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

D5.3 Observations and Recommendations of the Advisory Board - final version

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Glossary of Terms and Abbreviations:

Abbreviation / Term	Description
AB	Advisory Board or simply, “the Board”
AI	Artificial Intelligence
AIS	Automated Identification System
API	Application Programming Interface
BC	Blockchain
BlockLab / DockLab	Blockchain Fieldlab BV (currently DOCKLAB) – Netherlands (PLANET partner)
BREXIT	Term to describe the withdrawal of the United Kingdom from the European Union
BRICS	Brazil, Russia, India, China, South Africa
CBV	Chartered Business Valuator
CERTH	Greece´s National Center for Research and Technological Development (PLANET partner)
CIRPASS	Ecosystem Digital Product Passport project (www.cirpassproject.eu)
CMR	Convention on the Contract for the International Carriage of Goods by Road
CN	China
COSCO / COSSP	Cosco Shipping Technology (Spain) Co. Ltd. (PLANET partner)
CPSI	Sines Port Community - Portugal (PLANET partner)
DHL	DHL Exel Supply Chain SL - Spain (PLANET partner)
DIL	Digital Infrastructure Logistics project (Netherlands National Growth Fund)
DLT	Distributed ledger technology
DTLF	Digital Transport and Logistics Forum (European Commission)
EBOS	EBOS technologies limited - Cyprus (PLANET partner)
EBSI	European Blockchain Services Infrastructure
EC	European Commission
eCMR	Electronic Convention on the Contract for the International Carriage of Goods by Road
eFTI	Electronic Freight Transport Information
EGTC	European Grouping for Territorial Cooperation / Interregional Alliance for the Rhine Alpine Corridor (PLANET partner)
EGTN	European Green (global) Transport Network (www.PLANET.eu)
EPCIS	Electronic Product Code Information Service
EPCIS 2.0	Electronic Product Code Information Service 2.0 (in cooperation with IOTA)
ERASMUS	Erasmus University Rotterdam - Netherlands (PLANET Partner)

ERATV	European Register of Authorised Vehicles - (https://www.era.europa.eu/registers/evr_en)
ERP	Enterprise Resource Planning
ESC	European Shippers Council - Belgium (PLANET Partner)
EU	European Union
FEDeRATED	EU project for digital cooperation in logistics (www.federatedplatforms.eu)
FENIX	European Federated Network of Information Exchange in Logistics - FENIX project (www.fenix-network.eu)
FENIX 2.0	FENIX non-profit association (https://fenix-network.eu/fenix-2-0/)
FV	Fundación Valenciaport - Spain (PLANET Partner)
GA	Grant Agreement
GDP	Gross Domestic Product
GRAI	Global Returnable Asset Identifier
GS1	Global Standards 1
GTIN	Global Trade Identification Number
HARDT	HARDT - Netherlands (PLANET Partner)
IBM	International Business Machines Limited - Ireland (PLANET Partner)
ICT	Information and Communication Technologies
ILIM	Institute for Logistics and Warehousing - Poland (PLANET partner)
InfluxDB	Influx database
INLE	INLECOM Group - Greece (PLANET Partner)
IoT	Internet of Things
IOTA	Internet of Things Application (www.iota.org)
ITTAINOVA/ITTA	Instituto Tecnologico de Aragon - Spain (PLANET Partner)
KER	Key Exploitable Result
KG	Knowledge graph
KONNECTA / KNT	Konnecta Systems Limited - Ireland (PLANET Partner)
KPI	Key Performance Indicator
LL	Living Lab
LU	Logistics Unit
MongoDB	Mongo Database
NGS Sensors	New Generation Sensors SRL - Italy (PLANET partner)
OTN	Optical Transport Network

PANTEIA / PAN	PANTEIA BV - Netherlands (PLANET Partner)
PCS	Port Community System
PEN-CP	Pan-European Network of Customs Practitioners
PI	Physical Internet
PNO	PNO Innovation SL - Spain (PLANET Partner)
PP / Poczta Polska SA	Polish Post - Poland (PLANET partner)
PoR	Port of Rotterdam - Netherlands (PLANET partner)
PoV	Port of Valencia - Spain (PLANET partner)
RALP	Rhine Alpine region or corridor
SIRMA	SIRMA AI EAD - Bulgaria (PLANET partner)
SME	Small and Medium Enterprise
SOSA	Semantic Sensor Network Ontology
S.T.	Sub-task (part of a work package)
SSCC	Serial Shipping Container Code
TEN - T	Trans European Networks - Transport
T&L	Transport and Logistics
TradeLens	TradeLens project (www.tradelens.com)
TRANSFOLLOW	TRANSFOLLOW project (www.transfollow.org)
UC	Use Case
UIRR	International Union for Combined Road and Rail Transport
UN	United Nations
UN / CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
UPU	Universal Postal Union
VLTN GCV	VLTN bv - Belgium (PLANET partner)
WP	Work Package

1 Executive Summary

Deliverable D5.3. is the final version of deliverable D5.2 submitted at the end of 2021 and focuses on presenting the most vital issues for external stakeholders (members of the Advisory Board), how these issues were met by PLANET and which relationships were built with (which) key stakeholders to sustain PLANET´s life beyond the duration of the project, be it by long lasting relationships supportive of a commercialization plan, be it by new partnerships or future publicly and privately funded research.

To achieve the stated outcomes, this deliverable includes an overview of the Advisory Board (AB) members and the relationship built according to the area of competence of the specific Advisory Board member. As explained (later) in the deliverable, the Advisory Board was used as a platform to maximize project outcomes not only by being a source of valuable advice for PLANET and its partners, but also because it was a sounding board composed of members with experience in business, academia and public administration where PLANET´s vision and inventions resonate.

Following the presentation of Advisory Board members and the areas where relationships were formed, the deliverable thereafter provides an overview of the workings and contacts with the Advisory Board ("Chapter 4 – Key Advisory Board activities") with a focus on the November 2022 and March 2023 Advisory Board sessions attended by an average of 45 participants, 15 of which (on average) were Advisory Board members from the EU, the Americas and Asia.

Beyond the Advisory Board sessions, which served as central gathering for external stakeholders and PLANET partners, the Advisory Board maintained relations with PLANET in other ways, including via direct exchanges with partners focused on exchanging knowledge and building synergies.

Having looked at AB members and the relationships built as well as some of the key exchanges between Advisory Board (AB) members and PLANET partners, Chapter 5 provides for the most vital issues for stakeholders by clusters to maximise project impact. The clusters presented aggregate the AB´s input in 3 key areas and how it was internalized by partners:

- ✓ **Cluster 1 - "PLANET vision and EGTN"** where the focus is on the results of this project´s work packages 1 and 2. Abbreviated conclusions:
  - o PLANET´s models internalise geopolitical changes and guarantee PLANET´s openess to the world.
  - o PLANET´s models capture how the Physical Internet may profoundly alter today´s TEN-Ts.
  - o PLANET´s KPIs capture new trade-offs to cover areas such as climate change and related capacity restraints, thus reflecting new equilibriums between "optimalities" and "optionalities" as proposed by the Board.
  - o In PLANET, the "collaborative" and "interoperable" natures of services can be witnessed by the interwoven functioning of different systems, enabled by international standards and regulations.
  - o Technological solutions (e.g.: blockchain or smart contracts) are bespoke to purpose and add-value vis-à-vis technologies previously used.

- ✓ **Cluster 2 - "Demonstration via the Living Labs"** looks at experimentation and demonstration activities carried in work packages 3, the activities of its 3 living labs and synergies with technologies developed in work package 2. Abbreviated conclusions:
  - o PLANET establishes clearly the benefits arising from the solutions developed by looking at their impacts in the different Living Labs.
  - o "Efficient connectivity" is central for the Physical Internet vision put forward by PLANET. As a result, PLANET defines when the use of *real* time sensor data is relevant and when it is not necessary.

- In PLANET, technologies such as smart contracts for seamless multi-party coordination or artificial intelligence are used only where they add value.
- PLANET´s EGTN pre-defined governance arrangements establish how data is managed and accessed.
- PLANET´s technological PI ecosystems are sustained in joint venturing (in anti-trust environments) for common business and more widely, societal benefits.

✓ **Cluster 3 - "Life beyond the project"** focused on work packages 4 and 5´s activities. This cluster looks at commercialisation activities and "life beyond the project". It also includes future research topics to support PLANET´s Physical Internet vision as well as partnerships be it with other projects, the private and public sectors. Abbreviated conclusions:
  - Throughout PLANET a clear link is established between Key Exploitable Results pursued and the role of PLANET in supporting future exploitation either via commercialisation activities, scenario modelling, etc.
  - External interest over PLANET´s solutions expressed itself by signals of interest *during* the project with external parties looking into scaling up the solutions proposed.
  - Partners demonstrated interest to maintain the EGTN instantiation (the "Open EGTN Platform") alive beyond the project´s existence.
  - Technological advancements gain scale by joining larger networks. To this effect, relations developed with the Advisory Board supported PLANET in establishing contacts with other projects and networks that can further the exploitation and commercialisation of PLANET´s solutions.

The referred chapters of the deliverable are thoroughly introduced and outputs mapped in "Chapter 2 - Introduction". The main conclusions are presented in "Chapter 6 - Final Conclusions". Deliverable D5.3 is summed up in this Executive Summary.

This deliverable is further supported by a glossary, lists of tables, images and summaries, a list of references and annexes composed of the 2022 and 2023 agendas of Advisory Board sessions as well as all summaries (of deliverables) submitted by partners to the attention of the Advisory Board.

Summaries were designed in such a manner as to respect confidentiality requirements and support the depth of input provided by PLANET´s Advisory Board to the PLANET consortium. Such advice contributed strongly to further the PLANET project, the latter praised by Advisory Board members as extremely valuable and timely.

2 Introduction

The Trans-European Transport Networks (TEN-Ts) consist of many projects focused on ensuring, cohesion, interconnection and interoperability of all modes of transport. TEN-Ts are impacted by emerging global trade corridors (CORDIS - 2023). PLANET seeks to tackle such impacts by employing cutting-edge technology to address key challenges of sustainability, productivity and inclusivity of all stakeholders. PLANET addresses challenges by assessing the impact of global trade corridors on the TEN-T with a focus in two aspects:

- ✓ A geo-economics approach and modelling of new trade routes´ dynamics as well as their impact on the logistics infrastructure and operations of the TEN-T;
- ✓ The application of disruptive concepts and technologies such as artificial intelligence or blockchain, that already shape the form and focus of the TEN-Ts (European Shippers Council and JustAsk! - 2021).

PLANET is a research project financed by the Horizon 2020 research program - Smart, Green and Integrated Transport work program[2]. The project was granted over €7 million Euros and runs between 01/06/2020 and 31/06/2023.

The PLANET consortium comprises 33 partners including transport and logistics operators, technological champions, research institutes and leading industry associations such as the European Shippers Council[3] and SMEs. PLANET´s stated vision is to advance the European Union´s strategy for Smart, Green and Integrated Transport by efficiently interconnecting TEN-T infrastructure with geopolitical developments such as the Silk Road Initiative, whilst recurring to cutting-edge technological solutions, the latter understood as enablers of common societal values, including competitiveness, cooperation, sustainable development and prosperity for all.

The realisation of the described vision is what PLANET defines as the Integrated Green EU-Global Transport and Logistics Network (EGTN) consubstantiated in a multi-stakeholder ecosystem, integrated to provide interconnected services made available on the EGTN instantiation (the Open EFTN Platform), as explored later in this deliverable.

One of the consortium´s internal structures behind the PLANET project - recognized as such by the Consortium and Grant Agreement (GA)´s signed by PLANET´s partners and the European Commission - is the Advisory Board (AB). The GA´s subtask ST5.1.2 defines "the AB (as) an independent group composed of external experts that will provide expert advice to the project (…) to maximize the impact of project results."

Within the said purpose the GA establishes the requirement for "dedicated communications with the Advisory Board both in requesting advice on specific activities, research questions and in circulating material for dissemination purposes" (page 39, Annex 1 – Part A – Grant Agreement). The European Shippers Council led this work. PLANET partners were also expected to engage with the Advisory Board and indeed did so, either via direct interactions, active participation in Advisory Board sessions, etc.

Furthermore, the AB is composed of 26 external advisors originating from various parts of the world, drawn from academia, business and public administration with a range of knowledge relevant to the project's ambitions. The AB met annually, stakeholders signed Non-Disclosure Agreements and, where relevant, Letters of Support as detailed in Annex 1 of the Grant Agreement.

Still according to the said Agreement two key deliverables translate the structure, workings, purpose and outcomes of the Advisory Board in the PLANET project:

2 Further information: https://cordis.europa.eu/programme/id/H2020-EU.3.4.
3 European Shippers Council: www.europeanshippers.eu.

- ✓ Deliverable D5.2: “Observations and Recommendations of the Advisory Board - v1”. D5.2 provides an Initial analysis of most relevant stakeholders for the PLANET vision and tailored engagement strategies, in order to gather stakeholder information and feedback to support the project’s exploitation objectives.
- ✓ D5.3.: “Observations and Recommendations of the Advisory Board - final version”. This deliverable is the final version of D5.2. As per the wording of the Grant Agreement (page 43 of Annex 1 – Part B), it focus on “ensuring that the most vital issues for stakeholders are met” (chapter 5 of this deliverable) and “relationships with the key stakeholders are built” (chapter 3 of this deliverable) “to support the development and implementation of a commercialization plan beyond the project duration” (hereafter “life beyond the project”) as presented in sub-chapter 5.3. of this deliverable. The said sub-chapter includes commercialization advice, questions for future research as well as partnerships with other projects and organisations where PLANET´s expertise adds-value.

Beyond its contents, D5.3´s structure reflects the Grant Agreement´s requirements and PLANET´s outcomes:

- ✓ “Chapter 1 – Executive Summary”: provides an overview of this deliverable;
- ✓ “Chapter 2 – Introduction”: introduces the Deliverable by positioning it in the Grant Agreement, maps PLANET outputs by framing PLANET´s Grant Agreement commitments against the work performed and provides an overall view of the deliverable;
- ✓ “Chapter 3 – Advisory Board: Stakeholders and Areas of Relationship”: this chapter looks in detail at the stakeholders with which relations were fostered, their areas of competence and the areas of relationship relevant to PLANET;
- ✓ “Chapter 4 – Key Advisory Activities (post deliverable D5.2)” provides an overview of the workings and contacts with the Advisory Board focusing on 2 key moments: the November 2022 and March 2023 Advisory Board sessions. Worth recalling that the 2022 and 2023 Advisory Board sessions were attended by an average of 45 participants including 15 Advisory Board members (on average) originating from the European Union, the Americas and Asia;
- ✓ “Chapter 5 – Most vital issues for stakeholders to maximise project impact”: this chapter analyses the most vital issues for stakeholders by clusters to maximise project impact. The three clusters:
    - o “Cluster 1 – PLANET vision and EGTN” focus mainly on outcomes of work packages 1 and 2;
    - o “Cluster 2 – Demonstration via the Living Labs” focus on work package 3, its 3 living labs and their relation with the technological solutions developed in work package 2;
    - o “Cluster 3 – Life beyond the project” centred on work packages 4 and 5. This cluster contributes to commercial development efforts, proposes partnerships and research topics supported by other open questions contained in the deliverables´ summaries (Annexes III to XIX).
- ✓ “Chapters 6 – Final Conclusions”: key lessons drawn from the Deliverable.

This Deliverable is complemented by its annexes that include summaries of the deliverables brought to the attention of the Advisory Board with open questions related to the tasks carried out[4], agendas of the 2022 and 2023 Advisory Board sessions[5] as well as a glossary of terms and a list of references used.

Deliverable D5.3. reflects the depth of work of PLANET´s Advisory Board. In all its sections it seeks to discharge the ESC´s obligations under the Grant Agreement read in conjunction with the Consortium Agreement. More widely, it firmly establishes the value added of PLANET´s Advisory Board to the project´s

[4] Annex III to Annex XIX.
[5] Annex I and Annex II.

results and life beyond the project - namely via support to commercialisation activities, new research proposals and partnerships - sustained in the independent advice provided by the AB and incorporated by PLANET. Its value-added also lies in serving as a platform to share results and a catalyst for the adoption of the project´s solutions by (otherwise) distant external stakeholders, beyond the project´s existence.

Thus, the AB´s added-value rested firmly in (independent) knowledge transfer to PLANET. It also supported PLANET´s ecosystem and its innovations with a view to sustain PLANET´s life after the project. The AB did so by providing timely and "beyond the project" insights, much valued by all project partners. Finally, it must be underlined that Advisory Board members gathered free of charge and exempt of the legal obligations that pend over PLANET´s partners, as inscribed in the relevant funding agreements.

The PLANET project and more particularly, the European Shippers Council thanks all the members of the Board for their contributions and PLANET´s partners for their synergetic involvement.

As a follow-up to this Introduction, section 2.1. will hereafter map PLANET´s outputs, their intersection with the requirements established by the Grant Agreement and the work performed.

2.1 Mapping PLANET Outputs

Table 1: Adherence to PLANET's GA Deliverable & Tasks Descriptions

PLANET GA Component Title	PLANET GA Component Outline	Respective Document Chapter(s)	Justification
DELIVERABLE			
D5.3 - Final version – Observations and Recommendations of the Advisory Board	*This deliverable is the final version of D5.2 and focus on ensuring that the most vital issues for stakeholders are met and relationships with key stakeholders are built to support the development and implementation of a commercialization plan beyond the project duration.*	*Chapters 3, 4 and 5 read in conjunction with chapters 2 and 6.*	*The referred chapters look at the most vital issues raised by stakeholders, how they were met by PLANET´s partners and what relationships were built to support life after the project via the development of a commercialization plan, partnerships and future research.*
TASKS			
Task 5.1 – Stakeholder engagement, advisory board and support partners	*Sub Task 5.1.2 – Advisory Board: The PLANET AB is an independent group composed of external experts that provide (expert) advice to the project to maximize the impact of the project´s results.*	*Chapters 3, 4 and 5 read in conjunction with chapters 2 and 6.*	*Chapter 3 provides an overview of all Advisory Board members and the most relevant professional competencies vis-à-vis the relationships sought of by PLANET.* *Chapter 4 gives an overview of the workings and contacts with the Advisory Board.*

PLANET GA Component Title	PLANET GA Component Outline	Respective Document Chapter(s)	Justification
	This subtask will provide dedicated communications with the Advisory Board both in requesting advice on specific activities, research questions and in circulating material for dissemination purposes.		*Chapter 5 analyses the most vital issues for stakeholders to maximise project impact and includes a sub-section on life beyond the project with a focus on commercialization, partnerships and future research.* *Chapters 2 and 6 provide an introduction to the deliverable and key conclusions, respectively.* *This deliverable is supported by annexes, references, a glossary of terms and a list of images and tables.*

2.2 Deliverable Overview and Structure

Whilst section 2.1 mapped the outputs of the ESC´s work carried out against the project´s expected outcomes, section 2.2 describes the Deliverable's Structure outlining the respective chapters and content:

- ✓ "Chapter 1 – Executive Summary" of this deliverable highlights the key issues per section.
- ✓ "Chapter 2 – Introduction": introduces the Deliverable and positions it in the Grant Agreement.
- ✓ "Chapter 3 – Advisory Board: stakeholders and areas of relationship": this chapter looks at AB members´ most relevant experiences for the project and the areas of relationships sought of by PLANET.
- ✓ "Chapter 4 – Key Advisor Board Activities (post D5.2. deliverable)": gives an overview of the workings and exchanges with the Advisory Board.
- ✓ "Chapter 5 – Most vital issues for stakeholders to maximise project impact": structured in a "question and answer" format, this chapter analyses - by cluster - the most vital issues for stakeholders to maximise project impact and includes a sub-chapter on life beyond the project with a focus on commercialisation, future research and partnerships.
- ✓ "Chapters 6 – Final Conclusions" provides the Deliverable´s key conclusions.

The Deliverable is supported by the following:

- ✓ A glossary of terms and abbreviations used;
- ✓ Lists of references, images and tables;
- ✓ Summaries of deliverables presented to the Advisory Board;
- ✓ Agenda of the November 2022 Advisory Board Session;
- ✓ Agenda of the March 2023 Advisory Board Session.

This deliverable´s table of contents as well as the Advisory Board´s structure was discussed and approved by the PLANET project before works commenced. Chapter 3 hereafter will provide an overview of the Advisory Board´s stakeholders and areas of relationship established with partners to support life beyond the project.

3 Advisory Board: Stakeholders and Areas of Relationship

As stated, Chapter 3 provides an overview of the external stakeholders - Advisory Board members - and the relationships built per area of competence of the AB member. It also responds effectively to the Grant Agreement´s requirement for the Advisory Board to be an ecosystem of stakeholders that may effectively contribute to the project´s life beyond the duration of the project itself.

Pursuant to page 45 – Annex I (part A) of the Grant Agreement, the Advisory Board comprises a group of 26 external advisors ("stakeholders") originating from the research, business and public administration worlds, all acting on an independent capacity Stakeholders were selected according to the process detailed in section 3.1. of Deliverable D5.2[6] and to some extent, the input of deliverable D5.1[7]. They were drawn from the European Union, the American continent as well as Asia and have a wide range of experiences relevant to the project's focus areas (European Shippers Council and JustAsk! (2021)).

Building relationships with the stakeholders was primarily based on the match between the functional relationships sought of by PLANET and the AB´s relevant competences and experiences.

The referred experiences defined the area of the relationship between PLANET and the specific AB member. For example, as per Table 2 (below), a relationship was established with "AB 2" experienced (and active) in information technologies and international trade policy, both areas relevant to PLANET. That expert provided independent advice (as part of the Board) and also served - through her or his experience - as a "door" to other players in her or his respective sectors, of interest to PLANET´s partners (and their solutions) seeking the organic growth of new relationships, contributors to further commercial and non-commercial aspirations.

The various members signed non-disclosure agreements and, where relevant, letters of support, in conformity with Annex 1 of Part B of the Grant Agreement. Table 2 provides a detailed look at the Board´s experience and relationship developed by area with the PLANET project, per member. Due to privacy reasons, personally identifiable information of Advisory Board members is omitted.

Table 2: Advisory Board Members and Relationships (by area)

Advisory Board (AB) Member	Relevant experience:	Areas of Relationship (alphabetically)
AB 1	CEO - logistics company; Manager - IT company.	Digitisation, e-Toll, Information technologies, Last mile operations, Logistics, Supply chain management, Track and Trace, Transport.
AB 2	Professor and researcher in information technologies and infrastructures for international trade	Customs, Digitalisation,

[6] Deliverable D5.2. (ESC): Observations and Recommendations of the Advisory Board (initial version).
[7] Deliverable D5.1 (PNO): Stakeholder analysis report.

Advisory Board (AB) Member	Relevant experience:	Areas of Relationship (alphabetically)
	at a leading European University; Project coordinator and partner representative in EU research projects, in the fields of information technologies, logistics, supply chain innovation and customs.	Information Technologies, Infrastructure management, Innovation, International trade, Logistics, Project coordination, Research and development, Supply chain management.
AB 3	General Manager - innovation and logistics efficiency institute; Leading Researcher - studies and benchmarking in value chains (idem).	Digitalisation, Innovation, Last mile transportation, Logistics, Research, Transport, Value chains.
AB 4	Ex-CEO and Rector of a leading Asian institute specialised in supply chain innovation; Director and Professor - Supply Chain Management (idem); Technical Fellow – Research and Development (idem); Director – Global Supply Chain Strategic Planning (large corporation).	Digitalisation, Innovation, Logistics, Research and development, Risk management, Strategic planning, Supply chain management.
AB 5	European Distribution Process Lead (large corporation); Logistics Director (idem); Process & Project Manager - Outbound Supply Chain (idem); Central Europe Analyst – Automotive (idem).	Automotive industry, Information technologies, Logistics management, Supply chain management, Transport.
AB 6	Professor and Associate Director at leading US university, specialised in resilience & sustainability of integrated energy and manufacturing supply chains.	Energy, Innovation, Logistics, Manufacturing, Research and development, Supply chain management, Sustainability and resilience.

Advisory Board (AB) Member	Relevant experience:	Areas of Relationship (alphabetically)
AB 7	Researcher and Engineer at leading South American University specialised in logistics and engineering.	Engineering, Innovation, Logistics, Supply chain management, Research and development.
AB 8	Director – customs authority; Coordinator of supply chain and trade facilitation research; Coordinator of academic programs.	Customs, Learning, Research and development, Supply chain management, Trade facilitation.
AB 9	Program Director – research innovation at a leading supply chain innovation institute; Senior Business Consultant – logistics and innovation.	Business consulting, Industrial engineering, Industrial management, Innovation, IT, Logistics, Research and development, Supply chain management, Transport.
AB 10	Head of Global Sales & Tender Management (Tank Container) at global corporation; Head of Business Development Management for Eurasia & Far East (idem); General Manager Sales & Operations (idem).	Logistics, Procurement, Sales and operations, Supply Chain management, Transport (maritime).
AB 11	Specialist in logistics at a global corporation; Research Project Coordinator - logistics and supply chain management (leading research institute); Logistics specialist (corporation).	Innovation, Logistics, Research coordination, Supply chain management, Transport,

Advisory Board (AB) Member	Relevant experience:	Areas of Relationship (alphabetically)
		Warehousing.
AB 12	Owner Director – logistics company; Senior Member for port optimisation task force; Member of the Universal Postal Union (UPU) Consultative Committee.	Information technologies, Innovation, Logistics, Port optimisation and services, Postal services, Standards, Supply chain management, Transport.
AB 13	Dean at leading Asian University for supply chain innovation.	Economics, Supply chain innovation, Transport.
AB 14	Branch Manager at a global group of companies focused on multimodal and global logistics services.	Logistics management, Multimodal services.
Ab 15	Web3.0 Blockchain Product Manager at tech. company; Associate Professor (DevOps and Blockchain) at a leading European university.	Blockchain, DevOps, Information technologies, Web 3.0 - blockchain.
AB 16	Senior Professor in information technology and decision sciences at a leading North American university.	Decision sciences, Information technologies, Research and development.
AB 17	Senior Computer Scientist at a leading research institute; Professor at a leading European university; Coordinator of large EU research consortiums.	Computer science, Research and Development.
AB 18	Director for Purchasing Logistics at a global corporation, Purchasing Manager (idem); Purchasing Controller & Product Line Manager (idem); Director for Purchasing Logistics (idem).	Logistics management, Procurement, Purchasing,

Advisory Board (AB) Member	Relevant experience:	Areas of Relationship (alphabetically)
		Supply chains, Transport.
AB19	Senior Research Scientist at a leading North American university; Director at a leading South American center for innovation and logistics; Technical Director at a large European logistics center.	Innovation, Logistics management, Research and development.
AB 20	Managing Director and co-owner of company dedicated to multimodal, sustainable transport solutions; Business development and sales director for chemicals transport company.	Business development, Logistics, Multi-modality, Sales and operations, Sustainability, Transport (chemicals).
AB 21	Business Partner (transport) at a private company; Member of a leading European trade association; Purchasing Manager for Warehousing and Distribution at a leading global company; Transportation & International Logistics Project Manager (idem), Warehouse & Transport Manager (idem); Transportation & Operations Support Manager for Benelux (idem).	Digitalisation, Interest representation, Logistics management, Operations management, Supply chain, Sustainability, Transport, Warehousing.
AB 22	Strategy and Innovation Advisor at a Customs Authority; Expert on blockchain and blockchain platforms at the Digital Trade and Logistics Forum (DTLF EC expert group).	Blockchain, Customs, Digitalisation, Logistics, Standards, Strategy, Supply chain management, Web 3.0.
AB 23	Chief Supply Chain Officer at a global company;	Logistics, Supply chain management, Transport,

Advisory Board (AB) Member	Relevant experience:	Areas of Relationship (alphabetically)
	Director for Supply Chain Strategy & Solutions - Europe (idem); General Manager for Supply Chain - Europe (idem); Logistics & Transportation Manager - Europe (idem).	Warehousing.
AB 24	Digital Transformation Specialist at a leading technology company; Account Executive - Strategic Accounts (idem); Enterprise Account Executive UK (idem); Platform as a Service and Infrastructure as a Service (idem); Learning Facilitator at leading North American University.	Digital transformation, Lifelong learning, Web 3.0.
AB 25	Associate Professor of Operations and Supply Chain Management at a leading Asian University; Visiting Professor at a leading Asian institute for management.	Dynamic supply chains, Logistics, Management, Operations management, Research and development, Supply chain management.
AB 26	Professor of Information and Communication Technology at a leading European university for technology; Program Director of an Executive Master in Customs and Supply Chain Compliance; Professor of e-Business.	Compliance (supply chains), Customs, E-business, Information Technology, Research and development, Semantic models, Standards.

Concluding, the structure of the Advisory Board and its various stakeholder composed the fertile ground for relationships to be built to maximize the project´s outcomes. The following Chapter 4 will look at key AB activities fostering relations between PLANET partners and AB members.

4 Key Advisory Board Activities (post D5.2 deliverable)

Whilst Chapter 3 looked at the areas of relationships built with external stakeholders (Advisory Board members), Chapter 4 provides a brief explanation of the structure and contacts with the Advisory Board, complemented by two sections focusing on the Advisory Board sessions held in 2022 and 2023. It is worth recalling that dissemination materials distributed before and after Advisory Board sessions as well as other events (e.g.: power point presentations, summaries of deliverables, etc.) can now be reused further.

4.1 Brief Explanation of the Structure and Contacts with the Advisory Board

The Advisory Board of the PLANET project counted with 26 members originating from various parts of the world: Europe, the Americas and Asia. The pinnacle of their participation in project activities were the Advisory Board sessions. These served as the linking pin between all parts of the project with a fundamental difference from traditional consortium meetings: in Advisory Board sessions, PLANET partners were exposed to the preponderance of external views originating from external stakeholders active in public administration, academia and business.

Advisory Board members provided advice on an independent capacity not only from the project itself, but also from their "real-life" careers. The exposure to such advice led often to lively discussions on the results and processes of the project. It also served as impartial "testing ground" where PLANET´s partners and solutions were confronted with the views of external stakeholders, untamed by the legitimate interests of PLANET´s partners seeking the optimal integration of proposed solutions and the optimal discharge of their legal obligations under the relevant funding Agreements.

Advisory Board sessions also served as the "megaphone" to the world for the innovations presented by PLANET. A direct consequence of that was the eagerness of specific Advisory Board members to continue following - with potential commercial interest - proposed solutions or even, the synergies with other projects and organisations, as detailed in the relevant chapters of this Deliverable.

Finally, the Grant Agreement stipulated that Advisory Board members should meet at least annually. Below are summaries of the two annual meetings held in November 2022 and March 2023, the latter which served as closing activity for the last consortium meeting of the PLANET project. Both Advisory Board sessions received very positive written appraisals from consortium partners and Advisory Board members.

4.2 November 2022 Advisory Board session[8] – Summary

On the 29th of November 2022, the European Shippers Council organised its November 2022 Advisory Board session moderated by Andreas Kortenhaus (justASK!) and Hélder Pereira (European Shippers Council). The Advisory Board´s session concentrated on looking at PLANET project´s achievements to date, namely on:

- ✓ The development of interoperable technological tools to facilitate global trade;
- ✓ The shape of TEN-Ts following digital transformation *and*
- ✓ How the project addresses sustainability and cooperation in competitive environments.

[8] For the November 2022 Advisory Board´s agenda, please visit Annex I of this deliverable.

Key takeaways of the November 2022 Advisory Board meeting[9]:

- ✓ Data is at the heart of all technological developments.
- ✓ Interoperability of cutting-edge technologies (e.g.: artificial intelligence, blockchain, distributed ledger technologies, etc.) is as important as the technologies themselves.
- ✓ Digitalization must go hand-in-hand with commercial viability. The latter requires strong competitiveness, but also targeted cooperation among competing partners to enable technological integration - in an antitrust environment – and to forge a path towards commonly agreed societal goals, including sustainable development, inclusivity and open trade relations.
- ✓ Federated logistics requires seamless automated data exchanges within a wider European data space.
- ✓ The integration of the Physical Internet vision into the TEN-T fundamentally changes TEN-Ts to cater for (new) digital networks;
- ✓ Current trade routes and commercial operations must be planned in a dynamic way, due to a changing context marked by externalities such as conflict or climate change.

In detail:

While previous AB meetings layed the common ground for the Advisory Board´s actions, the November 2022 session concentrated on PLANET´s achievements to date. The meeting began by looking at PLANET project´s key strengths:

- ✓ PLANET brings the work of science, government and business together, in supporting global trade.
- ✓ PLANET contributes to moulding the shape of future TEN-Ts into their digital form.
- ✓ It addresses major societal challenges, including sustainability, competitiveness and digital transformation.
- ✓ PLANET develops the necessary infrastructure for synchro-modal management of transport and logistics.
- ✓ It demonstrates its technological capacities in real life situations, thus enabling innovations to "keep the project alive beyond its existence" as stated by the ESC`s Secretary-General Godfried Smit.

The event proceeded with a presentation (per work package) of some of PLANET´s key achievements:

- ✓ Modelling international trade whilst taking stock of the impact of the Ukrainian crisis.
- ✓ Understanding the impact of international trade and the Physical Internet on the TEN-T. How will the TEN-T look in the future?
- ✓ Developing key technologies and integrating PI services in a single platform by providing various services, including secure tracking, load, route and warehouse optimisation, automated decision-making, prediction and forecasting services…
- ✓ Aggregating the capacities of a vast multitude of partners under the European Green (Global) Transport Network (EGTN).

The Advisory Board highlighted the following key aspects:

- ✓ The quality of the work being developed is sustained on the triple helix: academia, public sector, business.

[9] For a detailed look at summaries of deliverables submitted to the attention of the Advisory Board, please visit Annexes III to XIX of this Deliverable.

- ✓ Interoperability must be at the beating heart of technology and PLANET.
- ✓ From the business point of view, very often performance – solely based on costs and lead time – of specific transport modes lies at the basis of all decisions. Hence, PLANET´s focus on the efficient synchro-modal management of supply chains, but not just…
- ✓ As a result of the changing international environment, traditional views on performance based solely on costs and lead time are currently challenged by new trade-offs between "optimalities" and "optionalities" where an "optimum" is considered against all other options and related opportunity costs. Thus, key performance indicators must mirror this reality. PLANET does so by incorporating indicators reflecting, for example, the impact of climate change and resource scarcity on operations.
- ✓ Further study is needed on the network effects of the PI nodal concept presented by PLANET.
- ✓ In line with their functional purposes, technologies employed must be bespoke and employed where their use can add-value vis-à-vis existing options. In this sense, PLANET explores, for example, the use of blockchains for storing valuable data or smart contracts to enhance multi-party transactions.
- ✓ Models developed in the PLANET project must consider the latest policy focus on resource resilience in Europe as well as the geo-strategic context. In fact, they do so as demonstrated by the analysis on the economic impact of the Ukrainian crisis.
- ✓ PLANET project benefits from reinforcing ties with public sector authorities such as customs and non-profit entities responsible for standardisation.

The virtual event was attended by over 60 participants from various parts of the world, including 17 Advisory Board members. Members of the Board were carefully selected to provide expertise on a wide range of areas, including logistics, supply chain automation, innovation, tracking and tracing of products, standards among others.

4.3 March 2023 Advisory Board Session[10] – Summary

On the 8th of March 2023, PLANET´s March 2023 Advisory Board session closed the last consortium meeting of the project. The Advisory Board session counted with the co-moderation of Hélder Pereira (European Shippers Council) and Andreas Kortenhaus (JustAsk!).

The meeting began with an introductory note by the ESC thanking participants and highlighting:

- ✓ The international nature of the Advisory Board composed of members from Europe, the Americas and Asia.
- ✓ The Advisory Board´s added value to the project as the linking pin of all PLANET´s work packages, but not only... It also served as the project´s platform for further discussions with external stakeholders on the project´s evolution. Additionally, it exposed PLANET´s solutions to the interest of external organisations beyond the project as it showcased PLANET´s innovations and discussed their potential market integration.
- ✓ The focus of the meeting: life beyond the project (with a focus on commercialisation activities, research and partnerships) as well as the experimentation and demonstration work of the Living Labs.

[10] For the session´s agenda, please visit Annex II of this deliverable.

Key takeaways of the March 2023 Advisory Board session[11]:

This Advisory Board session developed ideas & recommendations that contribute to guaranteeing that PLANET´s innovations live beyond the project´s be it via the models developed, the technologies and reference processes created and applied or even, the demonstrations and experimentations in the Living Labs where the work of science, government and business come together via the innovations tested.

The widely attended Advisory Board session included a presentation of selected sections of the PLANET project:

- ✓ Living Lab 1 (WP3) – Physical Internet and blockchain for optimized door-to-door Asia-Europe corridors (Mediterranean Corridor). LL1´s key objective is to evaluate how novel technologies and concepts can enhance the efficiency of processes and operations.
- ✓ Living Lab 2 (WP3) – Synchro-modal dynamic management of TEN-T & intercontinental flows promoting rail transport. LL2 utilises the Port of Rotterdam as the principal smart EGTN node. It focuses on intercontinental rail freight between China and the EU through Rotterdam to/from USA and the UK (shortsea and ocean freight).
- ✓ Living Lab 3 (WP3) – IoT for the Silk Road Route. This Living Lab focus on streamlining logistic processes in trade flows between China and Europe along the Silk Road by implementing technologies using Electronic Product Code Information Services - EPCIS/GS1 standards to enable seamless data transmission between partners involved in e-commerce operations.
- ✓ Commercialization and business plan development (WP5). It seeks to optimise the exploitation of KERs and develop a business and commercialisation plan. AB discussions related to this section were complemented with proposals for partnerships with other projects and external stakeholders as well as proposals for future research topics supportive of the PI vision demonstrated in PLANET (WP4).

In detail:

The Advisory Board generated a solid set of ideas & recommendations. It also established a clear direction for maximizing the impact of the project´s final results. Key takeaways of the March 2023 AB meeting:

- ✓ Cooperation between different actors in the supply chain is essential to enable the PI vision demonstrated in PLANET. Cooperation is central to the technological and societal goals pursued.
- ✓ PLANET produced 9 Key Exploitable Results of which 3 are patents pending, highlighted during the Advisory Board. As stated by the Board, these achievements must be commended and demonstrate PLANET´s contribution to advancing European research and innovation.
- ✓ PLANET´s Key Exploitable Results are clearly defined. Whether originating from the PLANET project or not, PLANET supports KER´s exploitation in different ways, including by providing support to future commercialisation, modelling the impact of their integration in the TEN-Ts, etc.
- ✓ PLANET´s innovations have real life use and found support for scaling-up during the project itself, a hallmark of the project´s quality. One example is PLANET´s proposed solution to simplify bureaucracy in commercial transactions with non-EU countries, enabling automated exchanges of legally valuable documents as well as cross-referencing of valuable data.
- ✓ New technological evolutions must be finely tuned to their usability. An example is blockchain technology whereas its primary functional value may reside on the secure registration of valuable data for legal and trust purposes, as demonstrated in PLANET.

[11] For a detailed look at summaries of deliverables submitted to the attention of the Advisory Board, please visit Annexes III to XIX of this deliverable.

- ✓ Interoperability lies at the beating heart of innovation. In this sense, adherence to international standards or, at least, the development of technology capable of incorporating changing standards whilst remaining operable with different systems lies at the center of innovation. Interoperability requires innovations from the present to connect to those of the past (and future), but also that such innovations function in harmony with solutions developed for different purposes. An immense challenge indeed.
- ✓ Innovation often lies at the inter-section of different solutions and areas of knowledge. The PLANET project reflects such reality by applying different knowledge areas and technologies for different purposes, in a diverse and integrated ecosystem composed of a wide range of internal and external actors. An example is the integration of blockchain technology with smart contracts and artificial intelligence for different purposes.
- ✓ In the future, automated data exchanges between governments and businesses may involve data pull models requiring fewer intermediaries as highlighted by Professors Tan and Rukanova in their book (Tan Y., Rukanova B. et al (2011)).
- ✓ In the case of customs, governments may also consider incorporating external data sources – such as PLANET´s EGTN - for legal purposes, as supported by relevant literature and recent experimentation in other EU projects[12].

PLANET´s last Advisory Board session counted with over 40 participants, including 13 Advisory Board members. The session strengthened the Board´s key role: be the linking pin between all parts of the project by providing key (independent) external advice to maximise project´s outcomes.

As seen, Advisory Board meetings served as an assembly for Board members to share their advice and foresight on the project whilst, in turn, being confronted by the experiences of actors behind such advancements. However, contacts between the PLANET project and Board members went beyond the Advisory Board sessions. Below are a few examples of such contacts and subsequent relations established as a result:

- ✓ The European Shippers Council received advise from the Advisory Board on how to energise discussions. The outcome of such advice were the lively exchanges that ensued with Advisory Board members and more importantly, the relations established between partners in PLANET and the Board members.
- ✓ All Advisory Board members were frequently informed of the PLANET´s evolution either via direct contacts, via the Advisory Board Private Area[13] or via PLANET´s website[14].
- ✓ All Advisory Board members were invited to workshops organised by the Living Labs (Work Package 3) to discuss the solutions presented directly with partners involved in Living Labs´ activities.
- ✓ Advisory Board members were invited to participate in the learning workshops organised by Work Package 4 (“Steering innovation and building capacity towards the EGTN”).
- ✓ Specific Advisory Board members provided direct input to partners in the project, according to their subject matter expertise: semantic models, legislation, standardisation, postal services, blockchain, etc. Such exchanges laid down the ground for relationships potentially conducive of new partnerships and avenues for the implementation of PLANET´s PI vision and exploitation of PLANET´s solutions.

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12 For further information, please visit the PEN-CP project at www.pen-cp.net.
13 Advisory Board Private Area accessible here: https://www.planetproject.eu/private-area/.
14 PLANET project available here: www.planetproject.eu.

- ✓ Other Advisory Board members focused their advice on further exploitation possibilities for PLANET´s outcomes, according to the external stakeholder´s (AB member) domain of experience.

The various contacts outlined together with the Advisory Board sessions established the ground for new relationships and the internalisation of stakeholder issues by PLANET´s partners in project´s solutions, as outlined hereafter in Chapter 5 looking at the "the most vital issues for stakeholders" and how they were met with a view to maximize PLANET´s final outputs.

5 Most Vital Issues for Stakeholders to Maximise Project Impact – Per Cluster

Chapter 5 looks at the most vital issues for stakeholders to maximise project impact by structuring those issues around three clusters reflecting the work packages of the project:

- ✓ Cluster 1 – PLANET vision and EGTN (focus on work packages 1 and 2);
- ✓ Cluster 2 – Demonstration via the Living Labs (focus on work packages 3, its 3 living labs and the impact of the solutions developed in work package 2);
- ✓ Cluster 3 – Life beyond the project (focus on work packages 4 and 5).

Each Chapter is further divided in sub-chapters covering groups of specific matters touched upon in exchanges with the Advisory Board. The format used is one of “question and answer” and follows, to the extent possible, the expressions and information used by partners and Advisory Board members in their interactions, the latter being the fertile ground for future relationships.

5.1 Cluster 1: PLANET vision and EGTN (WP1 and WP2)

A) Recommendations and observations on modelling and governance:

1.A.1.) Advisory Board: How does PLANET internalise recent political discussions on **resource resilience and strategic autonomy** of the European Union, whilst guaranteing PLANET´s openess to third countries?

PLANET response: PLANET´s initial approach was to connect international trade flows to the TEN-T. Beyond PLANET and partly due to geopolitical developments, a more regionalised approach is nowadays considered. PLANET´s current approach is that both options are valuable: strengthening the EU´s strategic autonomy, whilst guaranteeing seamless connectivity within the European continent and beyond. PLANET supports such approach by:

- ✓ Assimilating the current geopolitical situation through strategic models capable of internalising changing international contexts. For further information, please check, for example, deliverables D1.1 or D1.5.
- ✓ Developing technological options sufficiently adaptable to acomodate "change", be it regulatory or otherwise. For further information, please check the outcomes of work package 2.
- ✓ Providing technological solutions that support the EU´s fundamental values, for example, on the treatment of data or on interoperability. For further information, please check the outcomes of work package 2 and 7.
- ✓ The manner in which the EGTN interacts with non-EU countries. It does so through PLANET´s strategic model enriched to include the transport characteristics and infrastructure of non-EU countries in terms of costs, speed, reliability, etc. It is further enriched through simulations of different scenarios that include parameters related to geo-economics and trade policy options (e.g., rail subsidies in China) in non-EU countries. The results of these simulations were used to define the EGTN´s reference specifications.

For more information on the matters above, please revisit deliverables D1.3, D1.5, D1.11, D4.1. and D4.2.

<u>1.A.2.) Advisory Board:</u> Reflect on the following **OBSERVATIONS** vis-à-vis PLANET:

- ✓ Application Programming Interfaces (APIs): "**APIs**" are the real disruptors for the legacy systems of intermodal systems.
- ✓ Simulations: "**System dynamics potential**" is a tool that can be used for the strategic design of supply chain resilience in global networks, particularly at a time when China´s influence in the world brings seismic changes on how governments and business operate.
- ✓ New KPIs: "**KPIs**" need to capture new trade-offs between "optionalities" and "optimalities".

PLANET response: PLANET welcomes the Advisory Board´s observations and highlights the following:

- ✓ It has integrated the Board´s advice on the usage of "new" KPIs, as already detailed in deliverable D5.2. For example, climate change and subsequent capacity restraints are considered in PLANET.
- ✓ Even if "system dynamics potential" is only partially explored in the PLANET project, the Board´s observations are much welcome and support the need to continuously develop PLANET´s nodal point concept, whereas available corridors offer capacity to unavailable ones, thus guaranteeing goods, services and data flow seamlessly. Further study on network effects of PLANET´s modal concept is necessary.
- ✓ A dynamic simulation on the impact of the Belt and Road Initiative on the Rhine-Alpine Region (RALP) corridor was carried out for the 2030/2050 time horizon.
- ✓ Interoperability and APIs are at the heart of the PLANET project as detailed at a later stage.

<u>1.A.3.) Advisory Board:</u> The Board **OBSERVES** there are various **models** at interplay in the PLANET project. How accurate are PLANET´s models (used) in incorporating technological innovations?

Planet response: Existing models, validation methodologies and new procedures are used to explore the impact of the Physical Internet vision - as presented by PLANET - on the TEN-T of today. Models enable society to prepare and compare situations, albeit policy makers ultimately decide. On another note, if a technology is adopted then the actual improvement is studied and validation methodologies to evaluate connectivity are applied. As such, a key PLANET achievement is to look at how will the TEN-T become if IoT is massively adopted. For an example of the modelling work conducted, please check Figure 1:

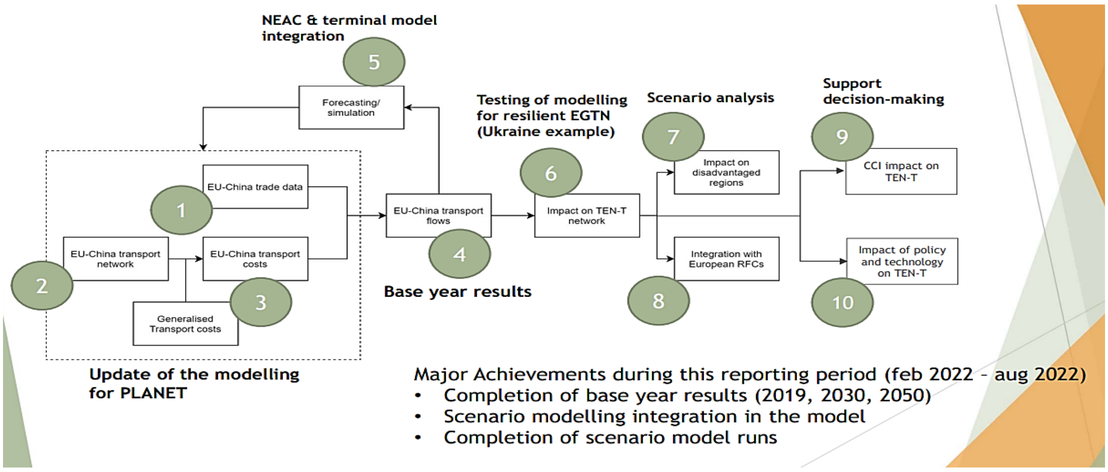

Figure 1: Modelling Overview[15]

15 Authors: CERTH, ITTAINOVA and PANTEIA for the PLANET project.

Moreover, as part of the PLANET project, an official market plan was delivered with regular updates. From this plan, the foundations for the models used in PLANET were produced. Over time the model and its parameters were adapted and developed. A proof that the model is able to incorporate changing contexts was the simulation on the Ukrainian crisis in terms of lost revenue. For further information on modelling, please revisit, for example, deliverables D1.1, D1.3 read in conjunction with D1.5.

1.A.4.) Advisory Board: The Board **OBSERVES** there should be a platform of services developed as part of the PLANET project. How was **collaboration and common governance** achieved between competing economic actors - partners in PLANET - from the perspective of the services delivered?

PLANET response: As per the requirements of the Grant Agreement and in line with the advice of the Advisory Board, governance is addressed via an explicit governance layer within the EGTN for onboarding users and managing data. To this effect, fundamental requirements were presented by WP1 to partners in other work packages. Ultimately, adherence to common governance was achieved by highlighting expected, shared gains. Such perceived benefits fuel synergies behind the innovations and solutions presented by PLANET.

From the perspective of the services delivered, the Living Labs are the first instance of the PI ecosystem created by PLANET. This ecosystem was defined in conjunction with local partners by demonstrating the benefits of collaboration in terms of optimisation. Such benefits were translated in the “real-life” services developed in work package 2 (PLANET Cloud-based Open EGTN infrastructure) and demonstrated in the Living Labs (work package 3). Services are the motivators for further collaboration and for closer governance arrangements.

Last but not least, microsimulations and test scenarios were implemented with the view to reinforce collaboration and further develop services with more stakeholders. For further information on governance in PLANET, please revisit recommendation 2.C.2. (PLANET response, 2nd paragraph onwards).

B) Recommendations and observations on interoperability:

1.B.1.) Advisory Board: Are the services offered via the EGTN infrastructure truly “collaborative” or are they just “peer-to-peer” services? Are they interoperable? In reporting to the European Commission, the Board **RECOMMENDS** that the **“collaborative” and “interoperable”** natures of services being deployed is clearly highlighted and distinguished.

PLANET response: The EGTN services are truly collaborative and interoperable.

Collaboration between services is continuously fine-tuned according to need, whilst considering the Living Lab´s use cases. Collaboration is flexible and was translated in terms of the open architecture that allows, for example, for a data lake or database to be accessed by all services in the platform. Moreover, further collaboration and flexibility can also be witnessed in the manner services are grouped, allowing them to be deployed in a stand-alone way or as a bundle, in a collaborative manner. Collaboration and interoperability are at the heart of the PLANET project and are ultimately tested in the Living Labs and Use Cases.

For an overview of the EGTN Platform Services please check Figure 2:

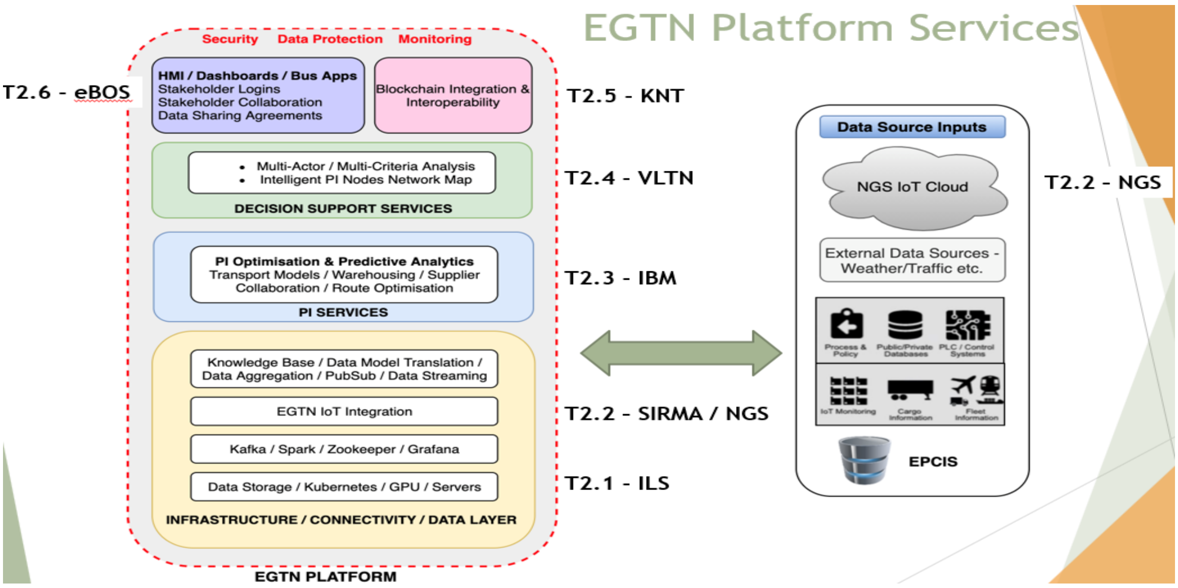

Figure 2: EGTN Platform Services[16]

Regarding interoperability, the latter can be witnessed in various ways:

- By the manner in which a smart contract is automatically generated as a response to data coming from IoT sensors, including live information on the vessel´s temperature or humidity of a consignment in a vessel or a specific logistic event, etc.
- By the usage of GS1 standards for "tracking and tracing", one of the EGTN´s dashboard functionalities allowing for and requiring seamless interoperability of services.
- By the open architecture of databases and the usage of certain knowledge graphs.
- By the services interaction demonstrated in Figure 3 on service interoperability examples:

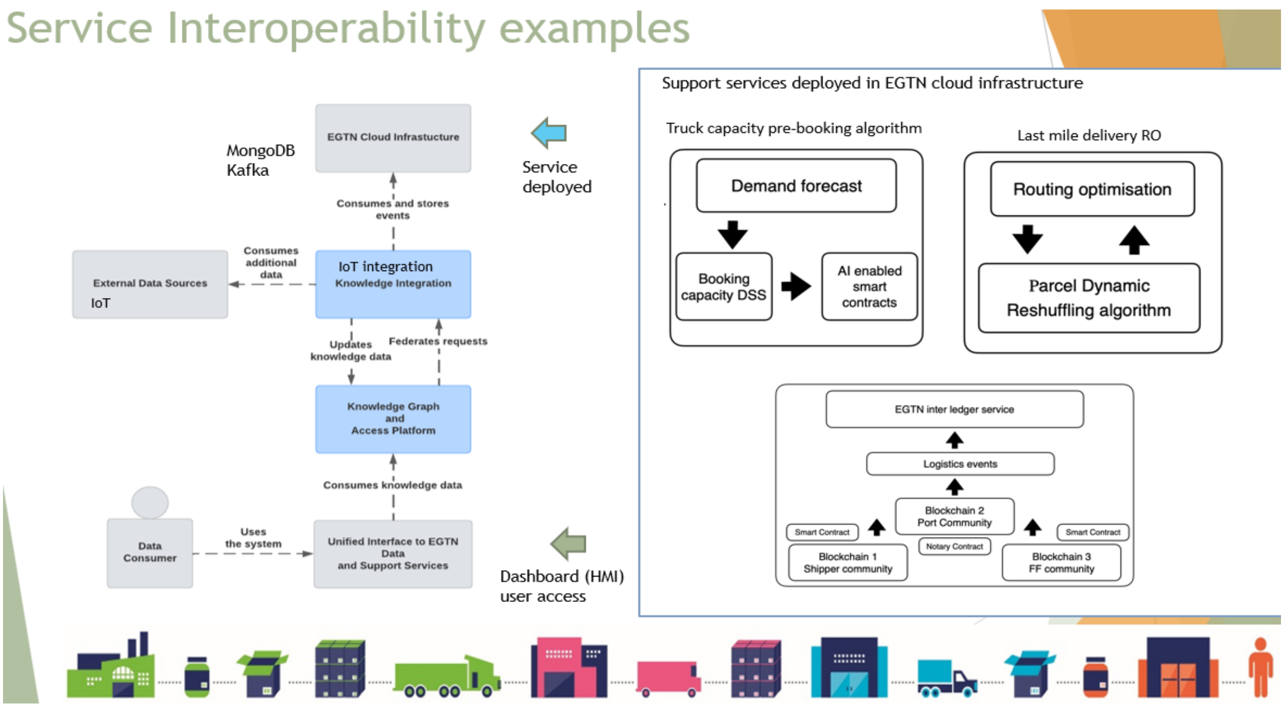

Figure 3: Service interoperability examples[17]

16 Author: eBOS and NGS Sensors for the PLANET project.
17 Author: eBOS for the PLANET project.

PLANET welcomes the Advisory Board´s recommendation and has refined its reporting to the EC accordingly, on the "collaborative" and "interoperable" nature of the services. To this effect, please check, for example, deliverable D2.20.

C) Recommendations and observations on data models, global standards and legislation:

1.C.1.) Advisory Board: The Board **OBSERVES** that collaboration and interoperability are at the heart of this project as they should be! In this sense, how is **common semantics** used to support seamless data exchange in the PLANET project?

PLANET response: Regarding "common semantics" used in the EGTN platform, one of the (EGTN) services integrates different kinds of data into the EGTN common data model so that other services can consume such data. This is the EGTN knowledge graph (KGs) and a knowledge graph API. In other words, one of the interfaces of the platform provides for the ingestion of heterogenous data from different sources. Once data enters the platform, KGs are used to generate a common data model that is pushed to the rest of the services, to be consumed and used for their purpose. This was the process followed. For more information, please revisit deliverable D2.8 read in conjunction with deliverable D2.9. For an overview of the complete data model, please see Figure 4.

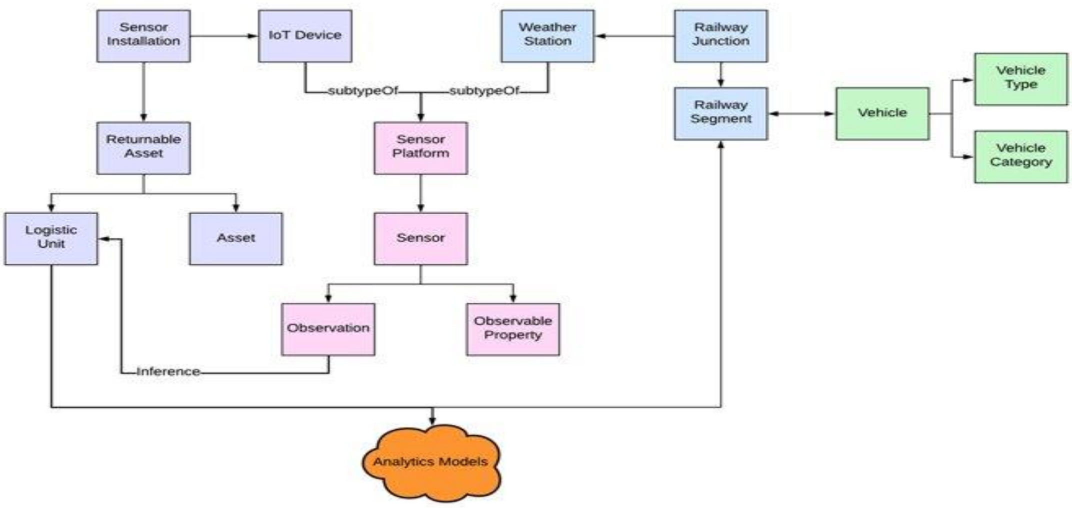

Figure 4: Data model: complete[18]

1.C.2.) Advisory Board: Still on interoperability, how are the various **semantic models** used? How does PLANET´s work relate with the data models developed in the Digital Transport and Logistics Forum (DTLF) and UN/CEFACT? The Board **RECOMMENDS** that such explanations are clearly made in reporting the final results to the European Commission. It is also the Board´s position that open data models are used, in line with international guidelines and firmly **SUPPORTS** the use of knowledge graphs, as described.

PLANET response: An important challenge for PLANET was indeed the data models to use. Globally, two separate data models are in use: 1 data model for sharing IoT data and 1 data model linked to the blockchain. The data model linked to the BC was defined for the information exchanged through blockchain events and

18 Author: SIRMA for the PLANET project.

unifies diverse transport documents used by different T&L partners (i.e.: PoV, DHL and BlockLab/Docklab). All relevant data is ultimately brought together in a unified data model.

To achieve interoperability, a common data model was developed for back-end systems as the Port of Valencia (PoV) and the Port of Rotterdam (PoR) use their own data models in their own BC networks. More precisely, PLANET brought the 2 initially referred models together and defined a common data model that allows the EGTN inter-ledger service to translate events from the PoR´s data model to the EGTN´s internal data model and thereafter from the said model to PoV´s data model. For LL2, the semantic model used is similar to the one used in the DIL project (Digital Infrastructure Logistics – Netherlands).

Since standards make interoperability possible, ultimately the EGTN Interledger (common) Data Model "provides a common language of standards that enable an ecosystem of applications and networks (to) seamlessly and securely link people, places, and things" (Deliverable 2.16).

In turn, the EGTN Interledger Service acts as a proxy between backend blockchain systems and redirects traffic from one to another system by translating heterogeneous events to the commonly unified data model. For further information, please revisit deliverables D1.11, D2.18, D2.2, D2.8 and D2.20.

On another note, at the time of writing this deliverable, the common semantic data model developed in the DTLF – that incorporates aspects of the UN/CEFACT semantic model – is incomplete, whilst the solutions developed by the PLANET project were projected to operate (and do function) today. They combine the agreement of EU partners, but also of non-EU partners.

PLANET eagerly awaits DTLF´s final recommendations on a common data model, fundamental for the effective implementation of important legislation impacting PLANET, as it is the case with the electronic Freight Transport Information (eFTI) EU Regulation 2020/1056 analysed in deliverable D1.7. PLANET´s technological options can incorporate changing regulatory requirements, once defined and available.

The valuable work of the Digital Transport and Logistics Forum (DTLF) is continuously incorporated in PLANET via its strategic model used to measure the impact of regulatory change in efficiency parameters of corridors. The final EGTN specifications (deliverable D1.11), made publicly available at the end of the project, and the models used to derive such specifications will incorporate new regulatory impacts including DTLF´s outcomes available to date.

Finally, PLANET follows with strong interest other regulatory developments, other projects (e.g.: FEDERATED and FENIX) and initiatives, such as the launch of the FENIX 2.0 association[19]. For further information, please revisit deliverables D1.7 and D5.7.

1.C.3.) Advisory Board: The Board strongly **RECOMMENDS** that PLANET analyses the impact of the electronic Freight Transport Information (**eFTI**) EU Regulation 2020/1056 on the EGTN. Was this analysis carried out?

PLANET response: PLANET welcomes the Board´s question. As per deliverable D1.7 read in conjunction with deliverable D5.7, one of PLANET´s focus was indeed the impact of upcoming legislation on the EGTN, including the EU´s eFTI Regulation 2020/1056.

[19] FENIX 2.0 Association: https://fenix-network.eu/fenix-2-0/.

D) Recommendations and observations on blockchain as a technological solution:

1.D.1.) Advisory Board: How does blockchain interoperability (in this project) connect with the European Blockchain Services Infrastructure (**EBSI**) initiative, European Product Code Information Services (**EPCIS**)/GS1 standards and other international standards? In reporting to the European Commission, the Board **RECOMMENDS** emphasizing such links.

PLANET response: PLANET welcomes the Board´s question and specific advice to emphasise - in reporting to the European Commission – how blockchain (BC) interoperability in this project links with other initiatives.

The EBSI initiative is considered by PLANET as extremely valuable as it seeks to address large challenges associated with BC interoperability. Worth noting, however, that there are different layers of BC interoperability systems. PLANET´s EGTN - not "just another blockchain" - strives to synchronise them with events emitted on the BC. This a different approach from the one followed by the EBSI.

On the application of EPCIS/GS1 standards, these are widely used in PLANET (e.g.: in Living Lab 3[20]). They also enable the "track and trace" functionality found in the EGTN dashboard. Below is a quick look at other international standards and ontologies used:

- ✓ Sensor readings utilize EPCIS 2.0;
- ✓ Objects and transportation steps utilize various GS1 standards/EPCIS 2.0, CBV (chartered business valuator) and rules for identification generation: Global Trade Identification Number (GTIN), Global Returnable Asset Identifier (GRAI), Serial Shipping Container Code (SSCC)…;
- ✓ Weather Stations utilize the Semantic Sensor Network Ontology (SOSA);
- ✓ Route Description utilizes the Optical Transport Network (OTN) ontology;
- ✓ Vehicle technical specifications follow the European Agency for Railways´ data model. For further information, please visit specifically ERATV – European Register of Authorized Vehicles[21].

On the matters addressed above, please revisit, for example, deliverables D1.11, D2.4, D2.8, D2.20 or deliverables D3.1 to D3.6.

1.D.2.) Advisory Board: Taking into account the current state of knowledge and initiatives such as TradeLens or the DIL project (Digital Infrastructure Logistics project - Netherlands), **blockchain´s intrinsic value** may lie in storing critical data, defined as such due to reasons of, for example, trust. The Board **RECOMMENDS** pursuing this approach as previously trialled.

PLANET response: PLANET welcomes the Board´s advice and has indeed considered it in defining what data is stored on the blockchain. As an example, legally valuable documents such as the eCMR document (Electronic Convention on the Contract for the International Carriage of Goods by Road) are stored on the blockchain. In this respect, the shared inter-ledger concept developed by PLANET is key as data may be *connected to* the blockchain but may *not be on* the blockchain. For further information, please revisit deliverables D2.16 and D2.18, read in conjunction with D2.20.

[20] Further information available in deliverables D2.4 and D3.4 to D3.6.
[21] Further information available here: https://www.era.europa.eu/domains/registers/eratv_en.

1.D.3.) Advisory Board: How did PLANET resolve the (known) limitations of **blockchains** to store large amounts of **data**? A solution could be to have a split between a service-oriented architecture and a BC, the latter used only for data pointers, "pointing" towards another service architecture storing real operational data ("the notary pointer of a blockchain"). The Board **RECOMMENDS** to explicitly detail to the European Commission how PLANET addressed the storage of large amounts of data and correlate such explanations with the functional value of blockchain technology.

PLANET response: In PLANET large amounts of data are not stored on the blockchain. The approach followed, in line with the Board´s advice, was of connecting pointers of data to the blockchain. Other data is stored on a large data lake accessible to all partners in the project. There are also an events stream service, a MongoDB database, an InfluxDB database and other databases.

In complement to the above and as per the question on how PLANET resolved (known) limitations of BCs to store large amounts of data, the answer also lies on the knowledge graphs used. More particularly, actual IoT sensor readings do not go on to the blockchain itself. In fact, the blockchain has a contract referring to either a package or possibly a container or a shipment ID. That serves as entry point to the knowledge graph connection.

Further to previous, if the contract refers to a package and a time period, the knowledge graph connection translates what assets that package was transported on, what sensors were installed there (at the time) and then translates it again into which sensors need to be queried and at what time.

Finally, there is an actual time series-oriented database specialised on sorting out those large quantities of data, referred to by sensors´ IDs in time periods. The data knowledge graph access, unified model and the access point "stitch all the data together". None of this data is stored in the BC at the moment.

For further information, please revisit deliverables D2.2, D2.6, D2.8, D2.16 and D2.18.

1.D.4.) Advisory Board: As already stated in recommendation 1.C.2., the Board fully **SUPPORTS** the use of **knowledge graphs** for knowledge data. As also stated, in reporting PLANET´s results to the European Commission, the Board strongly **RECOMMENDS** to explicitly clarify what kind of data is stored in the BC, whilst considering the use of KGs as stated.

PLANET response: PLANET welcomes the advice received from the Board for clear reporting to the EC. It has distilled it in deliverable D2.6, read in conjunction with deliverable D2.8. (on the use of knowledge graphs).

1.D.5.) Advisory Board: In public discussions beyond the PLANET project on the nature and **functionalities** of technologies used (e.g.: artificial intelligence, machine learning, smart contracts or DLTs), the Board **OBSERVES** these are often perceived as one by the general public, whereas they are very distinct. In reporting to the European Commission, the Board **RECOMMENDS** clear and sharp definitions on the value-added and functional differences (in PLANET) of technologies, such as smart contracts or blockchain.

PLANET response: PLANET welcomes the Board´s observations as the referred technologies are often misunderstood by society. One way it has integrated the above observation was, for example, by highlighting the added-value of smart contracts for multi-party coordination whereas PLANET correlates the use of smart contracts for multi-party operations with improvements in transaction performance against a baseline scenario. Further information on the usage of smart contracts in PLANET may be found in deliverable D2.18.

The Grant Agreement´s structure of PLANET´s work package 2 also reflects the distinct nature of the said technologies as they appear separately, even if used interwovenly in a such a way as to provide interoperable, complementary, unified services (deliverable D2.20F).

E) Recommendations and observations on services rendered – government perspective:

1.E.1.) Advisory Board: Does PLANET contribute to supporting the **needs of government** such as on dissemination of information of public importance (e.g.: European and international legislation, best practices…)? The Board considers that ICT should involve the needs of government and **RECOMMENDS** that PLANET and the EGTN instantiation reflect this reality.

PLANET response: PLANET thanks the Advisory Board for highlighting an important aspect of this project. By accessing the main dashboard, the user can have access to regulatory information and best EU practices. Public and private entities interested in, for example, seaports, can also access the connectivity index, publicly available. Examples of the information available: legislative, governance, taxation, corridor route index (e.g.: the user can check the most relevant port in a given moment), green facilities, network status, access to other initiatives (e.g.: on rail), etc.

For further information, please access the PLANET project´s dashboard available at https://planet.ebostechnologies.com and deliverable D2.20.

5.2 Cluster 2: Demonstrations via the Living Labs (WP2 and WP3)

A) Commendation on the connection between PLANET and selected projects

2.A.1.) Advisory Board: The Board **COMMENDS** PLANET project´s Living Labs on how explicitly their work relates with **global standards** and to some extent, the **FEDERATED and FENIX projects.**

PLANET response: The project welcomes the Board´s comments. In application of the Grant Agreement, throughout the project´s life, partners carefully considered the inter-section between the said initiatives, PLANET´s vision, the EGTN´s functionalities and purposes. For further information, please visit, for example, deliverable D1.7 read in conjunction with deliverable D5.7.

B) Recommendations and observations on IoT sensors:

2.B.1.) Advisory Board: In the specific case of Living Lab 1, how representative is the **data used**? How many shipments and consignments were involved in determining the figures used for Use Case 1´s impact assessment? The Board **RECOMMENDS** to detail (clearly) to the European Commission how representative the numbers used are for the analysis conducted on assessing future benefits.

PLANET response: PLANET welcomes the Board´s advice on clear reporting. There were 800 containers involved in the Physical Internet simulations. For last mile deliveries, there were at least 2 days of data for the city of Madrid involving over 10 000 deliveries per day. For reshuffling or re-routing, this was sufficient to cover the entire city thoroughly. Further information may be found in deliverables D3.1 and D3.2.

2.B.2.) Advisory Board: On **IoT and real time connectivity**, PLANET used intelligent sensors to measure specific parameters. In terms of real time connectivity when the container is at sea, what was the experience? What kind of technology is used? What is the ability of having sensor data in real time? If narrow-bit IoT and 5G are used, is it possible to capture real time data when the container is at sea?

In reporting to the EC, the Board strongly **RECOMMENDS** to clarify technological applicability in terms of connectivity, more precisely, which types of applications require real time visibility of IoT data and in which cases it is enough to simply log data and later on, analyse it.

PLANET response: NGS-Sensors developed the sensors used in the PLANET project. In PLANET, containers and pallets are tracked. IoT is used offshore and 5G capabilities exploiting low cost and low power satellite communications are considered. It is not an enabled service, however PLANET is in touch with companies capable of delivering such capabilities. In this sense, real data is stored in the devices and becomes accessible when connectivity is restored.

2.B.3.) Advisory Board: **IoT devices** can record and send positions as well as record and send other (sensor) data, such as temperature, etc. Logistics operators often prefer position data (real time). Other sensor data can be stored and accessed later, onshore. Do PLANET´s sensors send such data separately and more frequently than other sensor data itself?

From the explanations received, the Board **OBSERVES** that out in the open sea, no connectivity means no data. Data becomes accessible once onshore. Is this assertion correct?

PLANET response: PLANET welcomes the Board´s request for clarification and clear reporting to the European Commission. As detailed in deliverable D2.4 read in conjunction with deliverables D2.6, location data and data on conditions is sent in real time, at the same moment. Such processed data includes not only measurements, but processing ad-hoc dock thresholds related with logistics units in a container or a truck. It must be recalled that PLANET does not implement real shipments due to commercial privacy reasons.

2.B.4.) Advisory Board: The Board **RECOMMENDS** to clearly describe (to the European Commission) what is demonstrated, what are the real benefits and what is assumed. Depending on the use case, to capture **sensor data** (beyond location, if it is the case) may or may not be needed. However, in reporting to the European Commission, the scope must be clearly described.

PLANET response: As detailed previously, the main goal was to track IoT data in real time (for containers) using NGS Sensors, a PLANET partner. Furthermore, on sea PLANET considers that using AIS (Automated Identification System) data for the vessel position - knowing that a (specific) container is on board - is enough to get real time information on all the containers on board. It would be redundant to seek such information for each and every container. While on sea information is stored on the device. For further information, please revisit, for example, deliverables D2.4, D2.6 or D3.2.

C) Recommendations and observations on blockchain technology:

2.C.1.) Advisory Board: As previously detailed, in reporting to the European Commission, the Board **RECOMMENDS** that PLANET details very specifically *what is on* the blockchain and *what is connected to* the blockchain. The **shared inter-ledger concept** is extremely important and part of that appears to be on the blockchain, due to legal reasons or reasons of trust.

The detailed distinction also impacts directly on who has access to which data, at which moment. In effect with so much data floating around in PLANET, it is vital to define **who sees what** by establishing accessibility and security requirements.

The Board differentiates 2 layers of data: transport data (consignment data) and shipment data, delivering very granular information. These 2 layers should be separate. Operators do not wish for data to be mixed or made available erroneously. Also, specific modes (e.g.: train and maritime) often do not share data amongst each other. The Board **RECOMMENDS** to clearly detail who has access to which data. If PLANET is able to clearly establish this, then the business case is very strong.

PLANET response: PLANET welcomes the Board´s recommendations. The definition of what is *on* the blockchain and what is connected *to* the blockchain was previously explored in recommendations 1.D.2. to 1.D.4. As a result, this reply focus hereafter on *who* accesses which data by looking at a specific example.

In Living Lab 1, different user roles - to which permissions are associated - have been defined for access to an asset's data. Thus, each user can have one or more roles, by obtaining combined permissions. The application architecture consists of the user application (front-end) and the server (back-end), which implements a data access security layer through this system of roles and permissions. When an end-user reccurs to the application, the front-end checks its permissions and, based on them, sets up a request to the back-end. This step is, hence, the first security check.

Thereafter, the back-end receives the request and, regardless of the role specified in the request, always checks the veracity of the role. If the user's role is altered somehow from the front-end, the server will deny access to the data. In a certain way, this is as a double authentication system. Once user's permissions have been verified, access to the corresponding data will be allowed through a database query. In parallel, if the user has been configured as an entity of an organization in the blockchain network, the request will be made through the blockchain network.

On the one hand, the user will be identified in the network and checked for compliance with all necessary cryptographic material. On the other hand, the chaincode business layer will again check the permissions according to roles. In this way, the blockchain platform implements a role-based permission checking system in each layer of its architecture. Some examples:

- ✓ Shipping agent: Can read any port calls as well as read, create, update and delete their own shipments and read their own transport units (containers);
- ✓ Customer: Can read their own shipments;
- ✓ Depot: Can read, create, update and delete their own storages. Can read their own shipments.

To sum-up, different user personas have been created, which enables the interfaces´ administrator to distinguish and design what each group sees. For further information, please revisit deliverable D2.20.

2.C.2.) Advisory Board: Still on the matter of accessibility, but from the point of view of **interoperability**, the Board considers that a distinction must be established between how different supply chain partners connect *to* the blockchain ecosystem and how a blockchain ecosystem connects *with* another blockchain ecosystem.

In effect, one blockchain has its members and a specific governance structure. Another BC will have other members and a different governance structure. The Board **RECOMMENDS** that clear explanations are provided to the European Commission on data exchange and governance of the blockchains.

PLANET response: PLANET welcomes the Board´s recommendation. One of the services developed is the EGTN´s (open source) inter-ledger service. This services connects (back end) blockchain systems already deployed by stakeholders. This is one approach: "listening" for events emitted from backend systems, redirecting (an event) from one blockchain system to another and showing the events on the EGTN platform. Please check Figure 5 for a visualisation of this process.

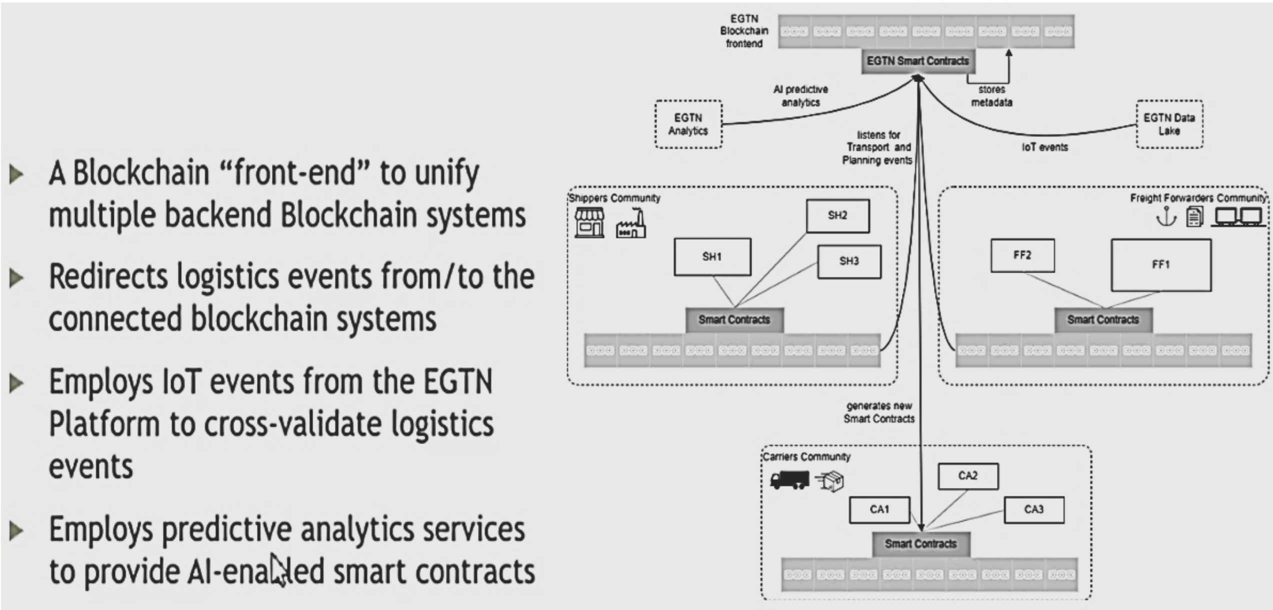

Figure 5: EGTN Interledger service[22]

As for the governance layer, the latter was considered early on in the project. PLANET´s approach was to discuss with all the stakeholders (of each BC) and reach a consensus on what data is shared externally, outside their specific BC system. This was done for all the BCs to be connected.

PLANET aligned the agreed data into a single data model as each partner was sharing different data (e.g.: different transport documents). This data model is included in the blockchain events that are emitted in the BC systems. For more information on PLANET´s common data model, please revisit deliverable 2.8. For information on interoperability and the use of blockchain technology, please check deliverable D2.16 and D2.18.

Even if PLANET´s interoperability solution between BCs is not totally unexpected, PLANET adds value exactly by developing architectures that allow different BCs ecosystems to exchange data to track events. For further information on blockchain interoperability, please check Figure 6:

[22] Author: Konnecta Systems for the PLANET project.

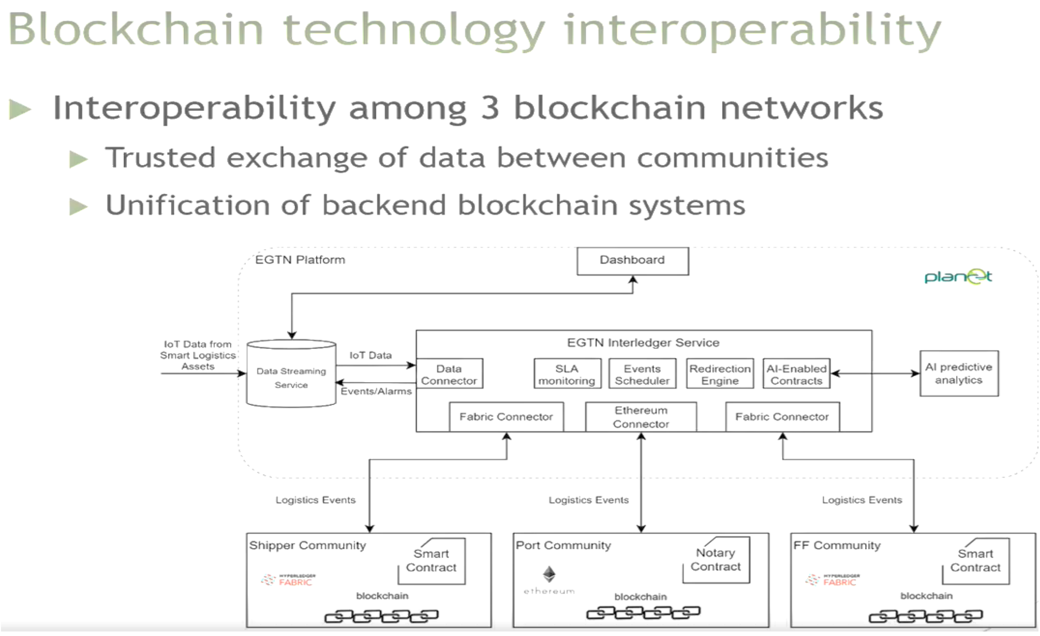

Figure 6: Blockchain technology interoperability across 3 blockchains[23]

2.C.3.) Advisory Board: The Board **OBSERVES** with interest the diverse and vast number of partners present in PLANET, all competing actors in complex, global supply chains. How´s **connectivity** achieved at such scale?

PLANET response: PLANET welcomes the Board´s observation. It is particularly relevant as organisations have their in-house (legacy) systems at times non-interoperable with other systems. PLANET is a demonstration of what can be achieved in an interoperable manner with data sourced from different systems and actors.

Beyond the technological solutions currently available (e.g.: FENIX connector) or even, the interoperability pathway solution described in 2.C.2., PLANET´s connectivity is firmly grounded in cooperation and building ecosystems around the technologies developed.

As stated, the Living Labs are the first instance of PLANET´s technological PI ecosystems. Living labs were defined in conjunction with local partners considering expected optimisation benefits as a result of collaboration. These benefits were translated in the services developed and experimented on the EGTN platform (e.g.: optimised routing of last mile). Shared benefits motivate further collaboration.

Interconnectivity is further supported by microsimulations and test scenarios to reinforce collaboration. For further information, please revisit deliverables D3.2., D3.4., D3.6. and D3.8.

In an nutshell, beyond the technical capabilities developed, PLANET´ s contribution to excellent research is grounded on demonstrating that cooperation is possible and beneficial in, otherwise, highly competitive environments. As such, PLANET delivered an ecosystem of organisations, a functioning platform as well as services and solutions that are proofs of concept of what can be achieved. Together they provide feasibility arguments to accelerate the move of industrial ecosystems towards PLANET´s PI vision. This is a PLANET value-proposition.

[23] Authors: Konnecta, EBOS, Fundación Valenciaport and INLECOM for the PLANET project.

D) Recommendations and observations on the impact of the electronic Freight Transport Information (eFTI) Regulation (EU Regulation 2020/1056)

2.D.1.) Advisory Board: It is the Board´s **ASSUMPTION** that documents exchanged in Use Case 1, Living Lab 2 relating to the "**End to End Digital and Document Management**" solution presented are subject to EU Regulation 2020/1056, the eFTI Regulation. Was the referred legislation considered in developing such a solution?

PLANET response: From the outset, the said legislation applies only from August 2024. The European Commission is currently defining the necessary delegated acts that will operationalise key aspects of the referred Regulation. This work is carried out on the DTLF, the outcomes of which are closely followed by PLANET.

On the other hand, in PLANET works were carried out on the basis of the infrastructure already in place as the goal was to resolve problems *today*, not in 1, 2 years or more years from now. Hence, works were carried out on the basis of existing standards, even if the technology developed is "regulation neutral" and thus, able to incorporate changing regulatory requirements.

Further to the previous point, it must also be pointed that PLANET´s reach goes beyond the European Union, whilst the eFTI Regulation is only applicable to the EU. In this sense, PLANET´s solutions developed looked beyond the EU´s reality, which in itself added another layer of complexity. For example, when considering railway and China, PLANET developed a use case relevant also to China´s reality. In this sense, the chemical (use) case was considered in coordination with other organisations, who presented their perspective on the future of new railway services to China and may now consider scaling PLANET´s solutions.

The reality is as such that, today, it is very complex for all players to exchange documents, due to the current context and technical limitations as seen with China, where the use of telex and telefax is still common. PLANET´s goal was to improve the situation for all. For example, if a shipment starts in Europe, how could PLANET improve the situation for all - including customs authorities - in preparing the supervision of necessary documents?

To the said effect, PLANET created the "End to End Digital and Document Management" solution as a proof of concept enabling the trustworthy and automated exchange of documents. A proof of concept created in PLANET, to be potentially turned into a concrete solution "on the ground", ready to be scaled-up and capable of incorporating changing regulatory requirements.

On a final note, EU law – including the referred eFTI Regulation – is always present in PLANET´s priorities as demonstrated in PLANET´s assessment of the regulatory environment for the efficiency of future transportation and the EGTN (deliverables D1.3, D1.5 and D1.11 read in conjunction with D5.7).

Identified impacts in efficiency parameters run in the strategic model – on the implementation of physical technologies - to measure up to what extent the competitiveness of a specific corridor is *"impacted"* by new regulatory or technological changes, according to different levels of regulatory internalisation. In considering different levels of legislative implementation, PLANET´s infrastructure, solutions and services offered can be bespoken to accommodate the changing regulatory context. At the end of the project, final EGTN specifications (Deliverable D1.11) are made publicly available and these internalise further the impacts of the regulatory environment.

5.3 Cluster 3: Life Beyond the Project (WPs 4 and WPs 5)

A) Recommendations and observations on commercialisation, partnerships and research:

3.A.1.) Advisory Board: According to the preparatory documentation received, the Board **OBSERVES** positively PLANET´s stated 9 **Key Exploitable Results** (KERs) as follows:

- ✓ Volume flow forecasting service for warehouses (IBM),
- ✓ Hyperloop (Hardt Global),
- ✓ Intelligent decision support algorithm for Just-in-Time (JIT) rail shuttle service (Fundación Valenciaport),
- ✓ Track and trace monitoring service (NGS),
- ✓ End-to-end (digital) and document management (Blocklab – Docklab) – patent pending,
- ✓ New distributed ledger technology for smart contract blockchain interoperability (Konnecta),
- ✓ Single logistics window platform (CPSI – Comunidade Portuária de Sines),
- ✓ Physical Internet routing algorithms (VLTN) – patent pending,
- ✓ Smart and Green collaborative platform (INLECOM) – patent pending.

From the list of the 9 products with an exploitation agenda, most are recognisable as clear PLANET results (e.g.: smart routing algorithms or track and trace services). Others are not. A prominent example is HYPERLOOP. The Board **RECOMMENDS** to clearly establish the specific relation between **HYPERLOOP** and the PLANET project by looking at a specific simulation or corridor where HYPERLOOP is considered.

PLANET response: PLANET welcomes the Board´s recommendation. Within the meaning given by the Grant Agreement and deliverable D5.6, a "Key Exploitable Result" may or may not have directly originated from the PLANET project. This is the case of HYPERLOOP. Notwithstanding, PLANET supports HYPERLOOP´s further exploitation by integrating it in various simulations where HYPERLOOP is considered as one of the most suitable means of transportation - in a future scenario - and as a new transport service offered along the TEN-T corridors. For further information on the exploitation paths of KERs, please revisit deliverable D5.6.

3.A.2.) Advisory Board: Based on previous experience with other research and innovation projects, the Board has **OBSERVED** that if exploitation activities are followed-up by impactful commercial initiatives, often this is *already known* and felt *during* the project. Very powerful partners appear during the project to support the solutions being developed during the project. These are clear and positive "signals" of commercial interest and of the relevance of the commercial exploitation strategy being followed by the project. Is this the case with PLANET? If so, the Board **RECOMMENDS** that **commercial signals** identified *during* the project are clearly detailed in reporting PLANET´s results to the European Commission, as they support the potential adoption of PLANET´s technologies and vision.

PLANET response: PLANET welcomes the Board´s observations and recommendations. It is worth recalling that long term exploitation pathways were developed for Key Exploitable Results. The most mature KERs go through tailor-made consultancy services with a focus on commercialisation, to tackle specific aspects such as acquiring a commercial license. All of them will be able to develop further, potentially with a view to be commercialised.

Furthermore, all exploitation activities were based on the innovation registry managed from the beginning of the PLANET project. Beyond the KER list mentioned (in 3.A.1.), there were 2 other (initial) KERs without further commercialisation interest. One was considered a “soft result”. The other one had a very low TRL.

As for expressions of interest - received during the PLANET project - on PLANET´s solutions, below are two examples:

- ✓ Docklab´s “Quay Connect”[24] (not a KER) used to mitigate the consequences of Brexit in the post-Brexit moment. “Quay Connect” (a commercial product) is now being scaled to include other EU and non-EU origins. This solution was first developed in PLANET and presented to European shippers as well as customs officials (acting on an independent capacity), via the Advisory Board.
- ✓ Docklab´s and UIRR´s “End to End Digital and Document Management” whereas there is interest from partners and related organisations to further develop it.

For further information please revisit deliverable D5.6.

From the process perspective, knowledge and solutions developed may also become reference processes for other organisations and companies. For further information on recommendations for PLANET standardisation, please revisit deliverable D4.5.

Finally, specific partners currently discuss further how to integrate other blockchain solutions in their organisations´ internal processes, to increase visibility of all stakeholders.

3.A.3.) Advisory Board: Looking at the number of **patents** resulting from the PLANET project, is the consortium satisfied with the results?

PLANET response: PLANET thanks the Board for the question. PLANET is a Research and Innovation Action (RIA). RIAs not always lead to commercially exploitable results. Yet, PLANET and its partners produced several Key Exploitable Results supported by concrete exploitations plans. These included 3 (pending) patents:

- End-to-End Digital and Document management (Blocklab / Docklab),
- Physical Internet Routing Algorithms (VLTN),
- Smart and Green collaborative platform (INLECOM).

This is a statement of PLANET´s capacity to innovate. For further information, please revisit deliverable D5.6.

Worth also is to note that specific partners consider using the solutions developed to increase end-to-end visibility across the supply chain for clients. Other partners are currently working to identify opportunities for further use of blockchain technology in internal processes.

B) Recommendations and observations on EGTN accessibility after the end of the project:

3.B.1.) The Advisory Board **OBSERVED** with satisfaction that the **EGTN** is online and may stay online after the project. How will the final EGTN infrastructure look like? Please reflect on the maturity stage of the EGTN and the experience of connecting to it. Will it be maintained after the end of the project?

[24] Quay Connect: https://quay-connect.com/.

If the EGTN software instances are not available for the future, possibilities for further cooperation may end. This is a **CONCERN** of the Advisory Board. Are there specific organisations interested in pursuing specific project solutions?

The Board is of the opinion that the creation of the FENIX 2.0 non-profit association - as a result of the FENIX project - could inspire partners in guaranteeing PLANET´s life beyond the project.

PLANET response: The EGTN is an instantiation of the architectures developed in PLANET. The user interface is the dashboard accessible here: https://planet.ebostechnologies.com. There is interest from partners in maintaining the instantiation alive beyond the PLANET project and conversations are ongoing regarding the specific requirements to do so.

The EGTN system is, at the moment, on a proof of concept stage where Living Labs feed inputs. It is in the final stages of its development and the dashboard is, partially, replicated in Figure 7:

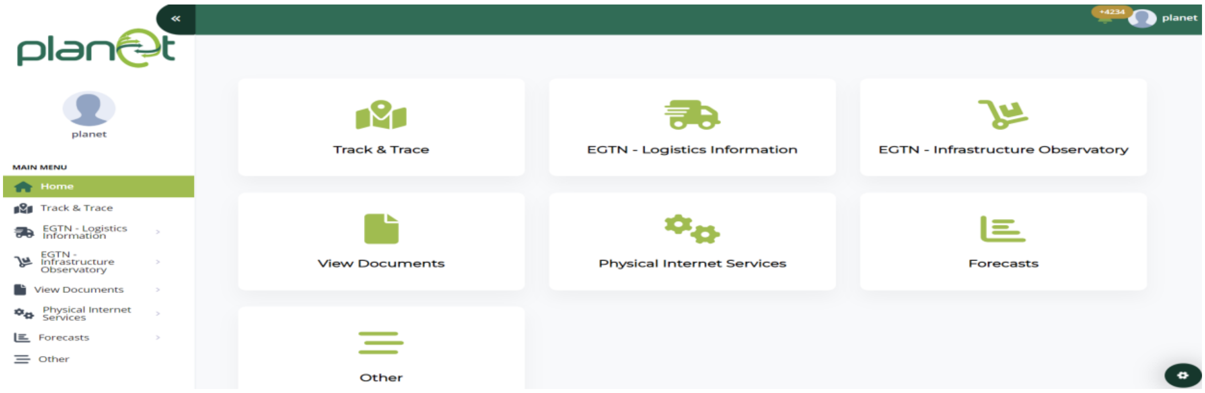

Figure 7: The Open EGTN Platform dashboard[25]

The EGTN brings together all the applications developed in the PLANET project and can serve as an analytical tool to acquire data for further analysis. In this respect, one can do simulations, get user data from other applications, optimise last mile deliveries, etc. based on real life data being fed to the Open EGTN platform. For further information, please check Figure 8:

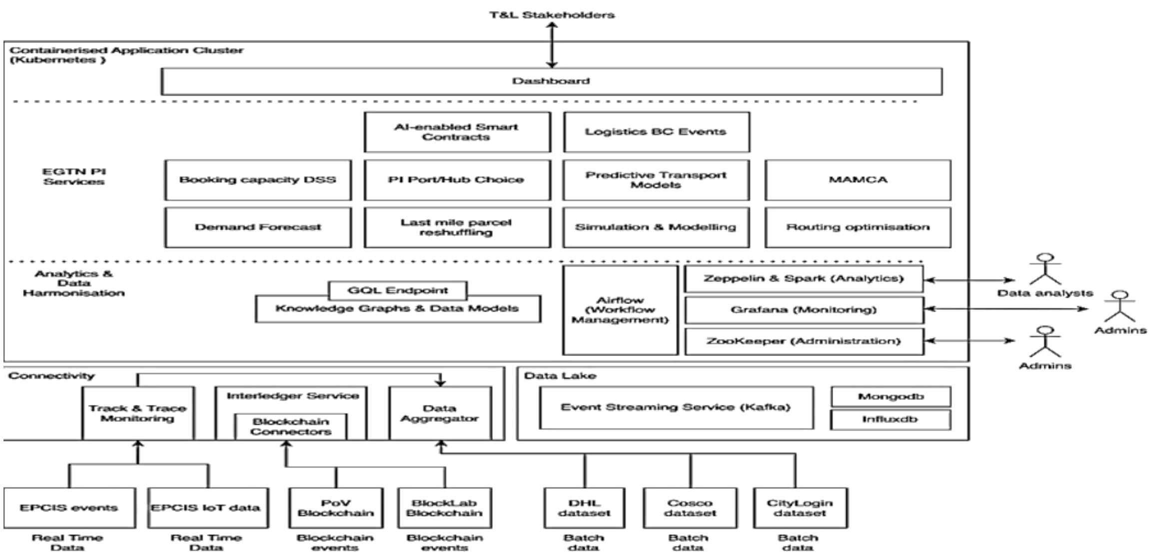

Figure 8: The Open EGTN platform[26]

[25] Author: EBOS for the PLANET project.
[26] Author: INLECOM for the PLANET project.

Finally, for additional information on the interest received during the project for PLANET´s solutions, please review recommendations 3.A.2. and 3.A.3.

3.B.2.) Advisory Board: Still regarding **life after the end of the project** will the data sets and models be made public? Are there other examples of public outcomes? The Board **RECOMMENDS** such outcomes are made public and presented as such to the European Commission.

PLANET response: PLANET welcomes the above recommendation. In line with previous recommendations from the Board to this effect and resulting actions by PLANET (deliverable D5.2), all deliverables defined as "public" according to the Grant Agreement are already or will be made public.

In effect, many of PLANET´s outcomes are available via its website: www.planetproject.eu. The EGTN code is open source and the EGTN data model is also public. Repositories such as Gitlab are available. For further information, please revisit (for example) deliverables D1.11F, D2.18F, D2.20F, D4.3, D4.4, D4.5 or D6.4.

C) Recommendations and observations on relations with other stakeholders and projects:

3.C.1.) Advisory Board: The Board **RECOMMENDS** that PLANET continues building **synergies** with organisations and projects that may benefit particularly from the work developed in PLANET and support PLANET´s exploitation efforts, including via commercialisation. Below are some recommended suggestions:

- ✓ Customs authorities and businesses exposed to complex customs procedures.

PLANET response: PLANET welcomes the Board´s advice. It approximated customs authorities and businesses (directly exposed to complex customs procedures) to PLANET, by inviting to the Advisory Board different stakeholders experienced in business, operations and customs procedures to discuss the solutions developed in PLANET, but not only….

One of the pilots developed in PLANET ("QuayConnect" by Docklab) enables fully digital processing of customs declarations post-Brexit. It re-uses validated data from ERP (Enterprise Resource Planning) systems, PCSs (Port Community System) export declarations and cross-references/cross-checks the commercial value of invoices against the values submitted in customs clearance import declarations.

The initial outcomes of QuayConnect were presented to customs authorities during an initial roundtable session. QuayConnect was also discussed with specific customs officials (acting on an independent capacity) via the Advisory Board. The finalised solution was also presented to European shippers via the European Shippers Council.

Currently, the solution targets products traded from the Netherlands to the UK in the post-Brexit context. It is a solution that will evolve in time to include non-EU shipments and non-EU products to be added to the rule engine, for automated cross-referencing.

Moreover, QuayConnect operates with any invoice, even if the focus is on working with original data from the source (e.g.: a shipper), in order to guarantee the information´s quality, and not with "untrusted" data from a third party. The pilot is up and running. Further automated integrations will now become possible. These integrations can, indeed, be further developed with customs authorities and shippers.

Finally, Quay Connect was first developed in the PLANET project and served as basis for the "End to End Document Management" Key Exploitable Result of this project. Partners are also exploring how to further the use of blockchain technology in other processes involving customs procedures and requiring increased end-to-end visibility across complex supply chains.

- ✓ CIRPASS - Digital Product Passport project. Further information available here: www.cirpassproject.eu.

PLANET response: PLANET welcomes the Board´s advice. PLANET keeps abreast of developments in the referred initiative via one of its partners and the Advisory Board as there are relevant standards being developed. PLANET will continue fostering synergies with CIRPASS.

- ✓ Digital Transport and Logistics Forum (DTLF), European Commission – for further information, please visit: https://transport.ec.europa.eu/transport-themes/digital-transport-and-logistics-forum-dtlf_en.

PLANET response: PLANET maintained continuous relations throughout the project with the DTLF via selected project partners (e.g.: UIRR) and specific Advisory Board members. Moreover, PLANET sought to integrate to the extent possible DTLF´s outcomes in the PLANET project, whilst taking into due consideration that specific aspects of the DTLFs work (e.g: the eFTI´s data model) must be further developed. For further information, please revisit (for example) deliverables D1.3, D1.7, D1.11 or D5.7.

- ✓ Electronic Product Code Information Services (EPCIS) 2.0 in cooperation with the Internet of Things Application (IOTA). More information available here: https://blog.iota.org/epcis-2-0-a-global-standard-to-build-trusted-and-decentralized-supply-chains-with-iota/.

PLANET response: PLANET welcomes the Board´s suggestion and highlights that ECPIS standards are used throughout the project as detailed in previous sections. Further developments in standardisation are followed with interest by PLANET, especially if related to the Physical Internet and the Internet of Things. Information on PLANET´s recommendations for standardisation may be found in deliverable D4.5. PLANET will continue to follow with interest the outcomes of the EPCIS 2.0 initiative as it feeds to other initiatives of PLANET´s partners.

- ✓ FEDERATED network of platforms project. For more information visit: www.federatedplatforms.eu.

PLANET response: PLANET maintained relations with projects such as FEDERATED, as detailed in deliverable D1.7. The outcomes of the FEDERATED project were considered throughout the PLANET project. Beyond FEDERATED, relations were also developed with the FENIX project and the FENIX 2.0. non-profit association.

- ✓ FENIX network project and the FENIX 2.0 association. For further information, please visit: https://fenix-network.eu/).

PLANET response: PLANET has strengthened contacts beyond the FEDERATED project to include relations with the FENIX project and has initiated contacts with founding members of the future FENIX 2.0. non-profit association, as proposed by the AB. Results from the FENIX project were also considered during the PLANET project.

- ✓ PEN-CP project - Pan-European Network of Customs Practitioners. Further information available here: www.pen-cp.net.

PLANET response: PLANET welcomes the suggestion. It continues to reinforce contacts with the referred initiative as a follow-up to the contacts already established via some members of the Advisory Board.

- ✓ Postal institutions, such as the Polish Post or the Universal Postal Union (UPU).

PLANET response: Poczta-Polska (the Polish Post) is a PLANET partner. Effectively, the solutions presented in Living Lab 3 were developed out of synergies with the Polish Post. Further observations received from the Board on postal flows and standardisation were considered and integrated in deliverable D3.6.

Notwithstanding the input received, implementation at the scale proposed by PLANET may prove difficult. As an example, the Polish post is currently implementing a new version of the integrated tracking system. However, problems subsist with getting proper data at source as discovered following a simulation with containers for road transport using public tracking registers. The quality of the data stored in public tracking systems was low and contained a large number of errors as it resulted of automated importation from other systems. This proves there is the need for high quality standardised data.

Concerning recent developments at the UPU, conclusions resulting from the workings of the UPU´s group on achieving interoperability between postal operators were followed throughout the PLANET project via one of PLANET´s partners. Furthermore, specific aspects relevant to LL3 were passed on to PLANET by specific Advisory Board members and distilled into deliverable D3.6 (Living Lab 3).

Once more, standardisation of data flows is needed from every UPU partner. The data available is either difficult to access or contains errors. There is a need to standardise such data further before it can be confidently reused by institutions such as the Poczta-Polska. Moreover, even if goods can be tracked once they enter Poland, before entering Poland such data is scarce and/or invalid.

D) Recommendations and observations on future research:

3.D.1.) In order to strengthen PLANET´s outcomes, the Board **RECOMMENDS** that the project proposes future topics for publicly and/or privately funded **research** to further PLANET´s vision and industrial interest for the PI vision presented. Which concrete proposals has PLANET produced in this respect?

PLANET response: PLANET welcomes the Board´s advice. In effect partners were invited to present open (research) questions relating to their topic of work during the PLANET project. For further information, please revisit the summaries presented in the Annexes of this deliverable.

Beyond questions relating to specific domains covered in the deliverables, the following proposals were presented with the intent to focus EU funding in areas of relevance to PLANET´ solutions and raise industrial interest for the PI vision presented:

1) Future *Connected Europe Facility* calls should focus on improving digital infrastructure:

- ✓ To improve capacity on the network and nodes;
- ✓ To increase interoperability (e.g.: security systems, ERTMS, electrification);
- ✓ To support:
    - o Digitization and digitalisation with a view to reinforcing connectivity, in the same way as physical infrastructure does;
    - o The definition and application of simulation and predictive analytics to improve connectivity, as previously exemplified with Use Cases;
    - o Greater collaboration and develop trust among stakeholders.

2) For the *Horizon Europe* program, the following recommendations are presented as topics of interest to PLANET:

- ✓ (Big) Data Analytics;
- ✓ Physical Internet (PI);
- ✓ Governance and stakeholder engagement;
- ✓ Digital Platforms;
- ✓ Blockchain technologies and smart contracts, more particularly:
    - Modelling import/export of process flows and synchro-modal booking;
    - Definition and emulation of smart contract functionality in specific process steps;
    - Analysis of overall completion and time reduction (import) process;
    - Use of blockchain technologies and smart contracts in booking transportation. PLANET identified the critical steps for the booking process, how it can be replaced by automated decision-making as well as smart contracts and how that helps total throughput.

For further information, please revisit the outcomes of work package 3 and deliverable D4.1.

At various moments of interaction with the Advisory Board as well as in preparatory activities, **other research topics** were proposed for future research, supported by public or private funding. Below are some examples directly or indirectly related with the PLANET project:

- What is the cost of implementing the technical solutions presented in PLANET´s Use Cases?

- What would be the cost of implementing PLANET´s solutions in real life after the PLANET project?

- Which incentives are needed for the adoption of the technologies used in PLANET and the internalisation of the Physical Internet vision by industry?

- What are the most commercially successful business models around the Physical Internet?

- How to build Physical Internet ecosystems around the technologies used in PLANET?

- What alternative routes and options can be explored to overcome bottlenecks and congestion on the Rhine-Alpine corridor and other corridors?

- What would be the impact on sustainable growth and capacity management if freight shifted from congested EU ports to less congested EU ports?

- How to improve the reliability of microsimulations for impact quantification of IoT technologies when applied at company level?

- Which technologies are more or less relevant for the development of the Physical Internet vision and why?

- Which geo-political & geo-economic factors are of relevance to the Physical Internet and why?

- What are the network effects of PLANET´s nodal point concept?

- What are the links, value-added and limits of the electronic Freight Transport Information/Digital Transport Logistics Forum´s semantic model, in contrast with the United Nations Centre for Trade Facilitation and Electronic Business semantic model?

- Strategic geopolitical autonomy of the European Green Transport Network (EGTN) beyond supply chain resilience.

- Governance in platforms. Is there a role for Decentralised Autonomous Organisations?

- How to support further research on IoT sensors producing data beyond location, including humidity, temperature, shocks, etc., particularly relevant for certain goods (e.g.: perishable)?

- Research moved from closed lab research to living labs, where various stakeholders interact. What could be the next steps in the evolution of living labs? What is the role of internal and external stakeholders?

- What role for advisory boards in EU projects with a strong technological focus?

- How to foster collaboration in competitive environments with a view to internalise technological developments?

Concluding, this chapter looked at the most important stakeholder issues highlighted by the Advisory Board and how PLANET incorporated the valuable contributions received from AB stakeholders. The proposed contributions also provided a forward vision for life beyond the project through:

- Commercialisation activities,
- Relations with other projects, that may also lead to commercial and non-commercial opportunities,
- Further research to raise industrial interest for the PI vision presented.

Chapter 8 will hereafter provide the final conclusions of this deliverable.

6 Final Conclusions

Deliverable D5.3 is the final version of deliverable D5.2 submitted at the end of 2021. With all the recommendations presented in deliverable D5.2. fully internalized by PLANET´s partners, the beating heart of this deliverable is on presenting the most vital issues for stakeholders by the Advisory Board (beyond deliverable D5.2) and how the said issues were met by PLANET partners with the purpose of supporting commercialization efforts and more widely, life beyond the project for PLANET and its solutions.

The deliverable does so by placing laser-focus on 3 key clusters defined in harmony with deliverable D5.2 (Chapter 8, page 43), the project´s structure and its work packages. The 3 clusters, key conclusions and their impact in PLANET (inscribed in Chapter 5 of this deliverable) are detailed below:

- ✓ Cluster 1 - "PLANET vision and EGTN" (work packages 1 and 2 mainly):
  - o The models used in PLANET internalise recent geopolitical developments and guarantee PLANET´s openess to third countries. PLANET achieved this by incorporating EU and non-EU partners in the project. It also did so via the models used, capable of internalising changing international contexts, such as the impact of the Ukranian crisis.
  - o The Physical Internet will alter profoundly the TEN-T as we know them today. PLANET´s models captured such change and the models developed sustain clear recommendations.
  - o KPIs used in PLANET capture trade-offs between new "optionalities" and not just "optimalities", as proposed by the Advisory Board. As such, KPIs used in PLANET covered areas such as climate change and resulting capacity restraints.
  - o The "collaborative" and "interoperable" natures of PLANET´s services are at the heart of the project. In PLANET´s EGTN, this is experienced in the interoperable and yet, autonomous manner different services function. To achieve interoperability between services, international standards and current regulations were used. They further enable accessibility of external actors. PLANET´s approach was supported by the Advisory Board.
  - o Legislative developments and international standardisation initiatives are embedded in PLANET´s technological developments and models, thus guaranteeing that governmental needs are dully considered by PLANET, as proposed by the Advisory Board. This can be witnessed, for example, in the services offered via the EGTN dashboard.
  - o Technological solutions such as blockchains or smart contracts must be bespoken to purpose and add-value vis-à-vis technologies previously used, as proposed by the Advisory Board. PLANET achieves this by employing specific technological solutions to improve an existing situation. For example, smart contracts are used to improve coordination, whilst blockchains are used to guarantee secure registration of valuable data.

- ✓ Cluster 2 - "Demonstration via the Living Labs" focused on experimentation and demonstration activities (work package 3, its 3 living labs as well as work package 2´s technologies). The main conclusions as distilled into PLANET:
  - o PLANET establishes clearly the benefits arising from the solutions developed, in line with proposals by the Advisory Board to this effect. PLANET does so by looking at the impacts of the solutions employed in different Living Labs.

- Efficient connectivity is central for the Physical Internet vision presented by PLANET, as discussed in detail with the Advisory Board. As a result, PLANET defines clearly when, for example, real time sensor data is available and when such data is not necessary. Such distinction enables the development of bespoke solutions for seamless data exchange.
- Technology should be bespoke to purpose and employed where it adds value. In PLANET, this can be witnessed by the use of AI for analysis, optimisation and prediction services, blockchain for the secure registration of valuable data or smart contracts for seamless multi-party coordination.
- At all moments, who accesses which data for which purpose and at which moment is clearly defined. In PLANET, this is achieved via the EGTN´s pre-defined governance arrangements and incorporated accessibility layers that materialise such arrangements.
- Technological development experimented and demonstrated in the Living Labs require highly competitive partners to join forces. Effective ecosystems were built around the technologies deployed and PLANET´s vision materialised, because competing partners - in complex supply chains - cooperated on the principle of mutual benefits arising from jointly venturing. Such benefits would have not been as efficiently achieved otherwise.

✓ Cluster 3 - “Life beyond the project” with a focus on the works carried in packages 4 and 5 of this project. This cluster looks more closely at commercialisation activities, future research topics to further PLANET´s vision supported by private and/or public funding as well as possible partnerships be it with other projects, the private and public sectors. The main conclusions and its impact in PLANET:

- Throughout PLANET a clear link must be established between Key Exploitable Results pursued and the role of PLANET in supporting their future implementation. PLANET does so by describing clearly its contribution to supporting the exploitation of specific key results be it via commercialisation, modelling and simulation, etc.
- External interest on the solutions developed often expresses itself in signals of interest *during* a project´s life by organisations looking to scale such innovations. PLANET´s proposed solutions already raised interest from external parties looking into scaling them up.
- Beyond PLANET´s proposed solutions, the EGTN instantiation should be kept alive after the project´s existence. Different partners have demonstrated interest to do so.
- As explained in “The role of public funding in the (…) upscaling of collective innovation trajectories” by Migeotte J., Rukanova, B. and Tan, Y. (2020), technological advancements demonstrated in and enabled by Living Labs experimentation can gain scale by joining larger networks. It is to this effect that various projects and other networks were proposed to PLANET partners to guarantee life beyond project. Relations were fostered to this effect.
- The PLANET project is a research and innovation project continuously evaluating its outcomes and posing new questions. The Advisory Board and partners in the PLANET project came together to define potential partnerships, propose topics of future research and explore open questions of interest to the PLANET project.

The referred conclusions are the result of synergetic work between PLANET partners and the Board, for which PLANET received praise from the Advisory Board. Such workings were detailed in Chapter 4 of this deliverable where the reader can find the main outcomes of the 2022 and 2023 widely attended Advisory Board sessions, but also a description of activities beyond formal Advisory sessions, used to further strengthen relations between PLANET partners and specific Advisory Board members.

The Advisory Board´s structure, international nature and relationships per area with external stakeholders (via the Advisory Board) were explained in Chapter 3 of this deliverable where a detailed view of the Advisory Board´s members is provided. Due to privacy reasons, personally identifiable information is omitted.

This deliverable was complemented with an executive summary and overview of the structure followed, introductory remarks, support sections (references, annexes, etc.) and, last but not least, these conclusions seeking to highlight the interwoven nature of relations and resulting interactions between PLANET partners and key external stakeholders (the Advisory Board).

Together, PLANET partners and key external stakeholders can guarantee that PLANET´s vision and solutions - praised by the Board for their merits - for transparent, competitive and sustainable global trade where the TEN-T of tomorrow play a central role, live on beyond the project´s life.

7 References

CORDIS – PLANET project (2023): https://cordis.europa.eu/project/id/860274.

European Shippers Council and JustAsk! (2021): "Deliverable D5.2 – Observations and Recommendations of the Advisory Board (version 1)" – selected parts. Source: https://www.planetproject.eu/wp-content/uploads/2021/12/PLANET-D5.2-Observations-and-Recom mendations-of-the-Advisory-Board-v1.pdf.

Migeotte J., Rukanova Boriana, Slegt M., Tan Yao-Hua, Post S., Wong S., Hintsa J. (2020): "The role of public funding in the initiation and upscaling of collective innovation trajectories" – Association for Computing Machinery – selected parts.

Klein S., Niels B., Rukanova B., Tan Yao-Hua (2011): "Accelerating Global Supply Chain with IT-innovation" – ITAIDE/SPRINGER – selected parts.

Annexes

Annex I: November 2022 Advisory Board Session

29 November 2022, MS Teams[27]

Arrival: 13:40 (CET)

Co-Moderation: Andreas Kortenhaus (justASK!) and Hélder Pereira (ESC)

Table 3: November 2022 Advisory Board Agenda

WP	Activity Detail	Start time	Duration	End time	Speaker	Slides or 1-pager summary	Supporting deliverables	Questions to the AB
	Welcome by the European Shippers Council	14:00	10 mins.	14:10	GST (ESC) AKA (justASK!) HPA (ESC)	No	No	No
	PLANET overview & current status	14:10	10 mins.	14:20	GAU (CERTH)	Slides	No	No
1	WP1 – EU Global Transport and Logistics Networks (EGTN) – Overview and questions to the Advisory Board	14:20	10 mins.	14:30	GAU (CERTH)	Slides	(see below)	Yes
	Task 1.2: Modelling and simulation (ITTAINNOVA).					1-pager	D1.3 Final[28] (not yet available)	yes
Discussion		14:30	20 mins.	14:50	Discussion			
2	WP2 – EGTN infrastructure (cloud based) Overview and questions to the Advisory Board	14:50	20 mins.	15:10	MSZ (IBM)	Slides	(see below)	Yes

[27] Agenda identical to the one distributed in November 2022, for the AB session.
[28] Final deliverable(s) due in November 2022. You are invited to read summary. Please click here.

WP	Activity Detail	Start time	Duration	End time	Speaker	Slides or 1-pager summary	Supporting deliverables	Questions to the AB
	Task 2.2 – IoT and Connectivity Infrastructure (SIRMA and NGS);					1-pager	D2.4F/D2.8F	Yes
	Task 2.3 – Forecasting optimisation AI (IBM);					1-pager	D2.9/D2.10F[29]	
	Task 2.4 – Physical Internet networks (VLTN GCV);					1-pager	D2.13/D2.14[30]	
	Task 2.5 – Blockchain and smart contracts interoperability (Konnecta);					1-pager	D2.15/D2.16[31] D2.17/D2.18[32]	
	Task 2.6 – Unified interface (EBOS).					1-pager	D2.19/D2.20[33]	
Discussion		15:10	40 mins.	15:50	Discussion			
Coffee Break		*15:50*	*15 mins.*	*16:05*	*Coffee Break (please bring your own coffee 😊)*			
3	WP3 – PLANET´s Living Labs and Use Cases Overview and questions to the Advisory Board	16.05	15 mins.	16.20	AMR (Cosco ES) ABS (Panteia) MZA (ILIM)	Slides	(see below)	Yes
	Task 3.1 – Living Labs 1 "Asia – Europe corridor (PI/blocchain)" (Cosco Shipping Spain);					1-pager	D3.1./D3.2F[34]	Yes
	Task 3.2 – Living Lab 2 "China-Rotterdam (rail)/USA" (Panteia);					1-pager	D3.3./D3.4F[35]	
	Task 3.3 – Living Lab 3 "Silk Road" economic corridor (IoT) (ILIM).					1-pager	D3.5./D3.6F[36]	
Discussion		16.20	20 mins.	16.40	Discussion			
4	WP4 – Steering innovation Overview and questions to the Advisory Board	16.40	10 mins.	16.50	RZK (Erasmus)	Slides	(see below)	Yes

[29] Final deliverable(s) due in November 2022. You are invited to read the summary. Please click here.
[30] Final deliverable(s) due in November 2022. You are invited to read the summary. Please click here.
[31] Final deliverable(s) due in November 2022. You are invited to read the summary. Please click here.
[32] Final deliverable(s) due in November 2022. You are invited to read the summary. Please click here.
[33] Final deliverable(s) due in November 2022. You are invited to read the summary. Please click here.
[34] Final deliverable(s) due in May 2023. You are invited to read the summary. Please click here.
[35] Final deliverable(s) due in May 2023. You are invited to read the summary. Please click here.
[36] Final deliverable(s) due in May 2023. You are invited to read the summary. Please click here.

WP	Activity Detail	Start time	Duration	End time	Speaker	Slides or 1-pager summary	Supporting deliverables	Questions to the AB
	Task 4.1 – Recommendation for TEN – T networks.					1-pager	D4.1[37] (not yet available)	Yes
Discussion		16.50	20 mins.	17.10	Discussion			
AB Wrap up		17.10	10 mins.	17.20	ESC	No	No	No

NOTE:

The PLANET project is divided in Work Packages, the latter sub-divided in Tasks. Outcomes of tasks are translated into specific Deliverables. For further information, please visit the Gantt Chart available in the Advisory Board private area.

Please visit the Advisory Board´s private area, by clicking here.

[37] Final deliverable(s) due end of December 2023. You are invited to read the "1-pagers" overview. Please click here.

Annex II: March 2023 Advisory Board Session - Agenda

8th March 2023, MS Teams[38]

Arrival: 09.50 AM (CET)

Co-Moderation: Hélder Pereira (ESC) and Andreas Kortenhaus (justASK!)

Table 4: March 2023 Advisory Board Agenda

WP	***Activity Detail***	***Start time***	***Duration***	***End time***	***Speaker***	***Slides and/or 1-pager summary***	***Supporting deliverables***	***Questions to the AB***
	PLANET - Welcome	10:00 CET	5 mins.	10:05 CET	AKS (justASK!) HPA (ESC)	N/A	N/A	N/A
5 3	WP 5 – Dissemination, Commercialisation, Policy Recommendations Task 5.3 – "Business model and commercialisation" (PNO) WP3 – PLANET´s Living Labs and Use Cases Overview and questions to the Advisory Board Task 3.1 – Living Labs 1 "Asia – Europe corridor (PI/blockchain)" (DHL, COSCO, FV, VLTN, IBM, eBOS, NGS)	10.05 CET	1h30 mins.	11.35 CET	MCO (PNO) AMR (COSCO ES)	Slides and 1pager[39]	D5.6F[40] General information, here D3.1/D3.2.F[41] D2.10, D2.14, D2.20	**Yes**
	Lunch Break	**11.35 CET**	**45 mins.**	**12:20 CET**	*Lunch Break (please bring your own lunch 😊)*			

[38] Agenda identical to the one distributed in March 2023, for the AB session.
[39] Summaries and presentations not available will be released 1 week prior to the meeting. Further information here.
[40] Final deliverable(s) due in March 2023. You are invited to read the available summaries by clicking the above links or here.
[41] Final deliverable(s) due in March 2023. You are invited to read the available summaries by clicking the above links or here.

WP	Activity Detail	Start time	Duration	End time	Speaker	Slides and/or 1-pager summary	Supporting deliverables	Questions to the AB
3 3	Task 3.2 – Living Lab 2 "China-Rotterdam (rail)/USA" (Panteia) (PAN, INLECOM, IBM) Task 3.3 – Living Lab 3 "Silk Road" economic corridor (IoT) (ILIM, IBM, SIRMA, VLTN)	12.20 CET	1h30m.	13.50 CET	CWK (Panteia) MZA (ILIM)	Slides and 1pager[42]	D3.3./D3.4.F[43] D2.16, D2.18 (check D2.16), D2.10 D3.5./D3.6.F[44] D2.10, D2.14	Yes
	Advisory Board Wrap up	13.50 CET	10 mins.	14.00 CET	AKS (justASK!) HPA (ESC)	N/A	N/A	N/A

NOTE:

The PLANET project is divided in Work Packages, the latter sub-divided in Tasks. Outcomes of tasks are translated into specific Deliverables. For further information, please visit the Gantt Chart available in the Advisory Board private area.

Please visit the Advisory Board´s private area, by clicking here.

[42] Summaries and presentations not available will be released 1 week prior to the meeting. Further information here.
[43] Final deliverable(s) due in March 2023. You are invited to read the available summaries by clicking the above links or here.
[44] Final deliverable(s) due in March 2023. You are invited to read the available summaries by clicking the above links or here.

Annex III: List of deliverables for the AB sessions

In advance of Advisory Board sessions, selected partners presented summaries of their deliverables with a dual purpose: to facilitate the effective preparations of Advisory Bord members and disseminate information contained in deliverables, including those marked "confidential (only for members of the consortium, including the Commission services)", among Advisory Board members, in such a manner as not to infringe the rights of PLANET´s partners and, at the same time, provide the necessary background for the Board to advise the consortium. As a result, the ESC effectively discharged its obligations under the Agreements entered.

Table 5: Summaries of deliverables for the AB sessions

Deliverable Number	***Lead Beneficiary***	***Title***	***Work Package***	***Dissemination Level***	***Due Date***
D1.3	ITAINNOVA	Modelling & Simulation Capability (Final)[45]	WP 1	Public	26
D1.5	PANTEIA	TEN-T focused modelling and Simulation[46]	WP1	Public	33
D2.10	IBM	Cloud deployment of EGTN Logistic services (Final)[47]	WP2	Confidential	30
D2.14	VLTN GCV	Intelligent PI Nodes and PI Network services (Final)[48]	WP2	Public	30
D2.16	Konnecta	Integration and Interoperability of proprietary blockchain systems for seamless global trade workflows final version (Final)[49]	WP2	Public	0
D2.20	EBOS	Unified HMI implementation & technical documentation (Final)[50]	WP2	Confidential	30
D2.4F	NGS	EGTN IoT Infrastructure (Final)[51]	WP2	Confidential	28
D2.6	SIRMA	Connectivity Infrastructure (Final)	WP2	Confidential	28
D2.8	SIRMA	Transport Data and Knowledge[52]	WP2	Public	28

[45] Author of the summary: https://www.itainnova.es.
[46] Author of the summary: www.panteia.com.
[47] Author of the summary: www.ibm.com.
[48] Author of the summary: https://vltn.be/en/.
[49] Author of the summary: https://konnecta.io.
[50] Author of the summary: https://ebos.com.cy/.
[51] Author of the summary: https://ngs-sensors.it/en/.
[52] Author of the summary: https://sirma.com/.

Deliverable Number	***Lead Beneficiary***	***Title***	***Work Package***	***Dissemination Level***	***Due Date***
D3.1	COSSP Spain	Living Lab 1 – Specifications and measures[53]	WP3	Public	21
D3.2	FV	Living Lab 1 – EGTN Solution Description and Test Results[54]	WP3	Confidential	34
D3.3	PANTEIA	Living Lab 2 – Specifications and baseline measurements[55]	WP3	Public	21
D3.4	PAN	Living Lab 2 – EGTN Solution description and test results[56]	WP3	Confidential	34
D3.5	ILIM	Living Lab 3 – Specifications and baseline measurements[57]	WP3	Public	21
D3.6	Polish Post; IBM; Łukasiewicz – Poznan Institute of Technology; Rohlig Suus; SIRMA.	Living Lab 3 – EGTN solution descriptions and test results[58]	WP3	Confidential	34
D4.1	PANTEIA	Recommendation for TEN-T networks interfacing to global routes[59]	WP4	Public	30
D5.6	PNO	Business & Commercialization plan[60]	WP5	Confidential	36

[53] Author of the summary: https://world.lines.coscoshipping.com/spain/es/home.
[54] Author of the summary: https://www.fundacion.valenciaport.com/.
[55] Author of the summary: https://panteia.com/.
[56] Author of the summary: www.panteia.com.
[57] Author of the summary: ILIM - https://www.linkedin.com/company/lukasiewiczpit/?original Subdomain=pl.
[58] Authors of the summary: Polish Post; Łukasiewicz – Poznan Institute of Technology; Rohlig Suus; IBM; SIRMA.
[59] Author of the summary: https://panteia.com/.
[60] Author of the summary: www.pnoconsultants.com.

Annex IV: Deliverable 1.3. (ITAINNOVA) – Modelling & Simulation Capability[61]

Objectives

The objective of this deliverable is to present the currently available models for representing freight transport processes in the intercontinental corridors, their enhancements performed during the project in relation to their key characteristics and functionalities, in order to fulfil modelling and decision-making support needs to the Living Labs' use cases.

Results

The deliverable describes the harmonization and customization of the selected micro and macro-level models that constitute EGTN's modelling and simulation capability. With respect to the micro-simulation capability and in the context of LLs, the project customized the micro-level models utilizing available operational data coming from project's industrial partners and simulated real life operations while utilizing technologies and innovative logistics concepts. In addition to the LL implementations, the customized micro-models have also been used in the context of Task 1.4 for simulating a set of Use Cases targeted to quantify the impacts of the implementation of technologies and innovative concepts (AI, IoT, Blockchain, PI) by testing them separately and in several combinations. Based on the testing results of this process both in the LLs and additional UCs, we proved the significance effect of technology in logistics operations through the calculation of KPIs depicting the positive impact on parameters such as the lead time, capacity usage/fill rate of transport means, compliance and operation costs, visibility and CO2 emissions.

The project also identified the need to bring the information produced through micro-simulation processes up to the macro (strategic) level of analysis and feed the corresponding models that simulate future scenarios and support the strategic decision making. For this reason, an interface was developed based on the calculated KPIs for supporting micro to macro integration and the generalization and alignment of their values to the input requirements of the project's macro-level models. Moreover, the project established the capability to measure the competitiveness of nodes and corridors of the TEN-T through the development of the Corridor Connectivity Index that facilitates monitoring as well as assessment of the changes happening in the European transportation network over time while being able to be integrated to the strategic model.

Concluding, through the macro-level modelling and simulation capability, the project has customized the strategic model to include the Eurasian rail routes and flows and utilize the outcomes of the technology micro-simulation processes and of the policy & legislation initiatives impact assessment. This capability will be key in the final project stage for analysing even more complex future scenarios that will introduce the impact of technology, policy, and legislation initiatives to the updated strategic model of the globally connected TEN-T and thus provide answer to the central research question related to the possibility for substituting hard infrastructure investments with targeted investments in technology implementation for serving the new flows reaching EU.

Open questions

- What questions would you propose to the available models?
- What parameters to consider when evaluating the future of the EU network in the next 10 years?

[61] Author: https://www.itainnova.es/es

Annex V: Deliverable 1.5. (PANTEIA) – TEN-T Modelling & Simulation[62]

Requirements

ST1.2.1 Preparatory activities for the simulation

Pre-modelling of three emerging trade routes: Belt and Road initiative; Northern Sea Route/Arctic route; North-South Trade Corridor.

ST1.2.2 Simulation of the impact of emerging trade routes on the TEN-T and on disadvantaged regions

Volumes per current and emerging trade routes, for the year 2030 and 2050, for all TEN-T corridors; Insight into deep sea port volumes, hinterland terminal volumes, and freight flows; potential up- or downgrades of existing TEN-T infrastructure will be identified, as well as missing links and the potential locations of hubs; the impact of emerging routes on disadvantaged regions in the areas around the routes will be assessed; Analysis of corridors will reach specific product level to allow impact of policies (T1.3) and technologies (T1.4) such as 3D printing on the international flow of some products.

Figure 9: Trans - European Networks – Transport (TEN-T)[63]

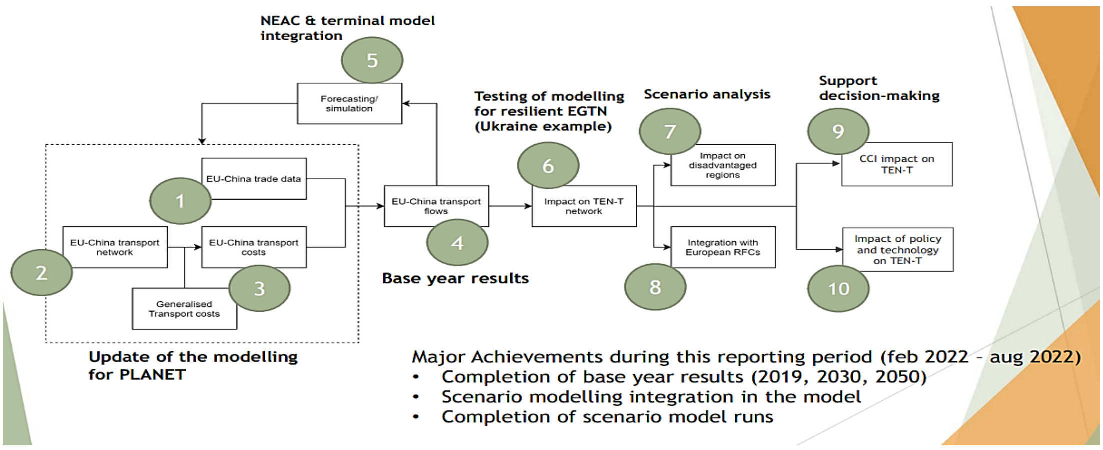

Figure 10: Modelling overview (deliverable summary)[64]

[62] Author: www.panteia.com.
[63] PANTEIA for the PLANET project.
[64] Authors: PANTEIA for the PLANET project.

Scenario simulation

Baseline scenario's

2019: pre covid and pre-war situation, 9 rail PEP; 2030: increased trade between EU & CN, higher share of high value good, 11 new rail PEP and intercontinental rail services, reduced cross-border time, no Chinese subsidies; 2050: increased trade between EU & CN, higher share of high value goods.

Alternative future scenario's

2030 Rail investment scenario: lower costs for rail container freight (Eurasian and hinterland); 2030 impact on disadvantaged regions: improved trade and connectivity between regions with below EU average GDP (new gravity model considerations to be improved with CCI); 2030 Technological & policy impact scenario; input from task 1.3 & 1.4.

Milestones and targets

Deliverable due date: D1.5 – M33 (Feb 2023)

Planned goals

Analysis of scenario runs to support PLANET objectives (oct – nov 2022); Impact on disadvantaged regions; Impact on rail freight corridors; Technology & policy impact model run & analysis (dec 2022); Conclusions from analysis to support EGTN decision-making (dec 2022 – jan 2023).

Issues & risks

Modelling capacity sharing with LL2 and overall WP1 scenarios; Model fitness for technology and policy scenario analysis.

Annex VI: Deliverable 2.10 (IBM) – Cloud Deployment of EGTN Logistic Services (Final)[65]

Objectives

The objective of this deliverable is to describe the further implementation and deployment of services and evaluate their performance using the datasets that the living lab project partners have made available.

Results

The results obtained from the evaluations provided quantitative evidence on the feasibility of building forecasting models to predict volume for the optimisation of resources in warehouses. The AI based forecasting models also demonstrated their usability as predictive transport models to reveal and understand better dependencies between future levels of volume and present or historical levels of cost and lead time across corridors, to avoid queues or bottlenecks, ecosystem fragmentation and allocation of required investment. Performance results were also quantified regarding route optimisation indicating the feasibility of reducing travel time while maximizing the usage of electric vehicles, minimizing y transportation related costs in performing large-scale delivery within the last mile.

Descriptions are also included regarding the deployment of services on the combination of technologies and processes for containerization and deployment on the EGTN platform of the IBM services mentioned above. The deployments provide the flexibility of the IBM services to be used through other services, by either providing a data input from IoT or knowledge graphs services, or by using the IBM service's output as an input parameter for other services such as for smart contracts in the case of volume forecasting models. In the case of the routing optimisation's deployment, interoperability could be enabled by means of using the forecasted volume in order for last mile operators to have more days in advance in the planning of a more effective allocation of delivery orders to transport units, and to drivers, and also to the set routes.

Other services operating on various of the transportation phases having information in advance regarding the volume could reduce the impact of disruptive events within its movement across transportation phases from the seaside, passing through ports and warehouses, and finalizing within the last mile delivery. From this perspective the work describes in depth the interoperability aspect of the IBM services, as a means of interchanging the information required with other services to produce higher value to the T&L stakeholders.

To achieve such value, three elements are required, 1) AI based predictive services ,2) an understanding of which services most require the generated predictions and 3) knowledge of what configuration and interoperability parameters are appropriate. These elements facilitate timely and actionable information across the EGTN services and dashboard. From this perspective the IBM services can be re-deployed and updated for re-usability purposes, and re-configured as required, when new or updated data is available. This flexibility in operability and interoperability of the IBM services deployed follows the Physical Internet paradigm for which further modular, automated and adaptable solutions for the interchange of information for collaborative purposes is key.

The work in the D2.10 deliverable aims to enquiry aspects for performing route optimisation at scale when the number of delivery nodes is in the order of several thousands. This while ensuring the delivery of all packages by using and interoperating with external sources of data and delivery services. Other enquiries of this deliverable include determining whether univariate data inputs are sufficient in forecasting freight volume accurately, or whether multivariate data is needed. And to enquiry regarding the suitability and added flexibility that Machine Learning based AI offers when used as transport model to determine and

[65] Author: www.ibm.com.

understand further the most relevant transportation data parameters that influence the changes of future freight volume across corridors of interest.

Annex VII: Deliverable 2.14 (VLTN GCV) – Intelligent PI Nodes and PI Network Services (Final)[66]

Objectives

The deliverable proposes methods and models for achieving a more efficient operation of the supply chain and in particular the integration of international trade corridors with the TEN-T. The models proposed align with the Physical Internet principles of continuous monitoring, standardization, flow consolidation and efficient modes utilization. The report aligns with the generic use cases of the project, and classifies models to intercontinental corridors, warehouse and hinterland routing, and last mile delivery. For each of the contexts, the PI principles, and operational protocols are considered, leading to the development of two PI container routing and one PI Node operations optimization models. Each model is delivered in the form of an EGTN service, capable of collecting and processing information available on the EGTN platform.

Results

The research of T&L challenges, has lead to the development of the following three EGTN services:

- The PI Hub Choice model, is a PI container routing algorithm, that considers intercontinental corridor and hinterland transport services availability and constraints. The service determines the optimal discharge port for each PI container, taking into account PI Hub congestion in loading, unloading, and customs, and hinterland transport options available. Costs associated to a PI Mover stopping at a specific discharge port are also considered.
- Parcel Dynamic Reshuffling algorithm, focuses on last mile delivery and more specifically van delivery rounds, and assigns PI containers to a PI Mover to ensure all PI containers are delivered within the available timeframe. The algorithm identifies vans operating in the vicinity from one or more operators, and proposes efficient options for delivering all parcels.
- Trucking capacity pre-booking algorithm, utilizes outbound flow predictions and applies stochastic inventory replenishment theory to identify cost efficient (6% cost reduction in studied route) actions in terms of pre-booking trucking capacity utilizing smart contracts.

Open questions:

The following questions might still need to be answered (amongst others):

- Which practices can the models replace/ disrupt?
- How to integrate a solution with existing legacy systems? Invest in further development?
- What use should be expected over the LL testing period (validation of findings)?

[66] Author: https://vltn.be/en/

Annex VIII: Deliverable 2.16 (Konnecta) – Integration and Interoperability of Proprietary Blockchain Systems for Seamless Global Trade Workflows (Final)[67]

Objectives

This deliverable is the second and final report on the integration and interoperability of proprietary Blockchain systems as part of the PLANET project. The report aspires to inform any stakeholder or consortium of stakeholders involved or interested in the design of innovative, cross-organisational EU-Global T&L networks, but also any stakeholders interested in the deployment of Blockchain interoperability solutions in T&L or any other field in which the use of smart contracts can be applied.

Blockchain Interoperability offers the potential to empower organisations across the entire T&L supply chain to collaborate seamlessly by enabling the interconnection of different Blockchain networks belonging to different stakeholders, based on different Blockchain frameworks and standards, and enabling data interoperability by developing a shared Data Model.

Results

The report presents the design, architecture, interfaces, and implementation of the Blockchain 'front end' that is an integral component of the open cloud based **EGTN Platform** (T2.1). This includes the presentation of the APIs between the different backend Blockchain networks, as well as the APIs towards the other EGTN components. The **EGTN Interledger Service** acts as a proxy between backend Blockchain systems and redirects traffic from one to another by translating heterogeneous events to a commonly agreed Data Model.

It takes advantage of the cutting edge microservices provided through the EGTN Platform - i.e., AI and DSS - and consumes data from the different datasets available in the EGTN Data Lake to enable advanced functionalities, such as forwarding logistics events between disconnected communities, cross-checking the validity of events through IoT data and automatic generation of smart contracts based on AI predictions.

Since standards make interoperability possible, the EGTN Interledger Data Model provides a common language of standards that creates an ecosystem of platforms, applications, and networks that securely link people, places, and things.

The EGTN Interledger Service is an open-source solution and offers best practices and guidelines on how T&L stakeholders of all sizes and budgets can easily adopt and extend the offered solution in their own use cases.

Overall, the developed solution offers data integrity and immutability throughout the entire T&L workflow, automated and safe contract execution using smart contracts, reduction of overheads and time delays; all this using a distributed and community-driven approach. In this manner, the EGTN Interledger Service highlights the benefits of Blockchain technologies to the Physical Internet (PI) paradigm. To add to the above, Blockchain interoperability may prove to be a great enabler for the PI, as it offers the ability for existing disparate blockchain systems to interoperate and share data regarding shipping manifests, smart contracts, customs declarations, transport events and so on.

Open questions

The following questions might still need to be answered (amongst others):

- What do you think the role of Blockchain and especially Blockchain Interoperability is towards the realisation of the Physical Internet?
- Are there any obstacles that can have a negative impact on the role of Blockchain in the roadmap towards the PI?

[67] Author: https://konnecta.io.

Annex IX: Deliverable 2.20 (EBOS) – Unified HMI implementation & technical documentation (Final)[68]

Objectives

The Project's deliverable **D2.20 'Unified HMI implementation and technical documentation- final version'** addresses Task 2.6 "Unified interface to EGTN Data and support Services" which was initiated in June 2021 (M12). This document details the final work on the Human Machine Interfaces (HMI) methodology, the mapping of the user requirements to the functionality of the dashboard visualities and the final technical design aspects. The report may also be used as a user manual to further assist any actor to easily and quickly adopt to the platform's functionality.

The vision of the PLANET project is to design a geo-economic aware Global Trade Logistics Network inspired by concepts such as the Physical Internet (PI) and technologies such as Blockchain (BC) and the Internet of Things (IoT). Towards that end, the project will provide a cloud based open EGTN infrastructure with components and services to accommodate and support the experimentation part of the project through the deployment of three Living Labs as well as the strategic aspirations of WP1.

Results

The unified interface to the EGTN infrastructure's data and services will support the users' interaction and interoperability with various systems via a trusted, web-based solution. The unified interface will accumulate, analyse and present information to the users in a customizable module.

The deliverable has been informed by a series of other reports in the project and research conducted, meetings and calls and advice by experts in the relevant field and industry actors.

The HMIs go beyond the presentation of numbers and analytics. In fact, they are based on various work packages of the project in an effort to draw requirements, needs and anticipated support to the logistics' user. Supply chain visibility to the evolving networks has been key to the design considerations. Technological advancements, solutions and concepts like Physical Internet and Blockchain have also been key to the final offering.

The aim was a content-rich, real time information library running across different information silos and enabling a more effective T&L decision support making and emphasizing interoperability amongst the logistics community and beyond.

The user can rely on the HMIs to:

1. Track and Trace a specific consignment(s) at any point of time.
2. Search and identify information and regulations as well as an observatory of the T&L network in one-for-all data library.
3. View, edit, communicate transport documents and logistics events exchanged securely using blockchain technologies.
4. Benefit from technical offerings like the Decision Support System last mile optimization, Physical Internet, predictive analytics, routing optimization, predictive transport models and blockchain to assess the best possible scenario for the logistics service as well as plan capacity resources and utilization.
5. Evaluate simulation tests evidencing the benefit of technologies and concepts designed and implemented in the project.

[68] Author: https://ebos.com.cy/.

6. Interface with other platforms and gain advantage of a dashboard capable to offer security, flexibility, connectivity and monitoring capacity.

The HMI offer tangible benefits to an industry which has always been described as fragmented with complex operations and isolated ICT systems and resources that often lead to elevated costs. The lack of information sharing and the large number of standards in the industry prevent the creation of collaborative networks capable of optimizing processes and taking advantage of shared capacities and resources especially technological ones.

Added value to the business community is achieved with an information ecosystem to support the decision-making process with real time data across different supply chain domains. Added value to the technology is the offering of tools, applications and programming languages to enhance integration of systems for an interoperable network of the logistics industry through a novel one-point data library.

Open questions

Annex X: Deliverable 2.4 (NGS) – EGTN IoT Infrastructure (Final)[69]

Objectives and Results

The main outcome of the NGS contributions in the LL1 regards the implementation of a solution capable to identify, characterize, track, trace, and specialized monitor the goods and the Logistics Units (LUs), as well as containers and transport means (for last mile logistics leg). The main objectives of the solution by NGS are:

1. To facilitate end-to-end supply chain visibility with improved granularity, covering all its legs (cargo and first/last mile).
2. To allow all the users secure, ad-hoc access to data and information collected/computed by the proposed infrastructure, concurrently enabling data-oriented and fact-based decision making.
3. To share the data in a standardized manner with the EGTN networking infrastructure, exploiting GS1/ EPCIS.
4. To promote and integrate the specific value proposition of the considered service provider withing the EGTN platform.

On the other hand, the objective of the PLANET project is to provide as much as information to the EGTN platform at improved granularity, supporting added value services of optimisation in every logistics leg, both first/last mile and cargo. Thus, starting from the Smart Logistics Unit (LU) discussed in D2.3, the openness of the PLANET approach has enabled to integration of added value services and devices to identify and characterise the LUs, and the goods consolidated on it. In fact, the following information are integrated within the EGTN platform:

1. Consolidation support service, creating a unique logical link (and not only physical) between the goods and the assets where the former is consolidated. It supports different services, detailed as following:
   a. **Association service**. It enables the association of a set of items (i.e., GS1 GTIN) to a certain LU (identified with the GS1 SSCC code). It allows to generate dematerialized documents, as shipping slips, and to be shared with the EGTN platform. On the other hand, it will support the reduction of the mistakes in consolidation, the reduction of disputes and the costumers' satisfaction improvement.
   b. **Characterization service.** Each LU can be characterized in terms of weight and size[70] and shared with the EGTN platform and its blockchain ledger. On the other hand, the Association service will provide information regarding the number of items consolidated within a certain LU. Such a service will support EGTN platform AI components in the consolidation activities, shaping and optimising the truck/container/warehouse layout, and supporting the load balancing operation. In the last mile scenario, these features can support Mobility as a Service approaches.
2. **Dedicated monitoring functionalities.** Each smart Logistics Unit (LU) is aware of the goods consolidated in the LU, so the EGTN can configure specialised monitoring services implemented at the edge, providing immediate and more granular (beacons monitor goods with seconds granularity, e.g., 1s) evaluation of the quality of the goods' storage. This information is managed as important events, shared with the EGTN platform, and stored on its blockchain distributed ledger. On the other hand, the openness, and the scalability of the IoT network enable the integration of added value sensors as ethylene in the case of fruits.

[69] Author: https://ngs-sensors.it/en/.
[70] Commercial and certified balance and dimensional sensors are considered.

3. **Tracking and tracing functionalities.** An improved granularity tracking, and tracing service is enabled, thus providing to the stakeholders involved the direct information of the goods/LUs position, instead of only the container information.

Open questions

Annex XI: Deliverable D2.6 (SIRMA) - Connectivity Infrastructure (Final) & Deliverable 2.8 (SIRMA) - Transport Data and Knowledge[71]

Objectives

Deliverable 2.8 presents the final version of the unified data model and explains the reasoning behind its development and the way in which it is intended to be used. It serves as a guide to partners integrating with the EGTN Connectivity Infrastructure and as a guide to anyone developing similar applications that incorporate IoT devices, transport and logistics tracking, weather data, route modelling and carbon footprint estimations.

Deliverable 2.6 provides a description of the system's capabilities and current state while serving as a guide to accessing and utilising the contents of the Knowledge Graph. It has a brief overview of the overall architecture followed by examination of each individual service. For each service, we cover not only the technical details but also data sourcing and the intended application of that data by partners.

Results

The improvement in end-to-end visibility is the most direct and obvious benefit of creating the EGTN Knowledge Graph. The combination of data sources allows answering various questions about the transportation of goods:

- What: barcode scans of goods, containers, and vehicles (received through EPCIS events)
- When and where: IoT devices physically present in the container/on the vehicle
- How: the abstract shipment route, vehicle specifications and specific knowledge of the world

This also leads to insight into strategies for emissions reductions and increased throughput of goods. Predicting the carbon footprint or transit time of a specific package relies on prediction analytics algorithms trained on historical data within the KG but the graph directly contains data on average transit times and footprints. This allows the KG to answer questions such as "What will be the effect of replacing these old locomotives with this newer model?" or "How has the throughput of goods over a segment varied over time?"

The businesses most directly interested in the insights possible through the EGTN Connectivity Infrastructure will be rail operators, shippers and logistic service providers. The route model combined with tracking data will enable not simply real-time tracking of rail transit globally, which is currently not available, but the collection and analysis of historical shipment data on a global scale. This is only possible by mapping the tracking information to the route model and, through analysis, can provide suggestions for route optimization and development based on this empirical data. The inclusion of vehicle technical specifications and fleet composition within the data can also be used to calculate the impact of using greener vehicles or various forms of transport or route choices.

Open questions

Integration of the data sets relevant for the project's living labs has been completed. Now that the system is deployed and integrated with partner and external data sources, it is collecting data from the IoT devices deployed by partners. Beyond the scope of the project, the Connectivity Infrastructure can incorporate other external sources of relevant data such as:

- Maritime shipment tracking (AIS)
- Cargo flight tracking

[71] Author: https://sirma.com/.

- Collections of relevant laws and customs rules changes
- EPCIS events for goods certification and production

Which of these (or others) would be the most interesting extension to the KG?

Annex XII: Deliverable 3.1 (Cosco Shipping) - Living Lab 1 - Specifications & baseline measurements[72]

Objectives

This document provides a detailed description of LL1's specifications and the implementation plans for optimising door-to-door logistics in the connection between Asia and the Mediterranean corridor through the use of technologies such as blockchain, artificial intelligence (AI) or the Internet of Things (IoT), along with application of Physical Internet (PI) concepts. As part of this work, the deliverable includes an overview of the assessment plan for the infrastructure corridor analysis and the simulation-based designs under developed, and to be integrated as part of PLANET EGTN infrastructure.

Based on LL1's vision, the main objectives of this deliverable are: (i) to identify LL1 goals in technical and business domains; (ii) to define a set of technical requirements to be addressed by the technological solutions designed to be applied in LL1, (iii) to specify the test planning procedures and define the evaluation plan needed to test the different systems and applications developed in LL1, and (iv) to define Living Lab's organizational structure and implementation & assessment plan that would materialize the above objectives.

Results

To test PLANET's solutions and concepts LL1 is segmented in two use cases: use case 1 is about containerized cargo optimization between China and Spanish hinterland, through the main Spanish ports; and use case 2 focus on warehouse operations optimization and last mile efficiency and sustainability. According to PLANET project objectives and challenges, the above mentioned Use Cases are employed to examine the role of new technologies on EU's strategic transport corridors and they can be summarized as follows: (i) Blockchain (BC) technology for paperless and real-time secure data sharing among port community actors; (ii) Artificial Intelligence (AI) combined with Physical Internet (PI) principles for better forecast and intelligent decision at logistics nodes for dynamically identified optimized routes; (iii) Internet of Things (IoT) for tracking data remotely and monitoring container position and cargo status; (iv) Machine Learning (ML) and Data Analytics for warehouse demand forecast and last mile collaboration; (v) Digital clones for warehouse.

Finally, to assess the impact of the innovations adopted as part of the Living Lab roadmap, the project has identified a set of Key Performance Indicators (KPIs) that will allow to quantify the benefits introduced by the different technological solutions. KPIs are defined and classified according to the technology innovations and compared against existing baseline measurements.

Open questions

- Are the scope and activities of this LL advancing beyond the existing knowledge of Industry 4.0?
- May the activities in this LL encourage the adoption of the solutions and PLANET approach by potential end-users?

[72] Author: https://world.lines.coscoshipping.com/spain/es/home.

Annex XIII: Deliverable 3.2 (Foundación Valenciaport) - Living Lab 1 - EGTN Solution Description & Test Results[73]

Executive Summary

The present document continues the work carried out in D3.1 LL1 Specification and Baseline measurements and provides a detailed description of LL1 EGTN Solution and the tests results obtained as part of the assessment of EGTN LL1 implementation. EGTN LL1 solution integrates a set of functionalities and services based on the use of different technologies such as blockchain, Artificial Intelligence (AI) or the Internet of Things (IoT), along with application of Physical Internet (PI) concepts. This document describes the testing of EGTN LL1 functionalities and services in different use cases and scenarios focused on optimising door-to-door logistics in the connection between Asia and the Mediterranean corridor. For the obtained test results, the deliverable provides a business impact and technology validation analysis.

According to WP3 and LL1 strategy, the main objectives of this deliverable are: (i) to describe EGTN implementation and integration in LL1, identifying the components, functionalities and services defined for the execution of LL1 use cases; (ii) to detail the battery of tests carried out for validating EGTN LL1 functionalities; (iii) to analyse the test results and perform the technology validation of the real EGTN LL1 implementation against requirements and KPIs previously defined, (iv) to evaluate the business impact and the innovation of EGTN LL1 solution; and (v) to disseminate lessons learned, recommendations and conclusions based on the outputs obtained from the technological and business analysis.

Test cases and results are described and analysed considering the different technologies integrated in EGTN LL1 functionalities and services, i.e., Physical Internet and Digital Clones, Blockchain, Internet of Things and Artificial Intelligence (AI). The obtained results are validated against specific KPIs, which were defined in D3.1 for each of the use cases defined in LL1: UC1 on containerized cargo optimization between China and Spanish hinterland, through the main Spanish ports, and UC2 on warehouse operations optimization and last mile efficiency and sustainability.

To complement the technology validation, this deliverable also offers an assessment of the business impact and the innovations offered by EGTN LL1 solution through the execution of impact-based survey oriented to the main LL1 stakeholders of the project. Validation is reinforced with a set of lessons learned and recommendations provided to support the way forward of the technology and business developments.

Open Questions

- What challenges do you see in terms of the adoption and implementation of the LL1 EGTN solution?
- Could this solution be effectively scaled up, aimed to meet the need of larger and more complex logistics networks and stakeholders?

[73] Author: https://www.fundacion.valenciaport.com/.

Annex XIV: Deliverable D3.3 (PANTEIA) - Living Lab 2 - Specifications & baseline measurements[74]

Objectives

This report introduces the work carried out during the first steps of this Living Lab: Synchro modal dynamic management of TEN-T & intercontinental flows promoting rail transport: China – Rotterdam, USA/UK focusing on the role of rail transport.

This Living Lab consists of three Use Cases:

1. The first use case focuses on synchromodality in a Blockchain enabled Platform utilising advanced IoT, supporting BlockLab customers & communities to create the best multi-modal alternatives for logistics solutions within LL2's corridors;
2. The second use case focuses on investigating Eurasian rail freight expansion in the LL2 corridor by building on results from T1.2. Key issues for infrastructure development are explored, as well as the potential for expanding services in the corridor and implement (in a test environment) the use of Blockchain on rail freight transport between China and Europe. This will also utilize use case 1 tools to investigate freight flow synergies and Blockchain innovation to support integration with European RFCs;
3. The third use case analyses LL2 corridor flows and assess the implications for TEN-T infrastructure, extending T1.2 results with data from EGTC and use cases 1 and 2. This is directed at strategic corridor planning and its use for EGTC members (focusing on the EGTC Rhine-Alpine area).

Results

Within Use Case 1, Blocklab has developed a blockchain demonstrator to deal with post-Brexit customs processes between the Netherlands (PoR) and the UK. The functional specifications of this demonstrator will also be used as an initial step for Use Case 2. With the information gathering of functional requirements now on the way, Use Case 2 stakeholders, including HUPAC and VTG, are now able to reflect on initial requirements.

This use case will analyse LL2 corridor flows and assess the implications for the ports of Rotterdam, Hamburg, Duisburg, Tilburg and (other) TEN-T infrastructure, extending T1.2 results with data from the EGTC "Interregional Alliance for the Rhine-Alpine Corridor." The use of the PLANET tools by the EGTC will be directed at strategic corridor planning. For these purposes, a dynamic simulation for the 2030- and 2050-time horizons of the impact of the Belt and Road Initiative (BRI) on the Rhine-Alpine (R-ALP) corridor will be carried out.

In this report we provide an overview of the Use Case 1 demonstrator in terms of its functional capabilities, explain why this demonstrator is of interest for Use Case 2 and propose a phased approach that will allow LL2 and PLANET to benefit from the lessons learned and the digital infrastructure created for the post-Brexit use case. For Use Cases 1 and 2, the business case is shown to be significant, with potential for market uptake of the solutions elsewhere. Also, the implications for synchromodal management are addressed. For Use Case 3, the baseline measurements of the dynamic scenario simulation for future TEN-T planning is established.

Finally, alignment of LL2 with the wider purposed of EGTN development is also examined. To support EGTN services, the Blockchain platform shall include a service that summarizes non-sensitive logistic data related to a certain shipment. Information included in those data will allow for synchromodal dynamic management and logistic optimisation.

[74] Author: https://panteia.com/.

Open questions

- Are the scope and activities of this LL advancing beyond the existing knowledge of Industry 4.0?
- May the activities in this LL encourage the adoption of the solutions and PLANET approach by potential end-users?

Annex XV: Deliverable 3.4 (Panteia) - LL2 EGTN Solution Description & Test Results[75]

Executive Summary

This report consolidates the results of the Living Lab 2 and its three use cases on Synchro modal dynamic management of TEN-T & intercontinental flows promoting rail transport: China – Rotterdam, USA/UK focusing on the role of rail transport. This Living Lab consists of three Use Cases:

1. The first use case focuses on synchromodality in a Blockchain enabled Platform utilising advanced IoT, supporting BlockLab customers & communities to create the best multi-modal alternatives for logistics solutions within the LL2 corridors.
2. The second use case focuses on investigating Eurasian rail freight expansion in the LL2 corridor by building on results from T1.2. Key issues for infrastructure development are explored, as well as the potential for expanding services in the corridor and implement (in a test environment) the use of Blockchain on rail freight transport between China and Europe. This will also utilize use case 1 tools to investigate freight flow synergies and Blockchain innovation to support integration with European RFCs.
3. The third use case analyses LL2 corridor flows and assess the implications for TEN-T infrastructure, extending T1.2 results with data from EGTC and use cases 1 and 2. This is directed at strategic corridor planning and its use for EGTC members (focusing on the EGTC Rhine-Alpine area).

Within Use Case 1, Blocklab has developed a blockchain demonstrator to deal with post-Brexit customs processes between the Netherlands (PoR) and the UK. UC1 developed the fundamental digital infrastructure to share logistic events and shipment documents between regional systems (UK customs, PoV platform and PoR platform) and the overarching EGTN platform, in support of TEN-T and intercontinal flows and in preparation of dynamic synchromodal management. For the PoR-UK connection, fully digitised customs declarations were established, the application having been materialized in Quayconnect. For the PoR-PoV connection, the sharing of road logistics events was enabled. For the PoR-ASIA connection, shipment document management and distribution was created. The functional specifications of this demonstrator have also been used as an initial step for Use Case 2. With the information gathering of functional requirements now established, Use Case 2 stakeholders, including HUPAC and VTG, are now in a position to reflect on implementation requirements.

Use Case 3 analysed LL2 corridor flows and assessed the implications for the ports of Rotterdam, Hamburg, Duisburg, Tilburg and (other) TEN-T infrastructure, extending T1.2 results with data from the EGTC "Interregional Alliance for the Rhine-Alpine Corridor." The use of the PLANET tools by the EGTC is directed at strategic corridor planning. For these purposes, a dynamic simulation for the 2030 and 2050 time horizons of the impact of the Belt and Road Initiative (BRI) on the Rhine-Alpine (R-ALP) corridor was carried out.

In this report we provide an overview of the Use Case 1 demonstrator in terms of its functional capabilities, show the application of the demonstrator concept in Use Case 2 and propose a phased approach that will allow LL2 and PLANET to benefit from the lessons learned and the digital infrastructure created for the post-Brexit use case. For Use Cases 1 and 2, the business case is shown to be significant, with potential for market uptake of the solutions elsewhere. Also, the implications for synchro-modal management are addressed. For Use Case 3, the dynamic future simulation results are set forth.

Finally, alignment of LL2 with the wider purposed of EGTN development is discussed. With the overarching EGTN infrastructure, the sharing of logistics events, document access, and (theoretically) offerings of shipment planning support were established. To support potential EGTN services, the Blockchain platform

[75] Author: www.panteia.com.

includes a service that summarizes unsensitive logistic data related to a certain shipment. Information included in this data allows for synchro-modal dynamic management and logistic optimisations.

Open Questions

Annex XVI: Deliverable 3.5 (ILIM) - Living Lab 3 - Specifications and baseline measurements[76]

Objectives

LL3 will focus on streamlining logistic processes in flows from China to Europe along the Silk Road Route by implementation of IoT technologies and EPCIS platform along with other GS1 standards that would facilitate transmission of data between the partners involved in the logistics operations within an e-commerce channel.

Living Lab was established around two main goals:

1. Increased visibility of goods thanks to IoT along the Silk Road:

Development of IoT solutions based on DASH7, RFID, LPWSN and sensors systems that help control resource parameters in real time and identify them while moving in the transport process, examining potential positive results in terms of broad implementation.

2. Implementation of the SSCC number and EPCIS test (standardization of information flow):

Creation of a digital connection between actors in the transport network, enabling standardized data flow and access to information about cargoes coming from China to Poland in the whole supply chain in real time (implementation of the SSCC number and EPCIS test).

Results:

So far, the following key achievements and their value to the involved actors as well as the industry have been recognized:

- Wide usability of Process Analysis & Simulation based on BPMN for mapping of processes in both Use Cases.

An open repository of these processes together with simulations of changes will be a reference for the logistics market and can be widely used by industry professionals as best practices.

- Increased cooperation between business partners towards sharing of data.

Polish Post has strengthened cooperation with GS1 China and Chinese Post in order to improve data sharing via EPCIS.

Rohlig Suus has started working with Blocklab to identify opportunities for blockchain implementation in customs processes.

- Increased awareness of business partners in the area of the Physical Internet and the possibility of implementing its components into operational processes.

LL3 is currently testing IoT solutions for the use of EPCIS and sharing of data and information with EGTN in real time in order to improve the quality of processes and improve cooperation within supply chains.

Open questions

- Are the scope and activities of this LL advancing beyond the existing knowledge of Industry 4.0?
- May the activities in this LL encourage the adoption of the solutions and PLANET approach by potential end-users?

[76] Author: ILIM - https://www.linkedin.com/company/lukasiewiczpit/?originalSubdomain=pl.

Annex XVII: Deliverable 3.6 (ILIM) - Living Lab 3 - EGTN Solution Description and Test Results[77]

LL3 focused on streamlining logistic processes in flows from China to Europe along the Silk Road Route by the implementation of IoT technologies and EPCIS platform as well as other GS1 standards that facilitate the transmission of data between the partners involved in the logistics operations within the B2C and B2B channels.

Proposed and tested solutions

- IoT implementation - a set of sensors to track the location, shocks, humidity and the temperature of the container with shipments
- Implementation of the SSCC number and EPCIS test (standardization of information flow)
- EGTN platform – data management and AI use

Expectations & Results

The following logic of action has been used as part of the KPIs' assessment process:

1. **KPIs that can only be measured by simulating changes in the process by iGrafx platform.**
    - Reduced compliance costs (goal>10%) -> achieved (simulation) **22%**

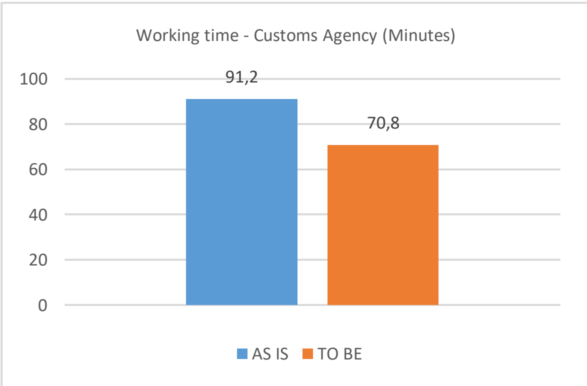

Figure 11: Working time - Customs Agency (minutes)

(GS1 Standards - GTIN, GPC, GDSN)

Automation of data exchange between the company's customs agency and governmental customs office, will reduce the working time of people involved in all documents (f.e. customs declaration)

preparation.

Additional benefits:

- Improved accuracy, consistency and data quality,

- Validated origin and data product.

2. ***KPIs that can only be measured by testing changes within the pilot.***
    - Improved end-to-end visibility (goal >50%) -> achieved (pilot) **100%**

Customers will be able to follow all the data and statuses of their packages once the IoT and EGTN prediction system is applied to each container.

- Improved customer experience (goal >15%) -> achieved (pilot) **11%**

[77] Authors: ILIM; Rohlig Suus; Polish Post; IBM; SIRMA.

According to a survey conducted among Rohlig Suus customers, the impact of the changes introduced will increase their satisfaction.

3. **KPIs that can be measured by both iGrafx simulation and pilot testing.**
   - Reduced operational costs (goal >10%) -> achieved (simulation) **12%** -> achieved (pilot) **9%**

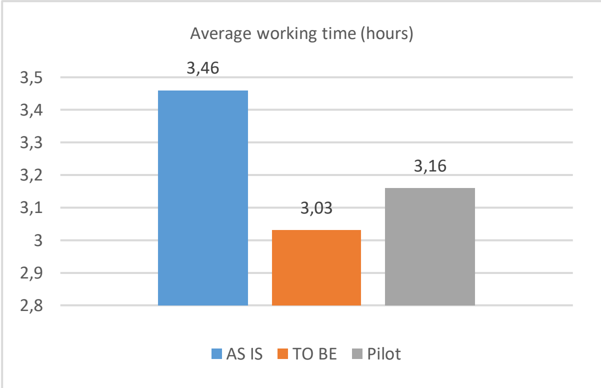

Figure 12: Average working time (hours)

Automatic notification system (IOT, EPCS, EGTN)

Increases the accuracy of knowledge about the location of the train, which helps in the planning process. Gives ability to book fixed carriers to drop off containers, instead of seeking additional transportation. Allows the optimal replanning of a container to alternative routes in terms of distance from the customer, available resources and cost of operations.

- Increased volumes (>8%) -> achieved (simulation) **17%** -> achieved (pilot) **11%**

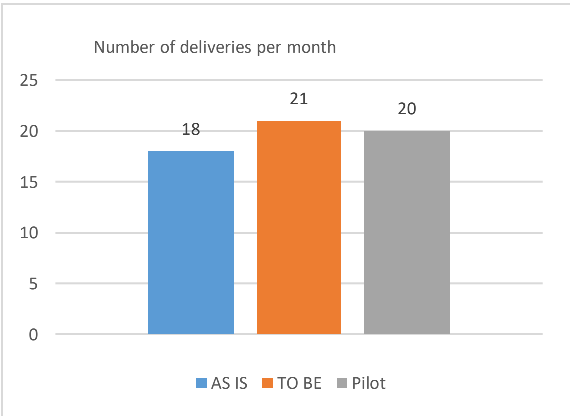

Figure 13: Number of deliveries per month

Automatic notification system (IOT, EPCS, EGTN)

Advance scheduling of carriers to drop off containers will increase their efficiency. In turn, this will enable more containers to be served weekly and reduce the number of delays. Also, automatic notification of container location to the customer will reduce the work time of the forwarder.

Open questions

Annex XVIII: Deliverable 4.1 (PANTEIA) - Recommendation for TEN-T networks[78]

Work Package 4 provides guidance and builds capacity on geo-economic and technological awareness. This awareness is critical in the development of the EGTN. Geo-economical awareness learns us about the geo-economical context of the EU network, and technological awareness will learn us how technological innovations can be deployed to support the strengthening of the EGTN network.

Objectives

Deliverable 4.1 has come up with recommendation on funding research and infrastructure development by the Commission to facilitate the transition from TEN-T to EGTN. These recommendations are meant to support future CEF and Horizon calls. This deliverable has built upon the findings from Task 1.2 (PLANET simulation models) and Task 3.6 (on the development and pilots of the living labs).

This deliverable consists of three topics that were separately examined: Intra-European transport patterns, global connectivity trends, and disruptive technologies. The effect of the Eurasian freight on the EU transport infrastructure is assessed using the results of the PLANET simulation model. The model identifies which corridors, PEPs and nodes needs to be strengthened to be able to accommodate the additional demand by 2030. Global connectivity issues were considered when designing the scenarios included in the simulation model and in the evaluation framework, developed for assessing the impacted of disruptive technologies. Within this framework literature review, modelled impacts from Deliverable 1.2, and an evaluation workshop during the PLANET GA were input for assessing future impact of the technologies as wells as the governance needs in the transition of TEN-T to EGTN. After examining future infrastructure and technological developments potential obstacles were identified. The identified issues were coupled to appropriate research and funding that will help to overcome these obstacles.

Results

The deliverable proposes guidelines on which call future CEF and HE calls should be developed for EU funding. To support transition toward EGTN networks and PI facilitating nodes, there should be a comprehensive focus on investments both physical and digital solutions, as these solutions are interwoven and reinforcing.

The transition to PI networks requires the development not only of digital infrastructures as counterpart to physical infrastructures but even more explicitly the involvement of stakeholders of freight and person mobility. Governance issues and future needs of these stakeholders are explicitly addressed within both CEF and HE next calls.

CEF funding targets at strengthening, improving, and facilitating the integration of TEN-T corridors, the improvement of nodes to strengthen these corridors, as well as technological infrastructure development supporting PI operations and strengthening the stakeholder ecosystem. Next to this, our recommendations for HE calls focus on further research and development (R&D) of various technological innovations (e.g. Blockchain, Smart Contracts, ML and AI models) in the context of trade, transport and logistics, the increase in the TRL level of already developed innovations in the context of the PLANET Living Labs and the support of stakeholder training, raising awareness and trust actions.

Open questions

- How has the new economic geopolitical situation evolved after the offset of the war in Ukraine and the energy crisis?
- What are the possible new scenarios to be considered in the future?
- To what extent are the scenarios modelled in PLANET still relevant?

[78] Author: https://panteia.com/.

- Will the current geopolitical situation lead to a more regionalized economy and less need to strengthen the global connection of the TEN-Ts?

Annex XIX: Deliverable D5.6 (PNO) – Business & Commercialization plan[79]

Deliverable 5.6 gathers the business and exploitation plan of the main results obtained in the project PLANET which main aim is to provide a Simulation Capability for analysing the impact of new trade routes and emerging innovations for the TEN-T and European logistics operations, and for designing a geo-economics aware and PI inspired Integrated EU Global Trade Logistics Network [EGTN]. The framework of this deliverable is the work package called “Dissemination, Commercialisation, Policy recommendations”, specifically the task “Business Model and Commercialisation strategy”.

The approach of the deliverable will consist in identify the most relevant key exploitable results obtained from PLANET, define the main characteristics and novelty of the solutions, linking the KERS with the Physical Internet Services and developing the business model and exploitation pathway of each result.

In this case the project results will not obtain a mature level of development to be commercialised after the project, due to PLANET is a research and innovation action. In this sense, the first step has been to characterise the results, to identify the typology of the result (product, service, knowledge/method) and provide the different options for short medium term exploitation pathways for a research projects, that are mainly focused on continue the development of the results to achieve a commercial solution (1.Further research and innovation activities; 2. Internal upscaling; 3. Standardization activities; 4. Education; 5. Technology development, 6. General knowledge sharing, 7. Material Transfer Agreements, 8. Consultancy; 9. Joint Venture).

After that, each KER has been related to a Physical Internet service being: PI Web logistics Service, PI Shipping Service, PI Encapsulation Service, PI Network Service and PI Routing Service. At the same time, long-term exploitation pathways have been also provided (1. Consultancy; 2. Joint Venture; 3. Transfer of results, ownership; 4. Licensing: 5. Spin-offs/outs). The next step was to organise an exploitation workshop including all the KER owners to select the suitable exploitation pathway for each KER and analyse how to implement it along the next years after the project.

In addition to these activities, each KER owner has completed a table description per each KER including: the novel solution (result and problem), market, Legal/normative or ethical requirements and intellectual property rights. A SWOT analysis and a business model canvas have been developed per each KER too.

A total of 9 key exploitable results have been analysed, being identified each of them as 3 products, 5 services and 1 process. The most recurrent exploitation pathways are further research and development and technology development, followed by consultancy and finally in a long-term basis one joint venture, one licensing service and one spin-out are expected. Regarding the relation to the PI, most of the results will contribute to the future development of the shipping service, routing service and web logistic service and in a lesser extent to encapsulation and network services.

Focusing on the market, the main beneficiaries of the results will be the transport and logistic sector, specially transport operators and shippers. In terms of Intellectual Property Rights three patents are expected.

In order to gather all the information internal individual meetings with the KER owner has been stablished, individual activities by each KER owner and a joint workshop have been organised.

As a main conclusion, the results obtained in PLANET will achieve a step forward as facilitator in the implementation of the Physical Internet, and will advance in achieving a more sustainable and efficient transport and logistic sector.

[79] Author: www.pnoconsultants.com.