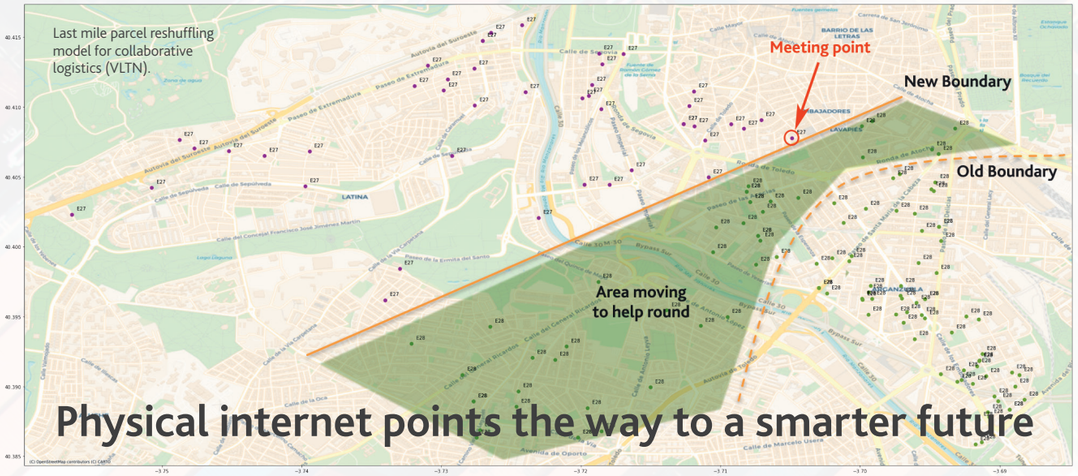


Physical internet points the way to a smarter future

The physical internet is a novel approach designed to help transport and logistics companies utilise more efficient transport modes and use the available container space more efficiently, alongside a variety of other benefits. We spoke to **Dr Konstantinos Zavitsas** about the work of the PLANET project in helping transport and logistics companies work in a smarter and greener way.

A huge volume of goods and products are transported across the world on a daily basis, and managing these flows is a complex logistical challenge. Cargo may be initially transported by ship before then being loaded on to a train or truck, and it is not easy to ensure that the available space is used effectively and efficiently. "Empty space is a big problem in today's transport and logistics industry. For example, a truck may be half full or carry a container that is only half full," acknowledges Dr Konstantinos Zavitsas, head of analytics at VTN, a Green supply chain and logistics company based in Antwerp. One route to addressing this issue is by increasing the container sizes offering/availability and identifying what containers are appropriate for transporting a specific shipment. "Whenever some sort of cargo is being distributed it can be broken down into containers, following the digital internet paradigm," says Dr Zavitsas. "It's not just the standard container sizes that need to be considered. One idea is to develop more sizes of containers, so that there is less empty space inside a truck, and use algorithms/ mathematical models to optimally fit cargo into containers and containers into transport vehicles."

Physical internet

This is an important element of the physical internet, a new logistics system which is designed to promote smart decision making throughout supply chains and so improve transport efficiency. As part of the PLANET project, Dr Zavitsas is investigating trade patterns at several 'living labs', with the long-term goal of developing an ICT system to help foster collaboration among transport and logistics stakeholders and ensure that transport infrastructure is used more efficiently. "We mainly consider the interface between global trade routes and the EU transport network, through sea-ports and rail routes to inland terminals such as the one belt, one road connection (OBOR) from China to Europe. We aim to cover a variety of modes for moving goods in and out of Europe," he outlines. This research holds wider commercial relevance to the project consortium, which includes shipping companies keen to harness the power of data as a route to improving efficiency. "Let's imagine that a company has a vessel in the Mediterranean and is looking to unload 1,000 containers at a Spanish port for onward transport to different parts of the Iberian peninsula," says Dr Zavitsas.

The port of Valencia would be one possible destination, while there are also alternatives such as Barcelona and others further afield. The intention may have initially been for the vessel to follow a specific route calling at several ports to unload cargo, but if circumstances change then it could be beneficial to change the route. "Maybe one of the ports has some sort of delay. A shipping company may not want their vessel to go to five ports and find big delays at all of them before they can enter," points out Dr Zavitsas. One option could be to unload all the cargo at a single port, and then let hinterland transport such as road and rail take over; Dr Zavitsas and his colleagues in the project are helping companies assess their options in this kind of scenario. "Would it be beneficial for a shipping company to unload everything at a single port? If a company decides to call at say three ports instead of five, then which ports should they be?" he outlines. "These are the kinds of questions we are addressing, which also helps us form a sort of unified database on the ports."

This would also provide deeper insights into the functionalities at specific ports, such as the infrastructure and facilities available. One aim in the project is to create data models which provide relevant information on ports to shipping operators, which can then inform their decisions. "It may be that there is a strike at a port, or there are hundreds of ships waiting to unload - we are offering this sort of integrated information. Alongside that, we also offer decision support systems that can make the decision for the operator, while also allowing the integrated management of clusters of ports, that will enable a more robust and efficient functionality," explains Dr Zavitsas. The project's agenda includes research into the whole supply chain, not just shipping, but also onward transport right to the final destination. "We are actually looking right down to the last mile, and we are trying to offer collaborative solutions, which includes looking at integrating traditional van deliveries with more efficient and green urban transport modes through parcel reshuffling and an integrated sharing platform," says Dr Zavitsas.

A wealth of data is available on last-mile logistics, where goods and products are delivered to customers, but much of it sits in entrepreneurial silos rather than being shared more widely. Researchers have found that they can develop dynamic solutions that track the progress of delivery runs during the day, which could help companies avoid wasted journeys and use their resources more efficiently. "We've shown that a solution like that is possible, and it can add value to the supply chain," says Dr Zavitsas. The aim in the project is to try and solve these kinds of real-world problems using the physical internet, which Dr Zavitsas hopes will encourage enterprises to embrace this technology. "With last-mile logistics the question is whether a company is willing to open up its data to someone else who can help and prevent them from having to make a dedicated trip just to deliver a small number of parcels," he outlines. "That solution will be beneficial in financial terms, as well as in reducing carbon emissions."

do we just need to figure out ways to convince people to share data and enable IoT tracking?" he outlines. The aim here is to create a roadmap for the development of the physical internet in Europe; several scenarios of future trading patterns are being considered. "We have tried to develop possible scenarios for 2030 and beyond. These scenarios centre around more trade routes being opened, such as the North Arctic corridor," continues Dr Zavitsas. "Other scenarios put more emphasis on environmental concerns and prioritise more efficient transport or the regionalisation of production."

The idea is to run the same strategic modelling on each of these scenarios, and from there assess which possible solutions are the most robust. This is a very important consideration in terms of dealing with strategic decisions, believes Dr Zavitsas. "This is why we are considering various different options for the future, such as investing in specific technologies, developing new infrastructure, or providing more sensing capability," he explains.

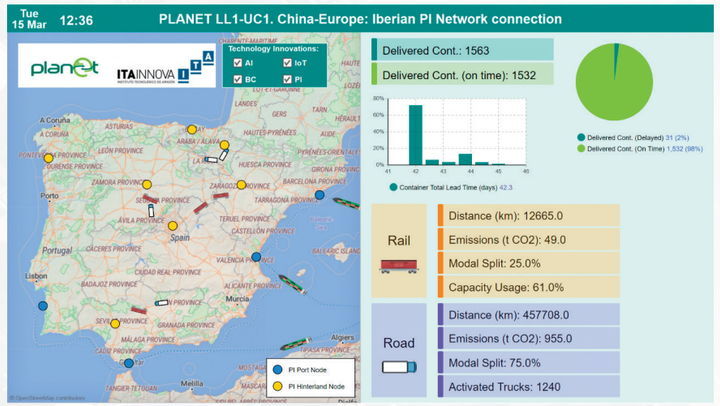
We mainly consider the **interface** between **global trade routes** and the **EU transport network,** through sea-ports and rail routes to inland terminals such as the one belt, **one road connection (OBOR) from China to Europe.**

Transport infrastructure

A further aspect of the project's research involves using models to answer questions about the future of the physical internet. On one side of the project researchers are trying to deal with operational problems through collaboration and data-sharing, while on the other Dr Zavitsas and his colleagues are also looking at the likely impact of these developments and what they will mean for transport infrastructure. "What do we actually need to do? Do we need to invest in building a new railway line or highway? Or

The environmental impact of these solutions is also being taken into account in the project. "For example, a lot of companies are moving towards using greener electric vehicles or bikes in last-mile logistics," says Dr Zavitsas. "In the first stage, the goal in the project is to monitor what is happening and assess the impact of every decision. We keep track of emissions, and we try – both at an operational level and also with respect to strategic projections – to assess the impact of each strategic level decision in terms of emissions."

Dynamic simulation model of multimodal transport network (ITAINNOVA, 2022)



PLANET

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

Project Objectives

The PLANET project addresses the challenges of assessing the impact of emerging global trade corridors on the Trans-European Transport Network (TEN-T) network and ensuring effective integration of the European network with the Global Network. This research is focused on two key R&D pillars:

- A Geo-economics approach, modelling and specifying the dynamics of new trade routes and their impacts on logistics infrastructure & operations, with specific reference to TEN-T;
- An EU-Global network enablement through disruptive concepts and technologies (IoT, Blockchain and PI, 5G, 3D printing, autonomous vehicles / automation, hyperloop) which can shape its future and address its shortcomings, aligned to the DTLF concept of a federated network of T&L platforms

Project Funding

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreement No. 860274.

Project Partners

• Inlecom (Coordinator) • CERTH • CATS • COS • COSTech • CPSI • Konnecta • DHL Supply Chain Spain DHL • EBOS • EGTC • Erasmus University Rotterdam EUR • ESC • CityLogin • FV • ZLC • GS1 China • GS1 Poland • HARDT HYPERLOOP • IBM Ireland • International Union for Road-Rail Combined Transport • Instituto Tecnológico de Aragon • ILIM • Jing Dong Logistics • New Generation Sensors • NEWOPERA AISBL • SIRMA AI • PANTEIA • PNO Innovation • Blockchain Fieldlab • Polish National Post • RÖHLIG SUUS LOGISTICS S. A • VLTN • Wuppertal Institute

Contact Details

Kostas Zavitsas, Head of Transport & Logistics Analytics | Vltn bv | Headquarters
T: +44 758353 9654
E: k.zavitsas@vltn.be
W: www.planetproject.eu
: @PlanetH2020
: https://www.linkedin.com/company/planeth2020
: https://www.youtube.com/channel/UC5ulbN3KYkK_yx_tcnz8-wg

Kostas Zavitsas

Kostas Zavitsas is Head of Analytics at VLTN, a Green supply chain and logistics company, and Senior Teaching Fellow at Imperial College Business School. He is an expert on machine learning and artificial intelligence, and investigates their applications in improving the efficiency and robustness of supply chains.

European Commission | Horizon 2020 European Union funding for Research & Innovation