

# ICONET

## ICONET Project Newsletter December 2019

ICONET is a 30-month, EU funded project launched in September 2018 with 16 partners coordinated by Inlecom focussing on the vision and implementation of the Physical Internet (PI).

### ICONET Vision

Explore and create innovative PI network services that optimise cargo flows against throughput, cost and environmental performance, based on Governance policies and SLAs, constantly and fully aware of network operations and status

**New business and governance models and enablers for the PI operations, addressing the barriers for collaboration and maturity issues**

**Generic PI Case Study and Simulation models for PI network design, addressing decision support with respect to the number and placement of PI nodes**

**PI Hyperconnectivity Open Reference Architecture and Platform for enabling the required connectivity at the digital level**

ICONET started with the outside-in design of mutually beneficial PI business models for the principal supply chain actors creating the ICONET PI Framework and PI Hubs Plan.

The PI business models set the context and lead for the formal requirements, specifications and design of the PI Control and Management Platform. The aim is to design and build networking technologies in conjunction with infrastructure, middleware and application componentry, realising the ICONET concepts and capabilities, in the form of a demonstrable Proof of Concept (PoC).

The ICONET PoC is deployed, tested, refined and extended in four industry-driven PI Living Labs (LLs) each focusing on one of four Key PI Capabilities (KIPC) as shown in the diagram below.

PI Hub Port of Antwerp	PI Corridor P&G	e-Commerce Fulfilment as a Service SONAE	Warehousing as a Service Stockbooking
<ul style="list-style-type: none"> <li>• Hub types capabilities and the possible topologies</li> <li>• PI containers travel according to synchro-modality principles</li> </ul>	<ul style="list-style-type: none"> <li>• Transformation (modelling) of TEN-T corridors into IoT-enabled PI corridors</li> </ul>	<ul style="list-style-type: none"> <li>• PI impact on e-commerce fulfilment models</li> <li>• Redesigning last-mile distribution centres to fulfil PI hub roles</li> <li>• Investigating the role of other forms of mobile or multirole last-mile hubs fall within this scope.</li> </ul>	<ul style="list-style-type: none"> <li>• Investigates the role of the warehouse as a key PI node</li> <li>• A dynamic buffer for flow between other PI hubs, to increase throughput of hubs, reduce congestion, etc</li> </ul>

**PI Hub** makes use of the most suitable transport mode at the time, while taking into account the type of cargo, the available transport resources, optimisation criteria and SLAs, thereby setting up an interesting industry-supported use case where PI Hubs, PI Routing, PI Containers, etc. seamlessly mix with new business strategies and models. PI movements between PI nodes include: from terminal to terminal within a PI hub; from terminal in one PI hub to terminal in another PI hub; between PI nodes (warehouses, distribution centres, others) in a PI corridor.

**PI Corridor** examines the transformation (modelling) of TEN-T corridors into IoT-enabled PI corridors, to support optimised movement of PI containers between two PI hubs and the broader PI network.

**e-Commerce Fulfilment as a Service** explores the impact of the PI on e-commerce fulfilment models as last-mile transport is an important aspect of the overall PI landscape. Redesigning last-mile distribution centres to fulfil PI hub roles and investigating the role of other forms of mobile or multi-role last-mile hubs fall within this scope.

**Warehousing as a Service** investigates the role of the warehouse as a key PI node acting as a dynamic buffer for flow between other PI hubs, so as to increase throughput of hubs and reduce congestion.

## Generic Physical Internet Case Study (GPICS)

The role of project partner, ITAINNOVA, is to define the generic rules to deploy Physical Internet (GPICS) and develop simulation models to test the rules and services from the project applied to the living labs.

GPICS represents an abstraction of a PI supply chain network, based on the four Key PI capabilities which correspond to a different LL within ICONET as described above. GPICS makes a representation of a real-world system by creating a conceptual model for a generic geographic area, a series of descriptive elements, the logical relationships relative to the components of the system, the input and output data and a set of capabilities for different scenarios configuration.

The final purpose of the Generic PI Case Study (GPICS), based on the ICONET Living Labs, is to investigate and produce a PI Hubs Plan with the position, size and number of hubs needed to efficiently link the long-distance network to urban areas, and use it for simulation of key PI scenarios to analyse PI performance at different scales and granularity levels, in terms of Key Performance Indicators (KPIs).

Simulation models are including real data from the LLs. They are based firstly on the actual logistics processes from the companies and secondly the data has some modifications to simulate the movement of goods according to the Physical Internet principles. This interim deliverable has initial KPI evaluation in the Living Lab selected for the initial version of the GPICS.

The simulation model helps to evaluate operational factors such as the fill rate of the transport or the lead time as well as economic factors such as the transport cost and the handling cost. Environmental factors (e.g. CO2 emissions estimation) are also considered.

ICONET partner, New Generation Sensors (NGS), is working on implementing the “Track & Trace” service for the PI Shipping Service. Particularly, the IoT will be in charge of realising the so-called PI Digital Twin, thus “translating” the real world into the digital one. In this scenario, the IoT environment will be in charge of answering the following questions:

1. **Where** are the goods?
2. **When** are the goods at that position?
3. **How** are the goods moving?

In this manner, the PI will enable the possibility to provide real-time information to all the supply chain actors, as well as to have data to implement services toward the improvement of the logistics network.

## INLECOM present at the H2020 RTR19 on December 4<sup>th</sup>, 2019

Road Transport Research in H2020 projects (RTR19) conference, is a very high-profile event where all relevant H2020 projects present what they have discovered, how they tackled and resolved the hurdles along with the next research steps in the fields covered by their activities. Projects from various areas, such as Green Vehicles, Urban Mobility, Logistics, Intelligent Transport Systems, Safety, and Automated Road Transport provided a holistic view of how the European scene is taking the lead in these fields, for the benefit of the environment, the economy and the society overall. Inlecom, as ICONET's Project Coordinator delivered a presentation on the 4th of December, elaborating on the main project outputs, the expected long-term impact as well as the necessary future research for making the Physical Internet a reality.



## ICONET Workshop in Antwerp on December 2<sup>nd</sup>/3<sup>rd</sup> 2019

A two-day workshop was held on the 2<sup>nd</sup>/3<sup>rd</sup> of December, hosted by the project partner Port of Antwerp at their impressive authority building pictured below. The first day focused on the technical aspects of the project,



addressing ICONET's PI Reference Architecture and the respective integration activities, and paying special focus to the PI Services belonging to the Encapsulation, Networking, Shipping and Routing OLI Layers. One of the key outputs was the design of an information workflow among those services built upon a simple Transport Planning and Execution scenario.

The second day was dedicated to the project Living Labs, led by ICONET's

partner eBOS, going through a thorough progress update both in the business as well as the technical implementation activities. Simulation and optimization scenarios were extensively covered, along with mapping of the required services with the OLI/NOLI Physical Internet layers.

The port is the key commercial partner for **PI Hub Living Lab**, which is focused on demonstrating how an IoT enabled hub will work. Eric Feyen outlined how the objective of this Living Lab is aligned to the Port of Antwerp authority's objectives of becoming more involved in supply chain service provision and how it directly supports their aim to increase share of rail (from 10% to 20% of traffic). The first use case is being created around an intermodal consolidation area within the deep-sea terminals at the port, where a range of different operators, including rail and shipping, must share data within the port environment. Each day the facility, on average, processes 130 trains a day, going to 32 destinations including terminals in Germany, Italy and Austria, requiring the assembly of 25 discrete railway freight bundles. To create a digital twin of the system, the team is building a simulation of the existing port activity in this area. To do this they are replicating how the operators use the infrastructure, how they move containers around the facility, and how they bundle and load wagons for train movement. The demonstration aims to address the technical challenges in using IoT to capture data, encapsulate the logistical activity (bundle and use that data), route traffic and optimise wagons, and make better use of the infrastructure including the 300km of rail track within the port. The commercial aim of the LL is to show achievement of reduced costs and congestion through new forms of IoT enabled routing within the hub and port facilities. Eric pointed out that beyond

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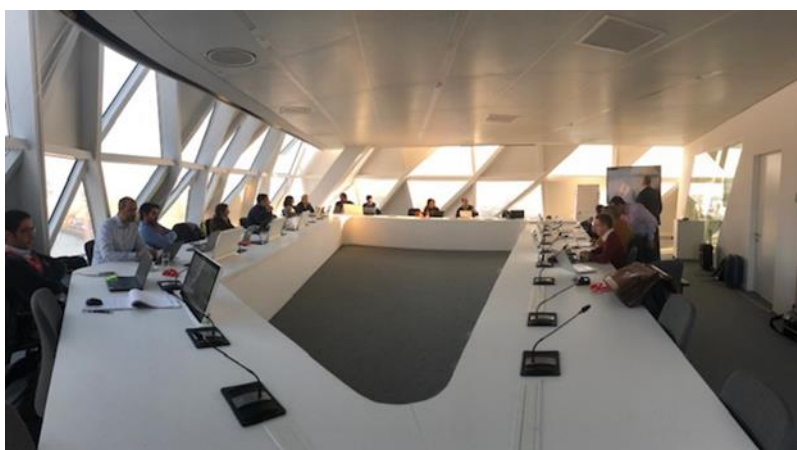
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the technical challenges, the LL must show how operators, many of whom are competitors, can be convinced to share data and collaborate for mutual benefit.

**PI Corridor Living Lab** is demonstrating IoT enabled corridor optimisation. Marc Verelst of P&G explained how the two use case corridors aim to test prioritisation and routing solutions where bottlenecks arise, and to measure the commercial benefits using standard KPI including delivery reliability, service quality and lead time. Angela Cruz and David Cipres updated the team on progress of **e-Commerce Fulfilment as a Service Living Lab**, which is focused on e-commerce fulfilment and distribution with Portuguese retailer SONAE. The team discussed the need to demonstrate the commercial benefit of an IoT enabled last mile distribution through a focus on reducing stock outs, so reducing lost or substitutional sales to customers (which cause both revenue loss and customer dissatisfaction). Hamid Badri of Stockbooking gave a status update on **Warehousing as a Service Living Lab**, which is modelling IoT enabled Warehousing as a Service, and in particular explained the development of location-based optimisation of stock holding as a service within the project.

The second day also included a comprehensive overview of the previous day's technical conclusions, and a very interesting presentation from Troy Muyschondt and Michiel Valee, co-founders of container tracking platform Dockflow, who showed how an integration service provider can commercialise IoT, bringing together data from sensors and existing data flows, and secure the data using blockchain. One use case shown illustrated how their service,



combined with use of temperature sensors on large flows of containers, could help forwarders to monitor temperature sensitive cargo handling through the Suez canal and so reward quality of service. The progress made by Dockflow hints at the huge future potential for the various solutions currently under development within ICONET. An early pioneer of the PI future!

## **NGS and EGerLink successfully presented the Horizon 2020 Project ICONET at this year's Intermodal Europe in Hamburg on November 5<sup>th</sup> to 7<sup>th</sup>.**

Intermodal Europe is “the world-leading exhibition and conference for companies associated with the container and intermodal industries and covers all areas of containers transport and logistics across road, rail and sea. The event provides an invaluable industry forum, bringing together high-quality speakers and key exhibitors.” In parallel with the exhibition, Intermodal Europe hosts a forum where experts from leading companies take the opportunity to discuss new market trends and innovative technology developments as well as new products and services.

The ICONET project, focusing on the vision and implementation of the Physical Internet was presented by Alessandro Vaglini from NGS and Britta Balden from EGERLink at the Innovation Theatre as part of the “IoT and Smart Container Forum” session under the moderation of Alan Robertson, Managing Director of Webster Robertson.

The Physical Internet is a vision of how physical objects might be moved via a set of processes, procedures, systems and mechanisms from an origin point to a desired destination in a manner analogous to how the internet moves packets of information from a host computer to another host computer. The use of IoT Devices is the



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enabling technology to bring this vision into practice. The ALICE Road Map foresees its implementation within 20 to 30 Years. However some leading international E-commerce and Logistics companies already have physical intranets in place. Will they be the trendsetters? Governments and International Agencies are pushing for fast development of the PI on an Intermodal level. This will bring opportunities for new and competitive digital business models; many of them cannot even be imagined from today's perspective, with new players and new value propositions.

## ICONET Partners



For more information please visit our website

[www.iconetproject.eu](http://www.iconetproject.eu)