Progress towards Federated Logistics through the Integration of TEN-T into A Global Trade Network

D3.1 LL1 Specifications and baseline measurements

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Grant Agreement No		**Acronym**	
Full Title			
Start Date		**Duration**	
Project URL			
Deliverable			
Work Package			
Contractual due date		**Actual submission date**	
Nature		**Dissemination Level**	
Lead Beneficiary			
Responsible Author			
Contributions from			

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Revision history (including peer reviewing & quality control)

Version	Issue Date	Complete[1]	Changes	Contributor(s)
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Table of Contents

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Abbreviation / Term	Description

1 Executive Summary

2 Introduction

2.1 Mapping PLANET Outputs

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PLANET GA Component Title	PLANET GA Component Outline	Respective Document Chapter(s)	Justification
DELIVERABLE			
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ffb	ffb		
TASKS			
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	ffb ffb ffb ffb ffb		ffb

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	ffb *ffb*		*ffb*

2.2 Deliverable Overview and Report Structure

3 Living Lab 1 scope of work

3.1 Living Lab 1 Use Case 1

3.2 Living Lab 1 Use Case 2

4 Living Lab AS-IS situation

4.1 Infrastructure Corridor Analysis

UC1

UC2

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4.2 UC1 Information Flows

4.2.1 Maritime transport planning

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4.2.2 Land transport planning

4.3 UC2 Information Flows

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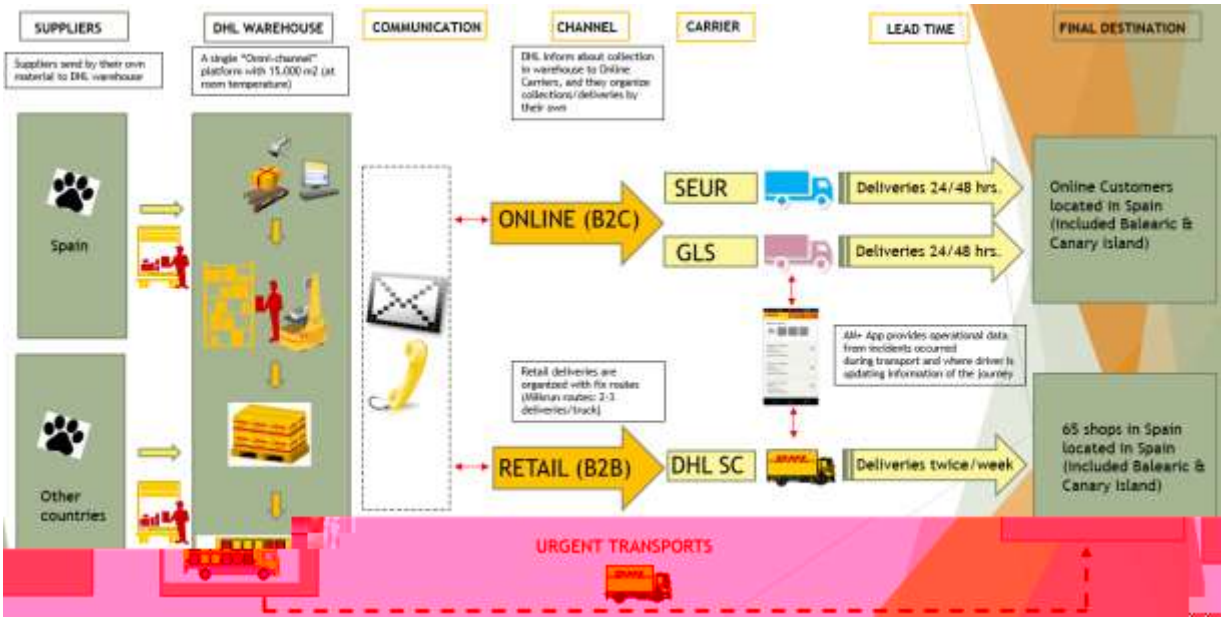

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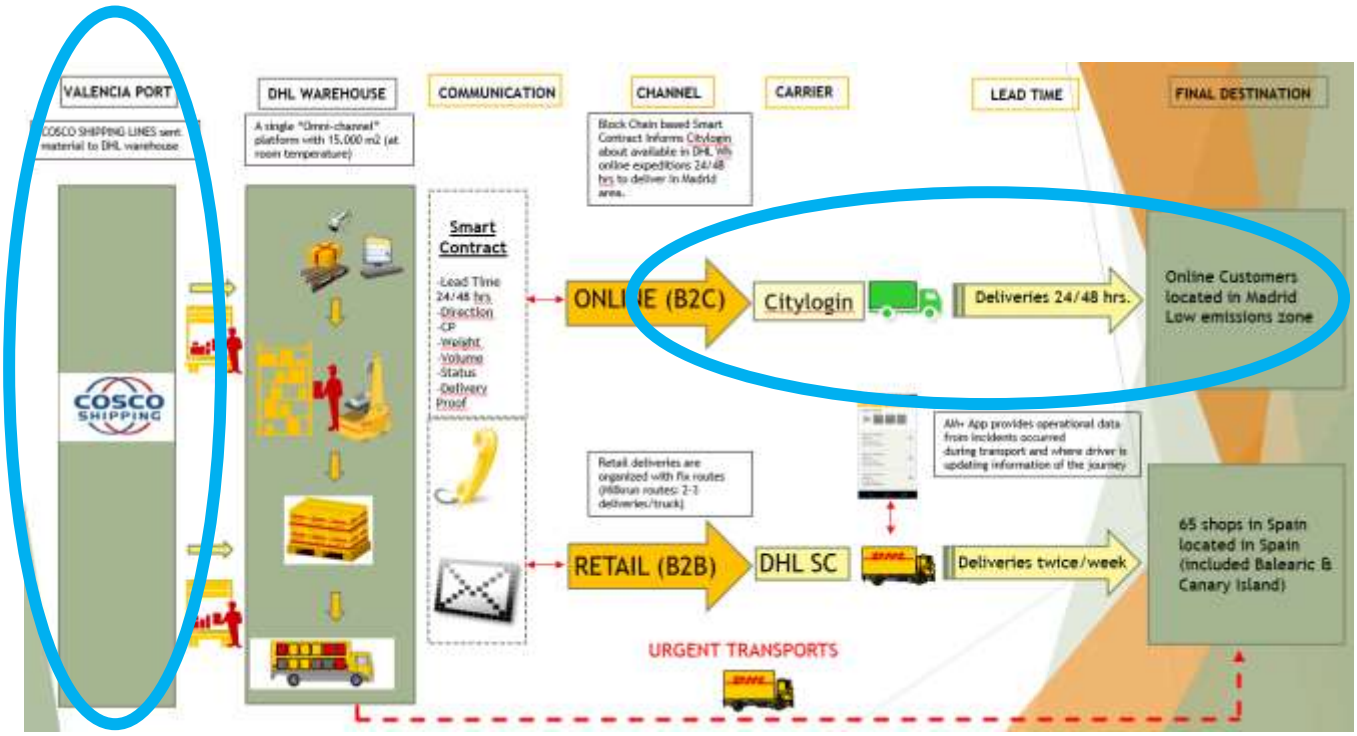

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4.3.1 Land transport planning (Port to warehouse)

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4.3.2 Warehouse planning

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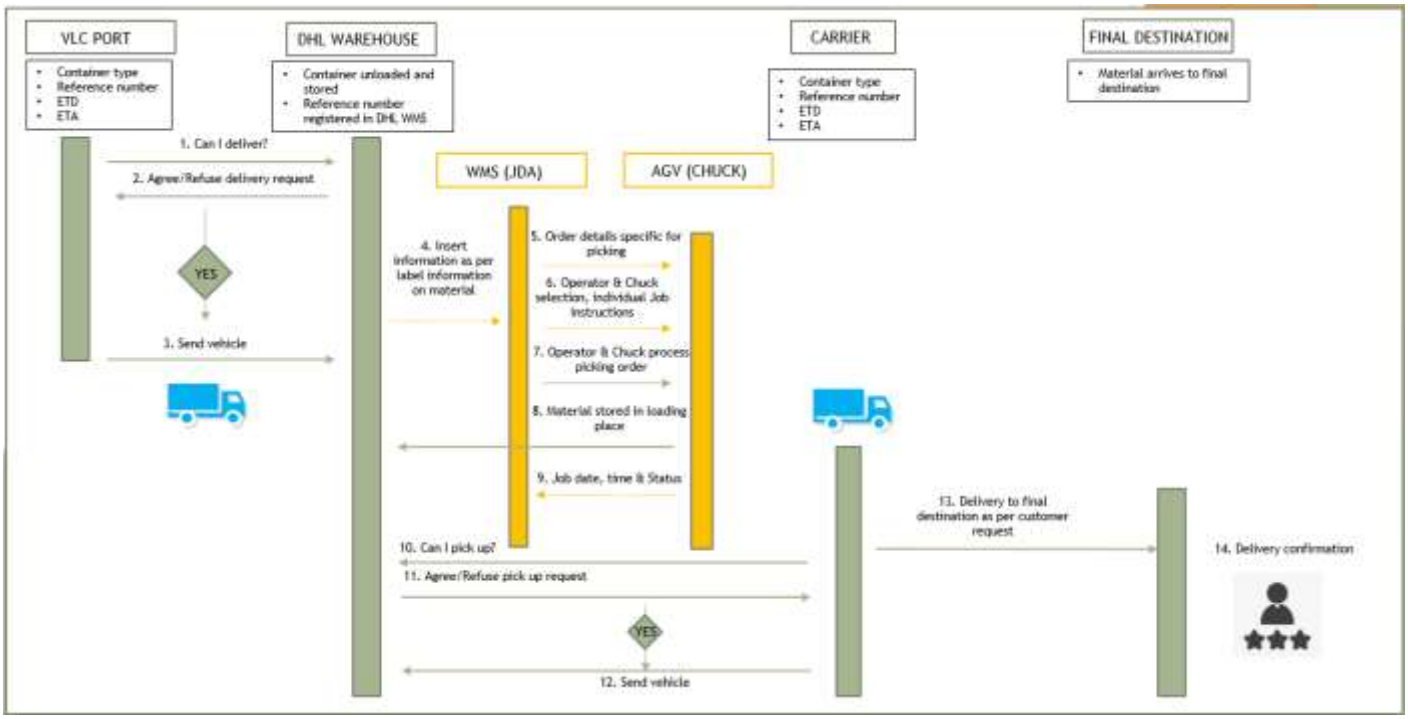
4.3.3 Last mile delivery Planning



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5.1 Envisioned physical flows

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Nodes	Type	Identification

M e N I B hkkb hkl

Corridor	Type	Identification

M e N I Bgh l

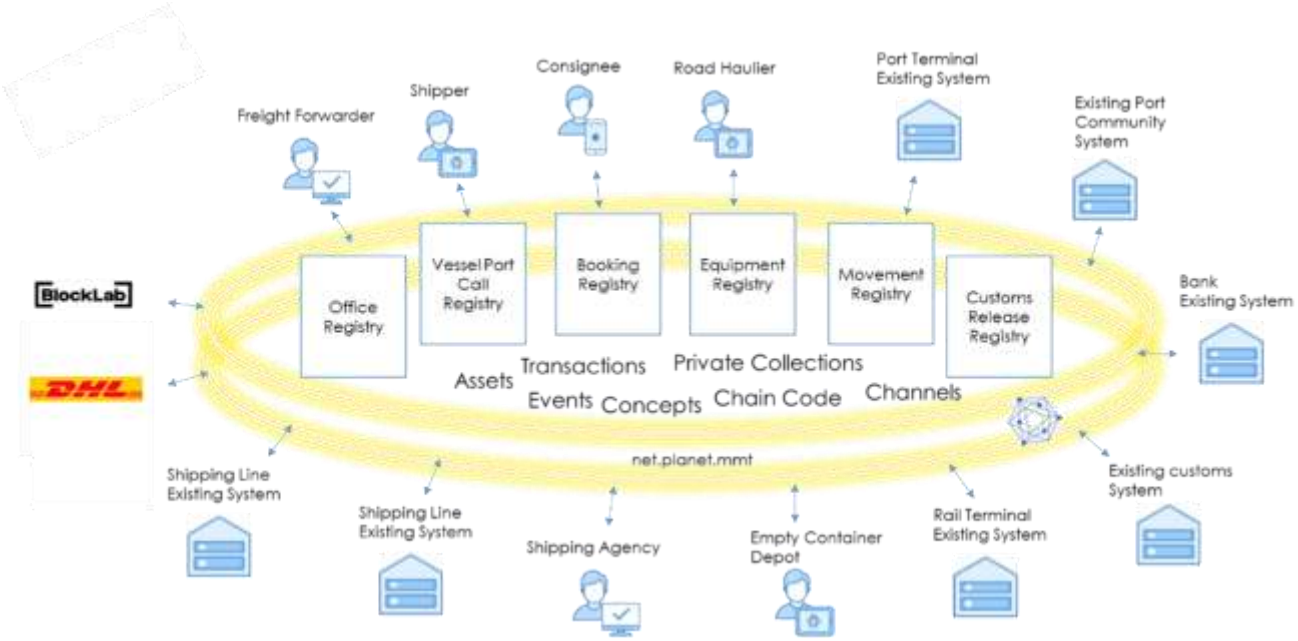
Nodes	Type	Identification

M e N I B hkkb hkl

Corridor	Type	Identification

5.2 Envisioned information flows, addressing interoperability requirements.

5.2.1 Blockchain



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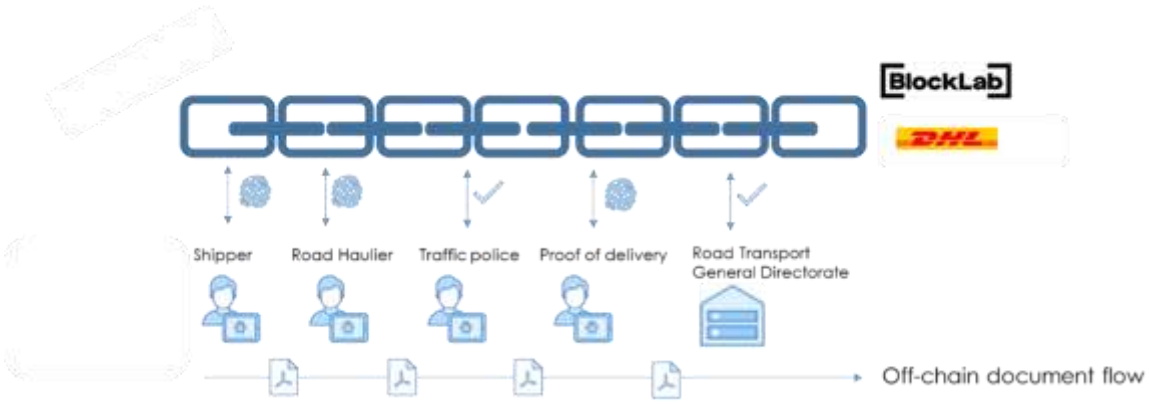

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consignment note

control document

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5.3 Envisioned Business Model & Incentive system for the implementation of the solution/concepts

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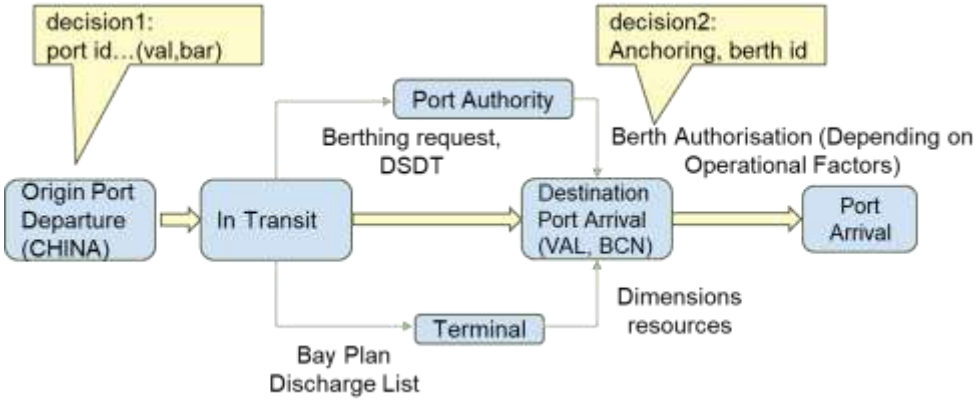
Key partners	Key Activities	Value Propositions	Customer Relationships	Costumer Segments
	Key Resources		Channels	

Cost Structure			**Revenue Streams**	

5.4 Logic,rules and available data for intelligent decision making

Identify assessment needs of route changes (UC1)



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Operational Factors

- **Availability at the requested time window:**

- **Port call scheduling and anchoring:**

- **Availability of technical-nautical services:**

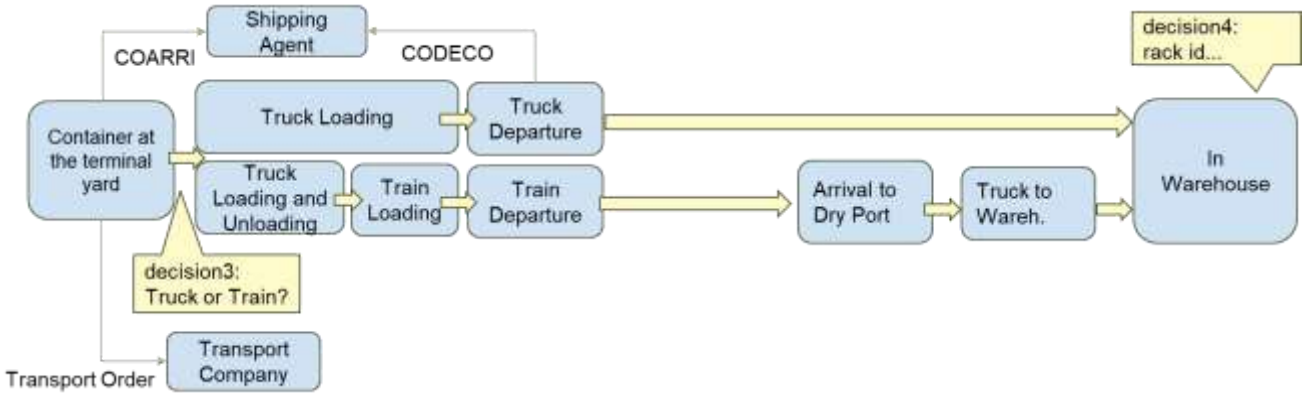
- **Terminal capacity, availability and congestion at a specific time:**

- **Distance to the port of destination:**

Economic Factors

- **Port costs:**
- **Terminal costs:**
- **Fuel costs:**

Inland transport planning (UC1)



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For improved predictions and warehouse operations planning (UC2)

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Last mile delivery (UC2)

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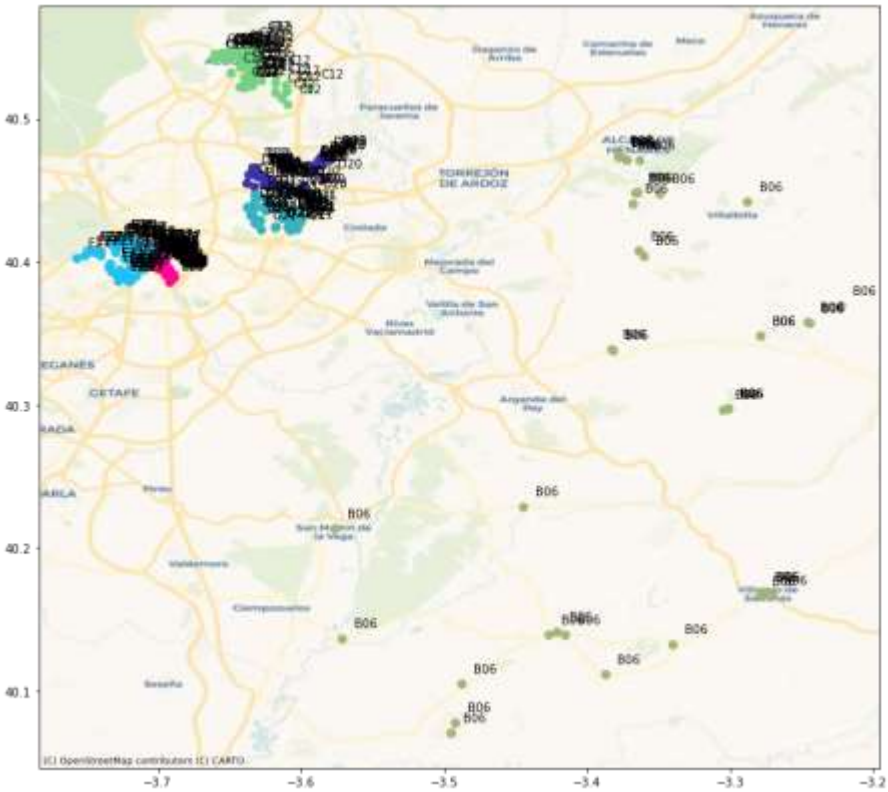

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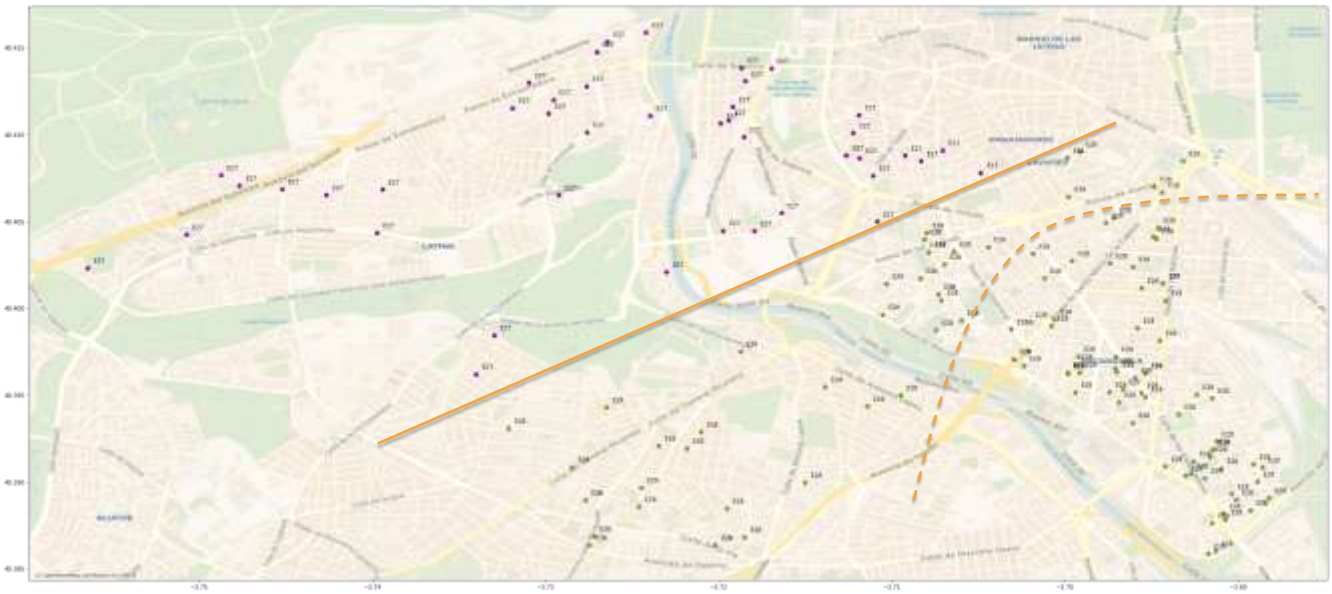

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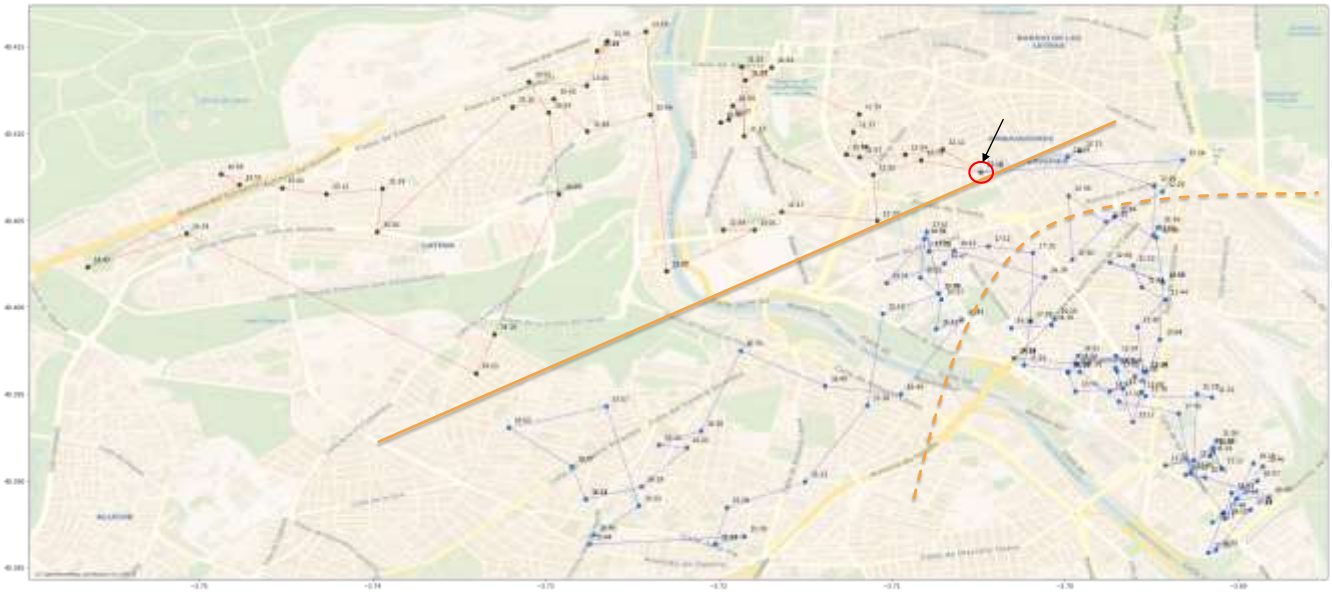

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Warehouse operations

5.5 Digital Clones business drivers

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5.6 Impact Assessment of adopted innovations including metrics

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Key Performance Indicator	Technology	Baseline measurement	PLANET Target

M e N DI B

Key Performance Indicator	Technology	Baseline measurement	PLANET Target
KPI 3: Operational efficiency (delivery time reduction)			
KPI 4: Increase speed of collaboration decisions -automation in routing decisions			
KPI 5: CO2 emissions related to transport and logistics operations.			

KPI 6: Decrease disruptions of the Supply Chain (in the hiring process (n)4(c)3.19 32

Note:

- **KPI 1: Transport cost reduction.**
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- **KPI 2: Operational cost reduction.**
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- **KPI 3: Operational efficiency (delivery time reduction).**
  -
  -
- **KPI 4: Increase speed of collaboration decisions -automation in routing decisions.**
  -
  -
- **KPI 5: CO2 emissions related to transport and logistics operations.**
  -
  -
- **KPI 6: Decrease disruptions of the Supply Chain in the hiring process in the spot market for specific vehicle.**
  -

- **KPI 7: Increase speed of inventories.**
- **KPI 8: Access to temperature, humidity, bump, gate opening and tracking in shipping containers and pallets.**

5.7 Alignment with EGTN objectives

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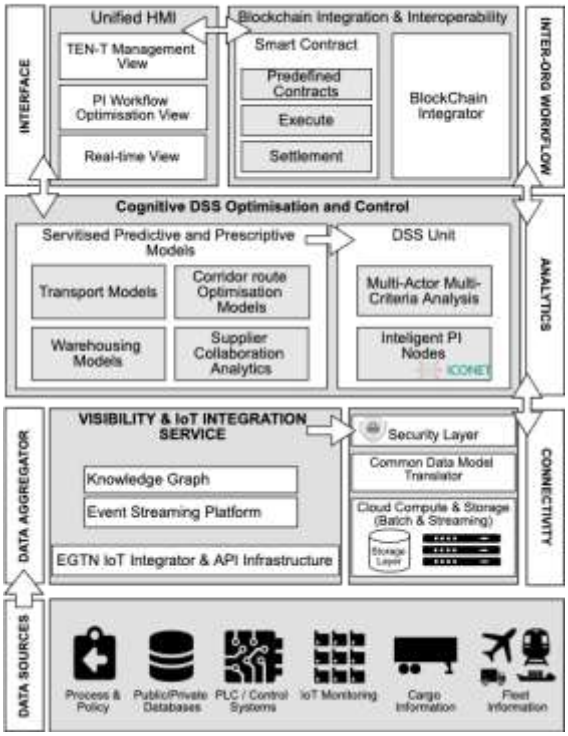
6.1 Link with the EGTN technological framework and infrastructure designed in WP2



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6.2 Cloud-based Open EGTN Infrastructure Technical Requirements (incl. performance capabilities)

6.3 Blockchain Requirements

SR1: PLANET LL1 blockchain should ensure immutability and permanent availability of the shared data, allowing organizations to perform a trusted data exchange, easy dispute resolution, accountability and verifiability of business processes within the network.

SR2: In PLANET LL1 blockchain, organizations must be able to join a new or existing blockchain network including network components such as endorsing, validating and anchor peers, orderer nodes, and CA to provide appropriate certificates to member components, end-users and applications.

SR3: PLANET LL1 blockchain must include a consensus mechanism to assure integrity and security at the network when validating transactions and ordering functionalities for the network.

SR4: PLANET LL1 blockchain must include strict authentication and authorization protocols for enabling transparency and trust when sharing and accessing data, configuring access roles, handling malicious participants, withstanding security attacks, etc.

SR5: PLANET LL1 blockchain must enable the connection with organizational and client applications, and end users via secure APIs to share, access and consume data. To do so, connections must be carried out in an authenticated manner to ensure that only approved parties are allowed to access the PLANET network.

SR6: PLANET LL1 blockchain must be able to allow the creation of multiple business networks where organizations could share data or business logic under private conditions with selected entities, or at least be able to keep data private for different participants.

SR7: PLANET LL1 blockchain must allow organizations to maintain a shared and single distributed source of truth, i.e. blockchain ledger, for registering all transactions within the network. Organizations must should also be able to store their own copy of it.

SR8: PLANET LL1 blockchain network must allow organizations to develop and execute agreed upon business logic in an automated manner for validating and signing on transactions and achieving transparency and accountability across the network.

SR9: PLANET LL1 blockchain network must allow organizations to endorse transactions by executing a specific business logic agreed as a bounding contract between the different network organizations.

SR10: PLANET blockchain must allow organizations to set new data governance and business rules and update or reinforce the existing ones.

SR11: PLANET LL1 blockchain must include mechanisms for allowing organizations to get information about other participants and querying them.

SR12: PLANET must provide unified interfaces to interconnect different blockchain systems for seamless Global Trade.

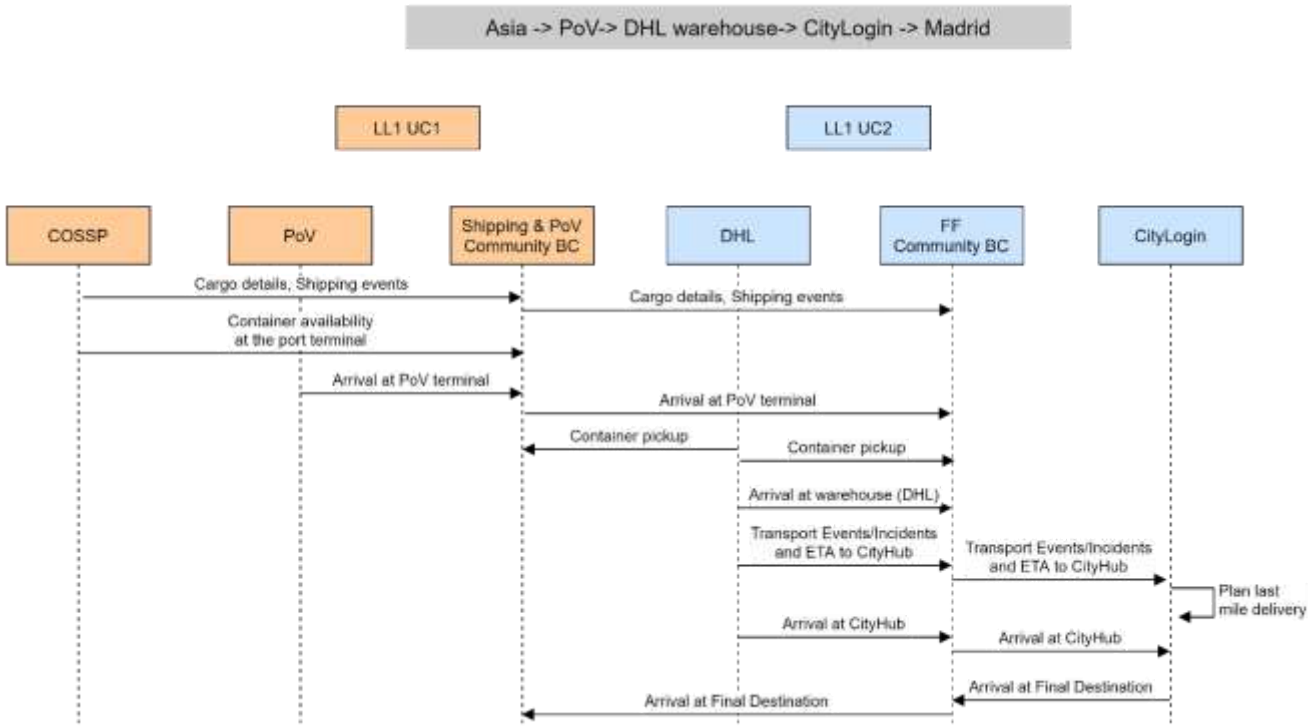
SR13: PLANET must allow organizations to redirect transactions and consume events from/to different blockchain systems.

SR14: PLANET blockchain should enable EGTN actors of different ecosystems to share data and functionality in order to operate in a unified and consistent way.

SR15: PLANET blockchain must collect external data coming from AI predictive models via a REST API.

SR16: PLANET blockchain should support a further integration with other disruptive technologies such as IoT or AI.

6.3.1 Blockchain Interoperability Workflow



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6.4 IoT Requirements

complete visibility of the supply chain

- **IoT enablement**
- **Composability and pervasiveness**
- **Interoperability**
- **Easy use maintenance and integration.**
- **Cloud based platform,**

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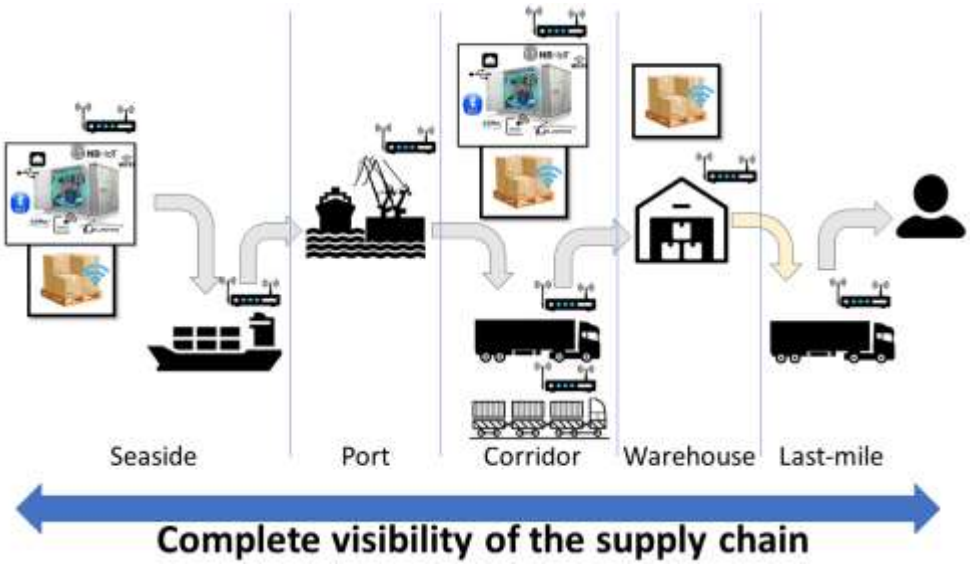
What?		
Where?		
When?		
How?		

6.4.1 The complete visibility of the supply chain



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Smart PI container

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general status of the container

A distributed set of devices capable to monitor in a pervasive manner inside and outside the container

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Smart PI Pallet

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Smart PI Packets

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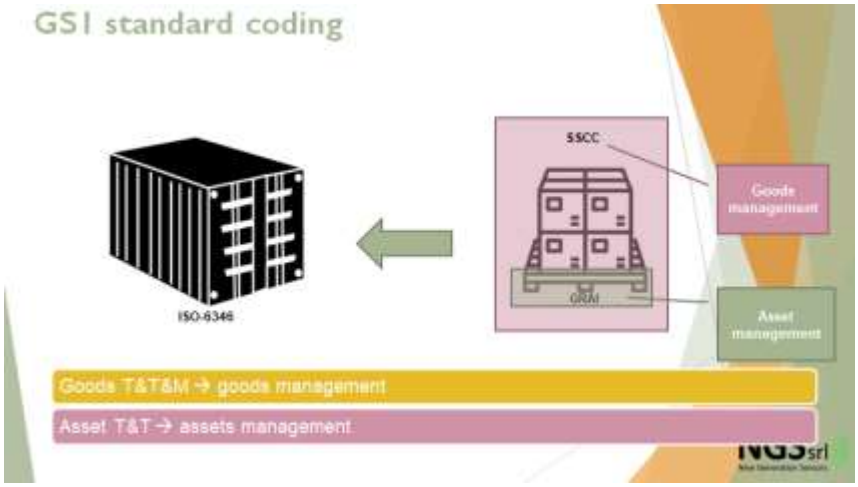
A unique and standardized goods identification



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An improved granularity in the goods tracking and monitoring

The possibility to implement improved assets monitoring and management service

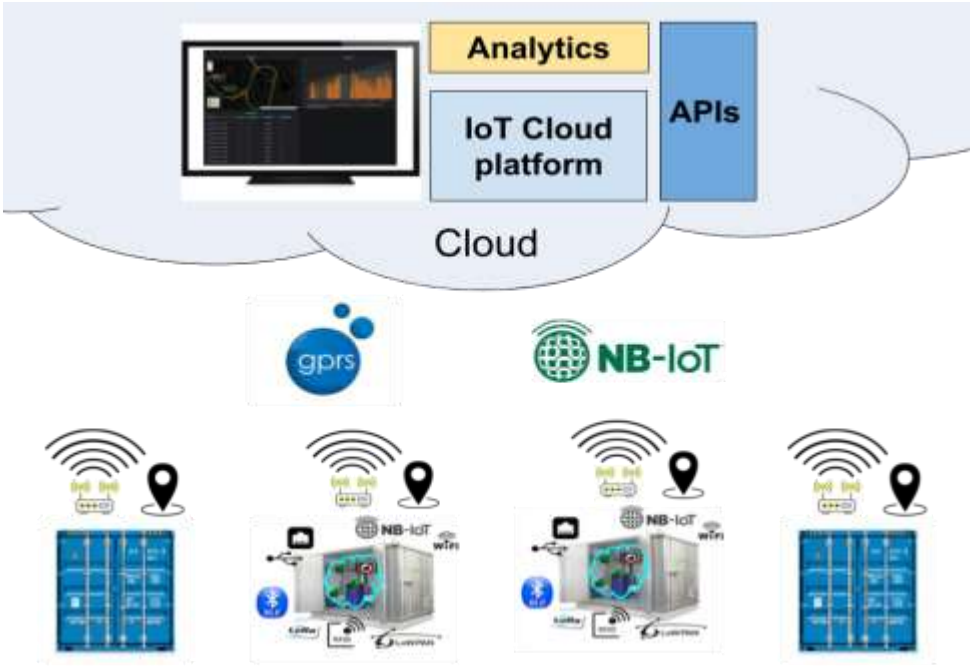
An enablement for the implementation of circular economy services

6.4.2 Use cases' realisation

UC 1

UC 2

On the premises IoT environment
Cloud IoT Platform



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FUNCTIONALITIES	DESCRIPTION
	SMART PI PALLET
GS1 STANDARD CODING	
REAL TIME INVENTORY	
DISTRIBUTED MONITORING	
SPECIAL EDGE FUNCTIONALITIES FOR CERTAIN GOODS	
CONNECTIVITY	
POWER SUPPLY	

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	SMART PI CONTAINER
ISO STANDARD CODING	
POSITION AND TIME	
DATA COLLECTION	
EDGE FUNCTIONALITIES	
CONNECTIVITY	
POWER SUPPLY	

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6.4.3 Data collection and sharing: interoperability, data usability and standardisation scenario

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6.5 Digital clones Requirements

SR1: Digital Clones should be able to visualize 3D representation of the warehouse making information more accessible

SR2: Digital Clones should be able to execute Pre-assessment & Optimization of Warehouse Processes

SR3: Digital Clones should be able to improve the warehouse layout

SR4: Digital Clones should be able to calculate the spare capacity

SR5: Digital Clones should be able to provide valid data to analyse of products

SR6: Digital Clones should be able to optimize the last mile delivery

6.6 Decision making intelligent algorithms (based on AI machine-learning)

Assessment of the impacts of route changes (UC1)

SR1: Intelligent algorithm should be able to assess the transit time to different port destinations, in this case, Valencia, Barcelona and Algeciras.

SR2: Intelligent algorithm should be able to calculate the costs associated to changing the port call on the fly for different port destinations, i.e., Valencia, Barcelona and Algeciras. Costs should cover port, terminal and fuel aspects.

SR4: Intelligent algorithm should be able to assess the operational time associated to the transportation of a specific cargo type by both truck and train transportation means considering a fixed destination.

SR5: Intelligent algorithm should be able to recalculate the operational time associated to the transportation of a specific cargo depending on the warehouse or customer destination.

SR6. Intelligent algorithm must ingest data related to the truck and train schedulings in order to define a specific time estimation depending on the requested delivery date and time.

SR7: Intelligent algorithm should be able to suggest a transportation type depending on the cargo type, final destination, transportation scheduling, etc.

<u>For improved predictions and warehouse operations planning (UC2)</u>

SR1: Intelligent algorithm should be able to provide the volume flow into warehouse for next days

SR2: Intelligent algorithm should be able to assess number of vehicles needed for next days

SR3: Intelligent algorithm should be able to assess number of persons needed in the warehouse for next days

SR4: Intelligent algorithm should be able to provide valid data to carry on simulations

SR5: Intelligent algorithm should be able to provide valid data to create Smart Contracts

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7.1 LL Modelling

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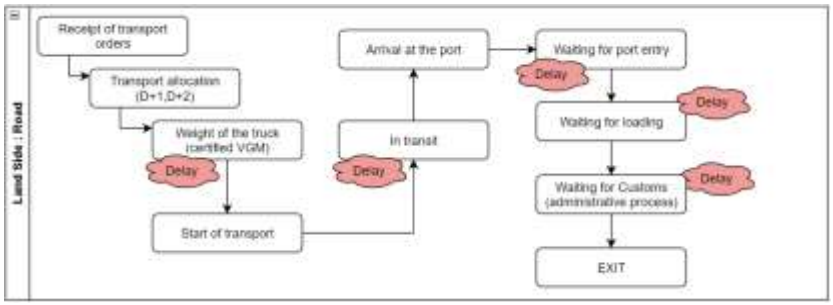

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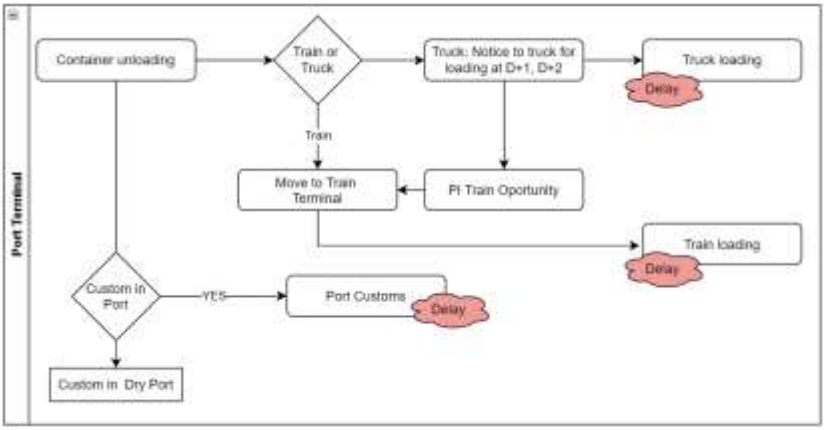

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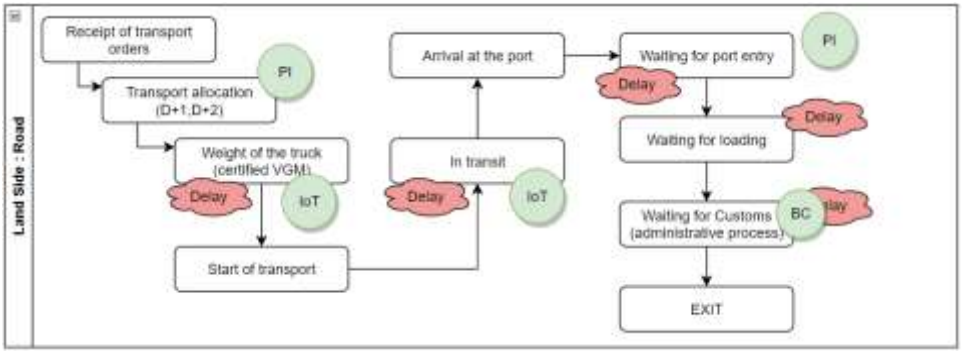

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8.1 Living Lab Organisational Structure (roles & responsibilities)

- **Use Case 1**

- **Use Case 2**

- **Activity 5: This fifth task focuses on the development of d**

- **ST3.3.1 LL AS-IS analysis and detailed specification and plan**

- **ST3.3.2 Installation and technical validation of the PLANET Cloud-based Open EGTN Infrastructure in the LLs:**

- **ST3.3.3 Testing:**

- **ST3.3.4 Analysis and results:**

- **COSCO SHIPPING Lines (Spain) S.A.**

- **DHL Supply Chain Spain**

- **Fundación Valenciaport**

- **CityLogin**

- **Itainnova**

- **IBM**

- **Konnecta**

- **VLTN**

- **Zaragoza Logistics Center (ZLC)**

8.2 Implementation Plan

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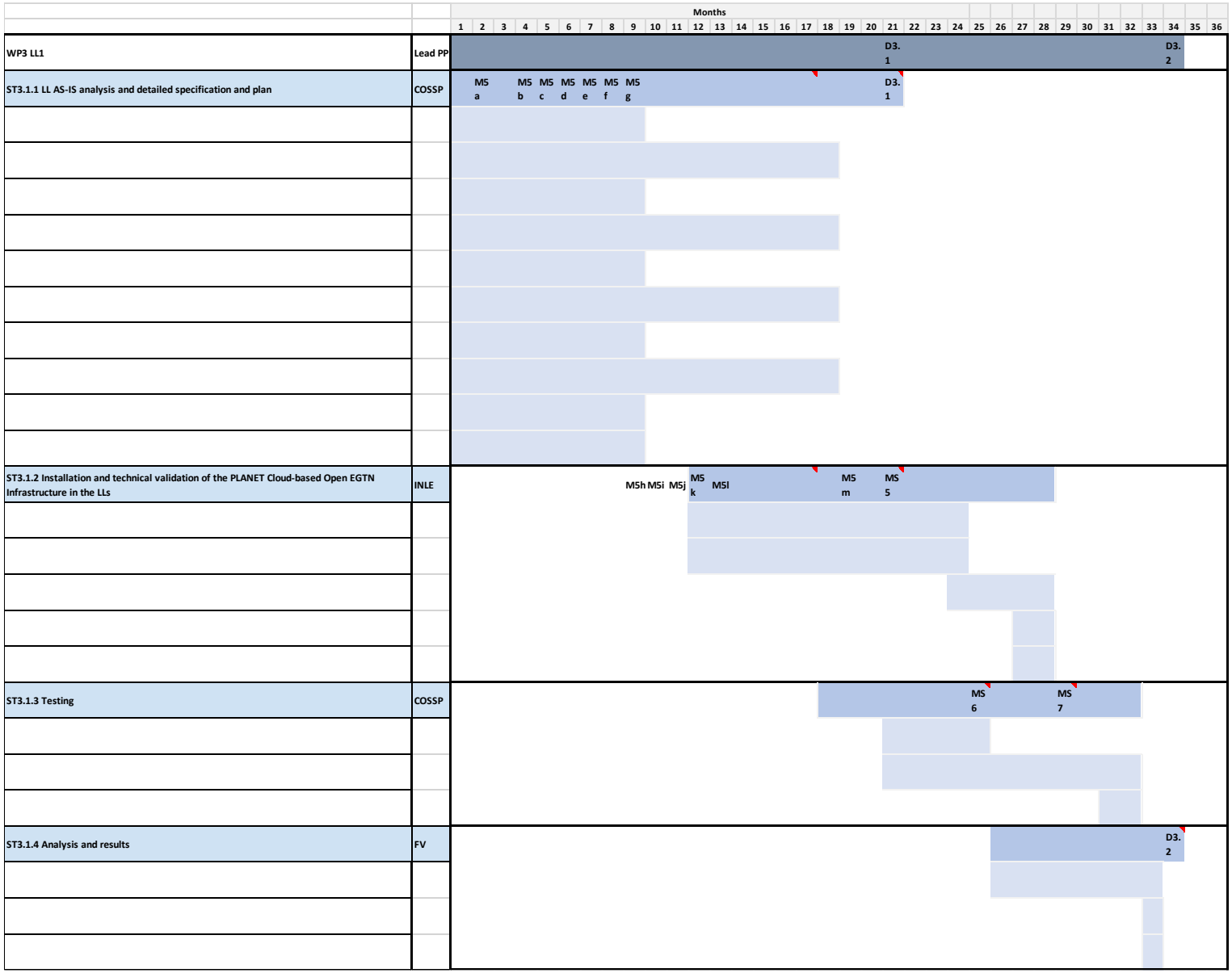
M5a	Detailed Textual Business Case Description (incl. KPIs)	jul-20	M2
M5b	Detail IoT/AR Requirements (required devices, existing services, etc.)	ago-20	M3
M5c	Identification of involved Data Flows, Sources and Access method	sep-20	M4
M5d	PoV & COSCO Blockchain Technical Specifications & exchanged data	oct-20	M5
M5e	Detail Intelligent Decisions (AI) Requirements & Goals	nov-20	M6
M5f	Detail Blockchain Interoperability & Smart Contract Requirements	dic-20	M7
M5g	Simulation Model Specifications	ene-21	M8
M5h	LL1 EGTN Infrastructure Requirements & UCs Testing and KPIs measurement method	feb-21	M9
M5i	Implement Tracking for Asia-Europe shipments and Warehouses	mar-21	M10
M5j	Implement initial Intelligent Decision (AI) Algorithms	abr-21	M11
M5k	Initial Simulation Model Setup in local Simulation Environment	may-21	M12
M5l	LL1 Initial EGTN Infrastructure Setup	jun-21	M13
M5m	Initial Simulation Execution on EGTN Infrastructure	dic-21	M19
MS5	Installation and technical validation of the EGTN Infrastructure in the LLs	feb-22	M21
MS6	First phase testing in LL complete	jun-22	M25
MS7	Second phase testing in LL initiated	oct-22	M29



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9 Conclusions

10 References