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PIXEL

IoT for environmental leverage in European ports

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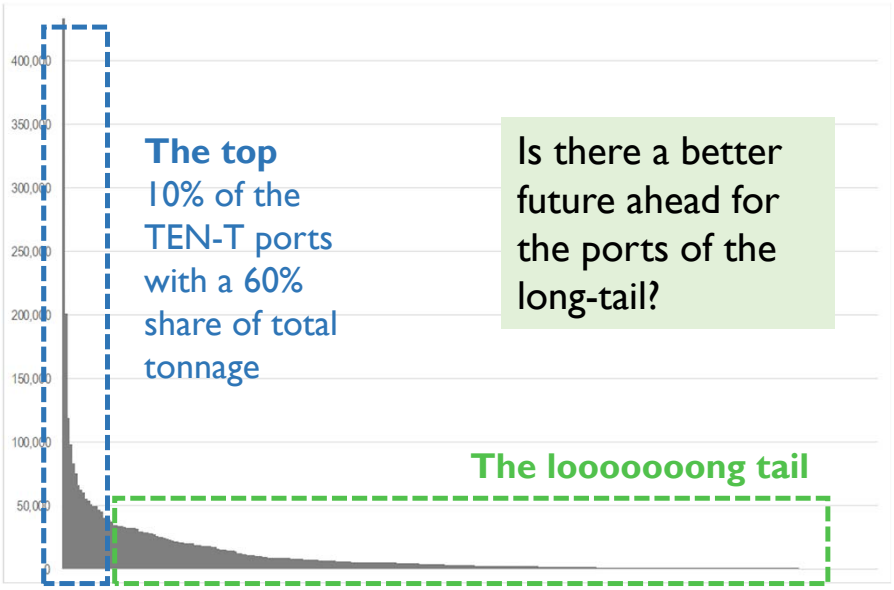
The context



Gross weight of goods transported in European Ports in 2017
(thousand tonnes - Source: Eurostat)

The challenges faced by (especially) the long-tail ports:

- **Efficient data capture** to continuously drive decision making is still a challenge
- Heterogeneous operational **data integration** still leaves much to be desired
- **Expected environmental impact** of operational decisions remains unclear to a large extent
- Commonly agreed **standardised** practices for **assessing**, integrating and **reporting** the **environmental impact** of port operations are missing
- **Digitalisation** moving at a slow pace in most long-tail ports

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PIXEL – Where IoT meets the Port of the Future

- PIXEL: Port IoT for Environmental Leverage
- Topic: MG-7-3 - The Port of the future
- Duration: May 2018 - April 2021 (36 months)
- 15 partners from 7 countries (ES, SI, IT, FR, HR, EL, UK)

Vision

A Port of the Future in which **small and medium ports** are also **innovators** in terms of **environmental sustainability**

Mission

To bring the **Sustainable** Port of the Future paradigm to the **complete spectrum** of ports

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What we do – The PIXEL innovation backbone

Integrate operational data from **IoT devices** & **systems**, to **continuously feed** monitoring, simulation & prediction

IoT integrated platform focused on automatic collection & processing of heterogeneous live data streams

Simulate, predict & optimise, port operations to reduce environmental impact, using a scaling approach based on data availability

Information hub and optimisation operations through **smart models & operational tools** (energy, transportation, pollution and port-city integration)

Standardise & integrate port **environmental impacts** into a **global metric**

Port Environmental Index (PEI) as a quantitative composite indicator of the overall environmental performance of a port

Monitor and inform port personnel & stakeholders on environmental and operational aspects

Dashboard & notification component, for decision support & information provision through the appropriate channel (e.g. API, email alert, etc.)

IoT as horizontal facilitator

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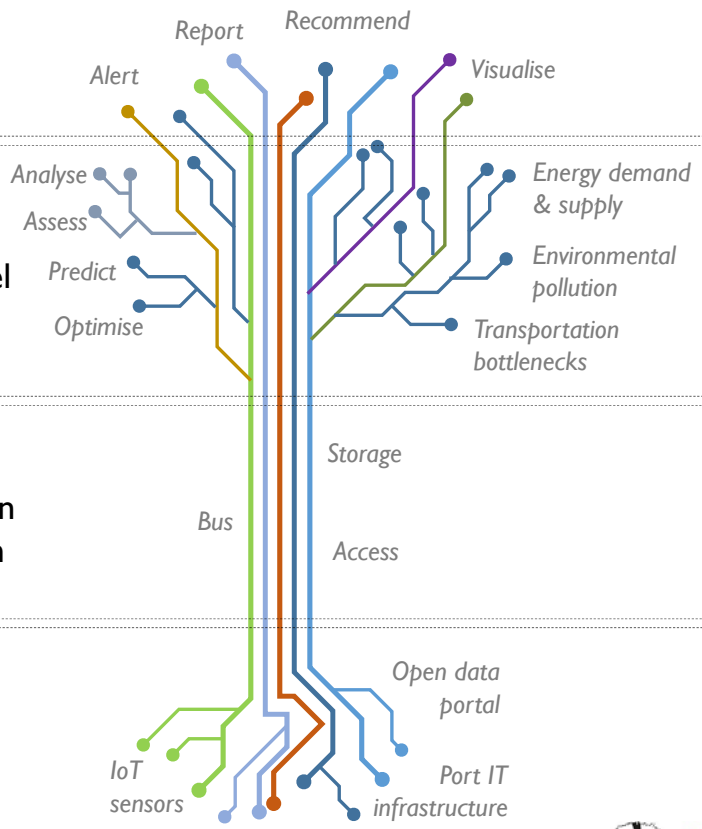
PIXEL services for port environmental leverage

Diffusion
Bring the relevant information to the subscriber through the relevant channel

Monitoring & Modelling
Convert raw data to useful information about today and model port activities to predict future impact & optimise

Management
Support data processing through an open, robust and modular platform

Acquisition
Collect heterogeneous data from multiple sources through live data stream connectors



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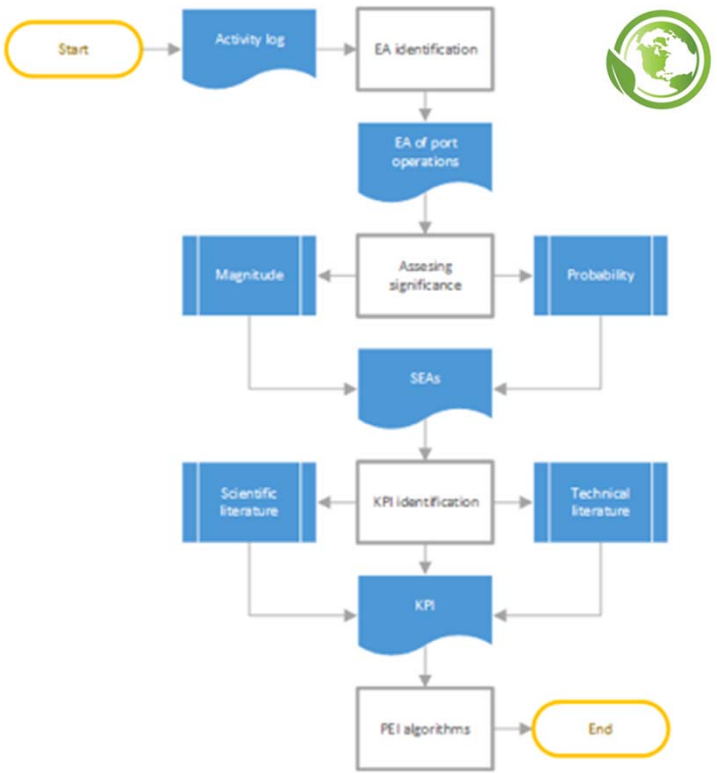
An IoT-facilitated Port Environmental Index

A global indicator (Port Environmental Index) of the environmental impact of ports, that is:

- **extends previous initiatives** aimed at the assessment and steering of port environmental performance
- designed to be **impact-oriented**
- integrating all environmental impacts in **one composite indicator** while allowing impact-level **drilling-down**
- implemented taking advantage of the opportunities of **real-time measurement** through the use of **IoT** devices
- **incorporated** in the **PIXEL platform** services



Emissions to the atmosphere

Emissions of wastewater

Noise emissions

Production of waste

Light pollution

Odour emissions

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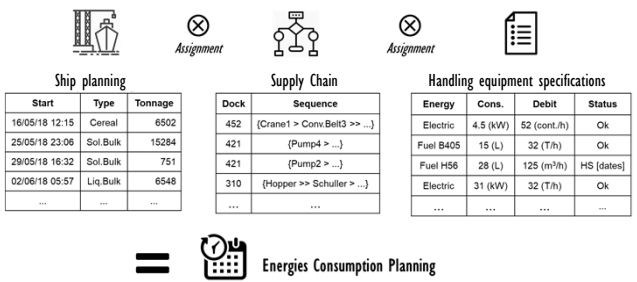
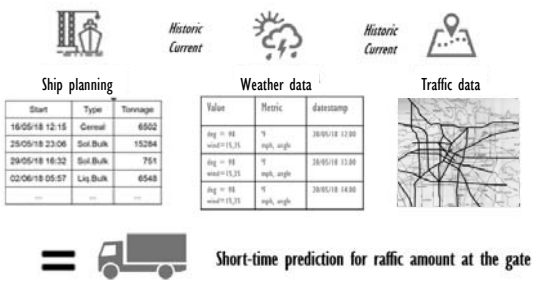
The PIXEL predictive models

Energy demand/supply model



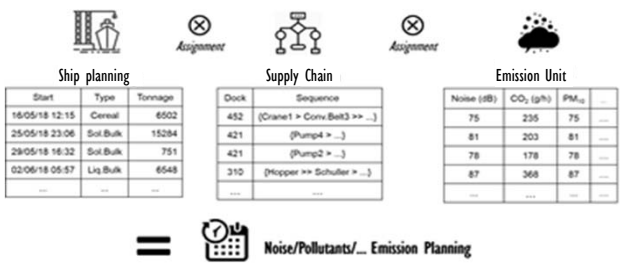
- **Predicts energy consumption** based on a mixed use of handling **equipment specifications** (based on port activity), **real-time consumption sensors** and **temporal conditions** (e.g. berths' lighting & building heating requirements during winter months)
- **Forecasts solar energy production** based on **irradiance** data and **weather conditions** (sensor measurement or satellite-based tools)
- **Balances** energy **consumption** and **production**

Port-city and multi-modal traffic model



- **Predicts potential bottlenecks** at the **port gates**
- Incorporates **port activity planning**
- Includes **current traffic data** in the city to detect upcoming congestion at gates
- Embeds **sensors/information of gates' status**
- Incorporates **weather conditions** that **can impact sea-based traffic**

Emissions quantification & pollutants dispersion



- **Predicts port emissions**
- Emissions inventory
- Pollutants in air, water & soil
- Forecasts pollution end-points in time & space

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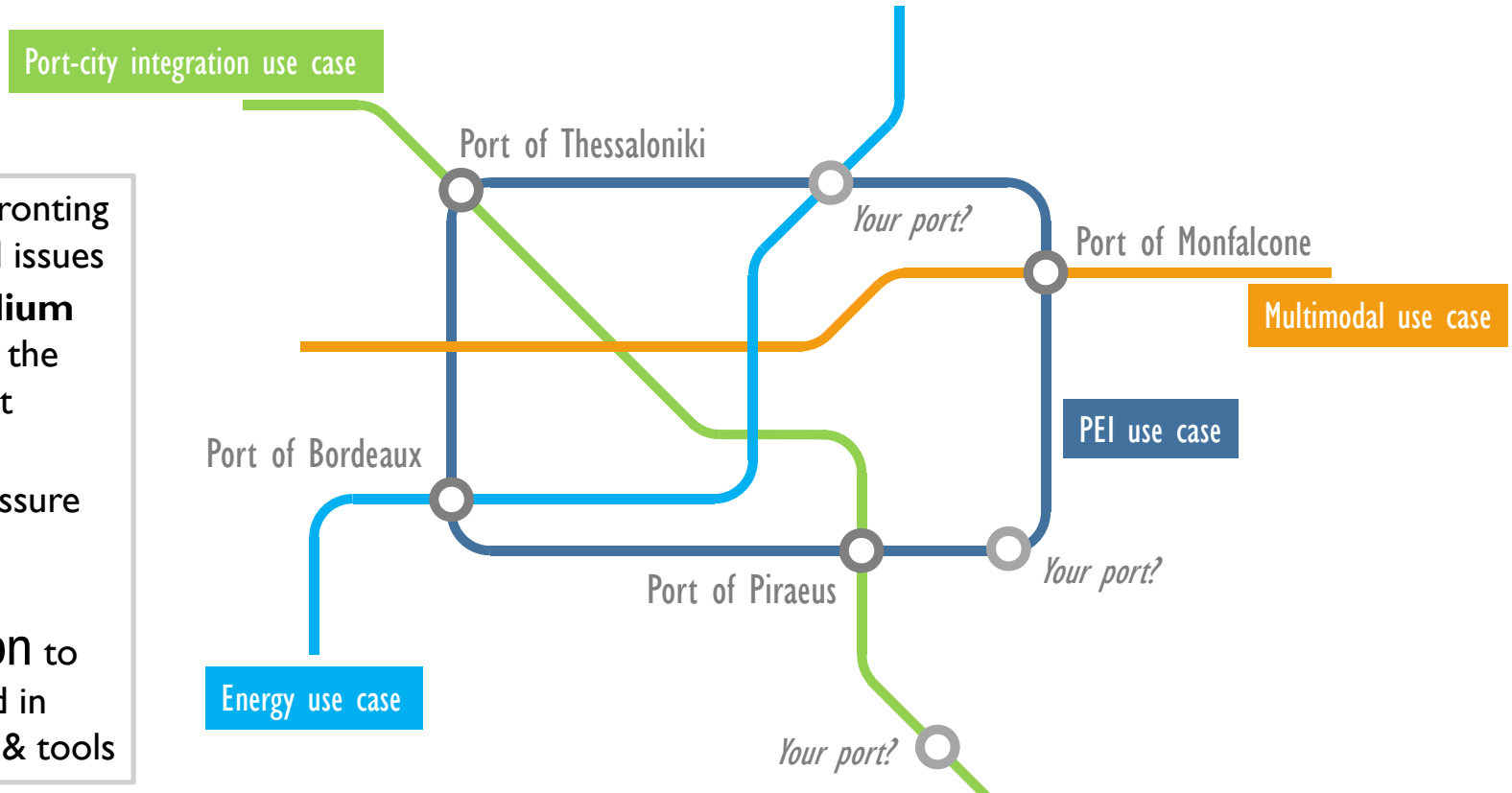
The PIXEL use-cases … and an open invitation

- **Four use cases** confronting varying environmental issues
- **Three small & medium** ports to demonstrate the **validity** of the project results
- **One large port** to assure results' **scalability**

And an open invitation to any other port interested in using our project results & tools



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Thank You + Questions?

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