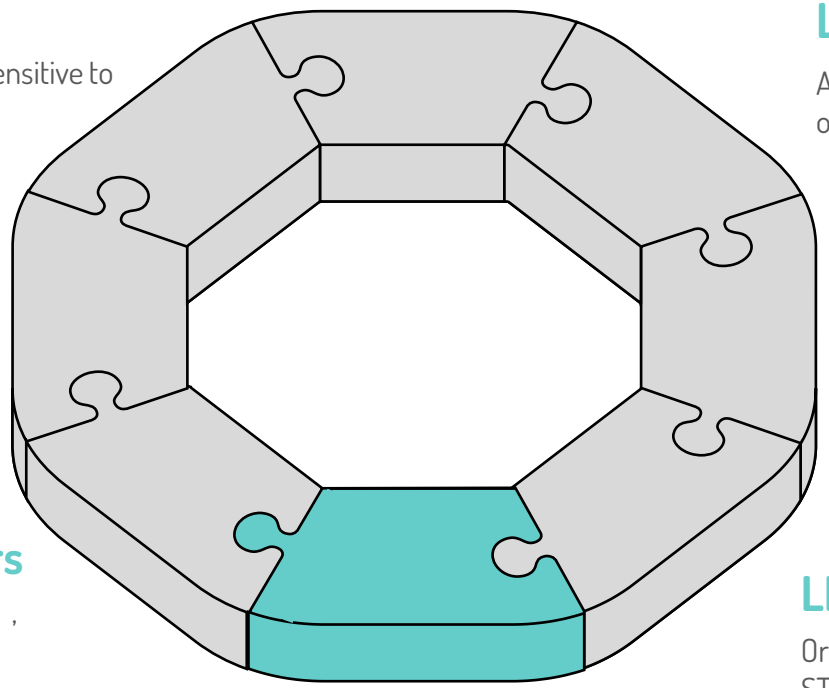
High relative accuracy, prone to drifts

GNSS

Galileo, GPS, Beidou, GLONASS...
Ubiquitious absolute localisation, sensitive to multipath, NLOS and interferences

Simulatenous Localisation and Mapping

Accurate for relative orientation using vision or lidar



Augmentation

PPP, RTK, PPP-RTK with CORS, EGNOS, HAS, commercial services

Odometry

Accurate for relative orientation, Terrestrial only

Barometric altimeters

Short-term dead-reackoning, , limited precision and accuracy

LEO satellites

Orbcomm, Globalstar, Iridium, OneWeb, Xona STAN (Simultaneous Tracking and Navigation)

Visual localisation

Accurate and reliable for absolute localisation

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Surveying-grade **visual and object data** from **terrestrial** and **aerial** origin serve as **reference in the cloud**

Data is available in **Europe, Canada** and **US** with **10 cm** root mean square error

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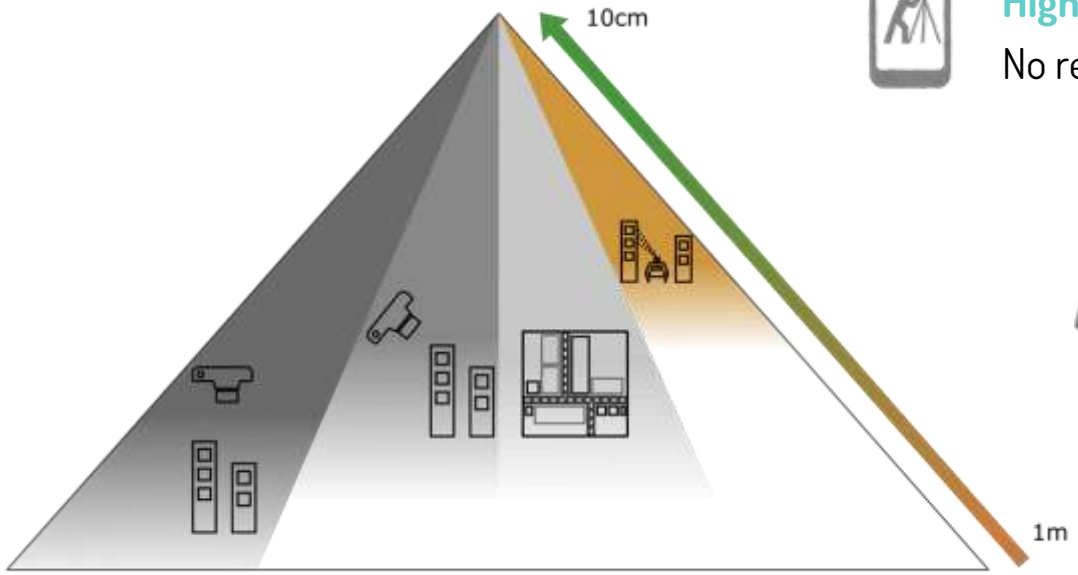

Smartphone-based surveying with Qfield

High accuracy requirements

No real-time requirement

Drone delivery

High **availability** & **continuity**

Low TTFF WS* requirement

Bike Navigation

Real-time requirement

Low accuracy req.

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*Time to first fix warm start – initialisation through GNSS

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	Basic GNSS		Augmented GNSS		egeniouss
+	**Available everywhere**	~	Potentially available everywhere	~	Potentially available everywhere (city-level)
–	Inaccurate and unreliable in many environments (e.g. urban areas)	~	Better accuracy and reliability in environments	+	**High accuracy** and **reliability** in difficult environments
–	Limited NLOS/ multipath mitigation	~	No full but enhanced NLOS/multipath mitigation	+	**NLOS/Multipath** resistance
–	Prone to jamming/spoofing	~	Prone to jamming	+	**Jamming/spoofing** resistance
–	metre-grade accuracy	~	dm-grade accuracy under ideal conditions (e.g. HAS)	+	**dm-grade accuracy** under most conditions
+	**free**	–	expensive	~	affordable

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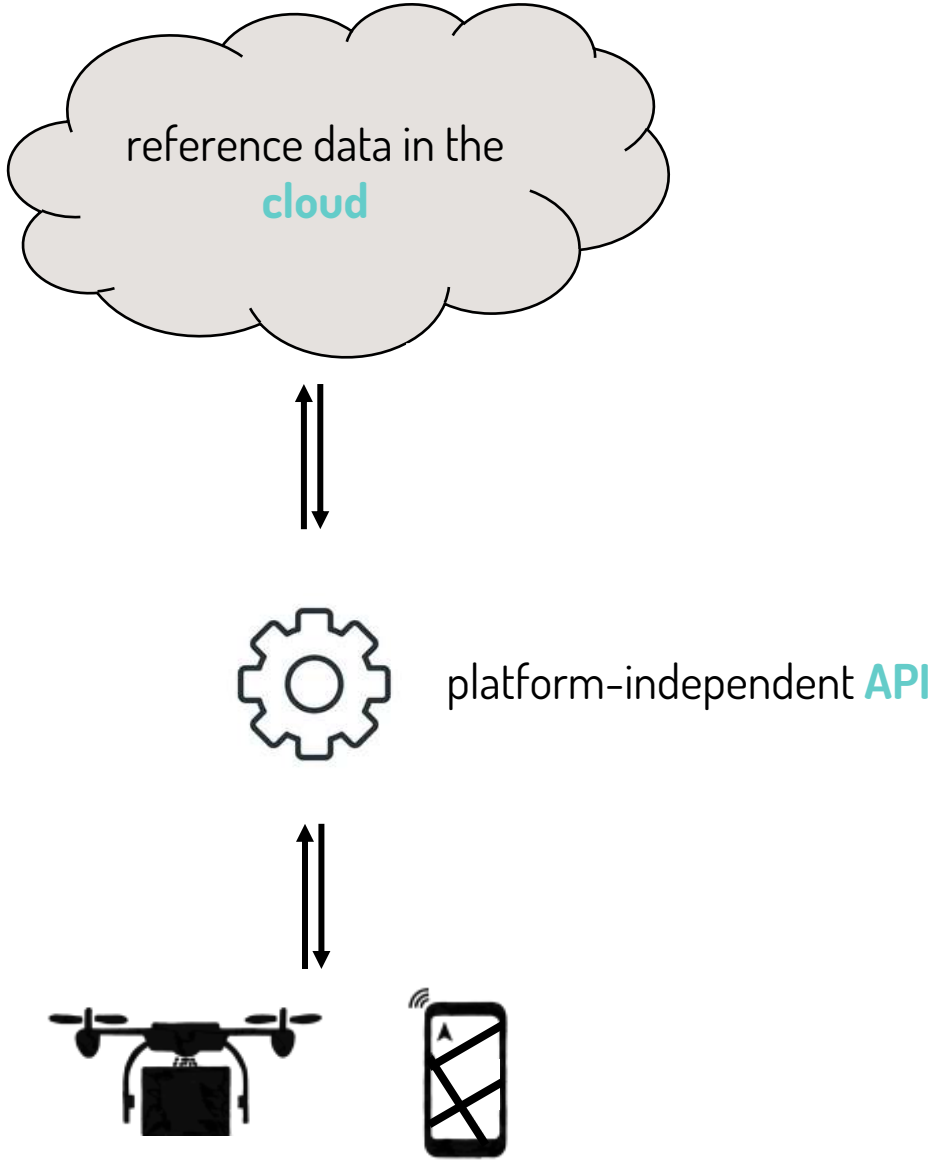

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Value Chain

Standardisation	Component Manufacturers	System Integrat. / Hardware Manuf.	Added Value Providers	End Users (Service Providers)	Users relying on AAA-PNT in cities
EASA, AESA, EUROCAE, ISO	**Public** and **private** geospatial data providers **Cloud** providers OEM	**Smartphones, tablet** & **UAVs** manuf. **Integrators**	egeniuss **MAIN OFFER 1** API access for **Hardware Developers** & Providers smartphones, tablets, drones	egeniuss **MAIN OFFER 2** API access for **Software Developers** & Service Providers Value-added software	egeniuss Applications **Offer 3** - AAA-PNT enabled **Professional** QField Surveying **Offer 4** - AAA-PNT enabled **Consumer** QField Mapping **Offer 5 +6** - AAA-PNT enabled **Bike/Consumer** Navigation **Future Offer** - AAA-PNT enabled **drone delivery** Applicability given in any AAA-PNT enabled urban location-based service & application	**Professional Surveying & Mapping** **Consumer Mapping Communities** **Urban Cyclists** later: Pedestrians, Motor cyclists **eCommerce & Delivery** later: Emergency, Insurance Inhabitants and professionals in cities using LBS, mapping apps, UAVs etc.
EUSPA, ESA					
OSGeo, CH Open, open geospatial standards and formats					

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ALE-HOP - Emergency Aero Logistics for Hospitals and Public Organizations

Traffic simulation and management platform with unmanned aircraft - AIRUS

Drone, operations (pilot and flight permits), logistics ticket office prototype and visual client interface

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Use Case – Logistics between Hospitals

Description

Air logistics for medical supplies between hospitals in the north of MadridAir transport of small medical equipment, medicines or other elements such as organs, blood or vaccines. Optimization of the logistics system of the hospitals involved and provide a better service in cases of emergencies.

Objectives

✓Innovation in logistics (air) for medical applications
✓R+D+i and Industry 4.0 demos
✓Competitive advantage in efficiency, speed and sustainability of air logistics compared to land
✓Air route design, ticket office development and logistics user interface
✓Validation through simulation and real flights

Project phases

1. Interaction with users through the application, interface for opening, loading and automated weighing of goods. Flights in STS environments to gain regulator confidence
2. Landing platform, increase in warehouse capacities and monitoring of delivery trajectories. More complex flights in demanding regulatory areas
3. Air-ground interface for loading and unloading of goods, productization and scaling

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https://www.suasnews.com/2021/09/the-red-cross-tests-delivery-of-blood-bag-by-drone/?amp
https://dronelife.com/2021/10/19/drones-for-organ-transport-revolutionizing-the-field-of-transplants

CLOUD DISTRICT

Logistics platform

NTT DATA AIRUS SUITE

- Operations simulation
- Air traffic management with unmanned aircraft

amazon web services™

- Shipping status & lockers
- Application for users
- QR Code generator
- Sending emails to users

- User interaction devices
- QR Codes validation
- Aircraft protection
- Equipment for navigation aids

Bluenest locker

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GAME LabsNET

Interreg Sudoe

EUROPEAN UNION

GameLabsNet MADRID

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GameLabsNET Starts in 2019, **Spain, Portugal and France** to create **a network of experimentation laboratories** that support the **digital transformation of companies** through the application of **immersive technologies** and **gamification**

Ends in December 2022 **+2,227 professionals** and **+800 companies** that have interacted online

Labs and Networks still active

6 labs are interconnected and allow **simulated training, as well as experimentation with real business solutions**

PLAGEDILOG Project

Intralogistics Digital Twins Platform

- Creation of a **Digital Twin** that has meant a virtual replica of a logistics warehouse. This already allows simulations of its operation to be carried out, in the event of changes in the main logistics management parameters.
- **It seeks to improve learning through advanced training** with immersive technologies in virtual settings.
- Use Case: **Development of a virtual training environment for Drone Pilots**

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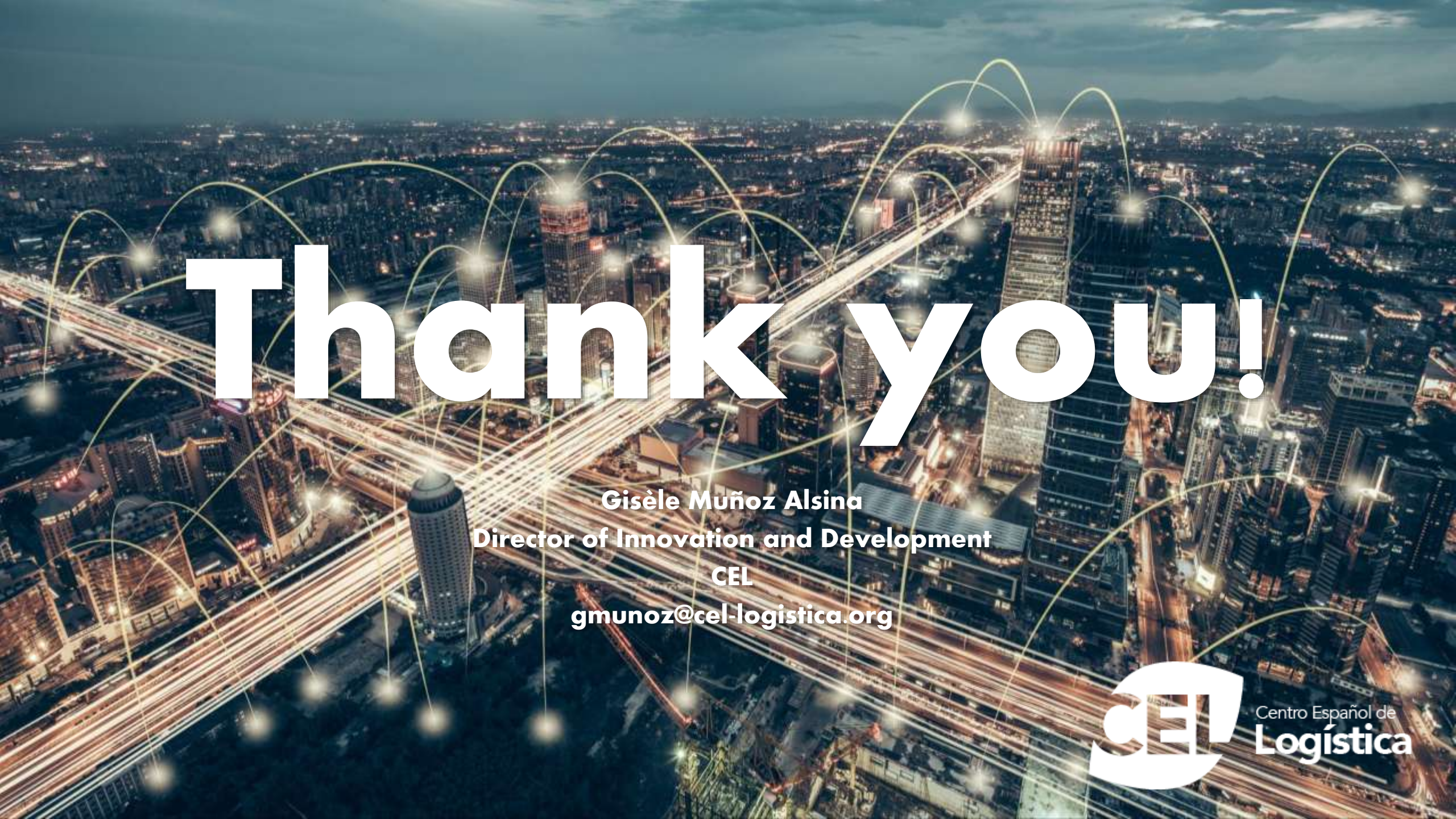
Thank you!
Gisèle Muñoz Alsina
Director of Innovation and Development
CEL
gmunoz@cel-logistica.org
Centro Español de
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