Progress towards Federated Logistics Through The Integration Of TEN-T into A Global Trade Network

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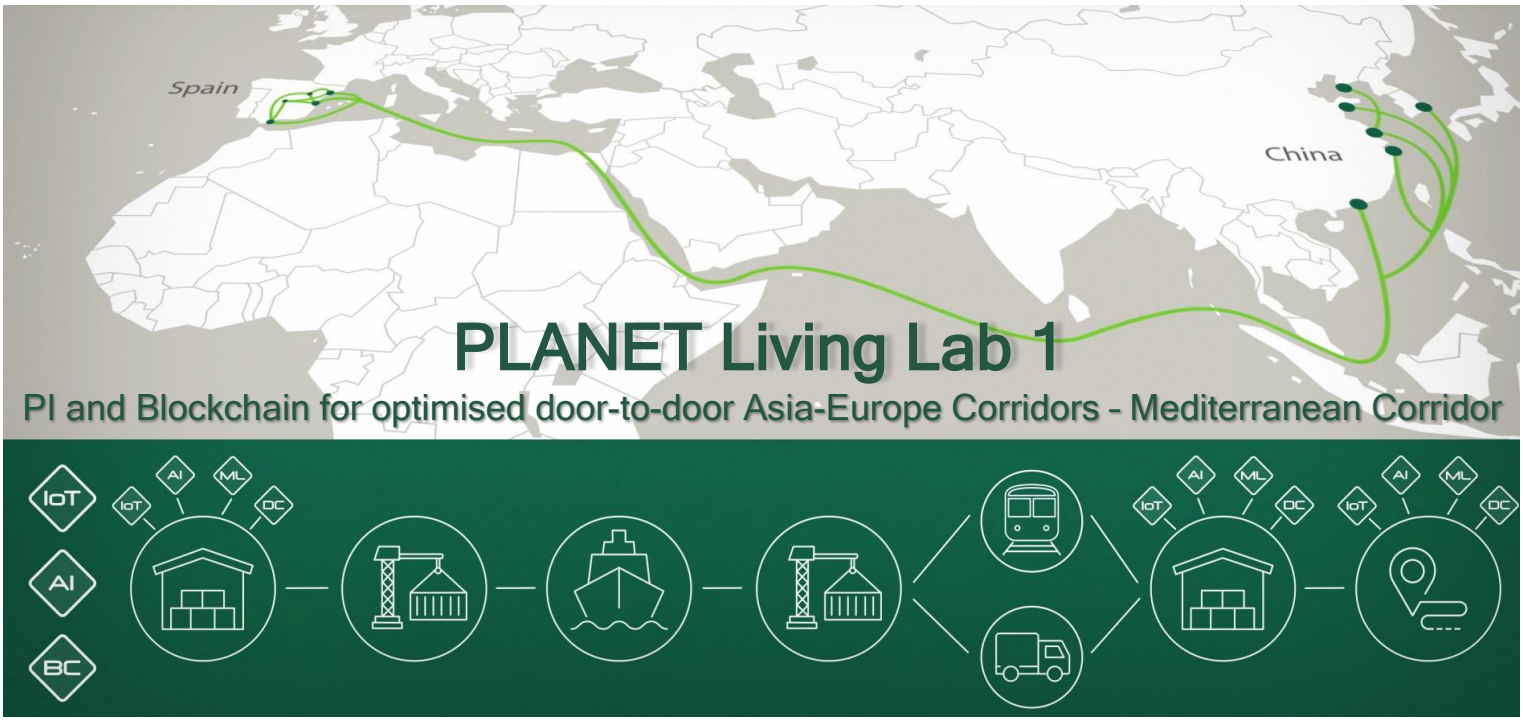

PLANET LL1 evaluates how novel technologies and concepts such as Blockchain, Artificial Intelligence (AI), Internet of Things (IoT), Machine Learning (ML) or Physical Internet (PI) can enhance the efficiency of the processes and operations performed along the door-to-door (D2D) transport and logistics in the link **between the Maritime Silk Road and EU internal corridors.**

Objectives & Business benefits of the technologies implemented

Blockchain

The use of Blockchain solution will ensure that every stakeholder has **access only to the information that he needs** and will **decrease disruptions of the supply chain and urban uncertainty in last mile deliveries,** allowing the **reduction of paper-based processes, exchange of real-time and secure data** and **customer experience improvement**. The Blockchain interoperability will be also explored for the exchange of information in between totally independent Blockchains.

Artificial Intelligence

The use of the AI, through the **optimization of synchro-modal routes and maritime and inland re-routing**, will allow a **better forecast and intelligent decision at logistics nodes**, saving time and both economic and environmental costs.

Internet of Things

The IoT devices will be used for **real-time logistics assets**, allowing to **know container location and cargo status in real time**, by exchanging information to all actors interested and keeping events registered.

Machine Learning

Data Analysis combined with ML will provide **demand forecast to hire Transport and Human resources in advance for a better logistics planning**. It is expected to reduce transport/operational/environmental costs, increase collaboration speed and improve delivery times.

Digital Clones & Simulations

Digital Clones & Simulations will (i) **improve the warehouse management** by calculating the spare capacity and stock level, increasing operational speed; (ii) **model potential logistics scenarios to face unforeseen Supply Chain disruptions**.

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Use case 1 Improving container cargo operations between China and Spanish hinterland

Overview

The first use case will focus on import/export D2D transport chain of containerized cargo between China and Spain and will evaluate how the combination of IoT (for real-time monitoring of logistics assets), AI (for better forecasts and intelligent decisions based on machine learning algorithms) and blockchain (for paperless transactions and the register of transport events), can contribute to a better management of the transport chain.

The development of the PI paradigm will be investigated, where intelligent logistic nodes or hubs play a key role in transport decisions and are optimized based on real time events/information and historical data.

Overall activities and to be view situation

	AS IS	TO BE
ACTIVITY 1 INTELLIGENT DECISIONS AT LOGISTIC HUBS Enhance transport planning by applying AI and ML	Predefined maritime routes not considering real-time information regarding congestions, level of capacity, time and costs.	• Identify optimal routing real-time considering synchromodality to support daily decision-making procedures, identify alternatives, improve Transport Service Level. • Considering minimizing carbon footprint, costs and time impact of maritime route changing and inland transport re-routing to propose alternative routing.
ACTIVITY 2 PI NETWORKS IN SPAIN Extend Activity #1 simulation to the last mile delivery in order to build flexible and resilient D2D service	• Real time information is not used for optimizing routing. • Inland transport requests are managed according to a FIFO logic without considering customer instruction on delivery date and time.	• Optimize routes of inland transport. • Logistic nodes to identify dynamically optimised routes. • Recalculate container transport decision in each PI network node. • Demonstrate connection between terminal hubs and warehouses.
ACTIVITY 3 BLOCKCHAIN TECHNOLOGY & INTEROPERABILITY Interoperable business network for integrated data sharing from seaport to hinterland to reduce multiple interactions and redundant data transactions between all actors while keeping trustable common records of each event	• Coordination of complex supply chains through multimodal corridors – multiple interactions and transactions with different stakeholders. • Documentation exchange: some electronic but not optimized transactions / others still paper based. • Large operations time, possibility of errors and duplication.	• Port of Valencia's hinterland blockchain to manage processes and data exchanges for container inland movements in real-time. • Enhance the information flow between all agents, optimizing the operations time and avoiding errors and duplication. • Automatic documentation reduces paper-based processes. • Data available for all stakeholders involved (different access rights). • Explore possibility of interoperability with agents involved in use cases.
ACTIVITY 4 INTERNET OF THINGS FOR CONTAINER TRACKING Get tracking data remotely in real-time of the containers to improve operations and monitoring of container and cargo	• No information available of container location in real time – only through vessel position during ocean trip. • No information available of cargo container status in real time – only information in terminals charge/discharge not real time.	• Know container location and cargo status in real time. • Logging of historical events – help to reduce conflicts between customer and other actors. • Use of Blockchain to make this information available to actors interested.

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Use case 2 Optimizing warehouse operations and automation and last mile deliver efficiency and sustainability

Overview

The second use case will focus on **warehouse operations** and will explore how new IoT, AI, AR and automation technologies can contribute to the **development of intelligent automated logistics nodes of the Integrated Green EU-Global T&L Network (EGTN) PI network**.

This use case will **complement Use Case 1**, particularly on how to integrate smart Warehouse Nodes for EGTN routing decisions, ultimately creating PI Warehousing Nodes. The extended level of potential automation will be represented through simulation.

Overall activities and to be view situation

	AS IS	TO BE
ACTIVITY 1 **INTELLIGENT DECISIONS AT LOGISTIC HUBS** Enhance transport planning by applying AI and ML Based on Demand Forecast apply Simulation for optimization of resources and warehouse operations	• Transport & warehouse operations with a short timeframe in terms of demand visibility (24hrs). • No transport & warehouse simulations possibilities.	• Plan transport routes according to the volumes forecasted with a better timeframe, hire transport /HR resources in advance to increase operational efficiency and increase asset utilization (including AGVs). • Reduce transport and operational costs, increase asset utilization and improve the warehouse layout.
ACTIVITY 2 **PI NETWORKS IN SPAIN** Simulate optimal routes to deliver goods coming from ports to warehouses and city-hubs Based on Smart Contracts and Algorithm to increase automation & collaboration in LM operations	• No use of Algorithm for last mile distribution. • Use of standard vehicles to execute last mile delivery (no green vehicles). • No automation process based on AI and Blockchain.	• Reduce urban uncertainty based on Algorithm for last mile collaboration to improve routing optimization. • Green vehicles fleet replacement to execute the last mile delivery (DHL vs CityLogin). • Use of AI and Blockchain for Smart Contracts reduce management time and increase automation in operational decisions.
ACTIVITY 3 **INTERNET OF THINGS FOR CONTAINER TRACKING** Get tracking data remotely in real-time of the containers to improve operations and monitoring of container and cargo	• No information available of container location in real time – only through vessel position during ocean trip. • No information available of cargo container status in real time – only information in terminals charge/discharge not real time.	• Know container location and cargo status in real time. • Logging of historical events – help to reduce conflicts between customer and other actors. • Use of Blockchain to make this information available to actors interested.

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