#H2020RTR21

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2 ZERO CCAM CONNECTED, COOPERATIVE & AUTOMATED MOBILITY ERTRAC European Commission

Overall project introduction

- Project start: 01/06/2020
- Duration: 36 months
- Budget: 7,037,670 EUR
- GA no: 860274
- 34 partners
- www.planetproject.eu

- Inlecom (Coordinator)
- DHL & COSCO
- Port of Rotterdam
- HUPAC
- Polish National Post
- GS1
- IBM Ireland
- ITAINNOVA
- UIRR
- CERTH
- ILIM
- PANTEIA
- ESC
- CITYLOGIN
- Fundación Valenciaport
- HYPERLOOP
- NGS
- PNO

PLANET Vision

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

Efficiently interconnecting infrastructure with geopolitical developments

Optimising the use of current & emerging transport modes and technological solutions

TEN-T, Rail-Freight **Corridors**

Future New Silk Road & emerging trade routes

Ensuring equitable inclusivity of all participants

Increasing the prosperity of nations

Preserving the environment

Enhancing Citizens quality of life

Objectives

Transport Flows Models & Simulation Capability

- End-to-end transport chain models including last mile and ocean shipping underpinned by IoT, BC and AI
- Eurasian rail freight expansion & Integration with European RFCs
- Synchromodality on BC enabled Platforms integrated with predictive and optimisation analytics
- Measures and monitor the connectivity of principal entry nodes (CCI)
- Warehouse operations planning and spare capacity quantification
- Simulation models for global/ TEN-T corridors to inform network design and impact of innovations
- Simulation Capability

Cloud-based Open EGTN ICT Infrastructure

- Open PubSub platform, privacy-preserving Data Sharing
- Connectivity Infrastructure for Semantic Interoperability
- Interoperability Layer supporting federation of BC
- IoT Architecture and GS1 PoC implementation
- Predictive and optimisation analytics components to support PI models
- Multi criteria DSS specially to support strategic development of TEN-T corridors
- Unified Human Machine Interface
- increase the effectiveness of the optimisation of routing as a service by acknowledging the relevant-dynamic network

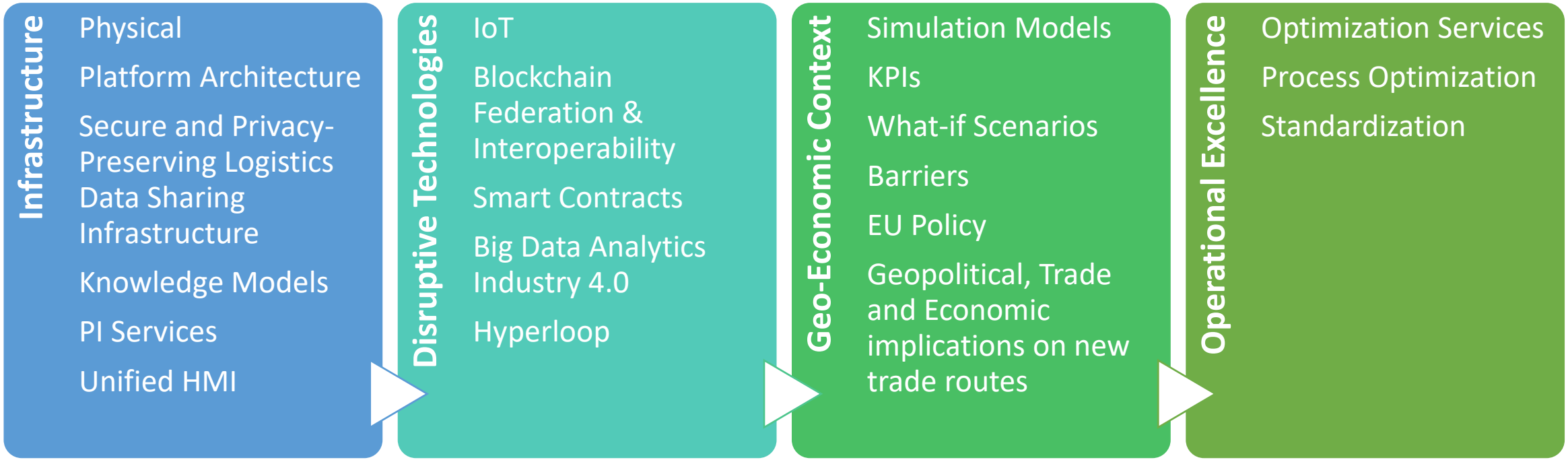
Key Performance Indicators

- Load Factor +20%
- Operational Costs -7%
- Paper-based processes cost -15%
- Efficiency of reconciliation >20%
- CO_2 -15%
- Increase speed of collaboration decisions 20%
- Increase speed of inventories and operational efficiency >7%
- Predict demand to enable smart contract services to automate and reduce to minutes the time for employing urgent transportation services reducing disruptions by 7%

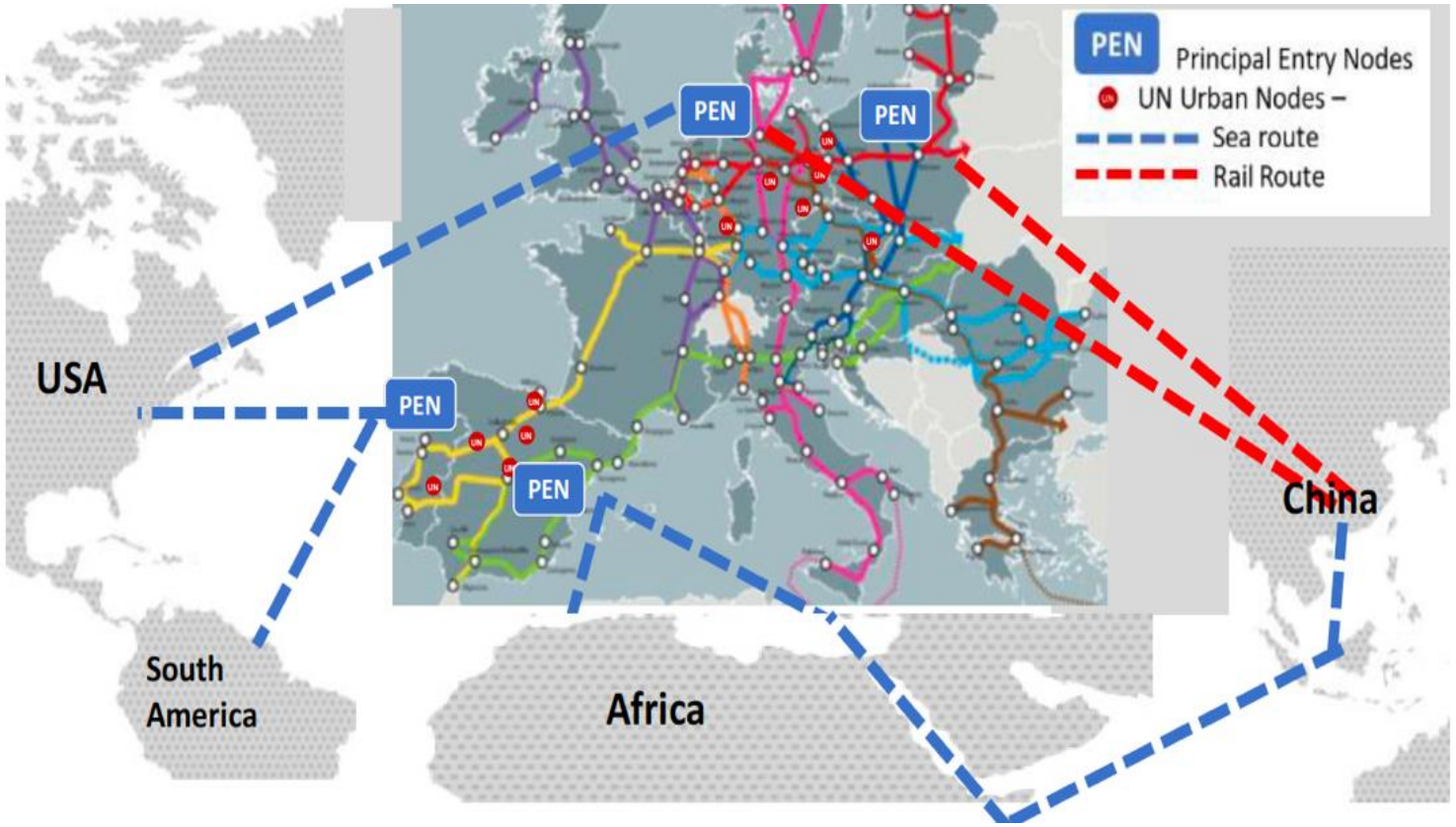
Recommendations & Dissemination

- 4 Position Papers
- Identification of forthcoming international, EU and national legislative and policy initiatives
- Qualitative assessment of the impact of each initiative on the LLs using experts' focus groups
- Prioritisation of the forthcoming legislative initiatives and selection of the ones to be used
- Active contribution to the revision of TEN-T guidelines and RFC Regulation
- 3 x patents under development

Green EU-Global Trade & Logistics Networks (International Logistics Systems)



Living Labs



- **LL1** - PI and AI Optimization for door-to-door Asia-Europe Mediterranean Corridor
- **LL2** – BC-based Synchromodal dynamic management of TEN-T & intercontinental flows promoting rail transport
- **LL3** - IoT & Standardization for Silk Road Route – reliable, transparent corridor from China to the EU

PLANET Position Papers

- **Geo-economic analysis** of the dynamics and potential impact of new trade routes for EU. 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
- Focused **analysis on railway transport-corridors** to/from the EU: Interconnection problems relating to economic, information, scientific, technical and ecological aspects
- **Analysis of the transition towards the PI paradigm**. Analysis of the role of IoT, BC, smart contracts, participation incentives mechanisms, automation and autonomous technologies, hyperloop, etc.; identify initial models

Shifting Trade Patterns

#	Port	Country	2018 TEUs	2017 TEUs	#	Port (cont.)	Country	2018 TEUs	2017 TEUs
1.	Valencia	Spain	5,104,000	4,832,136	11.	Port Said	Egypt	2,610,000	2,528,000
2.	Algeciras	Spain	4,772,000	4,380,849	12.	Alexandria	Egypt	1,757,000	1,589,000
3.	Marport	Turkey	1,591,983	1,711,357	13.	Haifa	Israel	1,464,000	1,343,000
4.	Piraeus	Greece	4,908,000	4,060,000	14.	Ashdod	Israel	N/A	1,525,000
5.	Gioa Tauro	Italy	2,301,000	2,448,570	15.	Beirut	Lebanon	1,300,000	1,305,038
6.	Marsaxlokk	Malta	3,310,000	3,150,000	16.	Marseille-Fos	France	1,400,000	1,362,204
7.	Genoa (Savona-Vado)	Italy	2,609,000	2,622,187	17.	Izmir-Alsancak	Turkey	610,908	610,908
8.	Barcelona	Spain	3,423,000	3,006,872	18.	Tanger-Med	Morocco	3,472,451	3,312,409
9.	Mersin	Turkey	1,723,000	1,591,983	19.	Damietta	Egypt	1,150,132	1,131,226
10.	La Spezia	Italy	1,543,000	1,473,571	20.	Koper	Slovenia	988,501	911,528

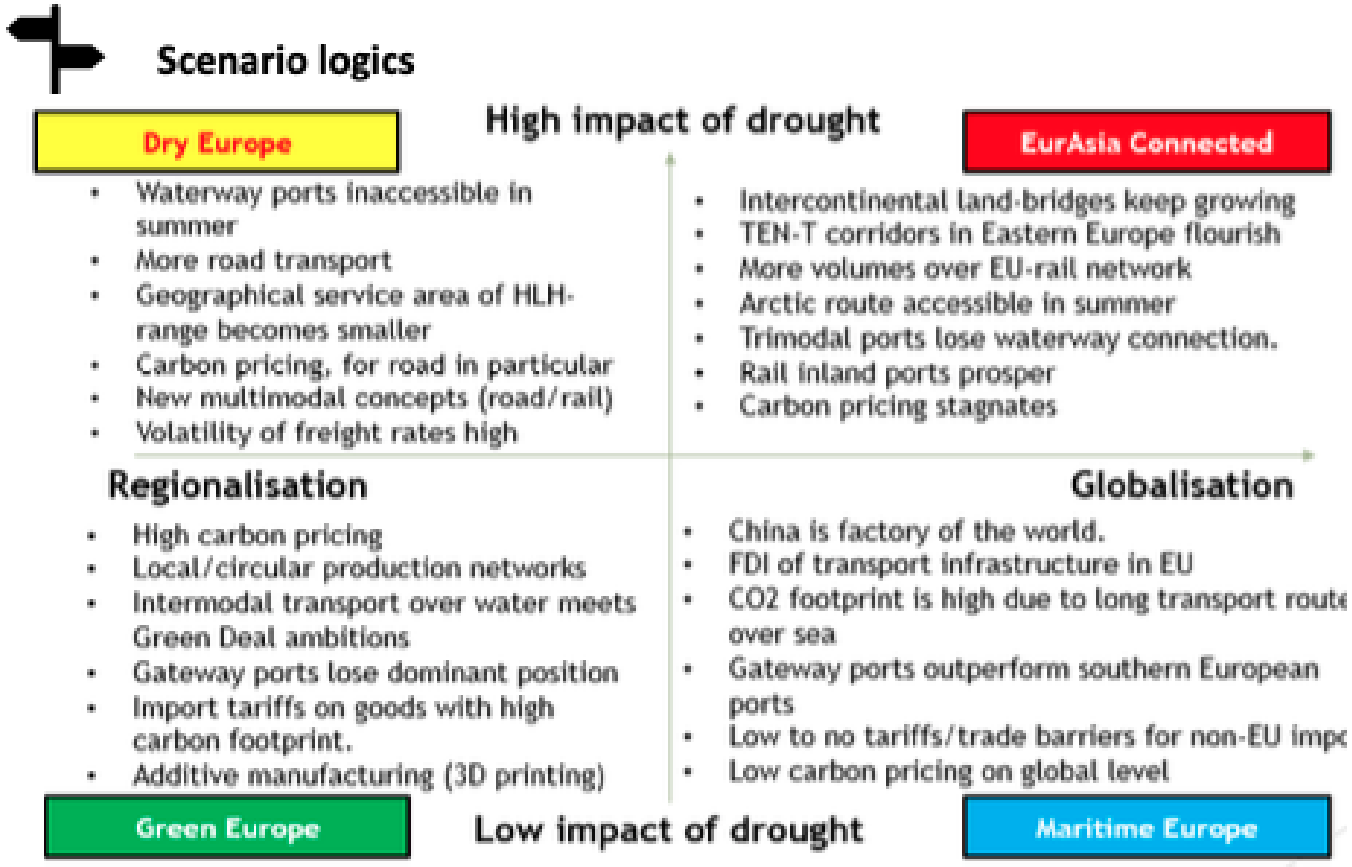
- Mediterranean has pure transshipment and mixed transshipment hubs.
- Strategically located on East-West. Tangiers and Algeciras also on North-South trade routes
- Terminals often owned by carriers. Hubs serve continents rather than regions.
- Footloose in nature, trade patterns can shift easily

- The route from Mumbai and Saint-Petersburg can be shortened by 10 days by the INSTC, compared to the route that uses the Suez Canal. The biggest difference is the way that it is being developed as a multi-stakeholder corridor.
- Connectivity is again a key-word in the development of this route

Shifting Trade Patterns

Scenario development aspects:

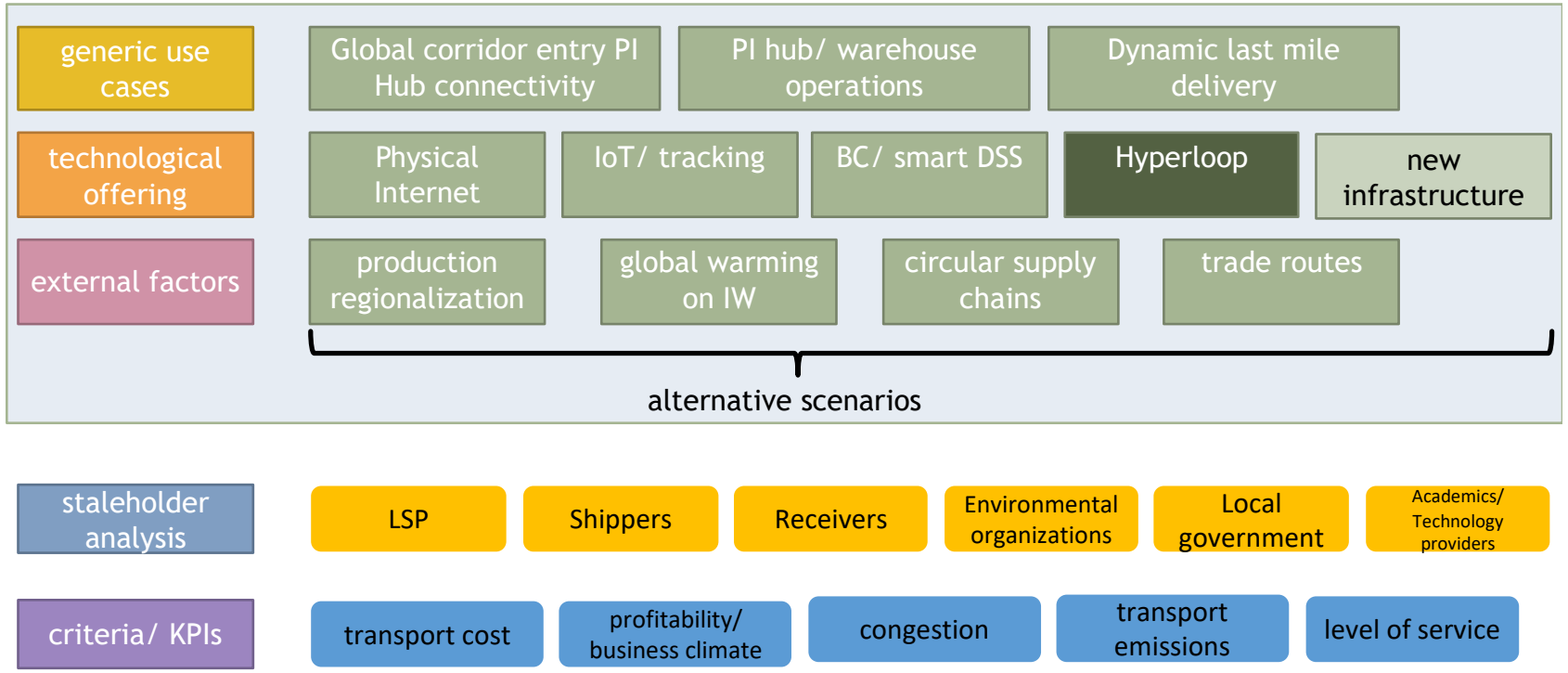
- Social
- Economic
- Trade routes
  - Arctic
  - Rail connectivity
- Environmental
  - CO2 regulations
  - circular supply chains
- Political
  - Regionalization of production
- Technological



Strategic Modelling Capability

Aims to utilize technological impact findings to inform TEN-T development roadmap

- generic use cases that cover the entire supply chain (international trade routes to last mile)
- multiple stakeholders and their priorities through analytical hierarchy process (MAMCA)
- future trade needs and development scenario

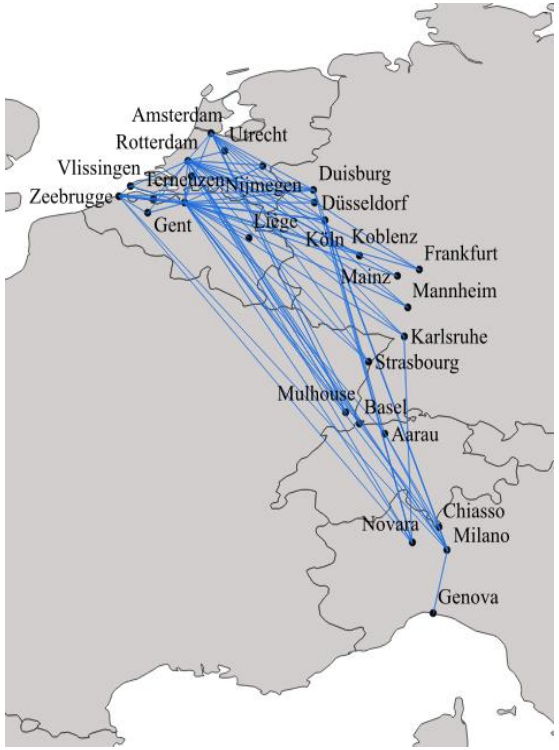


CONNECTIVITY INDEX

Inland Port	Index overall	Index Rail	Index Barge
Duisburg	100,00	93,75	100,00
Mannheim	85,45	100,00	60,00
Basel	78,18	81,25	68,00
Ludwigshafen	63,64	84,38	32,00
Neuss	50,91	28,13	76,00
Köln	49,09	62,50	28,00
Novara	36,36	62,50	-
Kehl	25,45	18,75	32,00
Melzo	21,82	37,50	-
Karlsruhe	21,82	18,75	24,00
Busto Arsizio	20,00	34,38	-
Germersheim	18,18	15,63	20,00
Düsseldorf	18,18	12,50	24,00
Gernsheim	18,18	18,75	16,00
Andernach	12,73	6,25	20,00
Bonn	12,73	-	28,00
Emmerich	12,73	-	28,00
Terminal Intermodale di Mortara	12,73	21,88	-
Gustavsburg	10,91	-	24,00
Emmelsum	10,91	-	24,00

Preliminary findings for the Rhine-Alpine corridor based on Service frequency

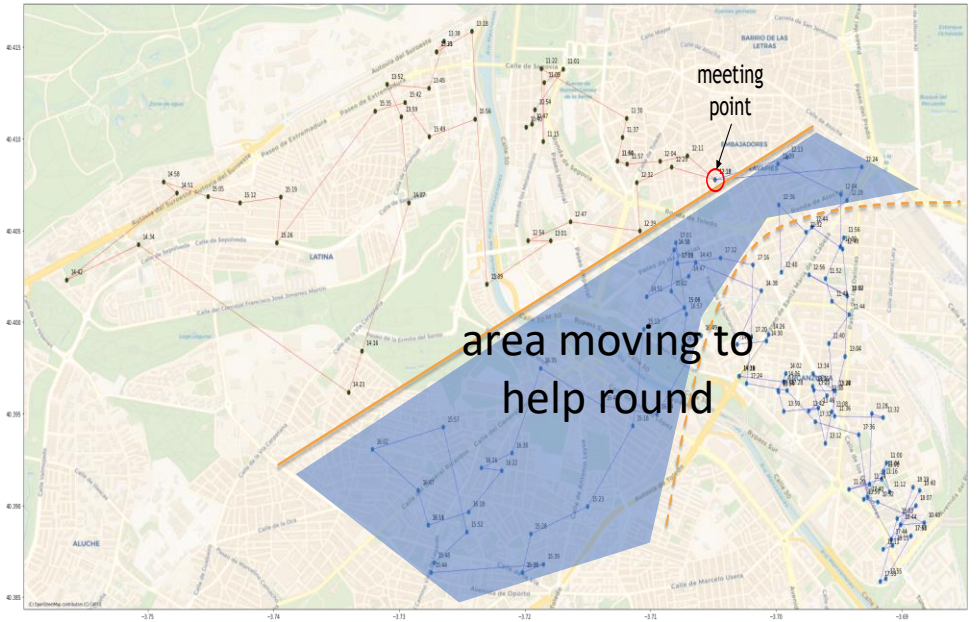
- By composing an index, complex, multidimensional concepts can be summarized and reduced the visible size of a set of indicators without losing the underlying information.
- Nodes' attractiveness is determinant for trade flows across the network
- Components : service frequency, port capacity, port infrastructure, digital infrastructure, ease of process, service quality.



PI Services- Last mile collaboration for urban uncertainty

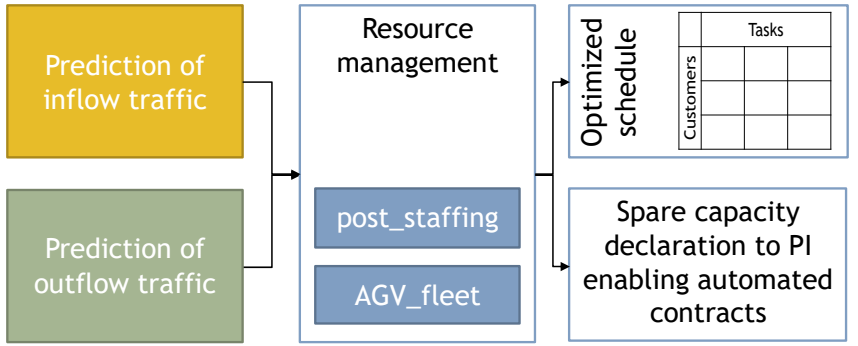
Last mile delivery delays → Collaborative opportunities → Algorithm for establishing optimal collaborative opportunity → redistributes parcels using ML clustering algorithm → Select van meeting point (micro-consolidation) → Redesign vehicle routes linked with consolidation location

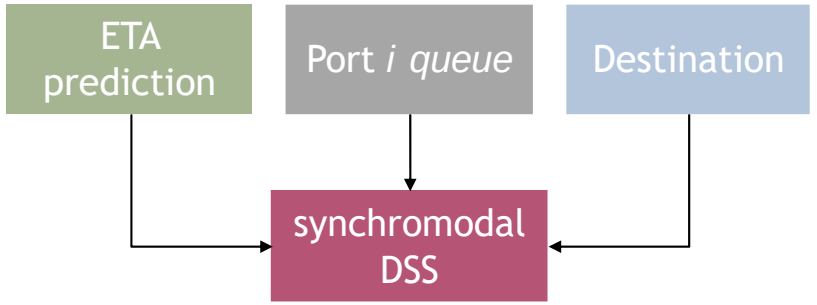
- Dynamic collaboration in last mile delivery, align with open PI transport services
- Automates and optimizes a process that is currently undertaken manually & inefficiently
- Assists decisions in highly uncertain urban environment
- Currently tested in Madrid



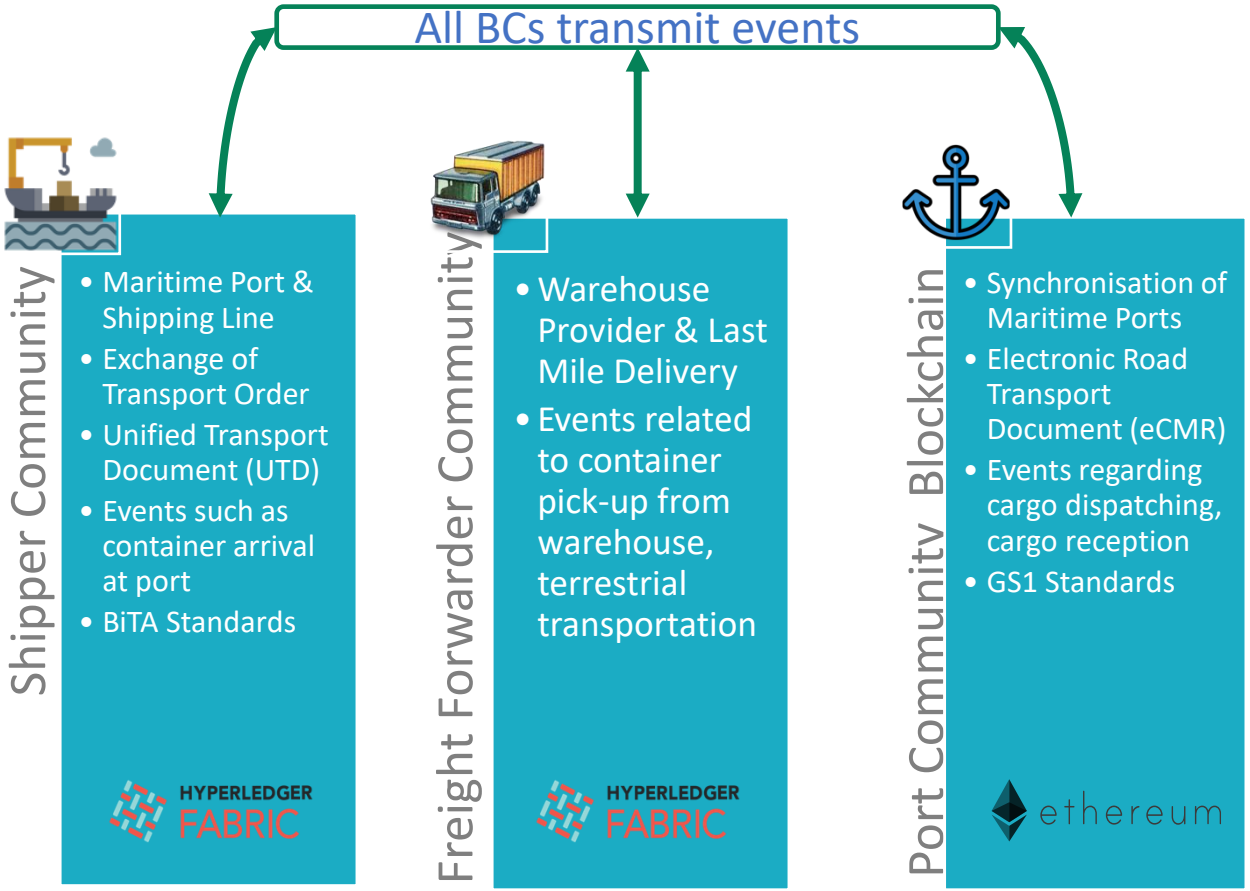
Predictive Analytics/AI based models

- Physical Internet Warehouse Operation management
  - Supplier collaboration analytics – capacity, item availability
  - Resource forecasting model – proactive resource allocation
  - Enabled smart contract for automated payments
- Physical Internet Smart Hubs – use of multivariate data for route optimisation
  - Marine, port-corridor traffic – actual arrival time
  - Dynamically re-design last mile routing delivery rounds, improve transport service level
  - Carbon footprint predictive model
- Data gathering from distributed sources of information generated across events and processes of a transportation network
- Data aggregation through AI and data analytics to provide integrated information to network transporters and node stakeholders





Blockchain Interoperability



- Event-based synchronisation between different ledgers
- Open-source repository
- Supports several ledgers
- Build upon SOFIE project
- Exploring Hyperledger Cactus

Mid to long term expected impact of the project

- Support technological innovation and digitization of T&L industry
- Enable and project PI's added value (environmental and economic) at all SC stages: international trade routes, points of entry, long-haul, last mile
- Provide the tools & services for increased SC resilience
- Inform policy and infrastructure/ technology investments in a robust futureproof way, for a smooth integration with international trade routes also considering the development of disadvantaged regions
- Other projects could also benefit from PLANET's activities by utilizing the:
  - Experience acquired in applying BC and BC Interoperability in the SC
  - Benefits of new type of nodal points & experience acquired on collaborative logistics models
  - Micro-simulation methodology for evaluating the impacts of new technology implementation

Future Research needs & Market uptake

- Explore for more scalable and secured Blockchain Interoperability frameworks
- Explore the modal shift utility of synchromodal solutions facilitated by IT
- Evolve the Corridor Connectivity Index and investigate potential uses
- Explore new types of intelligent PI nodal points

- Multimodal shipment information digitalization system (based on Blockchain) for synchromodal (document) management PoR-UK
- IoT trackers and gateways designed to facilitate PI-envisioned end-to-end visibility
- Intercontinental rail freight for sensitive, perishable, high-value commodities as lead times and service quality improve
- Simulation of new technologies & impact assessment as a decision support tool for introducing/investing in new technologies

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Mid to long term expected impact of the project

Provide better understanding of the impact of emerging technologies on freight flow'	Speed up the process and transition towards the PI paradigm	Better understanding of links between technology, trade and geopolitics	Improve integration of the European transport network with the global network
•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	•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	•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	•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