Structure of presentation

a. The Ports importance & future challenges

b. Definition of "Ports of the Future"

c. PIXEL project

Structure of presentation
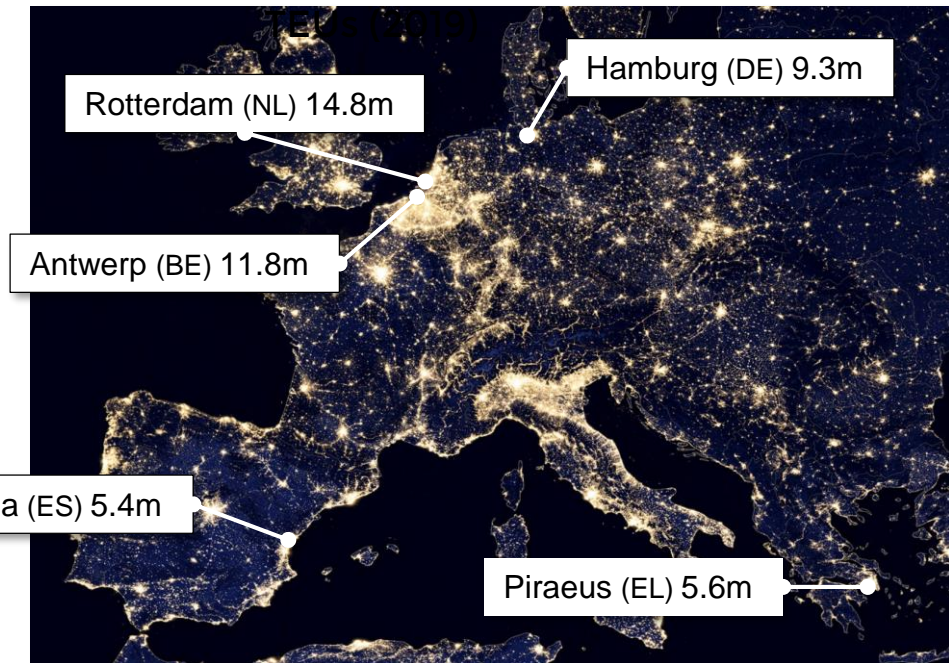
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The Project has received funding
from the European's Union
Horizon 2020 research innovation
program under GA No. 769355

Maritime trade and the European market

Importance for the European economy

❖ Ports are the primary **nexus of global trade** by orders of magnitude.

❖ Europe especially is **highly dependent on seaports** for trade with the rest of the world and internally.

❖ Approximately **74% of goods imported and exported,** and 37% of exchanges within the Union transit through seaports.

❖ **1.5 million workers** are employed European ports.

❖ The world trade fleet amounts approximately 52,961 ships and Greece is ranked 1st with a share of **17% of the world fleet (2020)**

Top-5 European Ports in million TEUs (2019)

Rotterdam (NL) 14.8m

Hamburg (DE) 9.3m

Antwerp (BE) 11.8m

Valencia (ES) 5.4m

Piraeus (EL) 5.6m

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Major challenges in European Ports

Current and future challenges

❖ When faced with the challenge of a fully integrated transport network, the Union's port system is confronted by **structural performance gaps**.

❖ Lack of high-quality infrastructure and low-performing services result in significant **port congestion, performance drop** and **extra costs** (up to 25% of the total logistic cost).

❖ Approximately 75% of European ports are directly connected to **major urban seaside and hinterland areas** affecting the daily life and quality of living of almost 40% of the European population.

❖ Port performance and hinterland connectivity issues should be addressed with **respect to the environment -** In the EU, maritime shipping accounted for 13% of the GHG emissions from the transport sector (2015).

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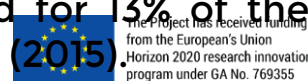
Strategic directions for the European Ports

Strategic directions for the future

- ❖ European ports are **a strategic partner** in building a sustainable, competitive and smart EU.

- ❖ Enable the **role of ports** throughout the supply chain and their **overall performance** by focusing on infrastructure and transport means use optimization.

- ❖ Core ports to be **connected with the railway, road and**, where possible, **inland waterway transport infrastructure** of the TEN-T Network **by 2030**.

- ❖ **Decarbonization - Going climate-neutral**: The European Commission announced that GHG from EU transport (incl. shipping) should be cut by 90% by 2050.

source: European Sea Ports Organisation (ESPO) (2020)

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Port of the Future – *Expectations & Goals*

- ❖ Advanced and efficient links and integration in the socio-economic industrial and urban surrounding environment (supporting the smart urban development of Port Cities)

- ❖ Re-engineering of port operational processes via process analysis and identification of interoperable ICT systems to improve the level of integration among all actors and facilitate critical decision-making.

- ❖ Sustainable maintenance, repair and reconfiguration.

- ❖ Better capacity management with reduced costs and land use.

- ❖ Identification of real-time indicators to improve the quality of services provided.

- ❖ Low environmental impact, climate change adaptation and mitigation, and moves towards the circular economy.

Port of the Future – *Expectations & Goals*

Port of the Future – Small and Medium sized ports

❖ Efficient connections with the hinterland transport network contributing to increased use of energy-efficient transport modes, in particular rail.

❖ Inland waterways and short sea shipping ports specific requirement fulfillment .

❖ Environmental-friendly behavior in all ports for complying to the EU objectives (Transport 2050 strategy)

❖ European ports included in the SECA zone to implement new technologies such as alternative fuels bunkering (Liquid Natural Gas), on-shore power supply thanks to EU supports (large ports, e.g. Rotterdam, Gothenburg).

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Green Port project proposal

"Green Ports as multimodal hubs for Sustainable and Smart mobility" submitted in EU **Green Deal call**

CERTH & **Huawei** cooperate in one of the *consortia*

Sustainable
Green energy production, distribution, supply
Use of clean energy for transport and other purposes

Smart
Connected and automated vehicles, cranes, etc.
Smart operations, logistics, intermodal connections

Multimodal
Road and rail multimodal connections
System-wide door-to-door mobility for passengers & freight

Interconnected
Links with cities, urban environment, urban mobility
Biodiversity, circular economy, effective land/sea/river use

Structure of presentation

a. The Ports importance & future challenges

b. Definition of "Ports of the Future" & the Green Port project

    proposal

c. **PIXEL HORIZON 2020 project**

PIXEL ambition

PIXEL's ambition is related to small and medium ports …..

Delivering outcomes to support these ports in being able to:

- **real-time and technology-based measuring, controlling and reducing the associated environmental impact according to current regulations & recommendations,**

- **going thus beyond the current state-of-the-art offering.**

PIXEL : Equilibrium environmental vs. cost-benefit

Reduction of **environmental impact** of port activities (e.g. greenhouse gases for 15-20%)

Increase of **renewables energy uptake** in use-cases at small, medium and large ports

Adoption of a **Port Environmental Index** as a **global quantitative measure** to monitor and act on own environmental footprint

Reduction of **operational and infrastructural costs** with better Port-City integration

Improvement of logistics through data analytics over **waiting time for vessels, on-time performance**

Heterogeneous information hub tailored for the interoperability in building over the limited data **interchange of Port Community Systems (PCS)**

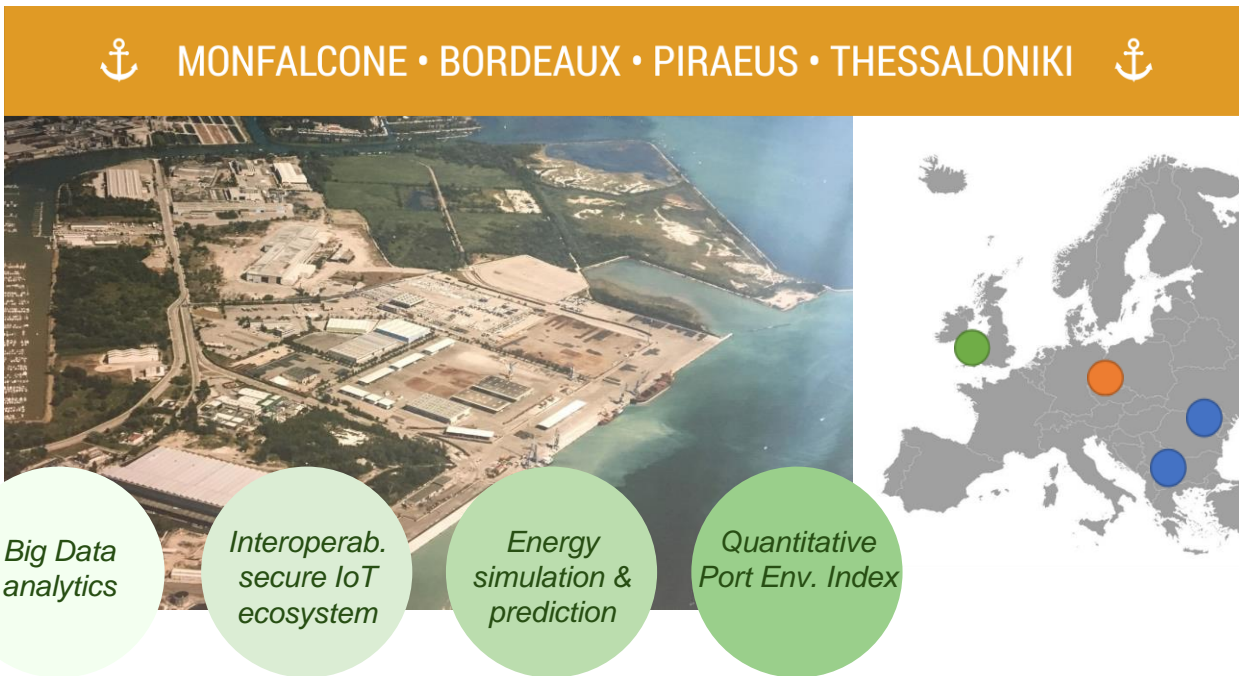PIXEL

PIXEL – Port IoT for Environmental Leverage

- **Secure IoT solutions** for port ecosystem operations

- **Business intelligence** w/ predictive analytics

- **Environmental awareness** with actionable tool: PEI

- Addressing **medium and small ports with scalability** to big ports

- Focusing on **port-city ecosystem challenges**

⚓ MONFALCONE • BORDEAUX • PIRAEUS • THESSALONIKI ⚓

Big Data analytics

Interoperab. secure IoT ecosystem

Energy simulation & prediction

Quantitative Port Env. Index

PIXEL – Where IoT meets the Port of the Future

First **IoT integrated platform** focused on optimization of operations w/ reduction of **environmental impact**

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

Secured dashboard with **operational tools** for decision support (real time monitoring and predictive analysis)

Information hub and optimization operations through **smart models** (energy, transportation, pollution and port-city integration)

A useful **Port Environmental Index**

Today's environmental challenges must fit real global needs, enhanced by legislation and standards - Ports need clear understanding of their **overall environmental performance**

Ports can **optimise their use of resources** to include the appropriate monitor of environmental-related activity and act on it

PEI is a global indicator of the impact in ports that permits the ports to have a **real-time measure of their environmental footprint and to plan actions** to reduce it to desired levels
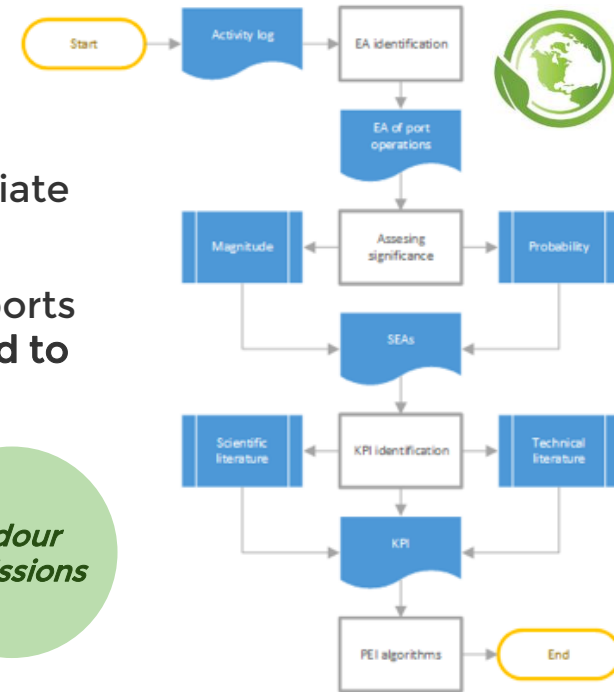

- Emissions to the atmosphere
- Emissions of wastewater
- Noise emissions
- Production of waste
- Light pollution
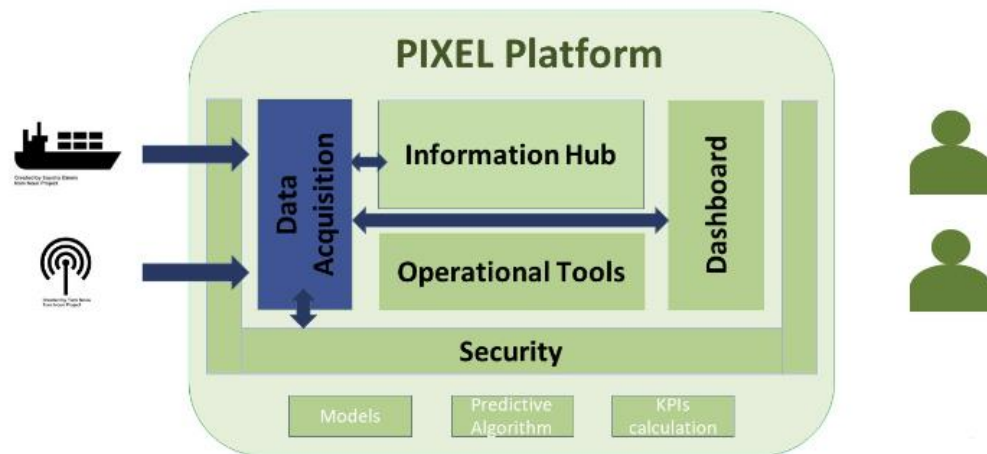- Odour emissions

IN THE CORE OF THE PIXEL SOLUTION
The context

central position in PIXEL architecture

enabler to a data-driven engine

easy integration with components

It is a Hub of Big Data-driven information, serving the different data challenges of PIXEL.
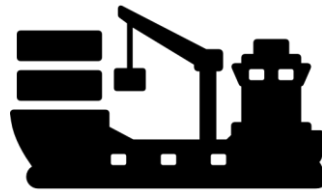
A WIDE RANGE OF BENEFITS
The value

Pluggable real-time data sources to enable forecasting support to port operations and traffic congestion

Edge and IoT enablement by ingesting and serving heterogeneous data seamlessly

Capability to preprocess data streams allowing the access of predictive algorithms to data with enough quality

Secure solution that can be integrated with existing rules and user management systems as well as FIWARE requirements

Big Data is not only about quality, but also the complexity and heterogeneous nature of data.

Implementation at Thessaloniki Port
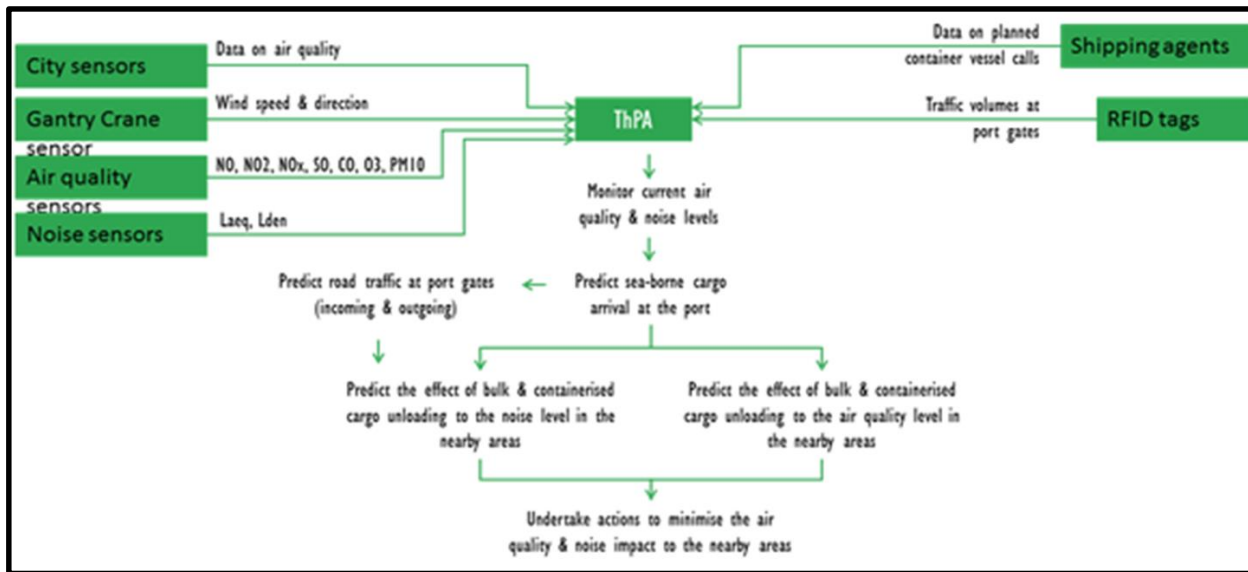
The Information Hub enables benefit all across the supply chain workflow in a secure way.

PIXEL project sum up

https://www.youtube.com/watch?v=zmWiwwNWHGQ

(the intention is to run the project video 2:15)

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THANK YOU

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