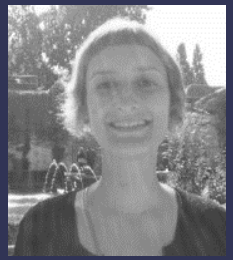
THE PHYSICAL INTERNET LIVING LAB (PILL)

REVOLUTIONIZING LOGISTICS OPERATIONS

imec | VUB mobilise analysing mobility, mobilising people | EMPOWERING LOGISTICS

TEAM PILL



An Cant(imec)
Domain research Lead

Dries Van Bever (imec)
Business Analyst

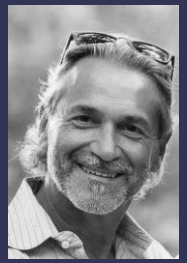
Vitor Lemos (imec)
Modelling Engineer

Joris Finck(imec)
Project Manager

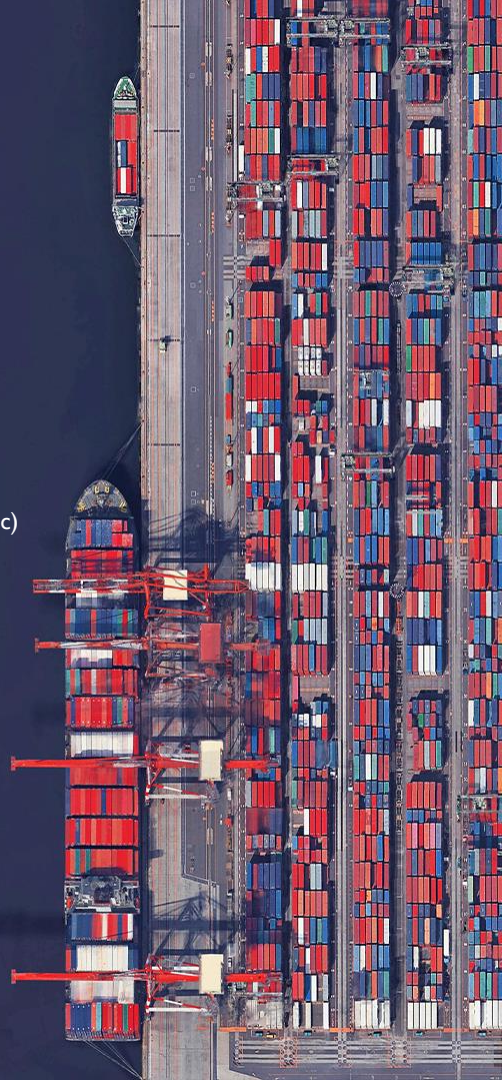
Philippe Michiels (imec)
Lead Architect

Cathérine Cassan (VUB Mobilise) Research Lead

Shiqi Sun (VUB Mobilise)
Researcher



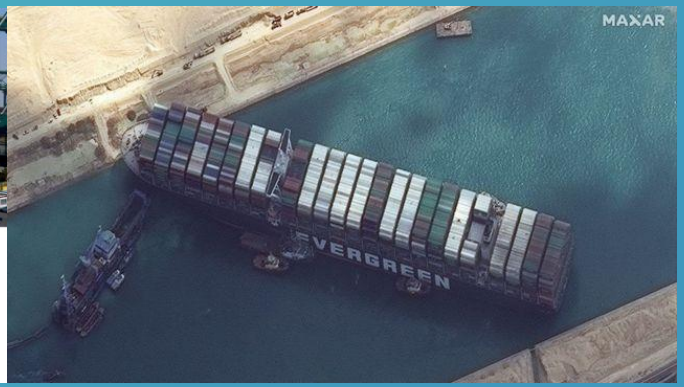
Dirk Jocquet (VIL)
Project Manager



THE LOGISTICS INDUSTRY TODAY IS PLAGUED BY SILOED OPERATIONS AND LACK OF AUTOMATED PROCESSES

Steeds meer vertragingen in haven Antwerpen, rederij MSC: "We moeten veel vaker naar Zeebrugge en Le Havre gaan"

An Verstuyft
do 13 jan 16:22



26 sep 2022, 13:54

Twee schepen botsen op Westerschelde

A fifth of road freight kilometres by empty vehicles

10/12/2021

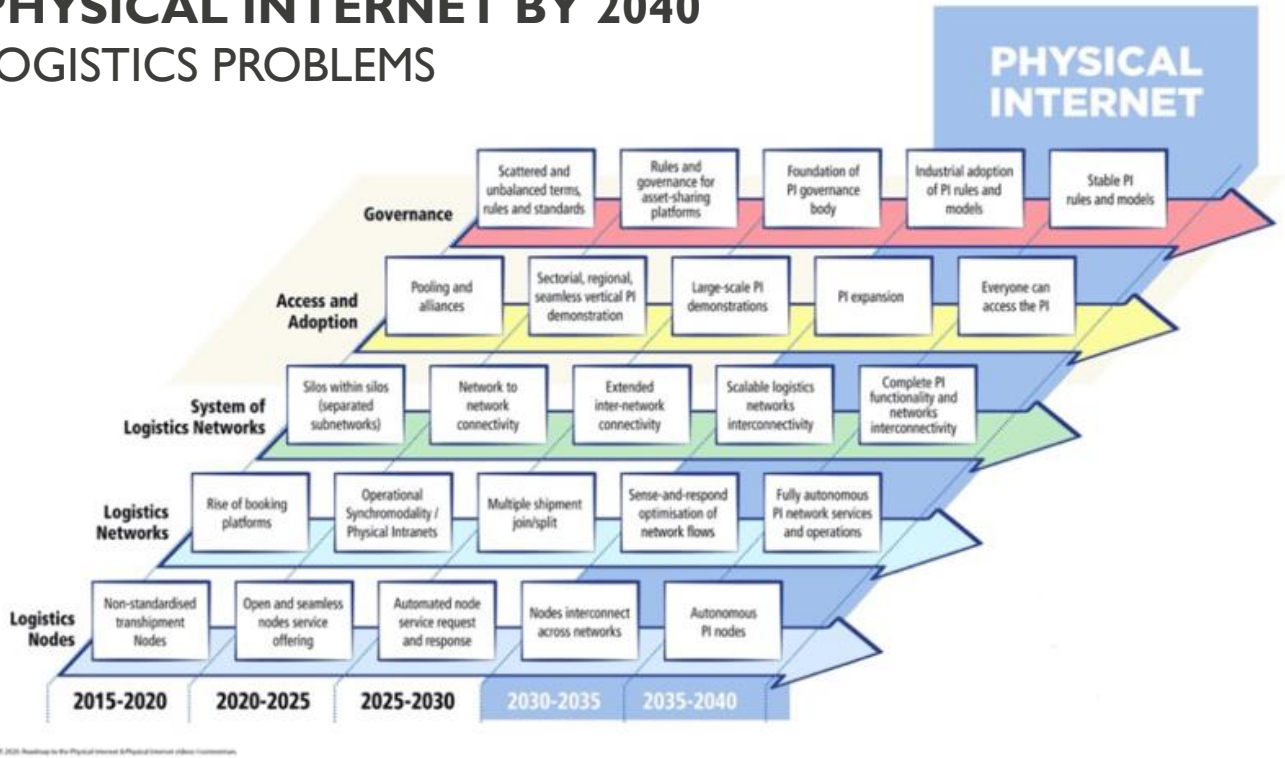
In 2020, around one-fifth of the total roa EU was carried out by empty vehicles. Th higher for national transport (24%) than international transport (13%).

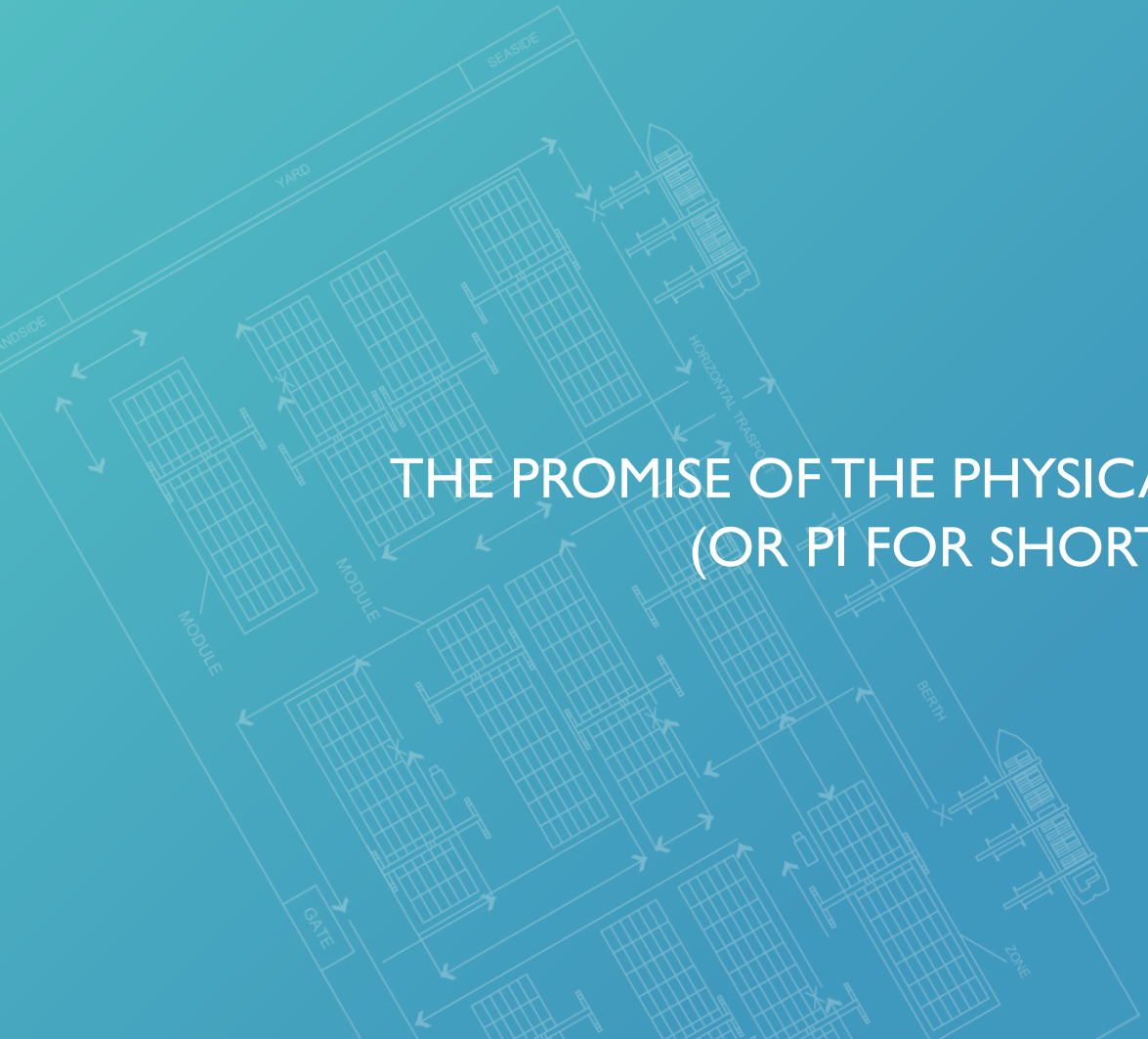
Nieuws

Hamburgse congestie levert Zeebrugge recordaanloop op

CHALLENGES

THE EUROPEAN COMMISSION MANDATES THE ROLLOUT OF **A PHYSICAL INTERNET BY 2040** TO TACKLE THE LOGISTICS PROBLEMS





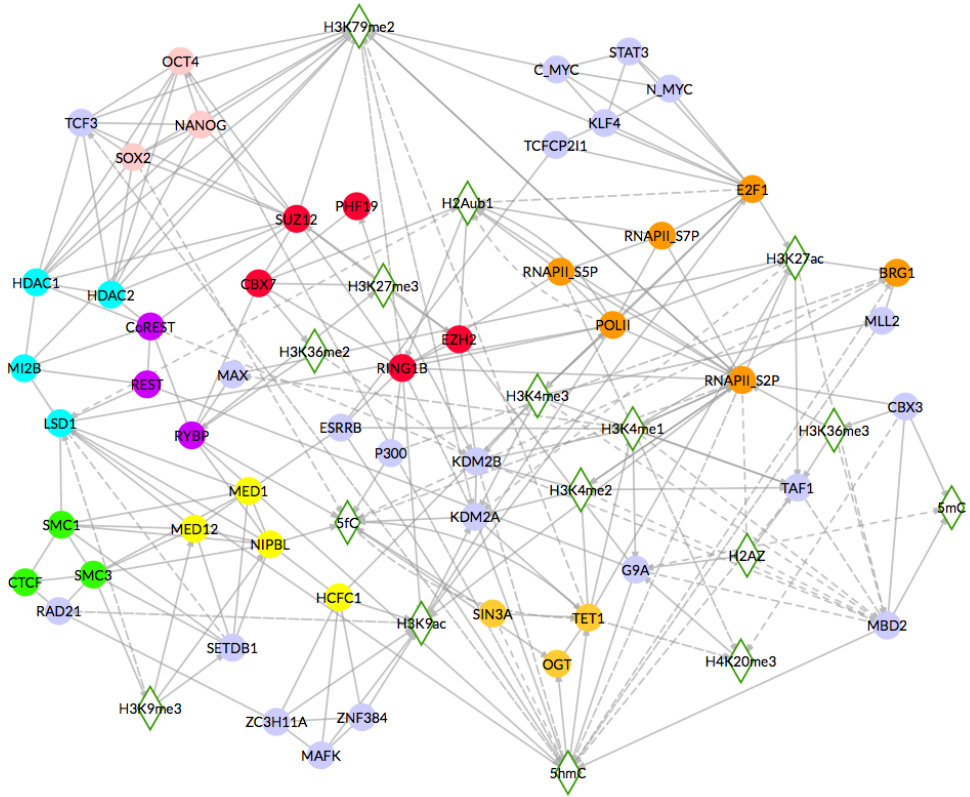
THE PROMISE OF THE PHYSICAL INTERNET (OR PI FOR SHORT)

THE PHYSICAL INTERNET (PI) IS A NEXT-GENERATION VISION ON EFFICIENT, RESILIENT AND SUSTAINABLE LOGISTICS BASED ON ***INTERCONNECTIVITY*** *AND* ***DATA SHARING***.

THE PHYSICAL INTERNET

INSPIRED BY DATA FLOWS ACROSS THE INTERNET

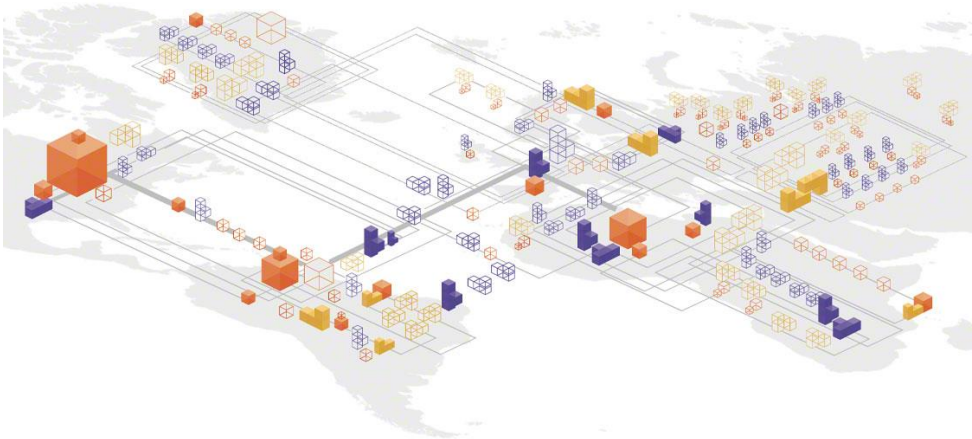
- Decentralised network of nodes
- Information of the entire network is shared with all nodes
- Information follows the most efficient route



THE PHYSICAL INTERNET

WHAT IF CONTAINERS WOULD FOLLOW THIS PROCESS AS WELL?

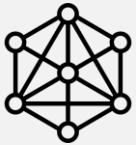
- You simply send a container from A to B. How it is shipped, is determined by the system
- Synchromodal network
- Real-time communication
- Distributed container flow to avoid congestion



imec | VUB mobilise analysing mobility, mobilising people | EMPOWERING LOGISTICS

WHAT IS PI?

KEY PRINCIPLES OF THE PHYSICAL INTERNET



Decentralised, interconnected system

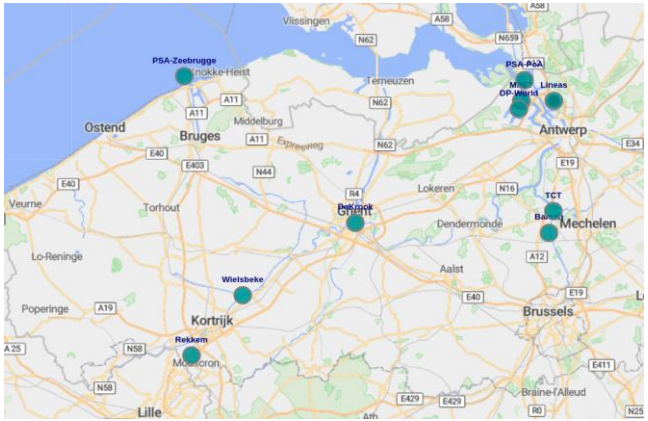
- No central authority
- Decentralized storage of data
- Unlimited scalability
- Privacy-sensitive data sharing

Automated interoperability

- Real-time knowledge of the entire network state
- Data-driven routing
- Automatic, real-time readjustments

Physical Internet Living Lab:

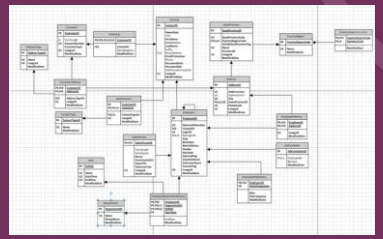
PILL is trying to build a blueprint of the PI logistics information system and hands-on prototype of a first PI network



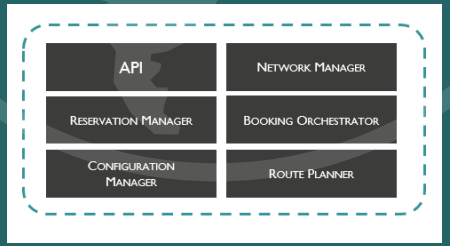
imec | VUB mobilise analysing mobility, mobilising people | EMPOWERING LOGISTICS

PILL: THE FIRST PI BLUEPRINT

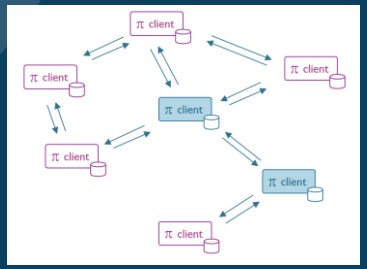
DATAMODEL



π CLIENT



NETWORK



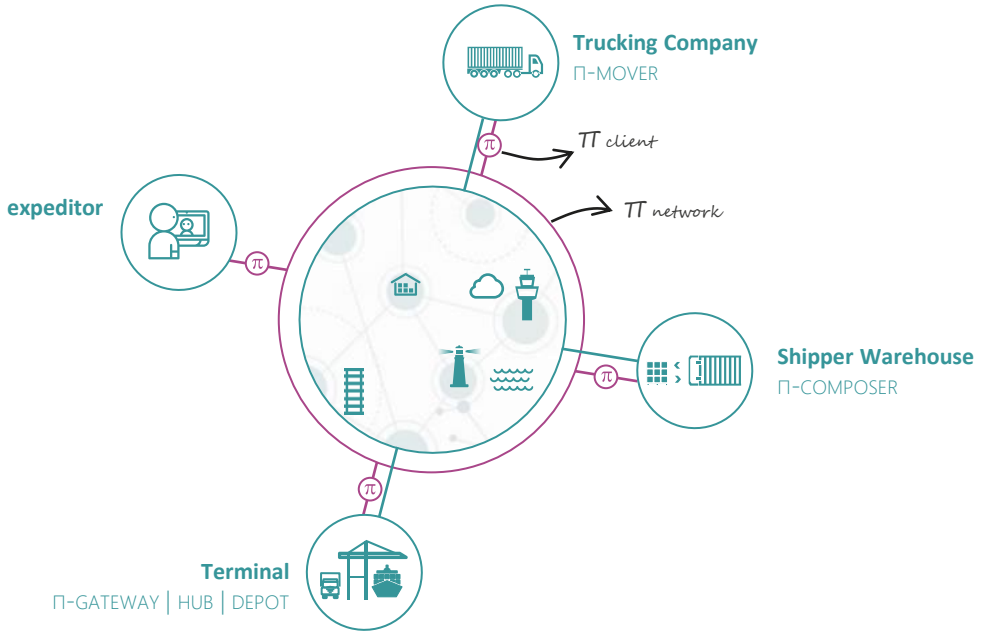
DATA MODEL

BASED ON THE DCSA STANDARD

- Emerging DCSA standards as a foundation
- Limited to the use in PILL
- Some gaps still
- Data standards enable interoperability

THE π NETWORK

PEER-TO-PEER NETWORK



Decentralized network of clients

-

No central database or infrastructure

imec | VUB mobilise analysing mobility, mobilising people | EMPOWERING LOGISTICS

PHYSICAL INTERNET ECOSYSTEM
π AS PART OF THE LOGISTICS DATASPACE

Broker service

Clearing house

π - authority

Standards provider

Identity provider

Governance

π - client

- Publishes capabilities
- Can provide schedules
- Can provide historical data

π - client

- Subscribes to network changes
- Responds to disruptions
- Uses historical data for better planning

Traffic data provider

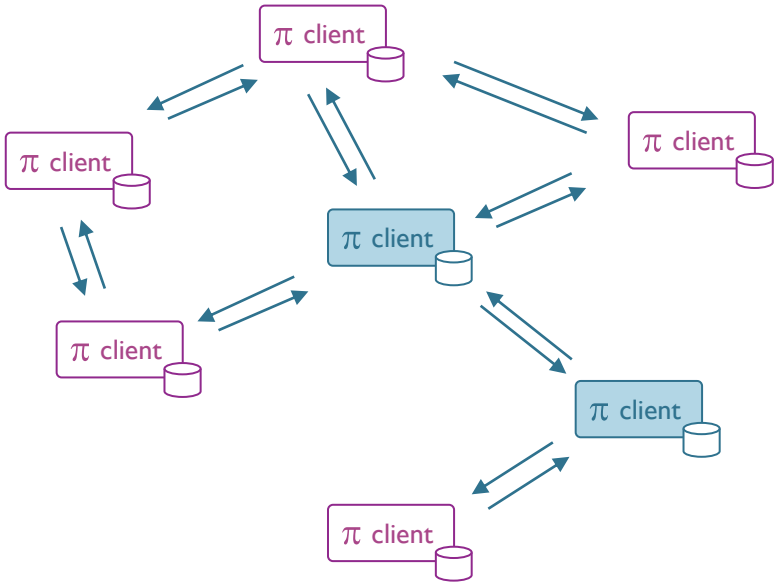
- Traffic data
- Hindrance data
- Road tax data
- …

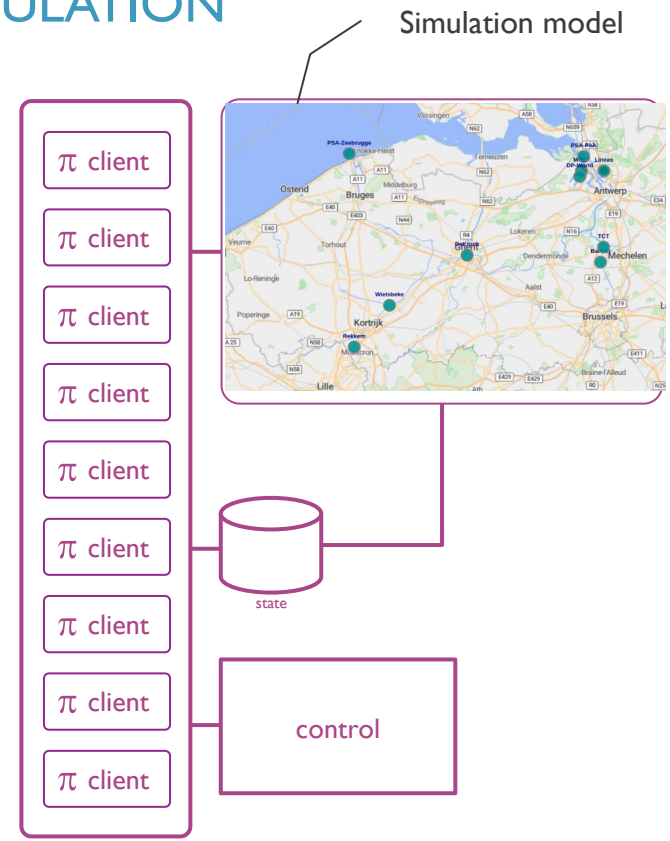
Routing Algorithm Provider

imec | VUB mobilise analysing mobility, mobilising people | EMPOWERING LOGISTICS

THE π-CLIENT AND THE AGENT-BASED SIMULATION

HOW DO THEY RELATE?





π-CLIENT: ROADMAP TO PHYSICAL INTERNET

Scope of PILL

Next steps

$\pi_{bèta}$

POC

Technical validation of the components

Capabilities

- Information sharing across the network
- Route planning
- Capacity check

$\pi_{V1.0}$

PILL Blueprint

Blueprint of first draft physical Internet

Added capabilities

- Order tracking
- Ad-hoc route changes to avoid disruptions

$\pi_{V2.0}$

MVP

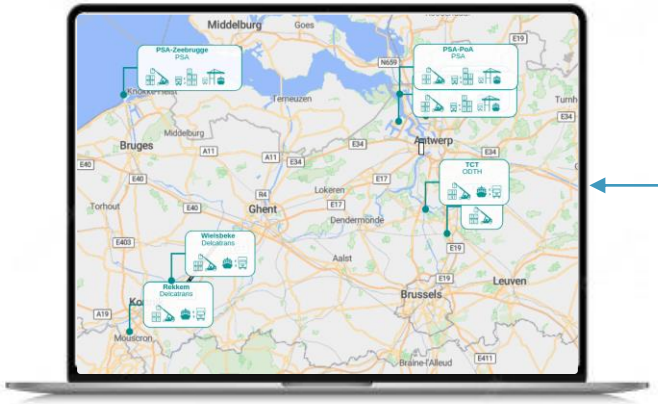
First real-life application

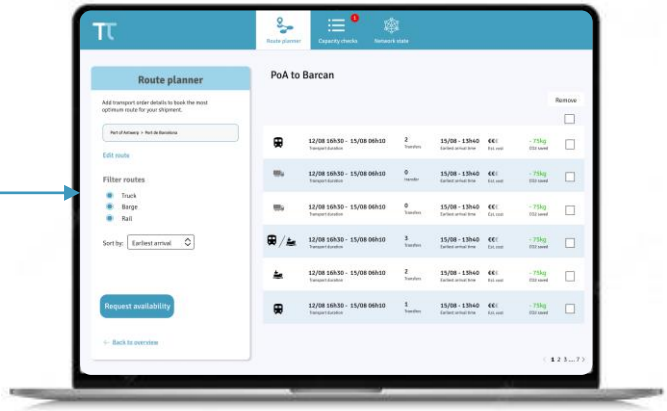
Added capabilities

- Payment integrations
- Booking automation

imec | VUB mobilise analysing mobility, mobilising people | EMPOWERING LOGISTICS

THE FIRST STEP
VALIDATION OF THE PILL SOLUTION





SIMULATION MODEL

- Digital Twin What-if scenarios
- Measured improvement PI vs BAU
- Test scalability of the PI client business rules

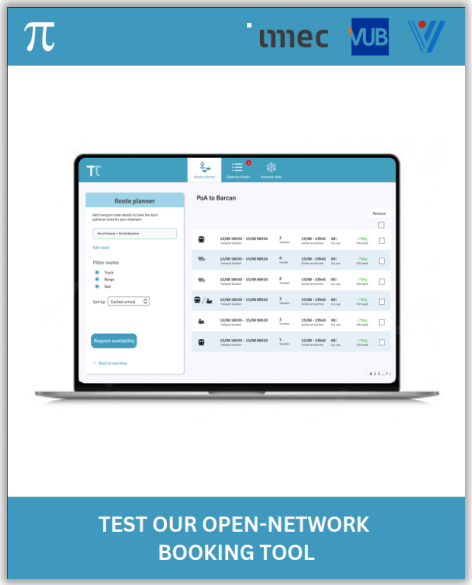
REAL-LIFE POC
@ PORT OF ANTWERP

- Data space + PI-client setup
- Decentralization
- Interoperability

imec | VUB mobilise analysing mobility, mobilising people | EMPOWERING LOGISTICS

QUESTIONS / FEEDBACK ?


HELP US
INNOVATE
LOGISTICS
PLANNING
BE PART OF THE
PHYSICAL INTERNET LIVING LAB


TEST OUR OPEN-NETWORK
BOOKING TOOL


CALL FOR PARTICIPANTS
We are looking for shippers, forwarders and transport operators to use the tool and give us your feedback!
OR
PARTICIPATE IN A USER TEST
JOIN A REAL- LIFE PILOT (Q2 2023)


Thank you
imec
VUB
mobi
MOBILITY, LOGISTICS &
AUTOMOTIVE TECHNOLOGY
RESEARCH CENTRE
EMPOWERING
LOGISTICS