

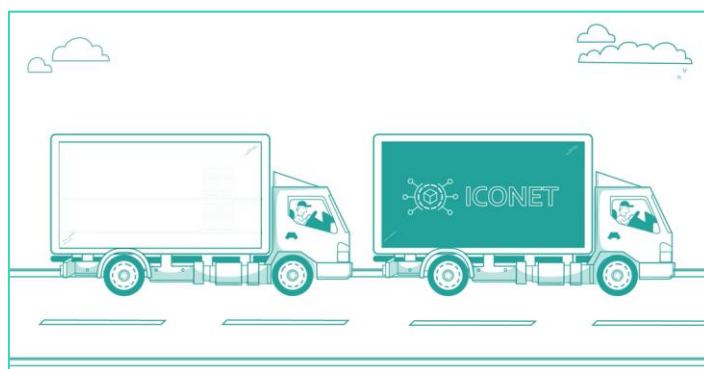


ICONET Newsletter June 2020

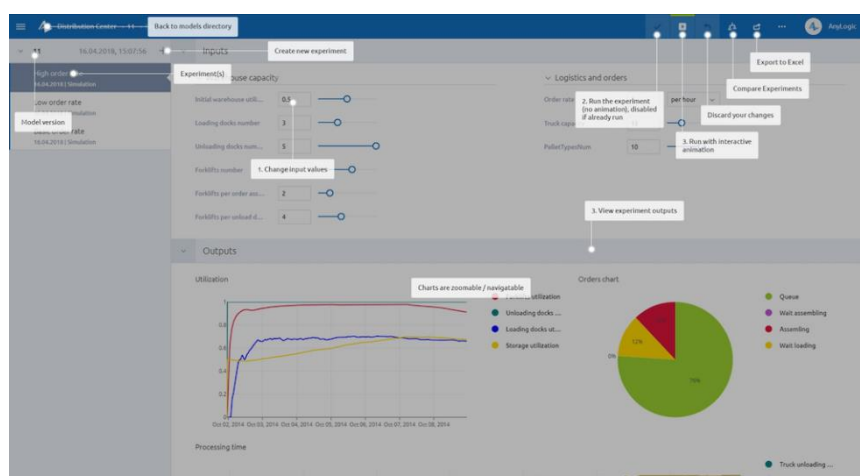
ICONET is a 30-month, EU funded project launched in September 2018 with 16 partners coordinated by Inlecom focussing on the vision and implementation of the Physical Internet (PI).

Many Supply Chains in Europe lack connectivity, visibility and collaboration. ICONET offers solutions to work more effectively with today's supply chain and logistics infrastructure.

We have created a short animation to describe the full offering of ICONET – click on the picture below to watch the video.



ICONET is moving into an exciting phase of its technical development. One of the project partners, ITAINNOVA has created a comprehensive set of simulation models covering a wide array of logistics use cases, business cases and theoretical Physical Internet scenarios. Recent developments have enabled these simulations to benefit from other technical advances within ICONET, allowing simulations to benefit from blockchain, AI algorithms and emerging IoT technologies. These simulations will address logistics challenges in the areas of rail yard operations, last mile delivery, e-commerce, dynamic warehousing location, supply chain visibility and container tracking. We would love to share these simulations with you and get your feedback and suggestions. If you are interested please sign up here <https://www.iconetproject.eu/simulation-models/>

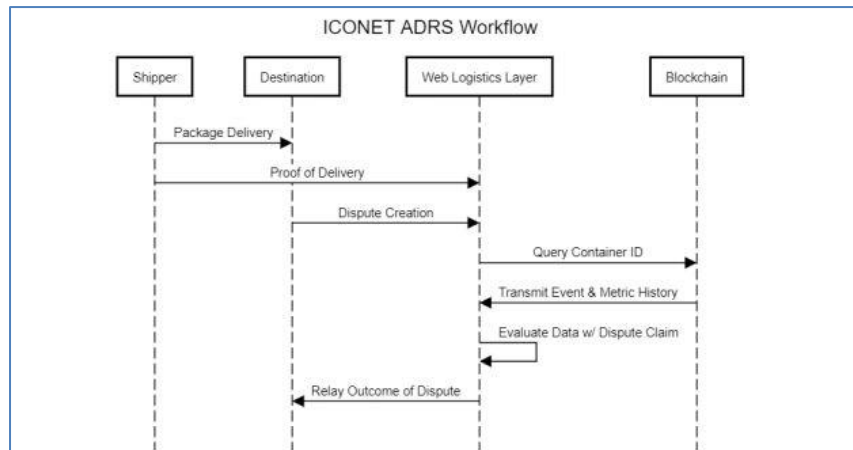


These simulations will address logistics challenges in the areas of rail yard operations, last mile delivery, e-commerce, dynamic warehousing location, supply chain visibility and container tracking. We would love to share these simulations with you and get your feedback and suggestions. If you are interested please sign up here <https://www.iconetproject.eu/simulation-models/>

Investigation of an Automated Dispute Resolution Mechanism

ICONET's final "Blockchain Transactional Ledgers and Smart Contracts as PI Enablers" deliverable has just been submitted and its purpose was to investigate an automated dispute resolution mechanism that arises from blockchain-enabled PI SLA contracts and replicate the system should it be possible. The mechanism's description is accompanied by what needs to be done at the blockchain as well as server level to ensure that enough data are available to the system and that the system operates in an autonomous way without the explicit assistance or input of an external human party.

Supplementary research findings also include an analysis of what has been done in the space of PI and transport in general in relation to blockchain technology. These findings are meant to distinguish the innovation aspect of the blockchain of ICONET and help paint a clearer picture of what differentiates the ICONET project blockchain initiative from other initiatives in the same field.



The report demonstrates the following:

- The applicability of dispute resolution mechanisms in a fully autonomous way in the context of SLAs
- Close integration of the solution in a tangible use case under the LL of Antwerp
- The innovative dimension of the blockchain initiative of within ICONET."

[To read the full report on our website please click here](#)

Realisation of the IoT-enabled PI environment

The Physical Internet (PI) is a boundary spanning field of research, which aims to optimize logistics processes and enable effective and sustainable supply chains by applying the concepts of the Digital Internet (DI) to the physical world. The idea behind the PI is to connect and synchronize all logistics networks to create a collaborative physical network of networks, capable of autonomously optimizing the shipment of encapsulated goods of several types and sizes in compliance with different Quality-of-Service (QoS) requirements by means of routing protocols, tracking mechanisms and interoperability standards.

Though the lessons learned from the DI can guide the development of an efficient global logistic network, the PI is inherently different from the DI because of the nature of the transported items, which are physical objects in the first case and digital information in the second. Nevertheless, the PI will reach a level of pervasiveness and complexity that only a massive exploitation of the Information and Communication Technologies will allow to manage. In particular, the Internet of Things (IoT) paradigm is expected to play a crucial role in filling the gap between the physical and the digital realms, strictly coupling them. In fact, IoT can provide the necessary technological layer to create digital twins of physical logistics flows, which can be operated by resorting to well-known and widespread DI concepts and technologies.

To implement an effective and business-oriented IoT environment, we have identified the main stakeholders in charge of exploiting these solutions, as well as the business and technical requirements to realise the PI grand-challenge. Particularly, our objective is to highlight the importance of IoT, seen as a PI enabler, thus to support the digitalisation and optimisation of the logistics processes, making these sustainable, low cost, efficient and reliable, thus realising the Zero Emission Logistic chain.

PI main stakeholders and their needs

The stakeholders involved in the realisation of the PI, are various and represent a complex and intricate group of operators and entities. The needs of these stakeholders are the main drivers of PI and then of the IoT-enabled PI environment, thus they represent the business requirements of the ICONET project. In the following, the list of the involved stakeholders' categories and their needs are detailed:

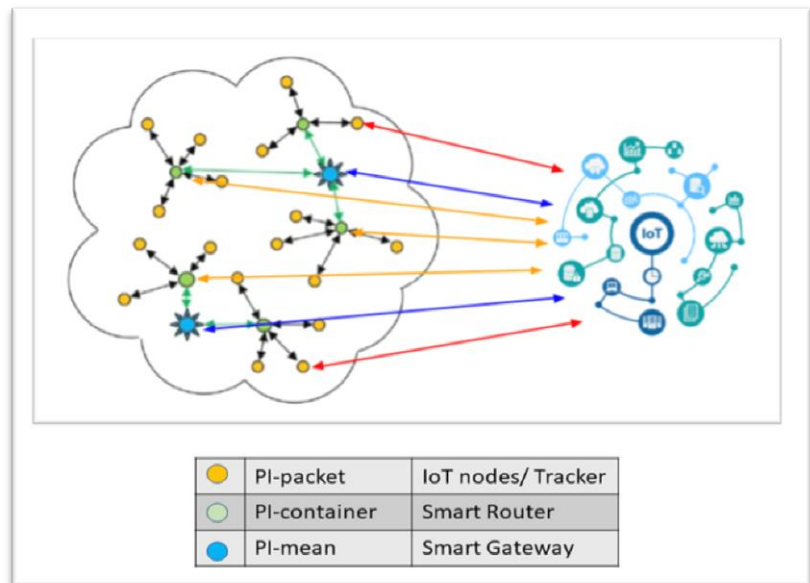
- 1. Logistic operators** interested in improving and optimising the logistics' services towards:
 - a. Cost reduction**, decreasing and harmonising the inefficiencies of the logistics ecosystem, and optimising the operations and services toward the productivity and market share increase.
 - b. Revenues' generation increase**, implementing innovative added value services to increase the customer's satisfaction and gaining competitive advantages, enhancing their market offering.
- 2. Technologies' and Solutions' Providers**, in charge of providing instruments to implement the complete supply chain visibility, as well as providing the automatic intelligence to optimise such processes. These stakeholders are interested in implementing **fruitful and innovative business models** within an **open and competitive PI and logistics markets**.
- 3. Authorities & Policy Makers** with the scope of **standardising methodologies** and **defining regulations** to improve the **companies' productivity and competitiveness**, as well as, **reducing the traffic and the pollution** footprint due to unoptimized logistics. Finally, these stakeholders are also the carrier to promote **the bureaucracy reduction and digitalisation**, towards a procedure simplification considering a paperless approach and a **greener** implementation of the logistics services.

Constructing the IoT-enabled PI environment

Following the guidelines derived by the stakeholders' needs, the paths to follow to realise innovative IoT-enabled PI environment proposed in the ICONET project are essentially four:

- 1. Realise a pervasive and open IoT environment**, capable to satisfy the digital encapsulation issues. In this scenario, **modular and composable** devices will be capable to ubiquitously monitoring the goods (presence and status) and cooperate with third parties' devices and on data collection and sharing, considering standardised protocols and representations. In this scenario, the complete and ubiquitous visibility of the supply-chain can be realised in a goods-centric manner.
- 2. Define the PI common language**, where all the components share data and information in an interoperable manner. In this scenario, standardised protocols and data-models must be selected toward the realisation of an open environment where different stakeholders can cooperate.
- 3. The devices must be easy and affordable to install** (plug&play, wireless and battery powered, with internal battery), and **maintain** (long duration internal battery).
- 4. Simplified integration with third parties application**, suggesting the realisation of a remote Cloud platform to implement the brokerage of a scalable set of IoT transaction, the data persistence and its sharing with third parties in a secure manner respectful of the privacy (ad-hoc transactions).

In this scenario, ICONET's **IoT architecture** allows implementation of a pervasive and ubiquitous environment, thus providing the visibility to the whole supply chain. We propose a **recursive architecture** capable to represent the encapsulation of the PI packets. The deployment of such architecture foresees the IoT coverage of all the supply-chain exploiting the most convenient communication between the mobile network (5G ready) or other IoT connectivity. For instance, the possibility of cooperating with OBUs on trucks based on the CALM protocol suite¹ can be enabled integrating 6LoWPAN and CoAP protocols. Following this approach, each element of the PI world (i.e., PI packet, PI pallets, PI containers, PI means) can communicate in a stand-alone manner as well as cooperating with the other, toward the optimisation of each communication (for example, selecting the lowest cost and/or lowest power communication) but maintaining those continuously connected with the remote servers.



ICONET Partners

For more information please visit our website
www.iconetproject.eu

¹ ISO 19080:2016 - Intelligent transport systems — Communications access for land mobiles (CALM) — CoAP facility

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769119

The views expressed by the ICONET Consortium do not necessarily represent the views of the EU Commission/INEA.

The Consortium and the EU Commission/INEA is not responsible for any use that may be made of the information it contains