

THE ADVANTAGE OF A GREEN AND SMART PORT OF THE FUTURE



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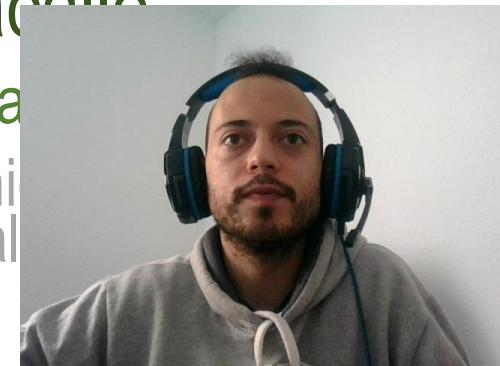
**URBAN AND MARITIME TRANSPORT
2021**

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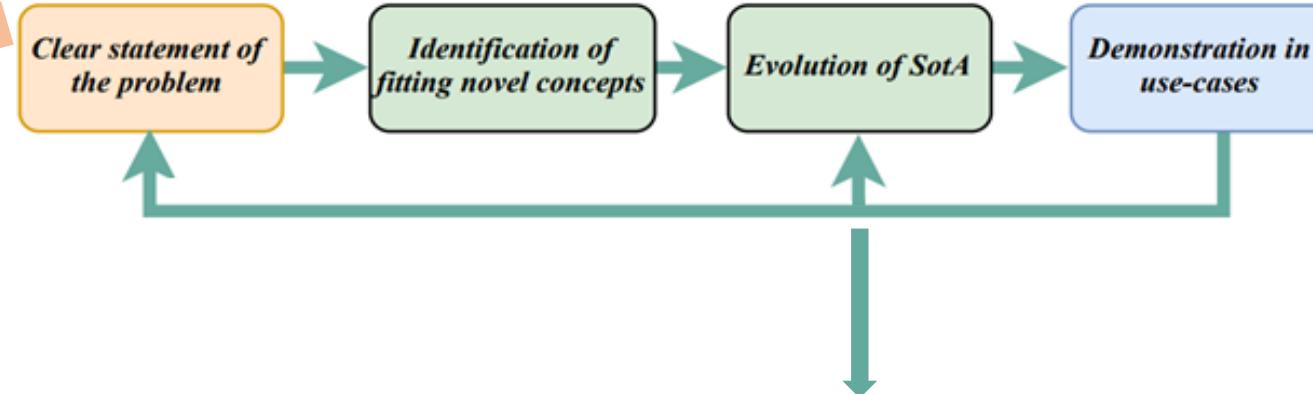
Context and introduction to the paper results



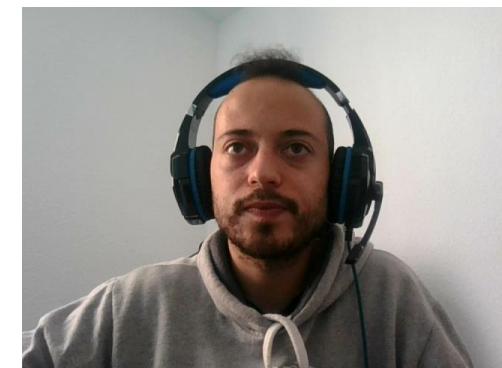
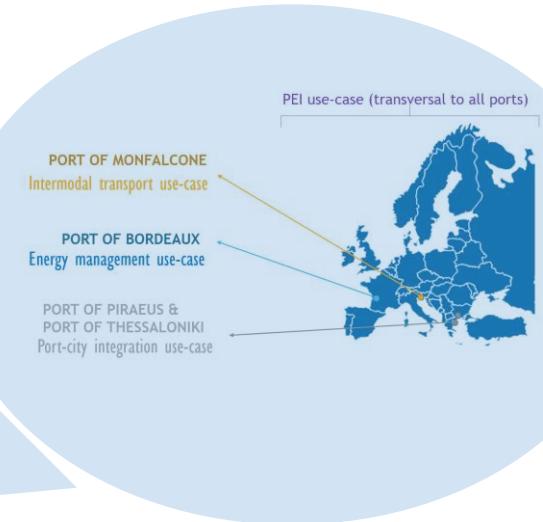
Digitalisation in ports far from optimal causing untracked environmental impact

- Ports' complexity and heterogeneity
- No clear open-source "reference" platform
- Expensive vendor lock-in situations
- Restrictive, old-fashioned regulations
- Heterogeneity on ports' ecosystem management, including many actors playing diverse roles with usually crossed objectives.

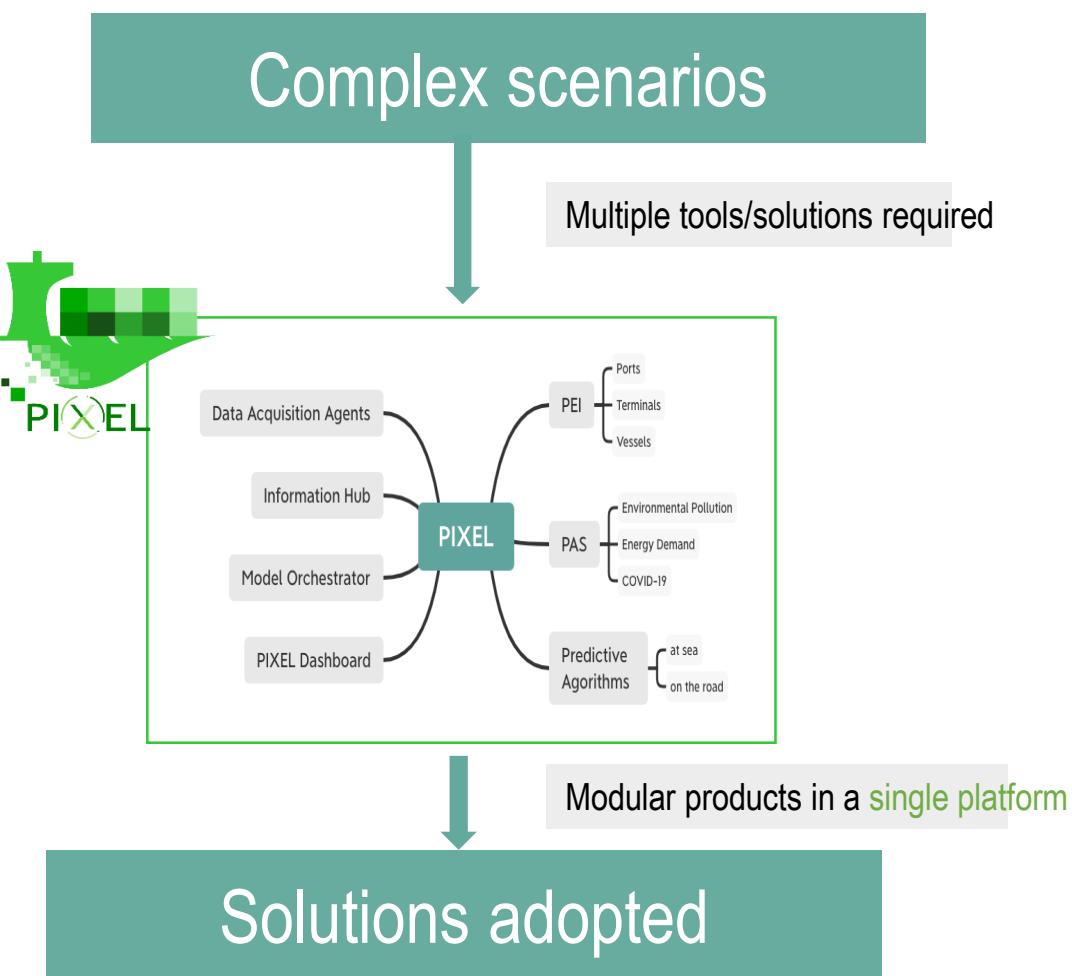
"problem-driven" approach



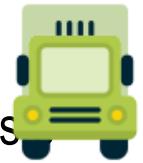
PIXEL is the **first** smart, flexible and scalable solution for reducing environmental impacts while enabling the optimization of operations in port ecosystems through the Internet of Things (IoT)



PIXEL innovative proposal



Reduction of environmental impact of port



Reduction of operational and infrastructural costs



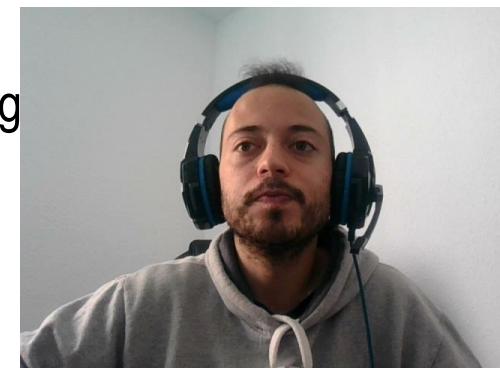
Improvement of logistics efficiency in multimodal hubs



Better Port-City **integration**



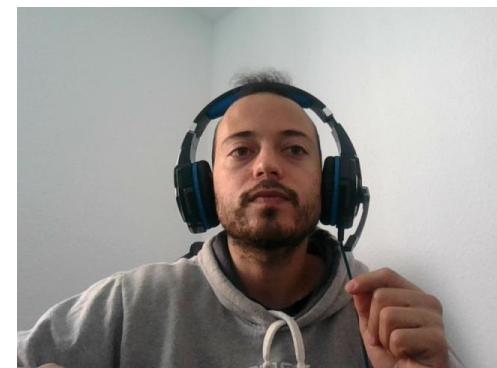
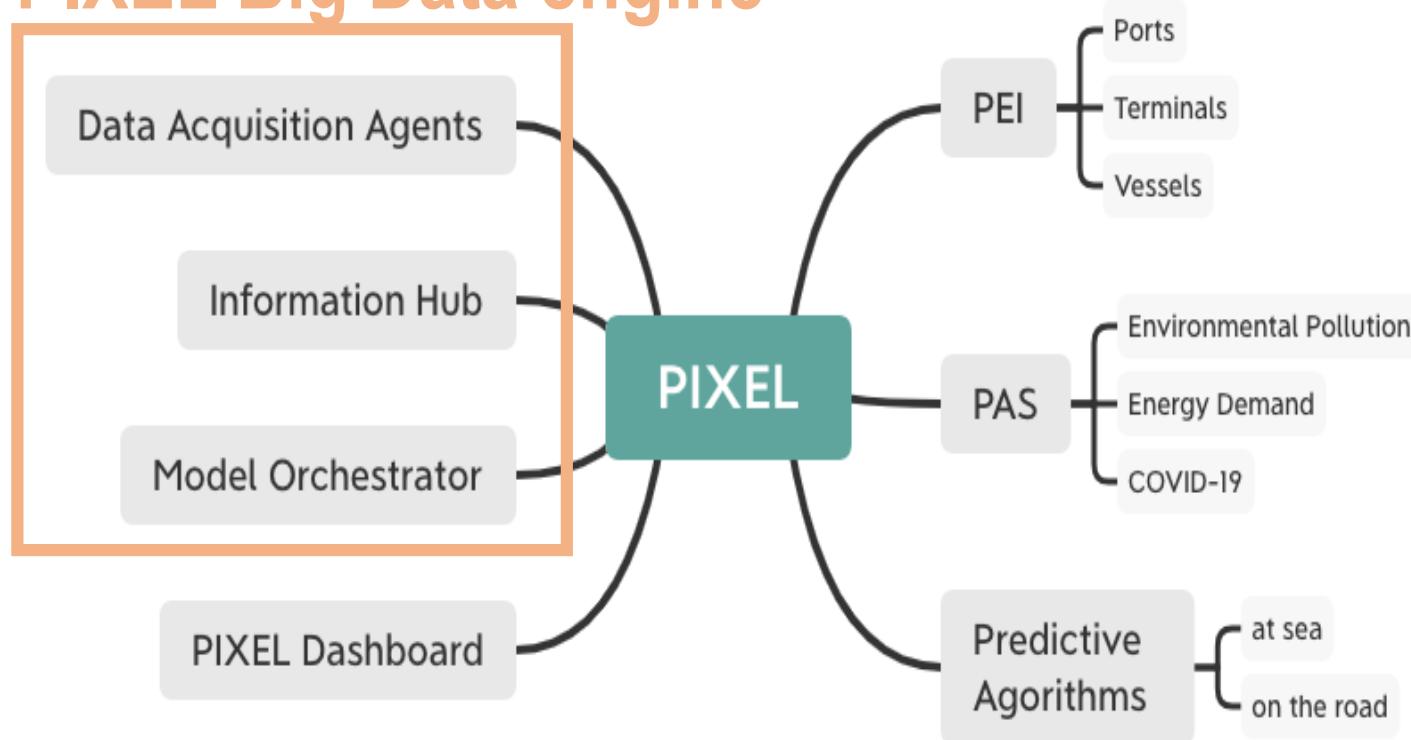
Less dependency on different technologies attempting digitalization



PIXEL products to pave the way towards the Port of the Future



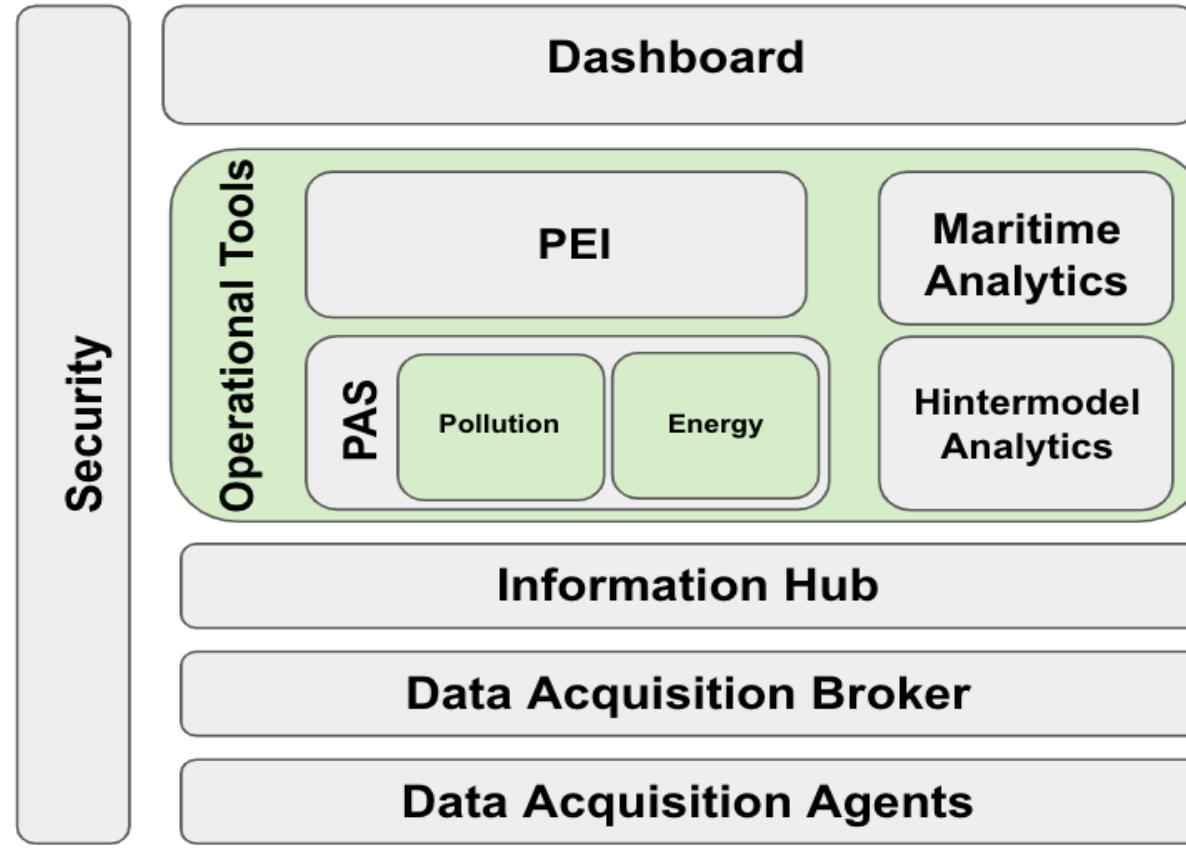
PIXEL Big Data engine



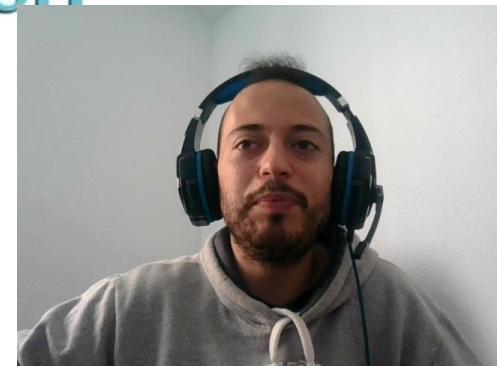
PIXEL engine



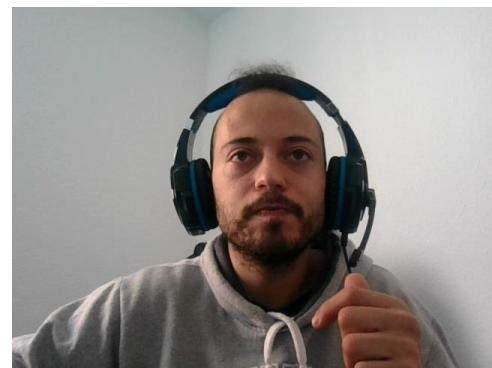
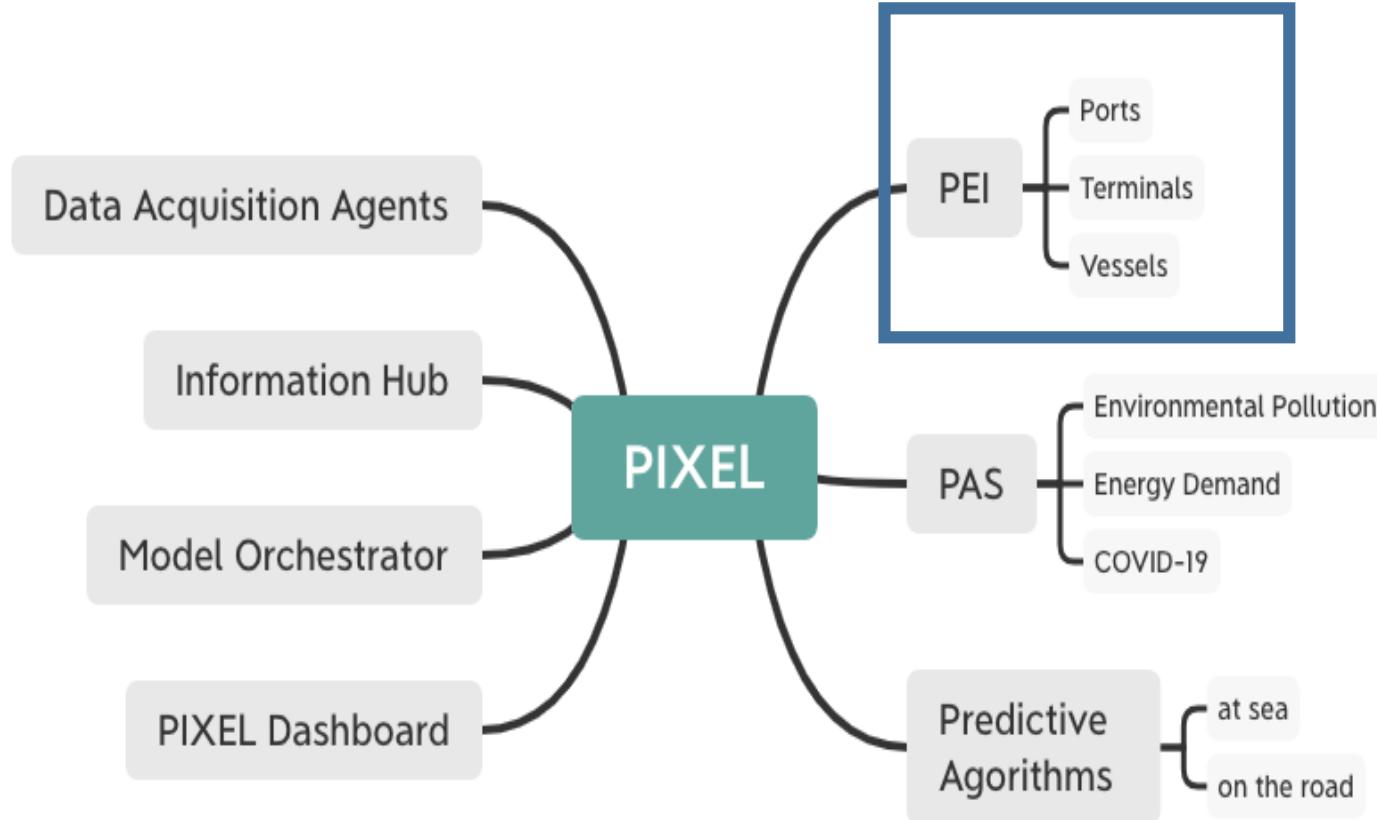
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 FIWARE



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PIXEL products to pave the way towards the Port of the Future



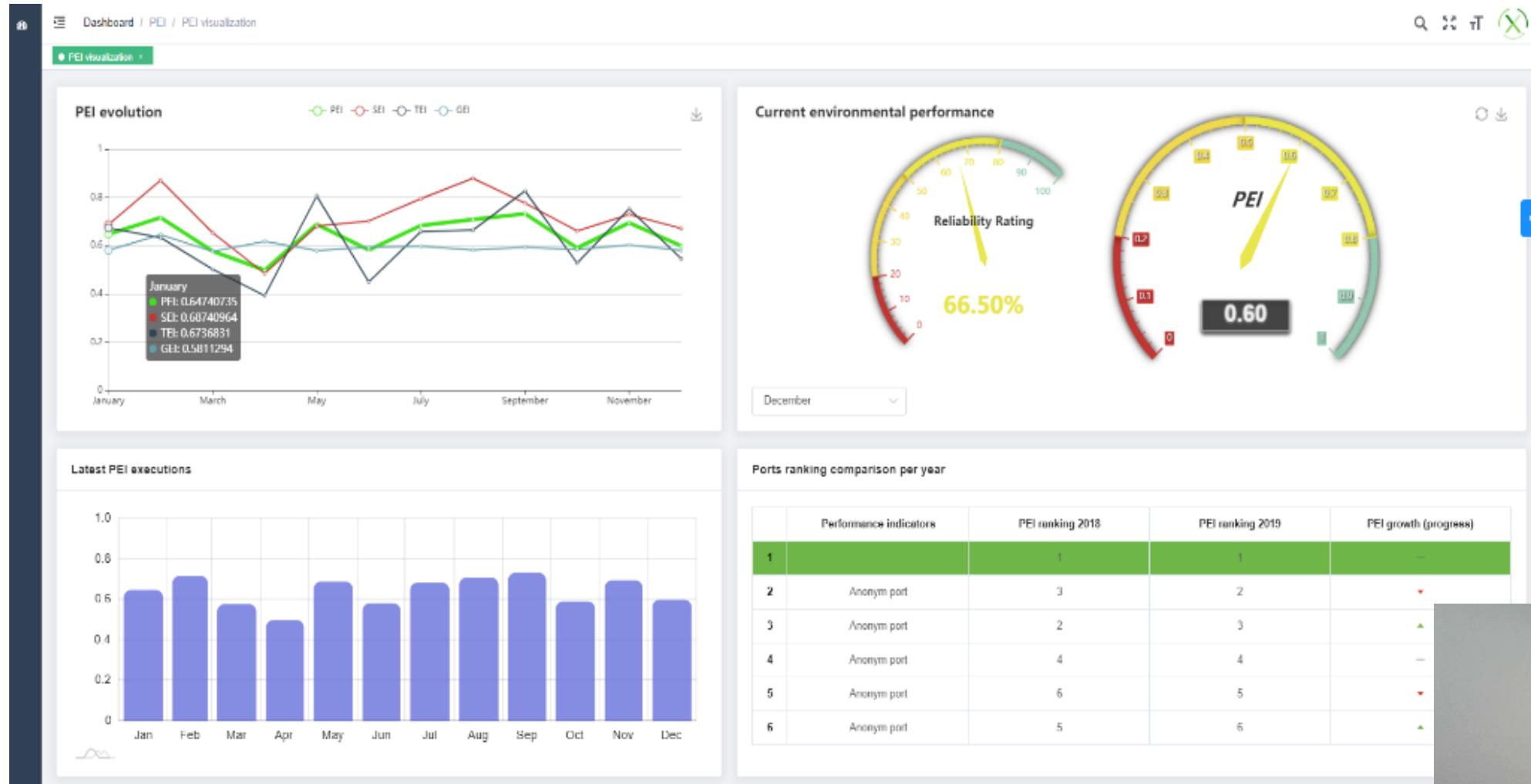
Port Environmental Index



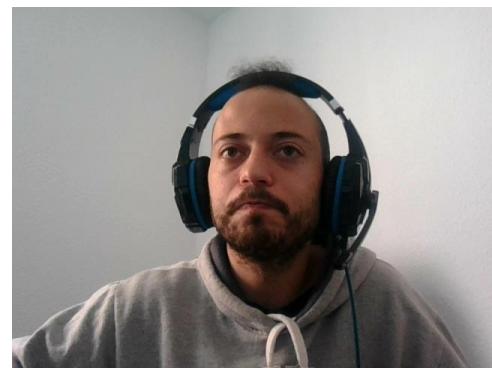
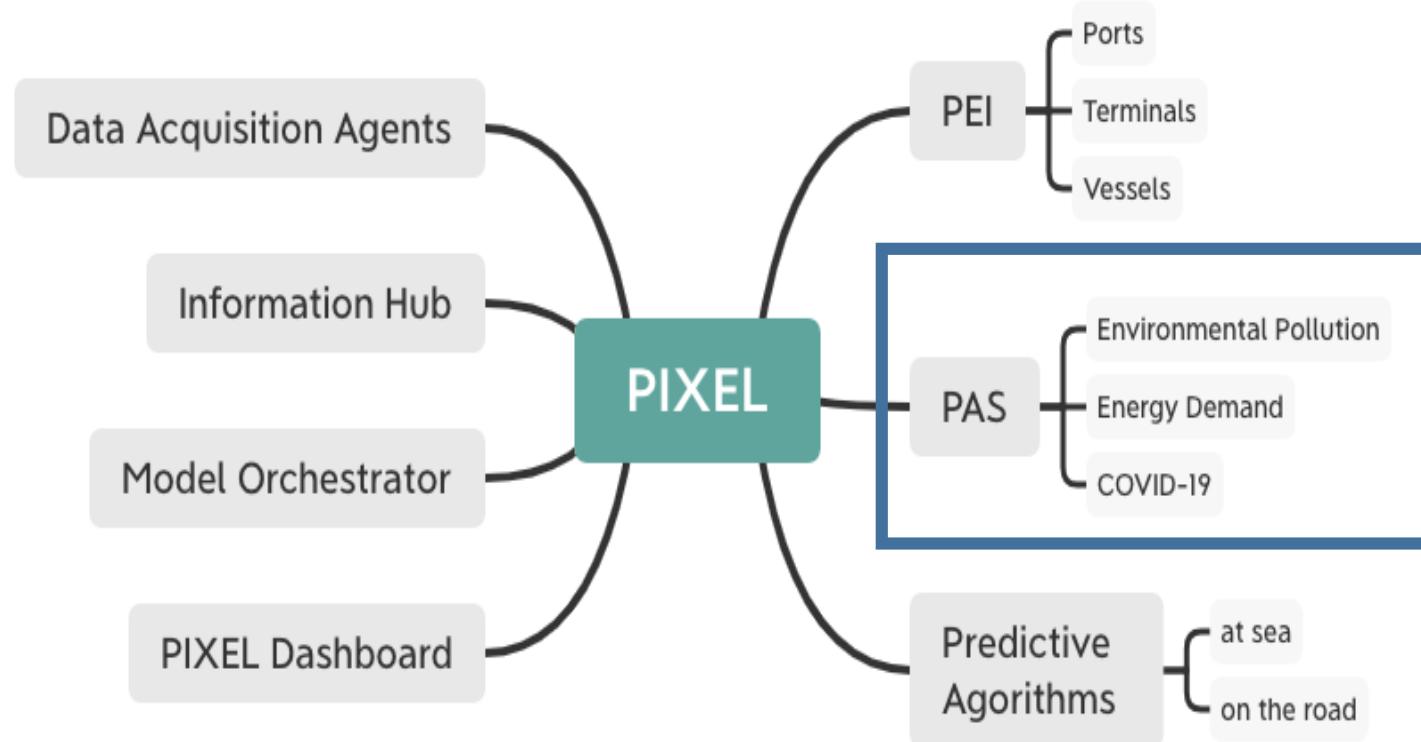
- Towards the Port of the Future: increasing environmental awareness, realising the need to (i) monitor and (ii) reduce the impact of the port. Most TEN-T ports are interested on measuring and improving the impact but the lack of standard, references, solid benchmarks is hindering their application.
- Quantifying the environmental performance at the port, the PIXEL-PEI approach:
 - Via a composite indicator (PEI)
 - Divided in sub-indexes categorised per type (waste, air quality...) and origin (terminal, ships...)
 - Relying on mathematic tools for normalisation, weighting and aggregation
- A meaningful user experience



Port Environmental Index



PIXEL products to pave the way towards the Port of the Future

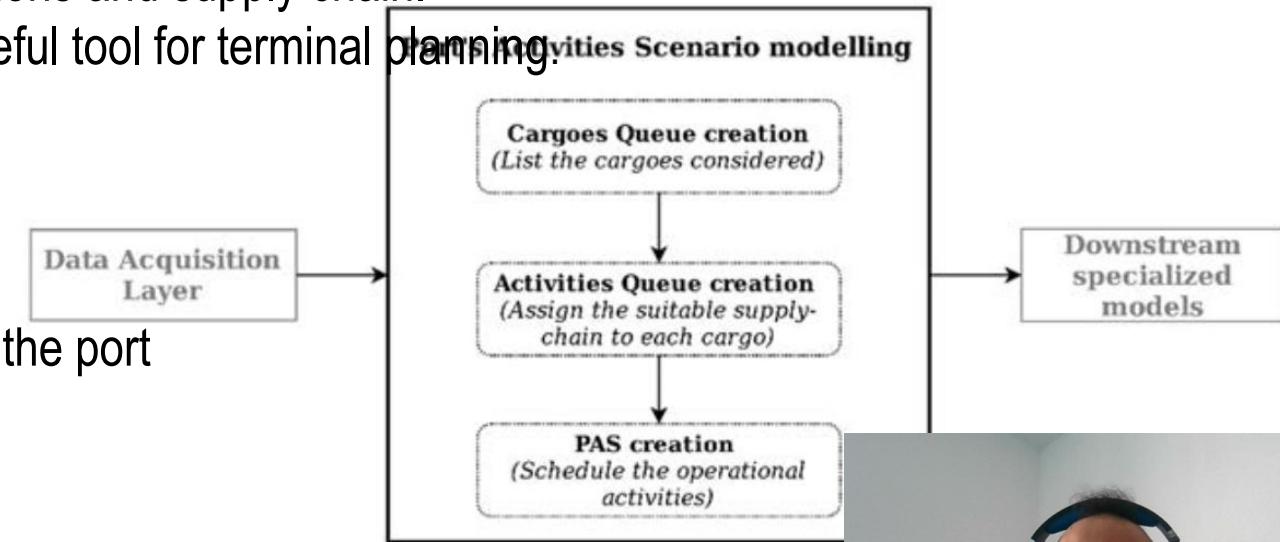


Evidence-based simulation at the port - PAS



- The paradigm of “Digital Twin” is the concept tackled by Port Activity Scenario (PAS):
 - Aims at “modelling for simulating” the behavior of a maritime port terminal given a series of parameters, conditions and inputs (vessels arriving, to be operated).
 - Relies on the digitalisation of insightful information, delivering an open-source system based on vessel calls and use of handling equipment specifications and supply chain.
 - It allows to “react” beforehand, becoming a useful tool for terminal planning.

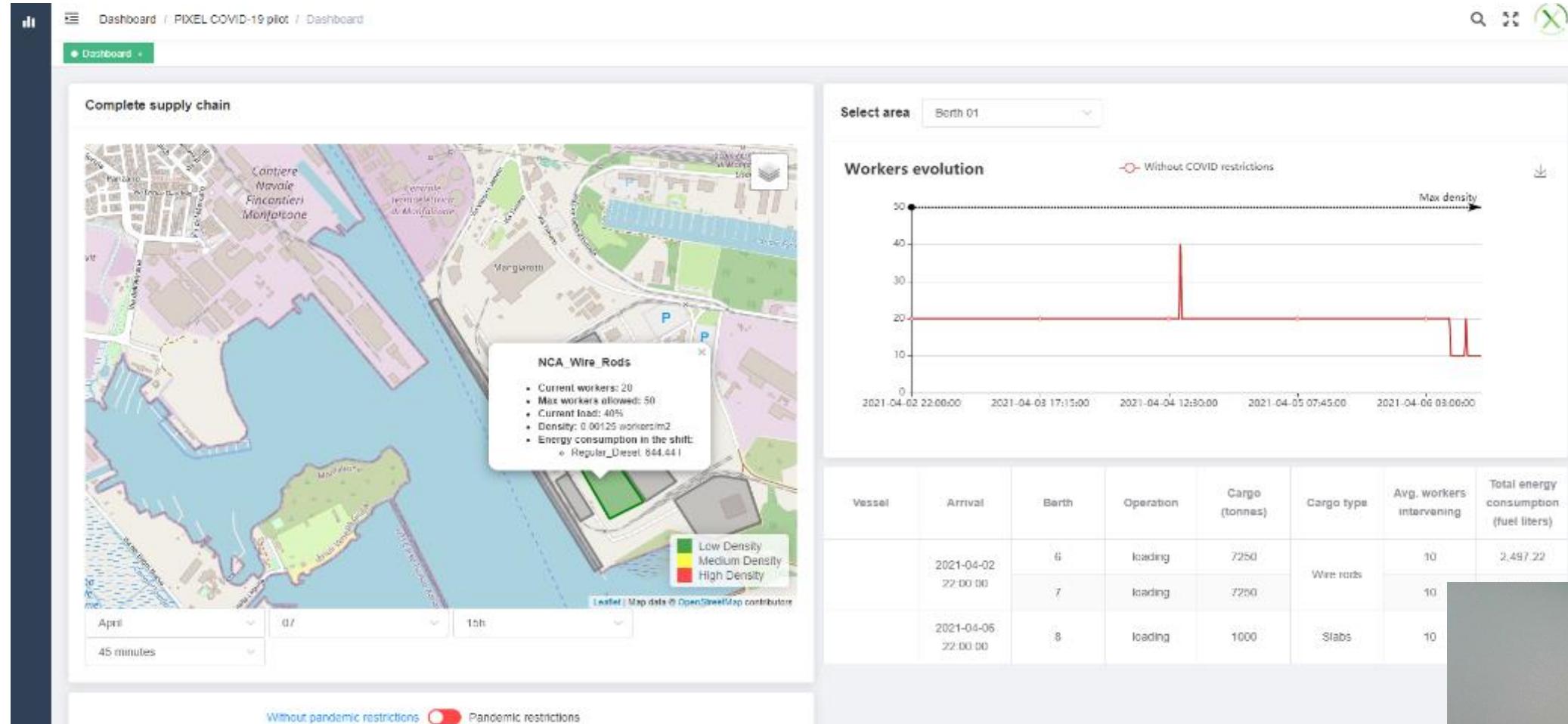
- PAS can also be used in specific areas like:
 - Modelling energy balance (demand-supply) at the port
 - Modelling environmental pollution



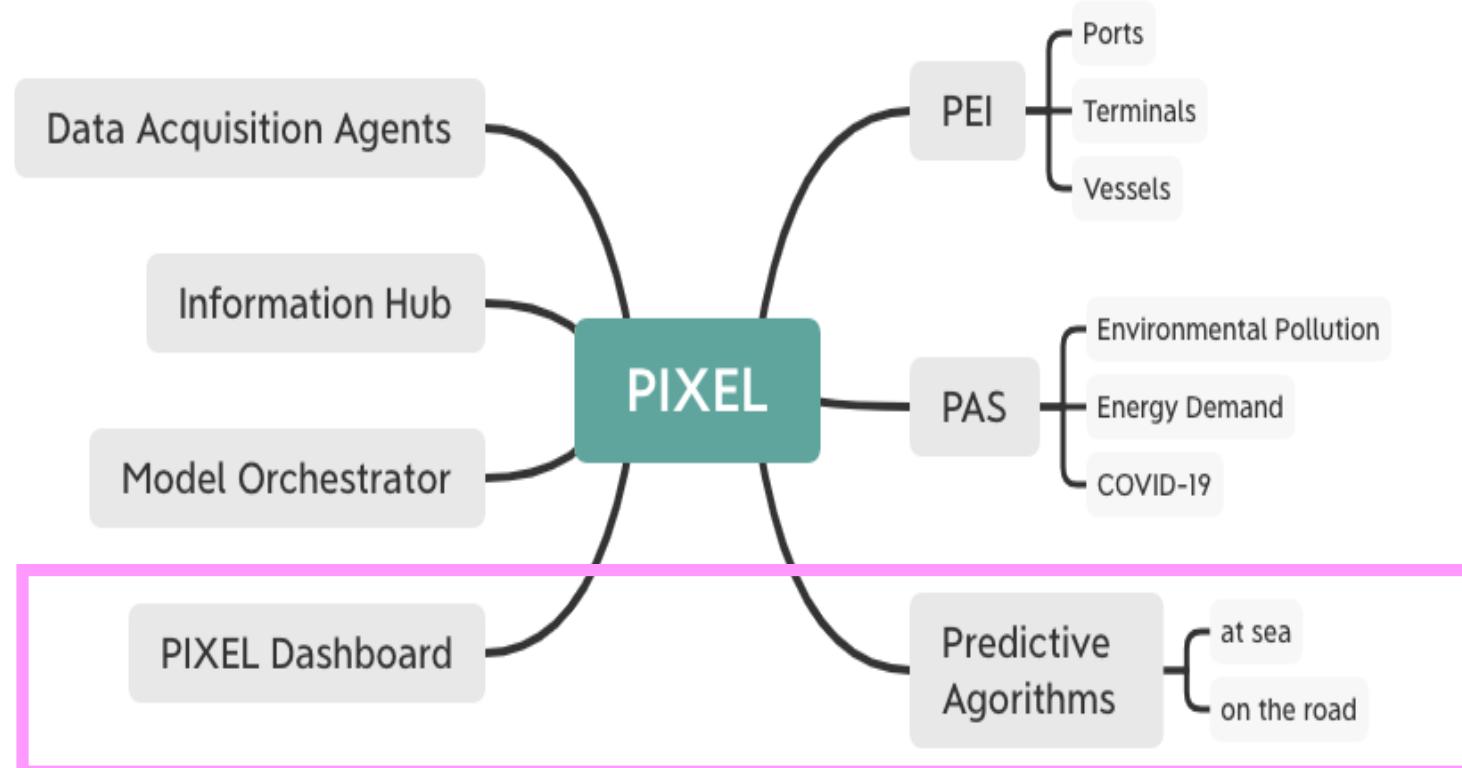
- One of the novel applications of the PAS – Monitoring social distancing for COVID-19 mitigation



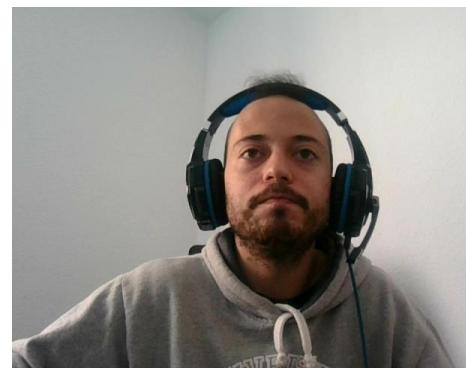
PAS - COVID-19 pilot for port access availability



PIXEL products to pave the way towards the Port of the Future



Maritime Data Analytics



Maritime Data Analytics



- Utilisation of the technological baseline provision to deliver Artificial Intelligence applications to the ports (success stories of PIXEL):
 - Estimated Time of Arrival (ETA)
 - Fed from historic vessel information, AIS antennae and Satellite information.
 - Intermodal transport forecasting:
 - Shared planning of freight transport with business operators in order to reduce the impact on hinterland

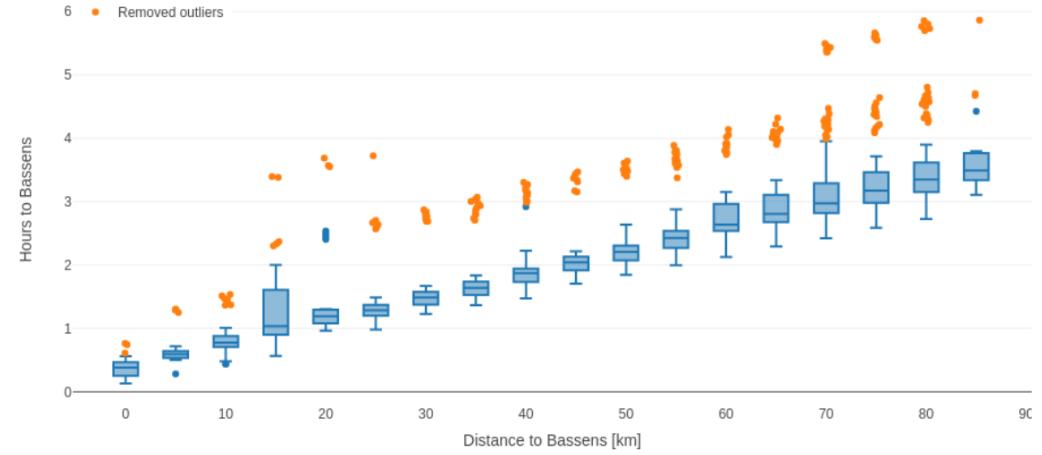
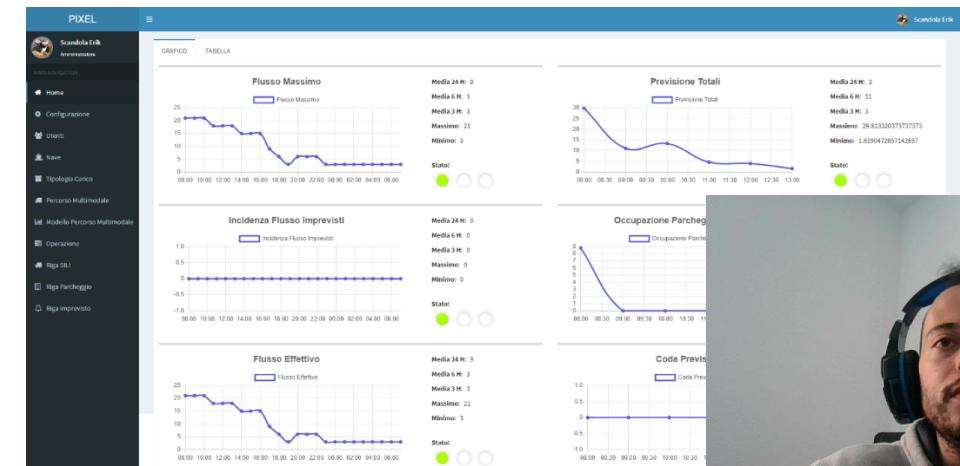
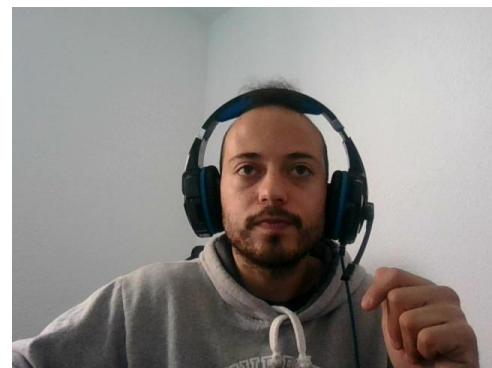
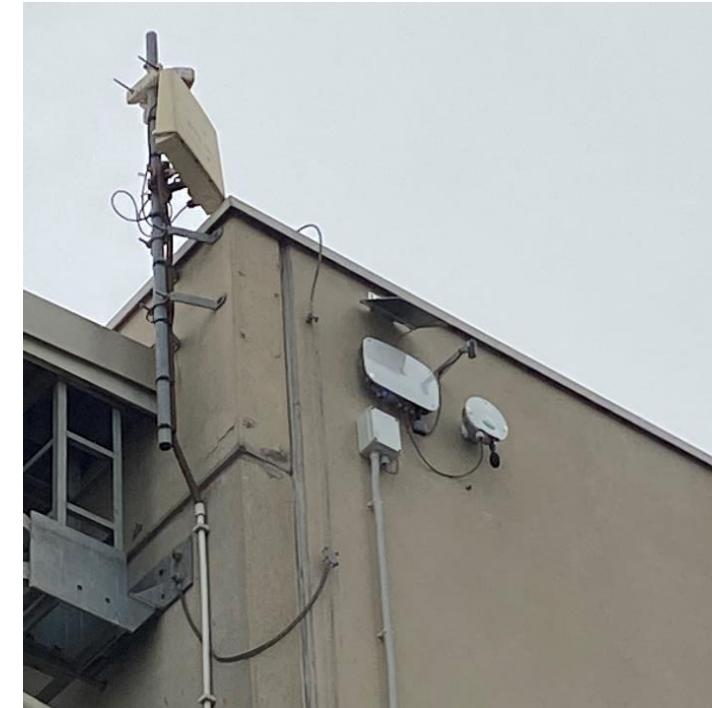


Figure 48. The time vessels need to reach the Bassens terminal after sending the AIS message²⁶



How PIXEL looks like – Specific data gathering



How PIXEL looks like – Usage in a port



Thank You + Questions?

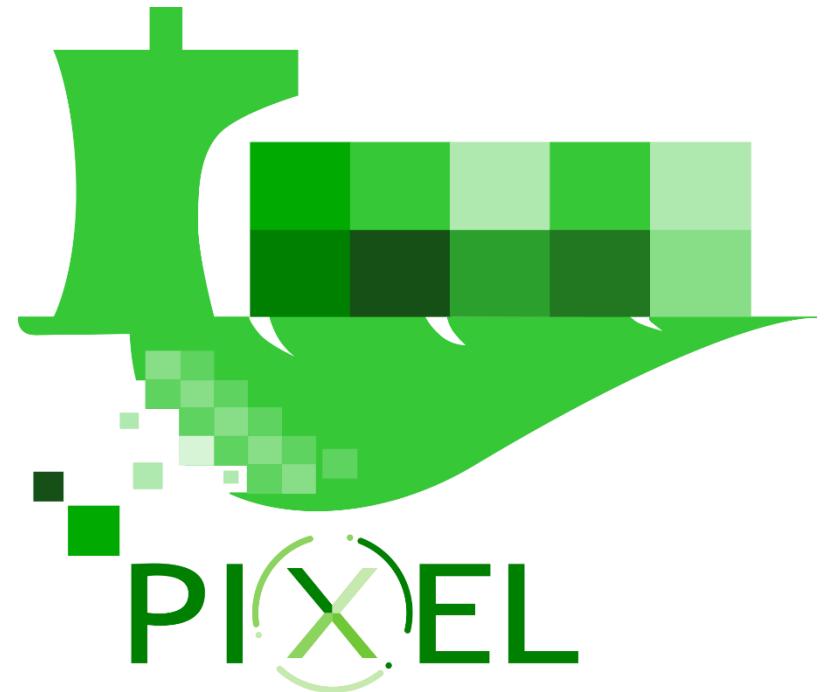
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