



PLANET Introduction

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

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Consortium
Vision
Mission
Focus Areas
Work Packages

Consortium (please turn your cameras on for a moment)

| | | | |
|------------|------------|--|----|
| P1 | INLE | INLECOM GROUP | BE |
| P2 | CERTH | Centre for Research and Technology Hellas | EL |
| P3 | CATS | China Academy of Transportation Sciences | CN |
| P4 | COS | COSCO Shipping Lines Spain | ES |
| P5 | COSTech | COSCO SHIPPING TECHNOLOGY | CN |
| P6 | CPSI | Comunidade Portuária de Sines | PT |
| P7 | KNT | Konnecta | IE |
| P8 | DHL | DHL Supply Chain Spain | ES |
| P9 | EBOS | EBOS Technologies | CY |
| P10 | EGTC | TEN-T Interregional Alliance for the Rhine-Alpine Corridor | DE |
| P11 | EUR | Erasmus University Rotterdam | NL |
| P12 | ESC | European Shippers Council | BE |
| P13 | CLN | CityLogin | ES |
| P14 | FV | Fundación Valenciaport | ES |
| P15 | ZLC | Fundación Zaragoza Logistics Center | ES |
| P16 | GS1 China | GS1 China | CN |
| P17 | GS1 Poland | GS1 Poland | PL |

| | | | |
|------------|-------|--|----|
| P18 | HARDT | HARDT HYPERLOOP | NL |
| P19 | HP | HUPAC | CH |
| P20 | IBM | IBM Ireland | IE |
| P21 | UIRR | International Union for Road-Rail Combined Transport | BE |
| P22 | ITA | INSTITUTO TECNOLÓGICO DE ARAGON | ES |
| P23 | ILIM | Instytut Logistyki i Magazynowania | PL |
| P24 | JD | Jing Dong Logistics | CN |
| P25 | NGS | New Generation Sensors | IT |
| P26 | NEWO | NEWOPERA AISBL | BE |
| P27 | SIR | SIRMA AI | BG |
| P28 | PAN | PANTEIA | NL |
| P29 | PNO | PNO Innovation | ES |
| P30 | PoR | Port of Rotterdam | NL |
| P31 | PP | Polish National Post | PL |
| P32 | RS | ROHLIG SUUS LOGISTICS S. A | PL |
| P33 | VLTN | VLTN | BE |
| P34 | WI | Wuppertal Institute | DE |

PLANET Vision

Advance the European Commission's strategy for Smart, Green and Integrated Transport and Logistics by

- **efficiently interconnecting infrastructure** (TEN-T, Rail-Freight Corridors) with geopolitical developments (e.g. future New Silk Road and emerging trade routes),
- **optimising the use of current & emerging transport modes and technological solutions,**
 - ensuring equitable inclusivity of all participants
 - increasing the prosperity of nations,
 - preserving the environment,
 - enhancing Citizens quality of life.

The realization of this vision is what PLANET calls the **Integrated Green EU-Global T&L Network (EGTN).**

Pillars supporting PLANET Vision

Understanding and Supporting

- **Global, Geopolitical, Trade and Economic imperative implications of new trade routes** and how best to maximize the EU's economic prospects through steering best practices that align with EC regulatory and environmental policies;
- **EU's strategic cooperation with China and USA** and explore international cooperation, including peripheral regions and landlocked developing countries
- **Model multimodal transfer zones and global trade zones** under the **Assess** concept of EU's Principal Entry Nodes

Leveraging Technological Advancements and New Logistics Concepts

- Leverage and advance current state of the art towards the **horizontal interoperability of T&L systems**, and promote the development of **European and Worldwide Standards**;
- **Demonstrate Secure and Privacy-Preserving Logistics Data Sharing Infrastructures** for Globally Interconnected Supply Chains,
- Leverage **Blockchain Federation and Interoperability** for
 - **Supply Chain (SC) governance, immutable auditability** in recording/reporting of Supply Chain transactions
 - supporting **smart contracts** and regulatory activities.

PLANET Focus Areas

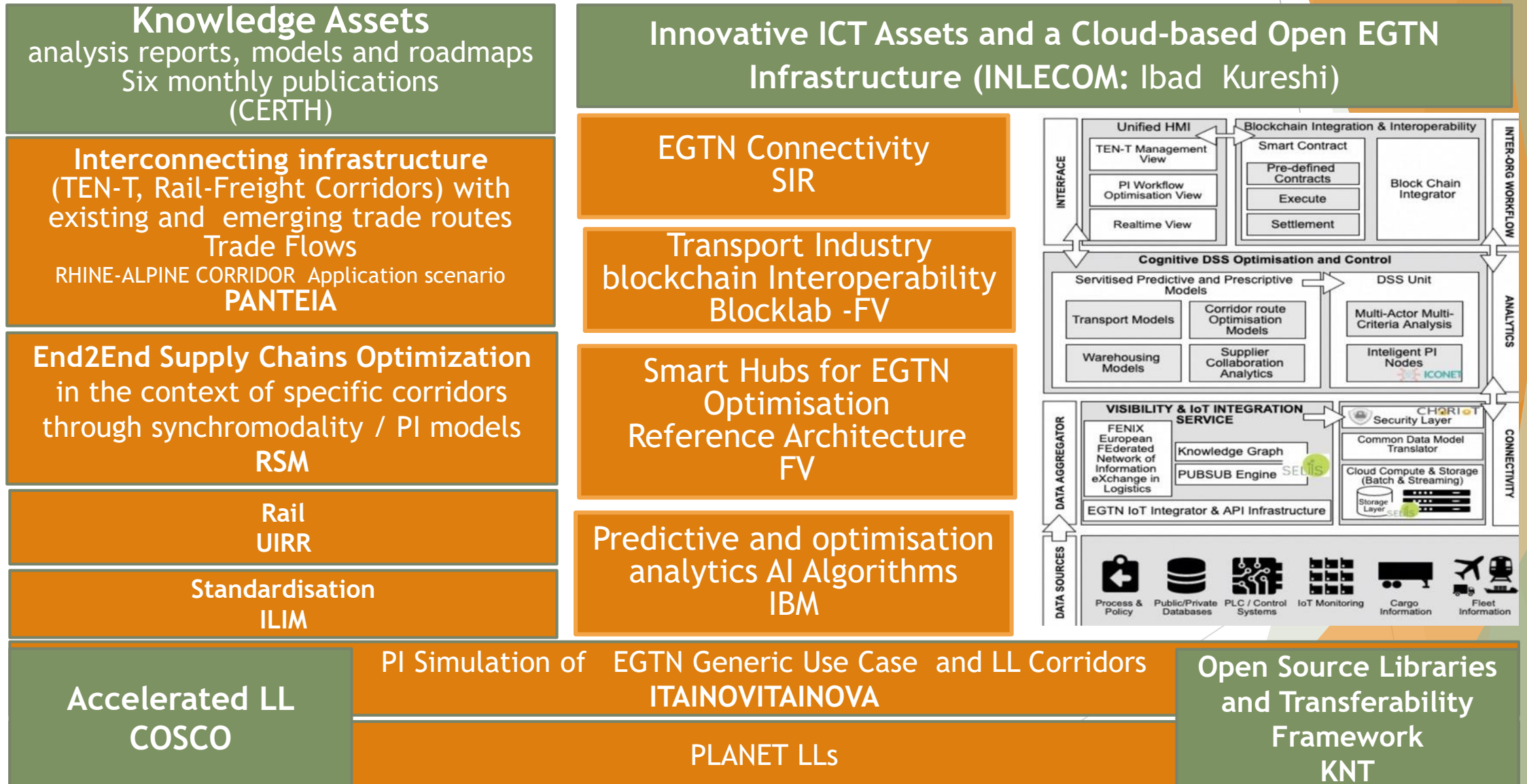
Swimlane 1 - Simulation & Modelling

- Understanding the **economic opportunities, risks, costs** in fusing actors and supply chains in and outside Europe along new and emerging trade corridors
- Simulation and Modelling would be an incredibly valuable tool

Swimlane 2 - Technology

- A very much applied and practical approach for **realising the EGTN platform**
- Reuse assets, such as BC, from projects like ICONET, SELIS, FENIX,
- Give the industry (through open source) a starting point to evolve and shape as things progress.
- less R&D, more “bringing things together”
- the EGTN platform will include **early prototypes of innovation components**
 - EGTN Connectivity
 - Industry blockchain Interoperability Layer / Blockchain Integrator
 - Predictive and optimisation analytics EGTN Algorithms
 - Smart Hubs / Intelligent PI Nodes

PLANET Overview and Focus Directions

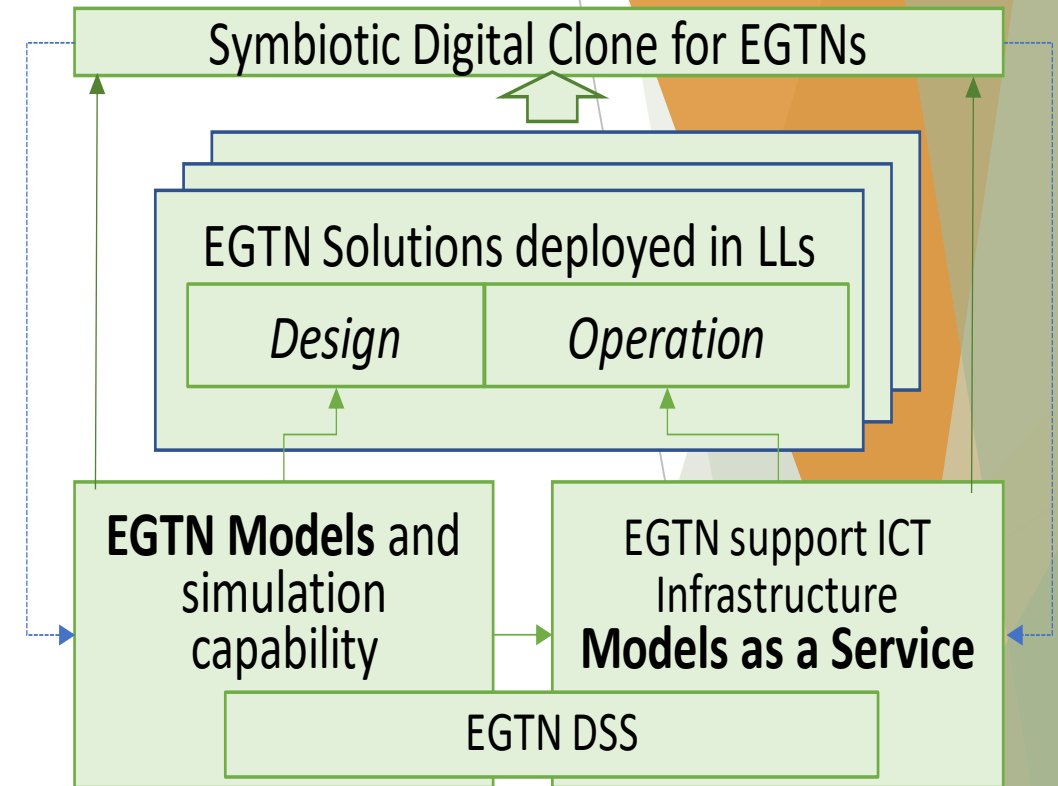


EGTN Concept

Green **EU-Global Trade & Logistics Networks** (EGTN) are international logistics systems that:

1. make **use of physical and digital infrastructures**;
2. aim at **operational excellence** for customers and external stakeholders;
3. incorporate geo-economic context;
4. are **enabled by** (disruptive) transport & logistics concepts and technologies.

The development of EGTN in PLANET encompasses **physical, technological and governance dimensions**



PLANET Unique Innovation Propositions

1. **Multimodal transport flows model** along global corridors and TEN-T and a comprehensive hybrid modelling and simulation capability tuned to **represent TEN-T integrated Green EU-Global T&L networks**
2. **End-to-end transport chain models** including last mile and ocean shipping underpinned by IoT, Blockchain and AI technologies and leveraging UIP1 related tools
3. **Synchromodality on Blockchain** enabled Platforms integrated with predictive and optimisation analytics enabling individual actors to find and manage the best transport solutions
4. Development of Ports/Hubs as **Smart EGTN Principal Nodes** making automated intelligent decisions required for a PI approach and associated smart warehousing nodes and smart city hubs
5. **Eurasian rail freight expansion and Integration** with European RFCs utilising UIP1-4
6. **e-commerce distribution through EGTN smart nodes** underpinned by Postal operators' innovative collaboration mode
7. **Multi criteria DSS specially to support strategic development of TEN-T corridors:** Intelligent PI Nodes and PI Network services

Work Packages

WP1 EU-Global T&L Networks (CERTH)

- EGTN Modelling & Simulation Capability **ITA**
- TEN-T focused modelling and Simulation **PAN**
- Legislation and EU policy to impact EGTN **UIRR**
- Simulation-based analysis of T&L and ICT innovations **EUR**
- EGTN Reference Specification **CERTH**

WP2 Cloud Based Open EGTN Infrastructure (IBM)

- Cloud-based Open EGTN ICT Infrastructure Architecture **ILS**
- EGTN IoT and Connectivity Infrastructure Components **SIR**
- Predictive and Optimisation Analytics **IBM**
- Group multi criteria DSS for transport and PI Networks **VLTN**
- EGTN Distributed Ledgers and Smart Contracts **KNT**
- Unified interface to EGTN Data and Support Services

WP3 PLANET Living Labs (ZLC)

- **LL1:** PI and Blockchain for optimised door-to-door ASIA-EU **COSSP**
- **LL2:** China-Rotterdam/USA focusing on rail transport **PAN**
- **LL3:** IoT for Silk Road Route to EU and Poland focused e-commerce **ILIM**
- **Generic Use Case** and EGTN Impact Assessment **ZLC**

WP4 Steering Innovation & Building Capacity (EUR)

- Recommendations for TEN-T Interfacing to Global trade routes **PAN**
- Briefing EGTN repots including the inclusion of disadvantages **WI**
- Open Source Libraries and Transferability Framework **KNT**
- PI-facilitating technology Roadmaps **ZLC**
- Recommendations for PLANET standardisation **ILIM**

WP5 Dissemination Commercialisation Policy Recom. (FV)

- Stakeholder Engagement, Advisory Board and Support Panel **ESC**
- Dissemination Strategy, Communication Plan and Activities **FV**
- Business Model and Commercialisation Strategy **PNO**
- Policy Recommendations **UIRR**



Objectives & Measurable Outputs

PLANET Mission

Provide **Knowledge** and **Software Assets** supporting the design and operation of **Integrated Green EU-Global T&L Networks (EGTN)**.

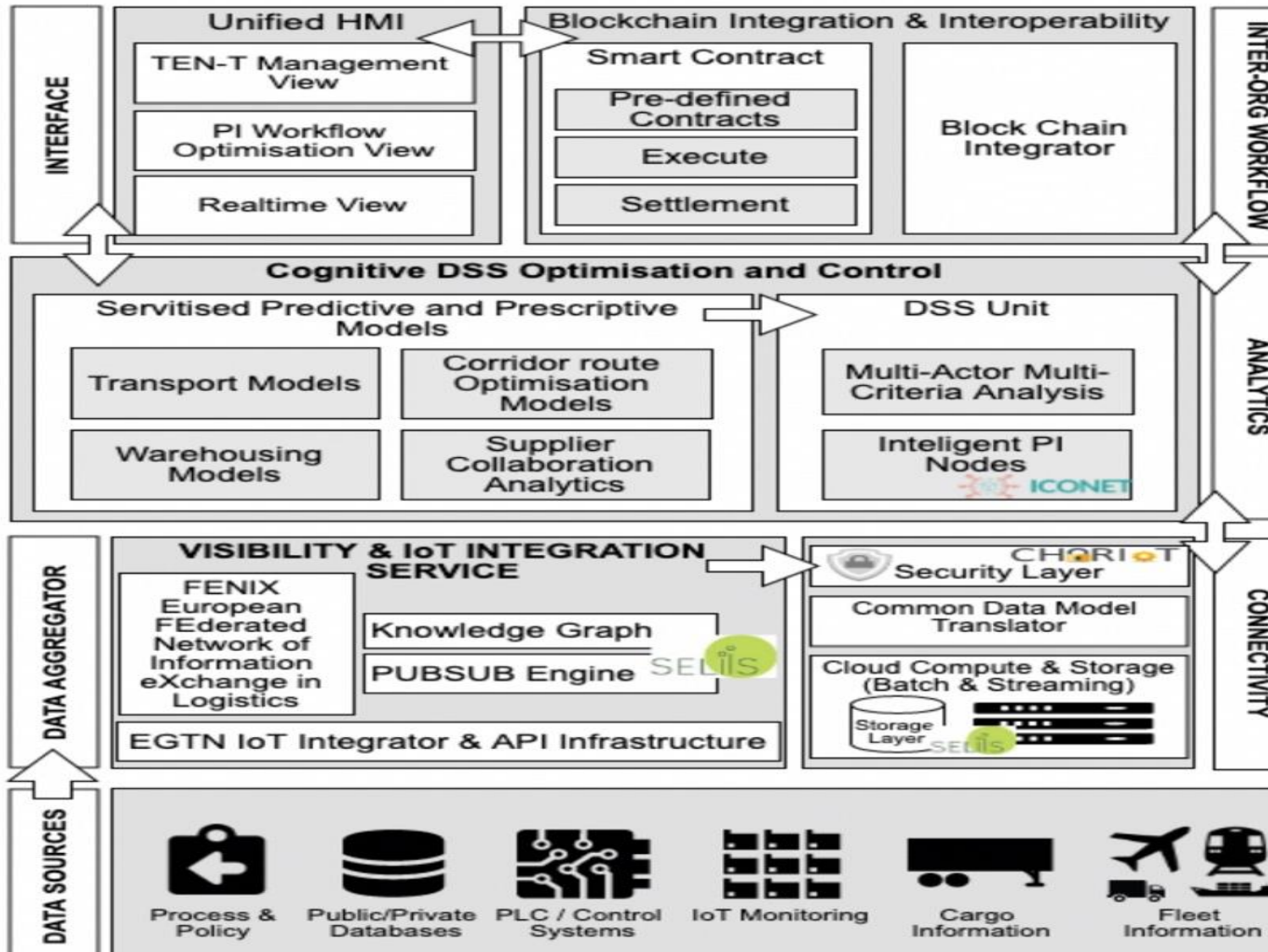
Knowledge Assets

- **Analysis Reports, Models and Roadmaps**
 - efficiently interconnecting infrastructure (TEN-T, Rail-Freight Corridors) with existing and emerging trade routes and Legislation and EU policy to impact EGTN
 - optimising End to End Supply Chains in the context of specific corridors through sychromodality / PI models exploiting suitable incentives mechanisms and technological innovations [IoT, BC, Smart Contracts, autonomous technologies, 5G, 3D printing, UAVs and hyperloop]

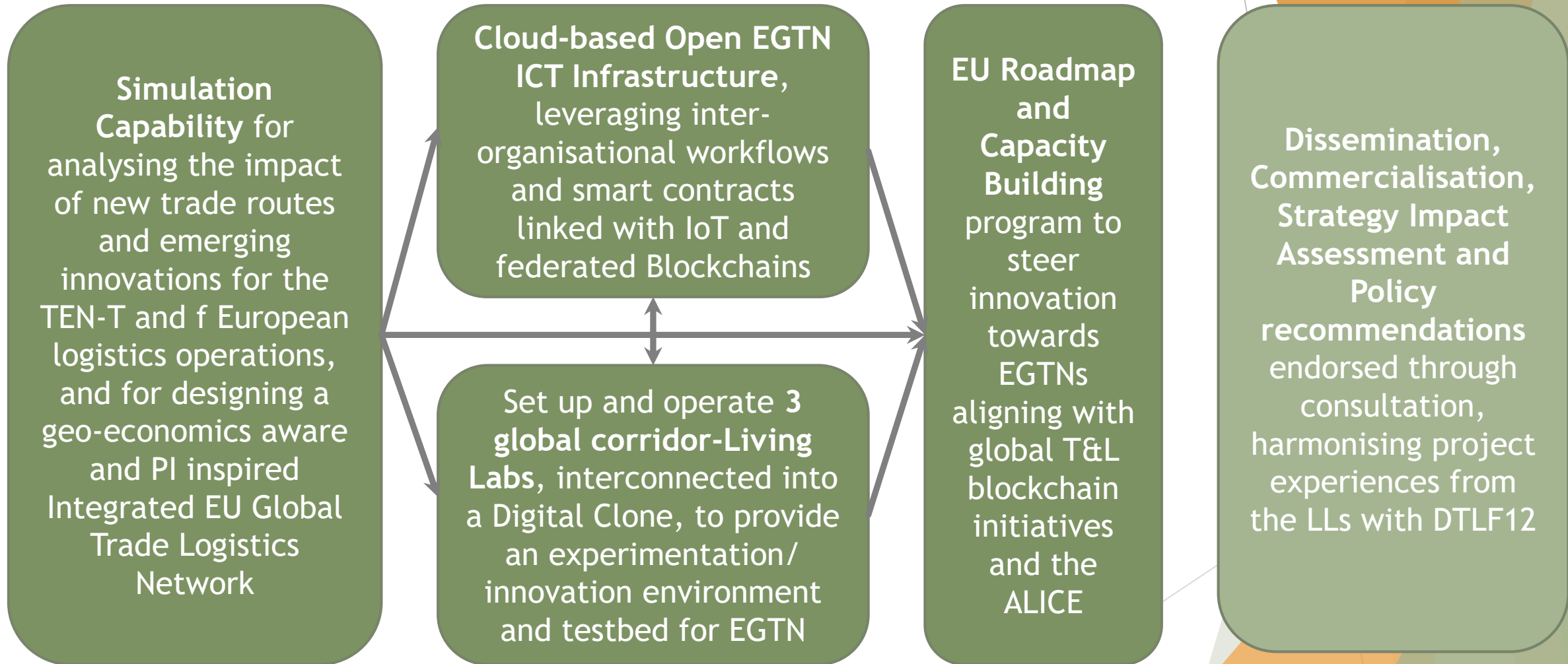
A Cloud-based Open EGTN Infrastructure

- (integrating existing assets and Innovative EGTN Assets)
- EGTN Connectivity
- Industry blockchain Interoperability Layer / Blockchain Integrator
- Predictive and optimisation analytics EGTN Algorithms
- Smart Hubs / Intelligent PI Nodes

PLANET High-level Architecture



PLANET Objectives



Progress Verification Indicators (PVI)

Simulation

- **Simulation** capability tuned to represent **TEN-T integrated Green EU-Global T&L networks** (M10)
- **Modelling and simulation of corridor infrastructure** including ‘vital’ urban nodes’, and Principal Entry Nodes, to determine KPIs associated with modal availability, efficiency, CO2 reduction, market function and intensity;
- EGTN specification with industry endorsement through ‘**strategic workshops**’ with **100+ industry representatives** and experts (M16)

Open EGTN ICT Infrastructure

- A generic, customisable, **validated EGTN infrastructure** that supports the implementation of the Reference EGTN specification in LL solutions;
- Evidence of **utilisation in each PLANET LL** (M21), including **baseline measurements** and inter-organisational workflows through federation of 3+ industry platforms and blockchains
- Assessment / new functionalities requirements report for each Infrastructure component from each LL acted upon (M28)

Global corridor Living Labs

- **Initial LL specifications completed** (M7) providing the innovation agenda and required datasets for the simulation work
- Each **LL use case implemented** (M21) with completed baseline measurements
- **Evidencing benefits** (M25) and prioritisation of components/innovations for the project’s final phase [M28-M34].
- Evidence based EGTN impact assessment endorsed by joint consortium/Advisory board major event co-sponsored by ESC, UIRR and ALICE

EU Roadmap and Capacity Building & Dissemination

- Roadmap & recommendations published and disseminated by the main T&L Associations
- Recommendations report for 2023 review endorsed through 2 planned workshops with TEN-T corridor coordinators
- EGTN training & supporting material validated by public authorities
- Successfully achieving dissemination, adoption and exploitation KPIs

PLANET Impact

Provide better understanding of the impact of emerging technologies on freight flow'

- Projected impact of autonomous vehicles in enhancing mode services towards green transport
- Evaluate warehousing automation impact on PI-corridors and last-mile delivery efficiency and sustainability LL1
- Models, best case scenarios and ICT systems to promote the development of EU and worldwide hyperloop network and standards
- Evaluate BC impact on corridor transparency, process integrity, efficiency & security
- Evaluate Industry 4.0's impact on intelligent transport node decision-making
- Level of effectiveness of the Technology Exploitation Paths to the optimal exploitation of T&L innovation technologies, BC, Industry 4.0
- Economic & environmental impact of BC in Global Transport & Logistics operations

Speed up the process and transition towards the PI paradigm

- Economic/Environmental impact of PI in real-world business cases
- Level of effectiveness of standardized PI LSP Applications in introducing the PI paradigm to SME LSPs
- Enhanced stakeholder capacity in governing PI-Global trade web
- Level of effectiveness of EGTN Governance models section 1.3.4
- Level of effectiveness of the PI transition guidelines for capability-rich and capability-poor Supply Chain environments

Better understanding of links between technology, trade and geopolitics

- Level of effectiveness of simulating the links between geopolitics and trade specified by trade change vectors
- Economic and environmental impact of PI on new trade routes to/from Europe
- Level of effectiveness of simulating the links between technology and trade
- Number of disadvantaged regions analysed

Improve integration of the European transport network with the global network

- Number of scenarios for integrated EU-Global trade logistics Network
- Acceptability of identity federation management
- Relevance of customisable corridor infrastructure performance monitoring dashboard for LSPs and authorities]
- Level of feasibility and effectiveness of the recommendations on infrastructural & technological TEN-T interfacing to global networks
- Level of feasibility and effectiveness of the recommendations for the development of disadvantaged regions

R&D Assets

| R&D Asset | Exploitable Interest | TRL Start/End | | Partner |
|---|-----------------------------|---------------|---|-------------|
| Geo-economics linked to Vectors of Change in trade flows Econometric models for flows forecasting and assessing investment options | Consultancy Services | 3 | 6 | PAN |
| Simulation models for global/TEN-T corridors to inform network design and impact of innovations | Consultancy Services | 3 | 6 | ITA |
| Hyperloop inclusive Network scenarios | Consultancy Services | 3 | 6 | HARDT |
| IoT PoCs based on DASH7, RFID, LPWSN and sensor systems to support the Polish and EU logistics industry | IoT | 3 | 5 | ILIM |
| IoT infrastructure for increased automation in T&L operational management with automated localised data capture, processing and event-based transmission including registration of events through EPCIS (GS1 standard) | IoT | 5 | 6 | NGS ILIM |
| Connectivity Infrastructure Components linked to a commercial suite of semantic technologies enabling better content management, knowledge discovery and semantic search in supply chain /corridor communities | Software | 4 | 7 | SIR |
| Smart import/export door-to-door transport chain management of containerized cargo utilising a combination of IoT (real-time monitoring of logistics assets), AI (better forecasts and intelligent decisions) and blockchain (paperless transactions and the register of transport events) | Software platform | 4 | 7 | COSSP |
| Synchromodality based on a Blockchain enabled platform - combination of intelligent routing driven by advanced IoT and analytics and encapsulated in Blockchain platform. This PoR platform will further enable the Port to become an intelligent hub for all of their customers in a future PI world | Software platform | 3 | 5 | BlockLab |
| An interoperability Layer supporting federation of Blockchain. | Consultancy Services | 2 | 5 | KNT |
| PI driven models for EU-Global transportation networks operating on smart contracts hosted on interconnecting blockchains | Consultancy Services | 3 | 5 | INLE |
| Predictive and optimisation analytics components to support Physical Internet models | Analytics products | 3 | 5 | IBM |
| A software-as-a-service (SaaS) model to encompass the technology outputs in a commercially driven cloud-based EGTN platform providing the services and adaptations that future PLANET users will require. Build on top of open SELIS platforms PubSub, privacy-preserving Data Sharing, Big Data Analytics this aims to create a global view of the entire participant corridor network aided by semantics for sensors/ applications and federated Blockchains | Cloud platform as a service | 4 | 7 | KNT |

Position Papers

- ▶ **Geo-economic analysis of the dynamics and potential impact of new trade routes for EU (RSM).** At macro level: how changes in trade policies, trade flows, and investments are expected to influence trade/routes to from EU and EU businesses. At micro level, T&L network models that guide EGTN design will be investigated.
- ▶ **Impact analysis of New Trade Routes on TEN-T corridors and multimodal transfer nodes from economic and environmental perspectives (PANTEIA)**
- ▶ **Focused analysis on railway transport-corridors to/from the EU:** Interconnection problems relating to economic, information, scientific, technical and ecological aspects (UIRR)
- ▶ **Analysis of the transition towards the PI paradigm.** Analysis of the role of IoT, BC, smart contracts, participation incentives mechanisms, automation and autonomous technologies, 5G, 3D printing, UAVs and hyperloop; (2) providing initial models (INLECOM/FV)

PLANET 18m Timeline

[illegible]



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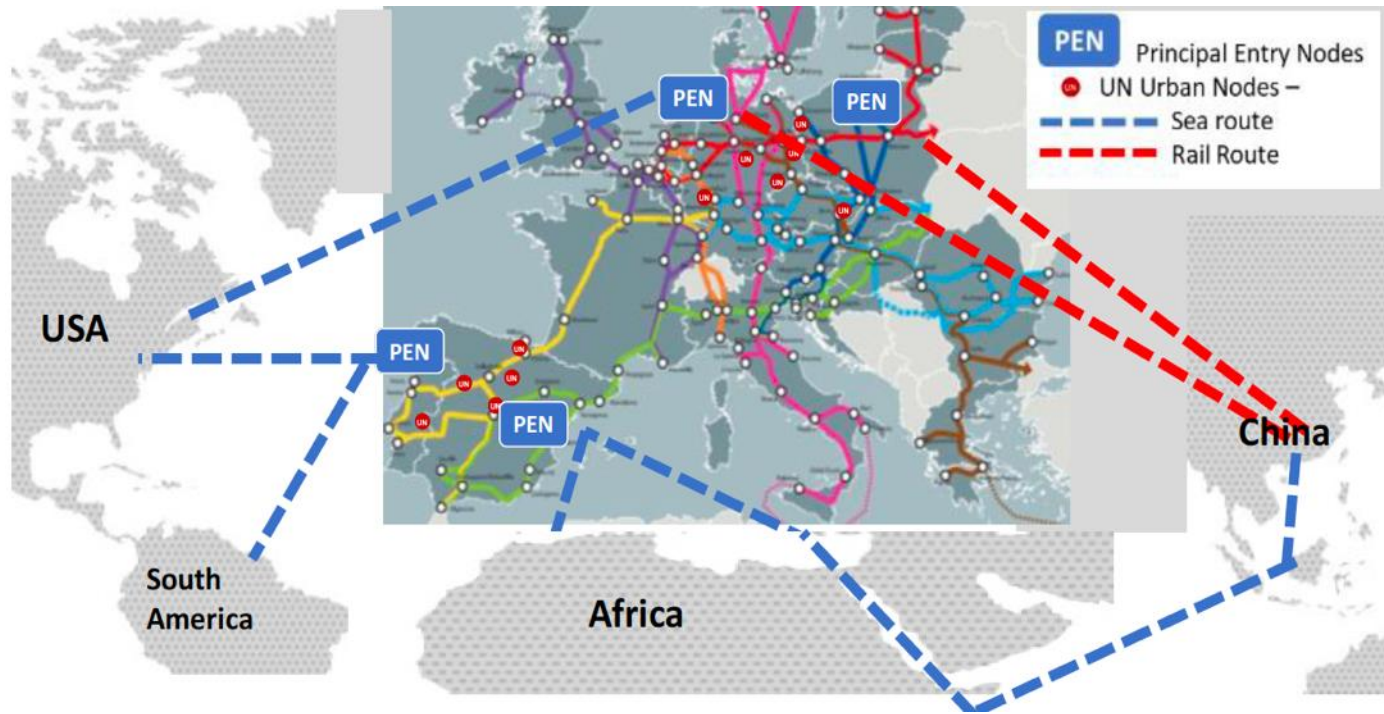
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PLANET TARGET IMPACTS AND BARRIERS

| Stakeholder | PLANET Value proposition | Barrier | Counter measures |
|---|---|---|---|
| Member States (MS) | Guide future TEN-T physical, digital and regulatory development aligned to geo-economics, and PI driven technological innovation | <ul style="list-style-type: none"> High implementation costs representing high-risk investments with long (ROI) timeframes Collaboration between MSs EU-level regulatory harmonisation with international developments | <ul style="list-style-type: none"> Simulation based impact analysis TEN-T and PI Investment Guide for Member States Collaborative multi criteria DSS for transport |
| Interface Hubs (maritime ports, inland hubs, city hubs) | Achieve enhanced integration to the global T&L network and provide physical/digital/regulatory connectivity & compliance | <ul style="list-style-type: none"> Investment considerations Specifying and managing synchromodality / PI corridors/ governance between 'PI' hubs Fears of automation implication on jobs or on changing established practices | <ul style="list-style-type: none"> PPP strategies linked to ROI simulations Synchromodality on Blockchain enabled Platform Governance models included in simulation capability including PI nodes with licenses to operate |
| LSPs | <ul style="list-style-type: none"> Provide secure, trusted, easy collaboration with digital mediation Improved / automated regulatory compliance | <ul style="list-style-type: none"> Fragmentation of initiatives across domains; technological challenges, the heterogeneous field of T&L networks Specifying and managing appropriate data sharing incentives | <ul style="list-style-type: none"> Improve visibility of roles and contributions to the value chain and sustainability KPIs Shippers interaction improvements |
| International Rail operators | Develop collaborative model within Europe and with intercontinental flows between rail operators and logistics/ transport service providers | <ul style="list-style-type: none"> Back-end systems from different stakeholders difficult to integrate Transport and Logistics tend to operate processes more on traditional basis rather than on data management systems Lack of experience and equitable approaches / incentives for allocating benefits of co-modal collaboration | <ul style="list-style-type: none"> Explore pay-for-use ICT integration services complementing operator's ICT capabilities Improve transaction transparency for enhancing co-modal advantages Collaborative multi criteria DSS for rail and PI Network services for rail operators. |
| Shippers | <ul style="list-style-type: none"> Improved customer service offerings by leveraging new capabilities of Carriers and LSPs. Improved accessibility to EGTN by all actors Improved average CO2 emission factor (g CO2/tonne-km) and other sustainability KPIs | <ul style="list-style-type: none"> Reduced control of logistics innovation drivers because of widespread outsourcing Traditional shippers' diffidence when testing new systems and technologies that their commercial data might be divulged and become available to competitors | <ul style="list-style-type: none"> Improve visibility of new capabilities potential in the logistics market. Demonstrate how blockchain technologies can allay fears about the leakage of sensitive data |



PLANET Living Labs



- **LL1 - PI and Blockchain** for optimised door-to-door Asia-Europe corridors - Mediterranean Corridor
- **LL2 - Synchromodal dynamic management** of TEN-T & intercontinental flows promoting rail transport
- **LL3 - IoT for Silk Road Route** - reliable, transparent and fully connected corridor from China to the EU

PLANET LL1 - PI & BC for optimised door-to-door Asia-Europe corridors - Mediterranean Corridor (PoV, COSCO)

- **UC1: import/export door-to-door transport chain of containerized cargo between China and Spain** and will evaluate how the combination of IoT, 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
- **UC2: warehouse operations** to explore how new IoT, AI, AR and automation technologies can contribute to the development of intelligent automated logistics nodes of the EGTN/PI network (how to integrate smart Warehouse Nodes for EGTN routing decisions, ultimately creating PI Warehousing Nodes)
 - ▶ Examine role of new technologies in EU's strategic T&L direction with China UC1
 - ▶ Model Multimodal transfer zones using autonomous vehicles and Intelligent Modular Load Units (IMLUs) UC2
 - ▶ Leverage Technological Advancements and New Logistics Concepts UC1 and 2
 - ▶ Demonstrate Secure and Privacy-Preserving Logistics Data Sharing Infrastructures for Globally Interconnected Supply Chains, to increase confidence in their use and to automate complex supply chain processes (R&D pillar 2) UC1

PLANET LL2 - Synchromodal dynamic management of TEN-T & intercontinental flows promoting rail transport

- **UC1: Synchromodality in a BC enabled Platform** utilizing advanced IoT, supporting BlockLab customers & communities to create the best multi-modal alternatives for logistics solutions within the LL2 corridors
- **UC2: investigate Eurasian rail freight expansion in the LL2 corridor.** UIRR will provide data from services and report on key issues to be addressed for infrastructure development and examine potential for expanding services in the corridor and implement (in a test environment) the use of BC on rail freight transport between China and Europe.
- **UC3: analyse LL2 corridor flows and assess the implication for TEN-T infrastructure**
 - ▶ Assess implications of new trade routes and how best to maximise the EU's economic prospects through strategic planning
 - ▶ Examine the role of new technologies (e.g. BC) on intercontinental rail services promoting EU's strategic cooperation with China and USA
 - ▶ Leverage BC interoperability and federation for Supply Chain platforms extending the Blocklab repository knowledge hub with synchromodality models as a service with predictive and prescriptive analytics enabling corridor actors to establish the best multimodal solutions that can optimise the interconnection of supply chains along the TEN-T Corridors a "green" Global T&L context

PLANET LL3 - IoT for Silk Road Route - reliable, transparent and fully connected corridor from China to the EU

- **Standardising information flows** and digitalising interactions between actors within the network (Alibaba, China Post, Polish National Post);
 - **Real-time access to information** on cargo coming from China to Poland along the entire supply chain through **application of IoT and EPCIS to monitor** supply chain events and support operational optimisation;
 - Facilitating effective **co-modal end-to-end transport** within EU's internal rail network.
- ▶ Assess implications of new trade routes, the Silk Road, and how best to maximise the EU's economic prospects
 - ▶ Promote standardization both by GS1 and also the development of European and worldwide standards easing adoption of EGTN innovations
 - ▶ Simplification of customs clearance and improvement of logistics operations due to identification of flows of unregistered parcels from China to EU
 - ▶ Support increased automation in T&L operational management through EPCIS (GS1 standard)
 - ▶ Apply PI principles in the development of a Polish EGTN for the e-commerce sector.