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DELPHI’s technologies/solutions so far

MTM Cluster Workshop Thessaloniki 2025

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DELPHI – **DeNIM-Gov**

DELPHI Novel Integrated Mobility Governance framework (DeNIM-Gov)

- ✓ Generation of a combined passenger and freight traffic governance framework including 21 tailored recommendations

- ✓ The findings are related to the following critical aspects:

  a) Multilevel Governance of Urban Mobility
  b) Stakeholder Roles and Engagement
  c) Policies Related to Urban Mobility for Passengers and Freight

- ✓ DeNIM-Gov includes 21 tailored recommendations including among others the following key areas:

  - *data interoperability*
  - *development of a shared vision and collaborative business models*
  - *harmonization of regulations across sectors and jurisdictions*
  - *smart contracts and dynamic data sharing protocols*

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DELPHI – **DeNIM-Gov**

# ID	Requirement
#1	Development of a Shared Vision and Collaborative Business Models
#2	Data Interoperability addressing siloed Data Systems
#3	Harmonisation of Regulations Across Sectors and Jurisdictions
#4	Building Trust and Ensuring Secure Data Sharing
#5	Stakeholder Engagement and Multistakeholder Collaboration
#6	Coordination of Freight and Passenger Transport in a Multimodal Context
#7	Multilevel, polycentric, Governance and New Responsibilities
#8	Experimental Approaches and Pilot Projects for Sustainable Mobility
#9	Market-Driven Governance with Legislative Backing
#10	Overcoming Economic Barriers and Lack of Familiarity with Multimodal Transport
#11	Addressing Data Sharing and Intellectual Property Concerns

# ID	Requirement
#12	Structured Platforms for Comprehensive Stakeholder Participation
#13	Public-Private Partnerships for Service Integration and Operational Efficiency
#14	Inclusion of New Stakeholders in Data-Driven Governance
#15	Coordination of New Technologies and Logistics Systems
#16	Socio-Political Engagement of Local Authorities
#17	Development of a Viable Economic Model for Multimodal Transport
#18	Support for Near Real-Time Information and Integrated Data Systems
#19	Incorporating Environmental & other Sustainable Development Metrics into Urban Mobility Policy
#20	Establishing Agile Regulatory Frameworks for Emerging Technologies
#21	Smart Contracts and Dynamic Data Sharing Protocols

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DELPHI – **Information Models**

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Total Information Models: 17

Entities: 87

1. **Transport Operator** – Appears in BC1, BC2, BC3
2. **Route** – Critical in BC2, BC3, BC4
3. **Network Object/Station** – Found in BC1 and BC2

Relationships: 64

1. **One-to-Many Relationships:** Most frequently used, especially for associating operators with objects or requests.
2. **Many-to-Many Relationships:** Critical for relationships involving users and transport infrastructure.

Key Standards Referenced in Multiple Models:

1. **DATEX II** – Present in BC1, BC2, and BC3 for traffic data exchange.
2. **GTFS (General Transit Feed Specification)** – Used in BC1 and BC2 for public transport.
3. **ISO/IEC 27001** – Ensuring data security across BC1 and BC5.

Key Ontologies Used Across Models:

1. **SSN/SOSA (Semantic Sensor Network)** – Appears in BC1, BC3, and BC4 for sensor data management.
2. **Transport Disruption Ontology** – Used in BC1, BC3, and BC4 for traffic anomalies.

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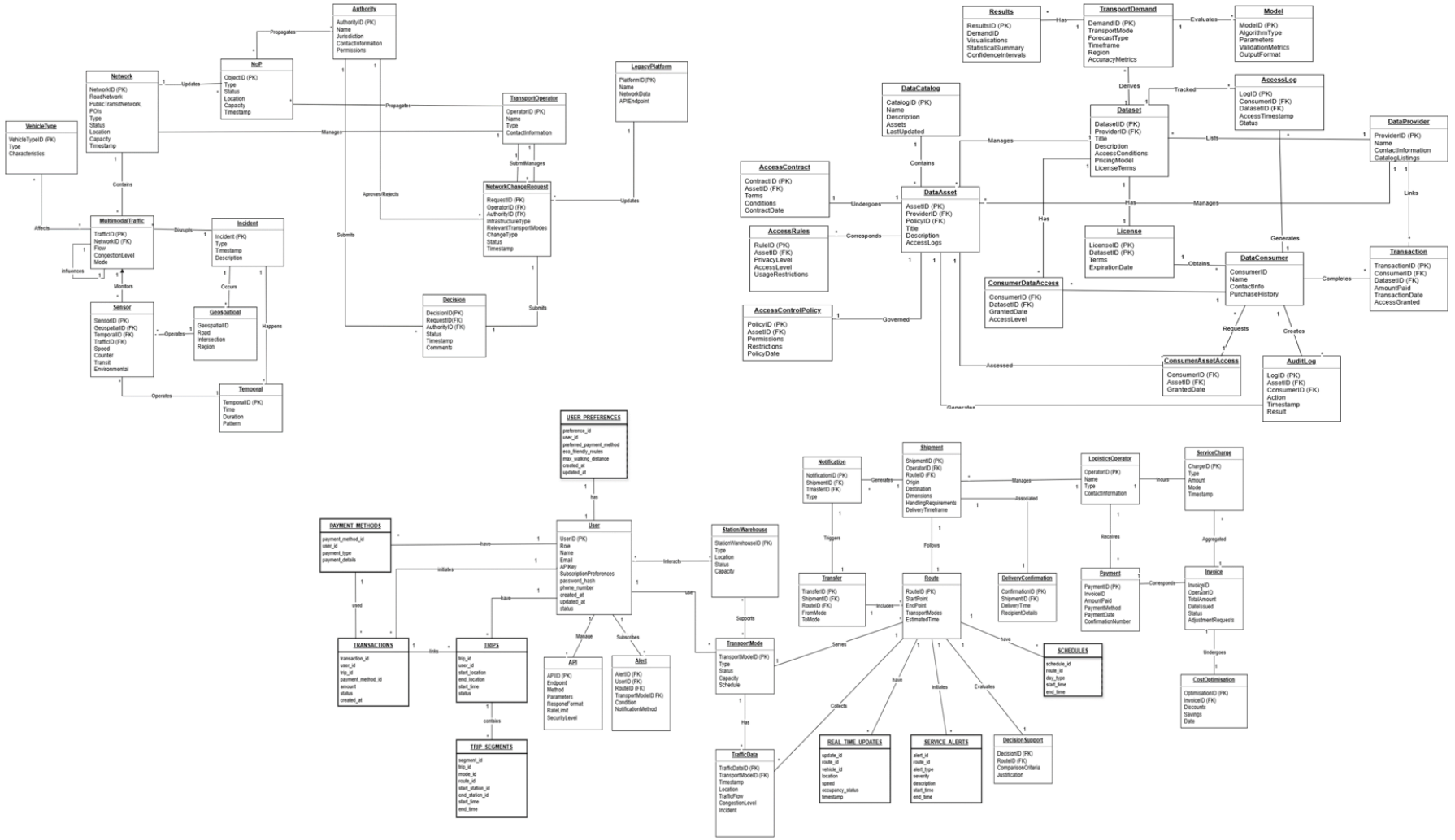
DELPHI - **Consolidated Information Model**



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DELPHI – **Mobility Dataspace**

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Development of an IDSA compliant mobility data space in Cluj-Napoca

Framework Selection:

- Evaluated multiple data space frameworks
- Selected **Eclipse Data Space Connector (EDC)** due to:
    - Modular architecture.
    - Active development.

Used a custom EDC Implementation:

- Enhanced with:
    - **Storage persistence** capabilities.
    - **Kafka-based streaming** for efficient data flow.

Established data sharing framework in collaboration with Mobility Data Space (MDS):

- Participants: NTT DATA & Municipality of Cluj-Napoca (MCN).
- Services: Car parking & bike sharing data services.

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DELPHI Use Cases

DELPHI - MADRID Use case

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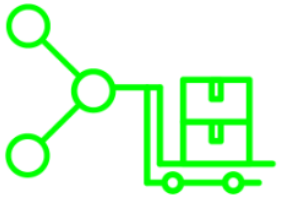
Problem Addressed

Currently, the logistics process in Madrid involves delivering goods from DHL warehouses to customers in the city's metropolitan center. This system relies heavily on **a traditional, siloed approach, with most transportation handled by external players using trucks and vans.** This has led to inefficiencies, resulting in **slower delivery times**, **increased congestion**, and a greater **environmental impact**.



MADRID USE CASE

Multimodal transport for a Sustainable LMD for sharing economy in the e-commerce Channel. Based on combined passenger and freight traffic over the Madrid metro network (Spain)

Expected Impact

- Acceleration of **delivery times**
- Reduced **road congestion**
- Minimization of **environmental impact**
- Creation of a more **financially sustainable and eco-friendly** logistics network for Madrid

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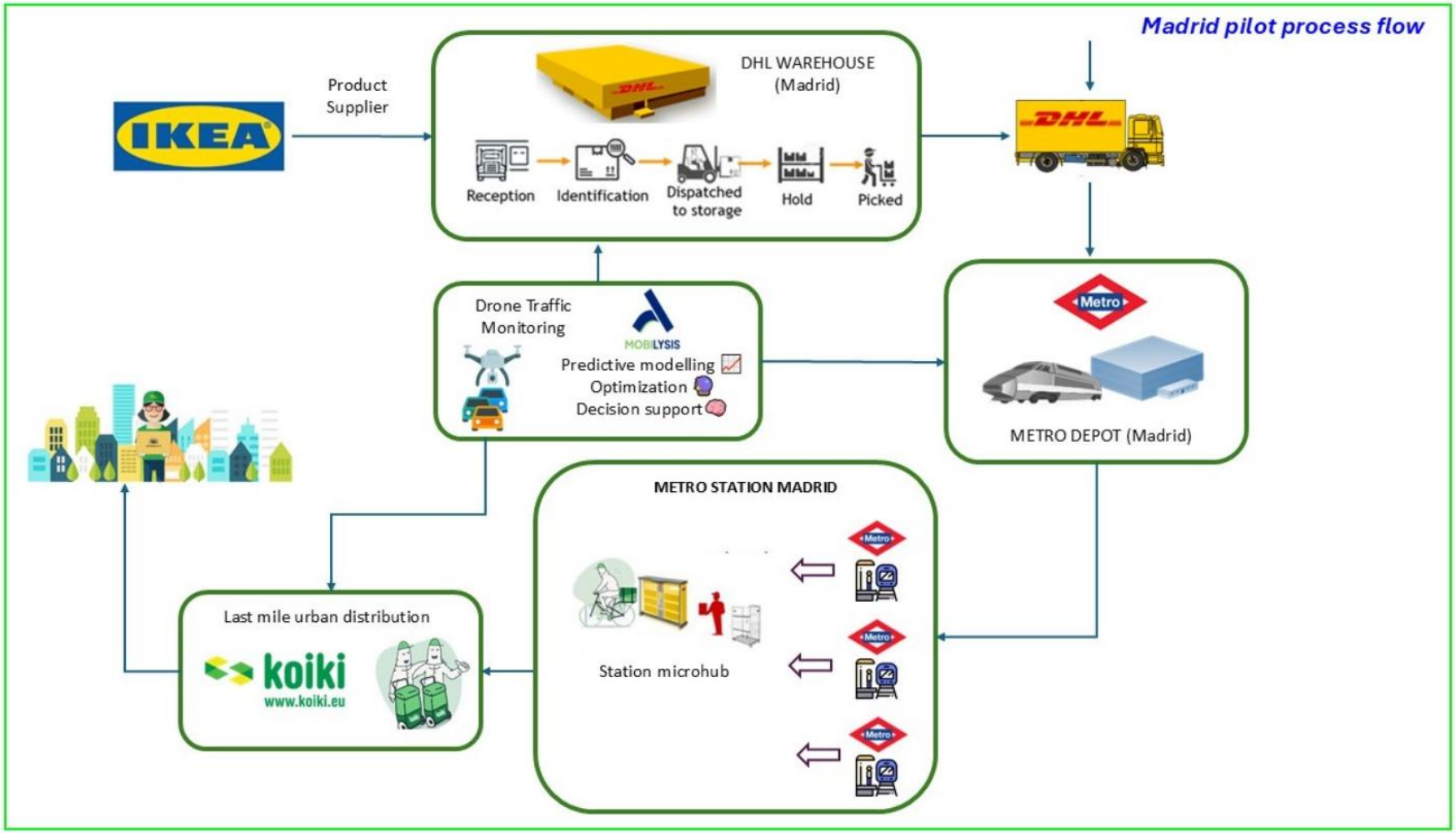
MADRID Use Case – Process Flow



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DELPHI - ATTICA Use case

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Problem Addressed

Currently, ATD and STASY **operate independently**, each using their own data exchange systems without real-time collaboration. This lack of integration means they cannot share real-time traffic conditions, incidents, or transport mode changes, especially during peak congestion. Given **the frequent traffic congestion** on AO, **freight and courier services need the flexibility to switch to faster transport modes** when necessary.

ATTICA USE CASE

Optimized freight and passenger traffic models and data sharing framework in the Attica transport network (Greece)

Expected Impact

- Provision of flexible, **on-demand mobility solutions**
- Acceleration of **delivery times**
- reduced **road congestion**
- Minimization of **environmental impact**

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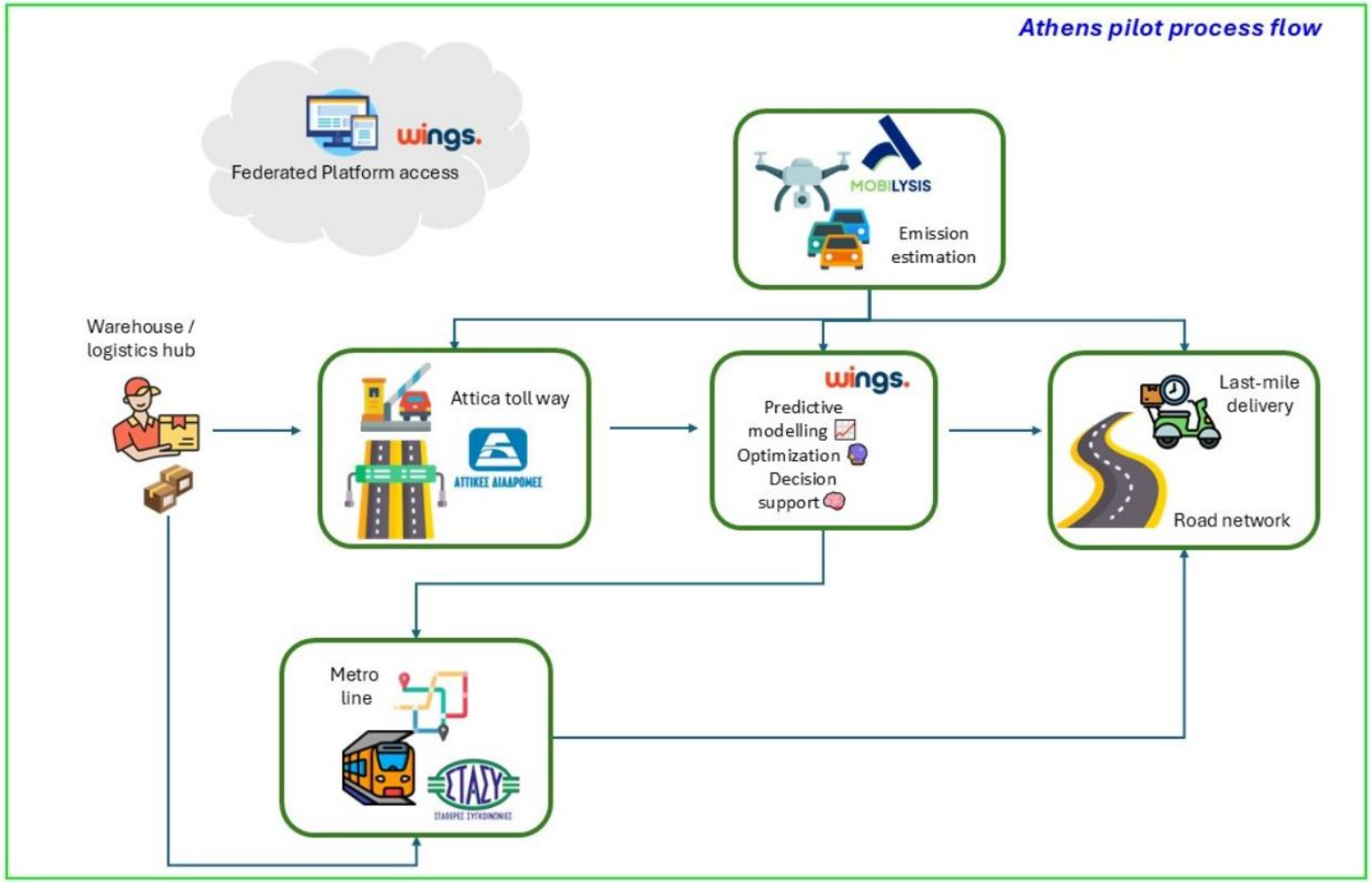
ATTICA Use Case – Process Flow



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DELPHI - MYKONOS Use case

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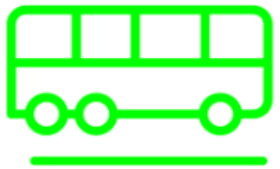
Problem Addressed

Mykonos, with winter population of around 10.000, becomes a bustling hub during the summer. Currently, Mykonos's transport system relies on two main entry points: the port and the airport. While the port can accommodate most maritime vessels, it lacks dedicated cargo handling infrastructure, leading to freight being transported via trucks from the port, or small vans shuttling goods around the island. Meanwhile, passengers use private cars, taxis, and a public bus network that services the island's key locations, including the port, airport, Mykonos Town, and popular touristic spots. However, this **shared road network** becomes **congested** as it is used by both freight and passenger vehicles, and the **lack of coordination** between passenger and freight transport operations results in **inefficiencies**.



MYKONOS USE CASE

Integrated freight and passengers' models and data sharing framework taking advantage of the fleet of the public transport network to optimize traffic between main hubs and interest points (port, airport and Mykonos city) (Greece)

Expected Impact

- **Integrating logistics operations** with passenger public bus transport, with **a long-term goal of expanding** to other road transport operators on the island.
- **Enhancement of both passenger mobility and freight logistics** on the island.

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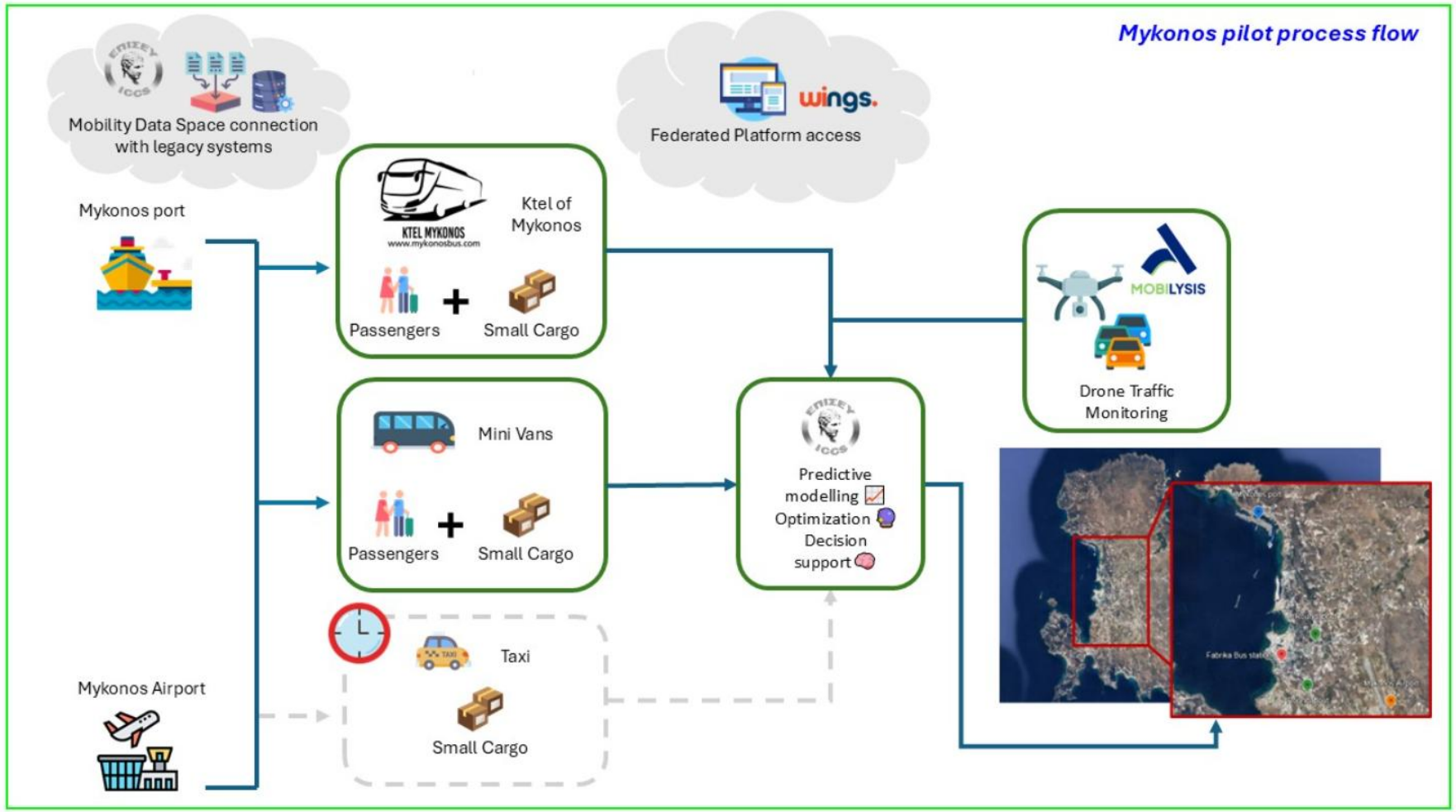
MYKONOS Use Case – Process Flow



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DELPHI – CLUJ-NAPOCA Use case

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Problem Addressed

Cluj-Napoca, Romania's second-largest city, has experienced significant population growth over the past decade and is recognized as one of the most digitally advanced cities in the country. However, the **rapid increase in population** has put pressure on the city to **further improve its public transportation system**. A key challenge, identified in the city's Sustainable Urban Mobility Plan (SUMP), is the **lack of data sharing** and coordination **between** different public and private **transportation operators** that serve Cluj-Napoca and its surrounding areas.

CLUJ-NAPOCA USE CASE

Integrated freight and passengers' data sharing and relevant governance framework in the Cluj-Napoca Metropolitan Area based on the creation of an IDSA compliant dataspace (Romania)

Expected Impact

- fully integrated, data-driven mobility ecosystem

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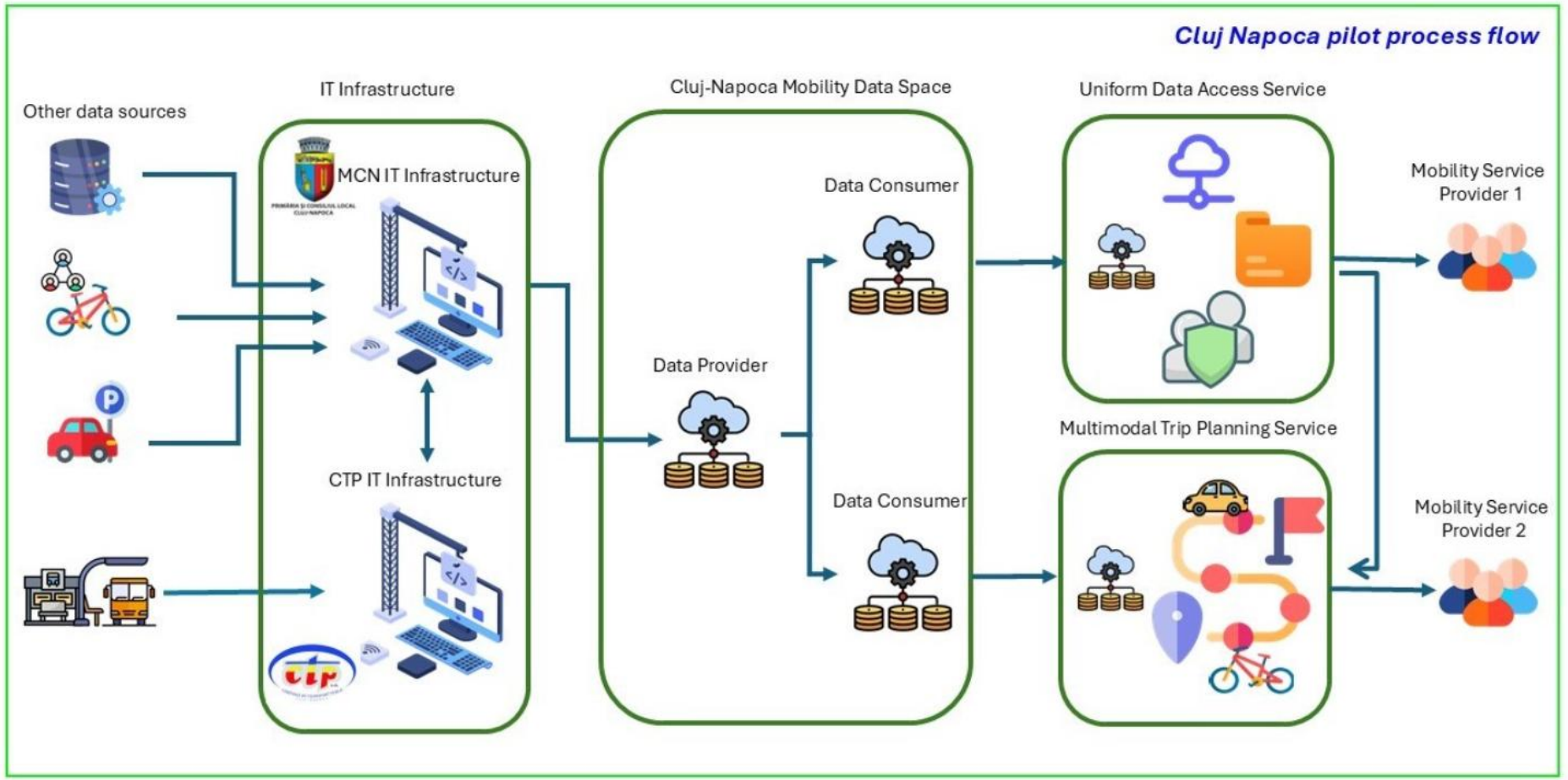
CLUJ-NAPOCA Use Case – Process Flow



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Performance iterations

- Madrid UC → October 2025 – February 2026
- Attica UC → October 2025 – February 2026
- Mykonos UC → January 2026 – May 2026
- Cluj-Napoca → July 2025 – November 2025

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Thank you for your attention!

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