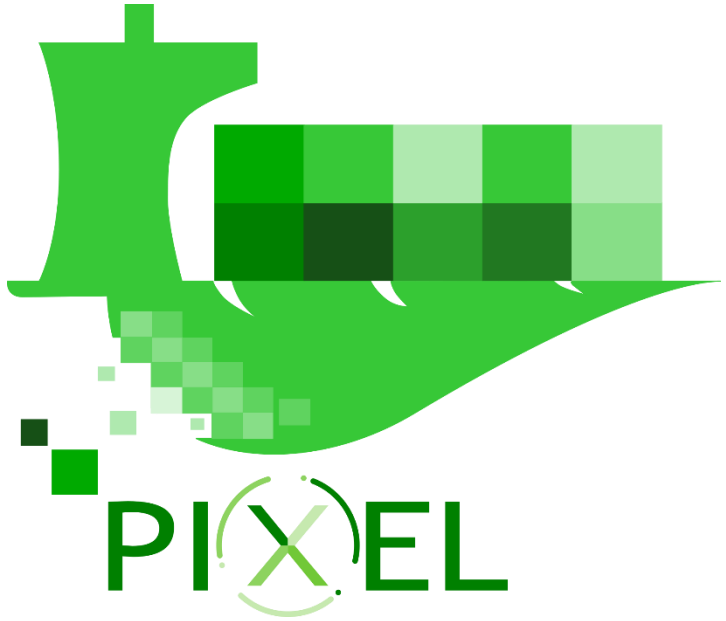


PIXEL - Port IoT for Environmental Leverage

Closure Event – The Port Environmental Index

Stjepan Piličić (MEDRI) - Researcher
Ignacio Lacalle Úbeda (UPV) - Researcher

PEI webinar

28th of September, 2021

Content

The Port Environmental Index – Overview

- Existing methodologies are qualitative = biased results
- PEI is a quantitative, standardized, and cohesive method that would give more accurate results
- Ports can track **evolution of their environmental impacts**
  - The PEI is a composite indicator created with the intention to measure the ports' performance and environmental impacts and to track them during the years
- PEI should serve as a benchmark that ports can use to evaluate their environmental performance and to compare it to the other ports
- PEI results can aid in the decision-making process for port operators - **it's a decision tool**
  - It can be used for decision making as it is much easier to estimate the impacts using one single metric rather than having more values

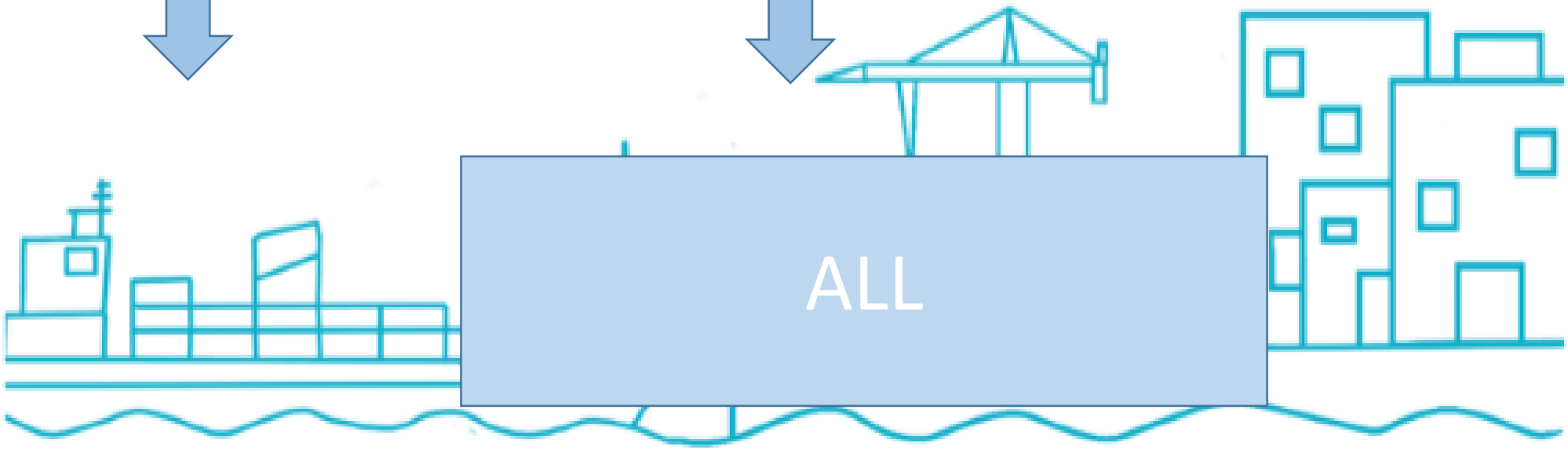
The Port Environmental Index – Overview

The PEI calculation includes:

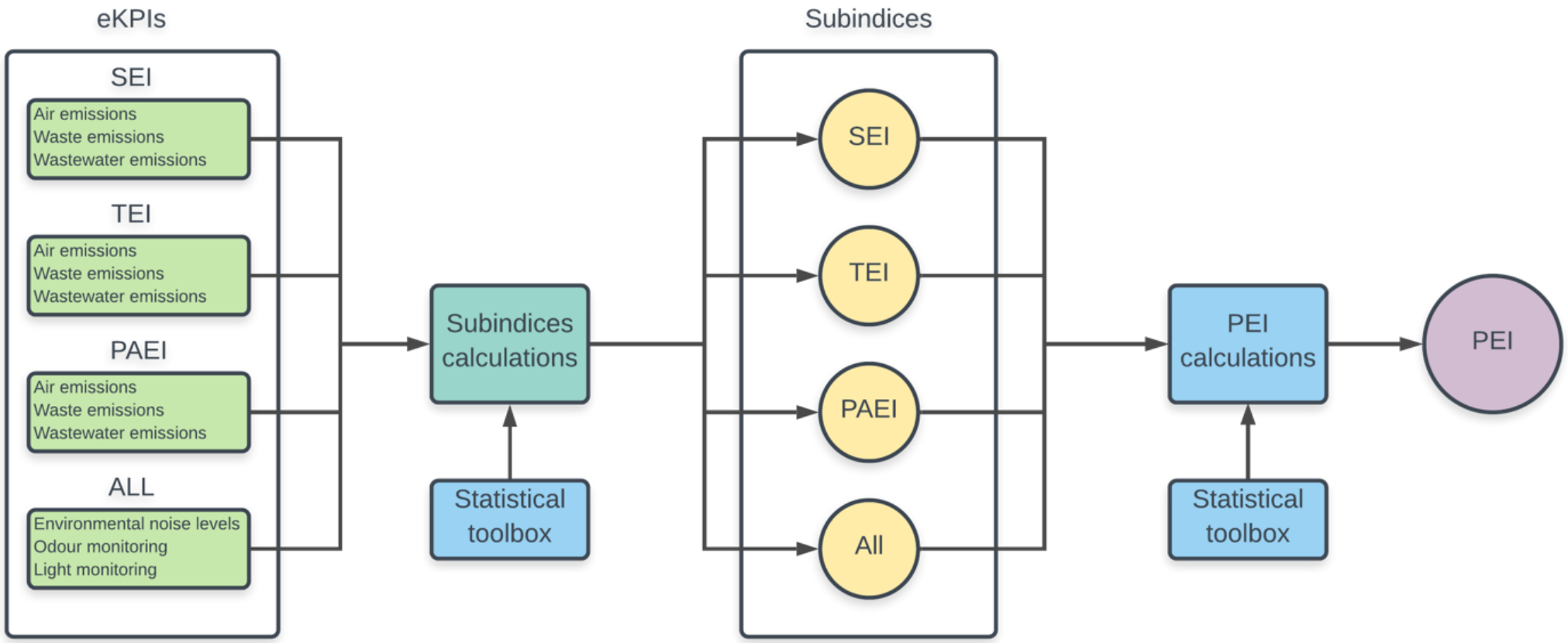
Ships – The Ship Environmental Index (SEI)

Terminal operators – The Terminal Environmental Index (TEI)

Port authorities – The Port Authority Environmental Index (PAEI)



The Port Environmental Index – Overview



PEI Visualization – the PEI evolution and current performance

- Overall PEI performance
- Evolution in time of the PEI and subindices
- Trackable Performance of previous periods
- The Reliability rating

PEI Visualization – The Reliability rating

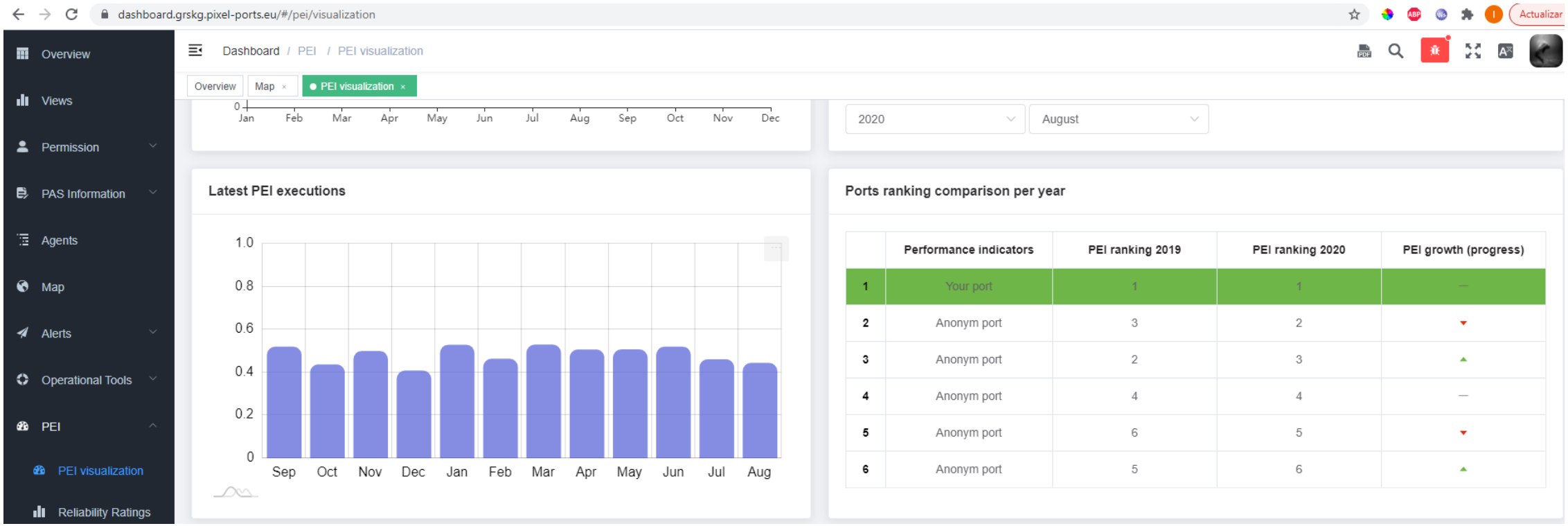
- Shows the port operator how far from the ideal data gathering technology are the eKPIs being obtained from

Data origin	Subindex	Piece of data	Optimal retrieval way	Current retrieval way	Reliability Rating	Aggregated RR (subindex)	Aggregated RR (origin)
Ships	Air Emission	IMO number and gross tonnage of ships	Real time API	Periodic API	80.56 %	67.96 %	83.47 %
		Main and auxiliary engine of ships	Periodic API	Average value from literature	36.84 %		
		Berth and maneuvering time of ships	Sensors	Periodic API	86.49 %		
	Waste	MARPOL annexes about waste	Pixel proxy tool	Periodic API	97.14 %	97.14 %	
	Wastewater	MARPOL annexes about wastewater	Pixel proxy tool	Periodic API	85.29 %	85.29 %	
Terminal	Air Emission	Emissions produced by terminal machinery	Sensors	Periodic API	73.47 %	73.47 %	85.42 %
	Waste	Waste produced by the terminals	Pixel proxy tool	Periodic API	97.37 %	97.37 %	
Global	Noise	Noise values Lden - Lnight - Leq	Sensors	Average value from literature	34.69 %	34.69 %	30.61 %
	Light pollution	Luminosity-lux	Sensors	Average value from literature	26.53 %	26.53 %	

2020 August

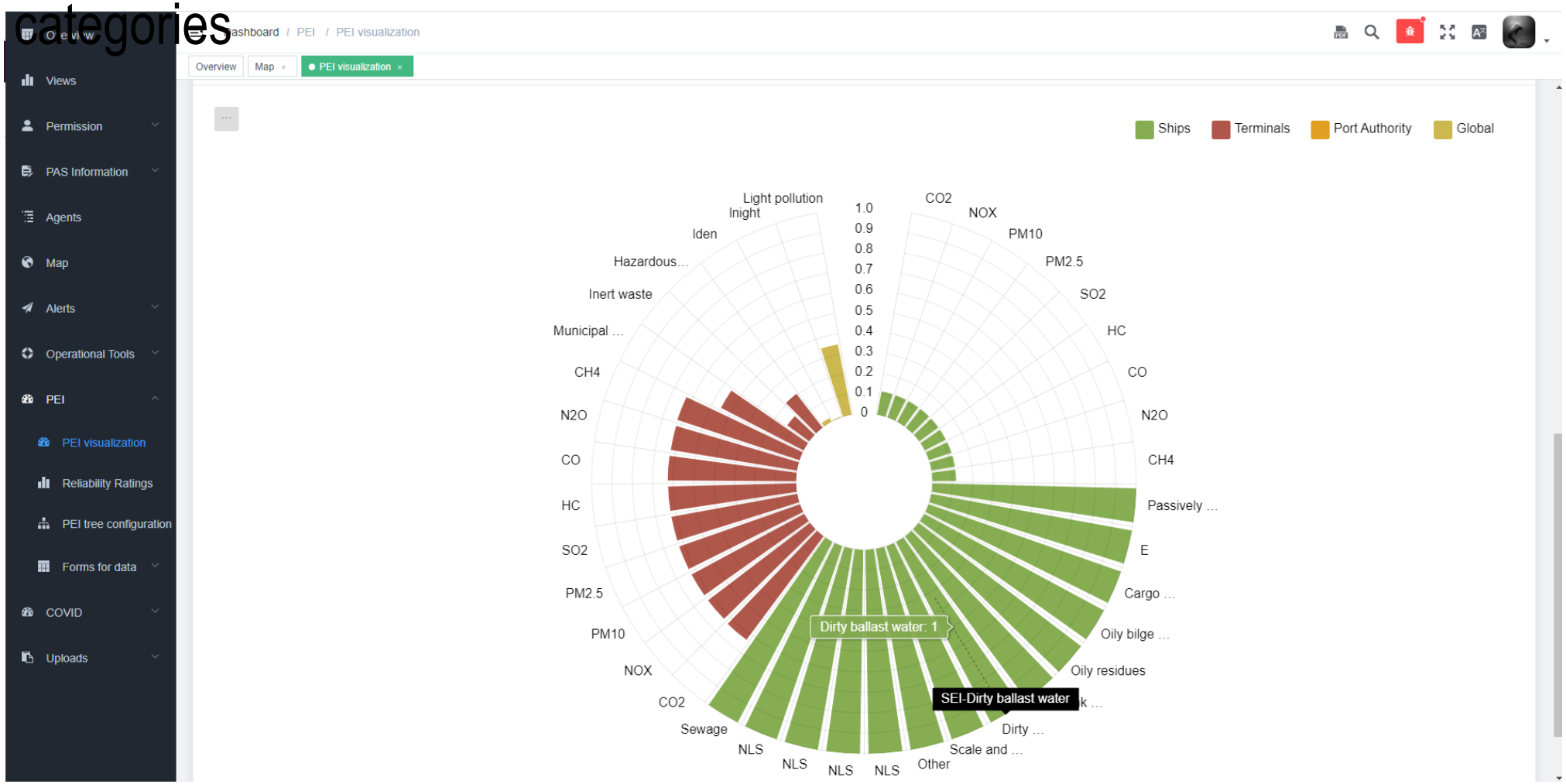
PEI Visualization – Ports ranking

- Different visualization types for the PEI values
- Ranking between ports (anonymous)



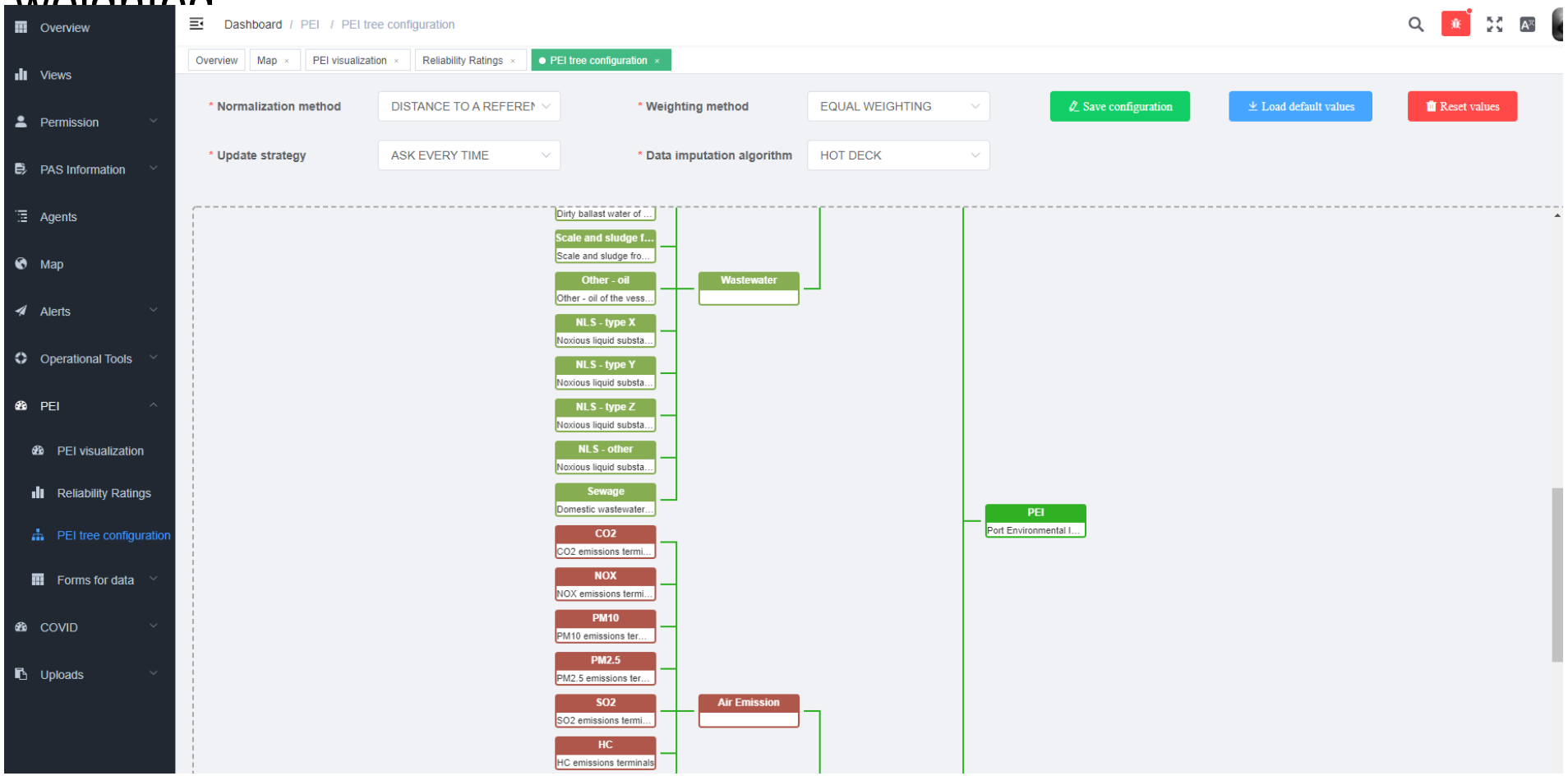
PEI Visualization – eKPi overview

- Specific (normalized) values of the eKPIs in all subindex categories



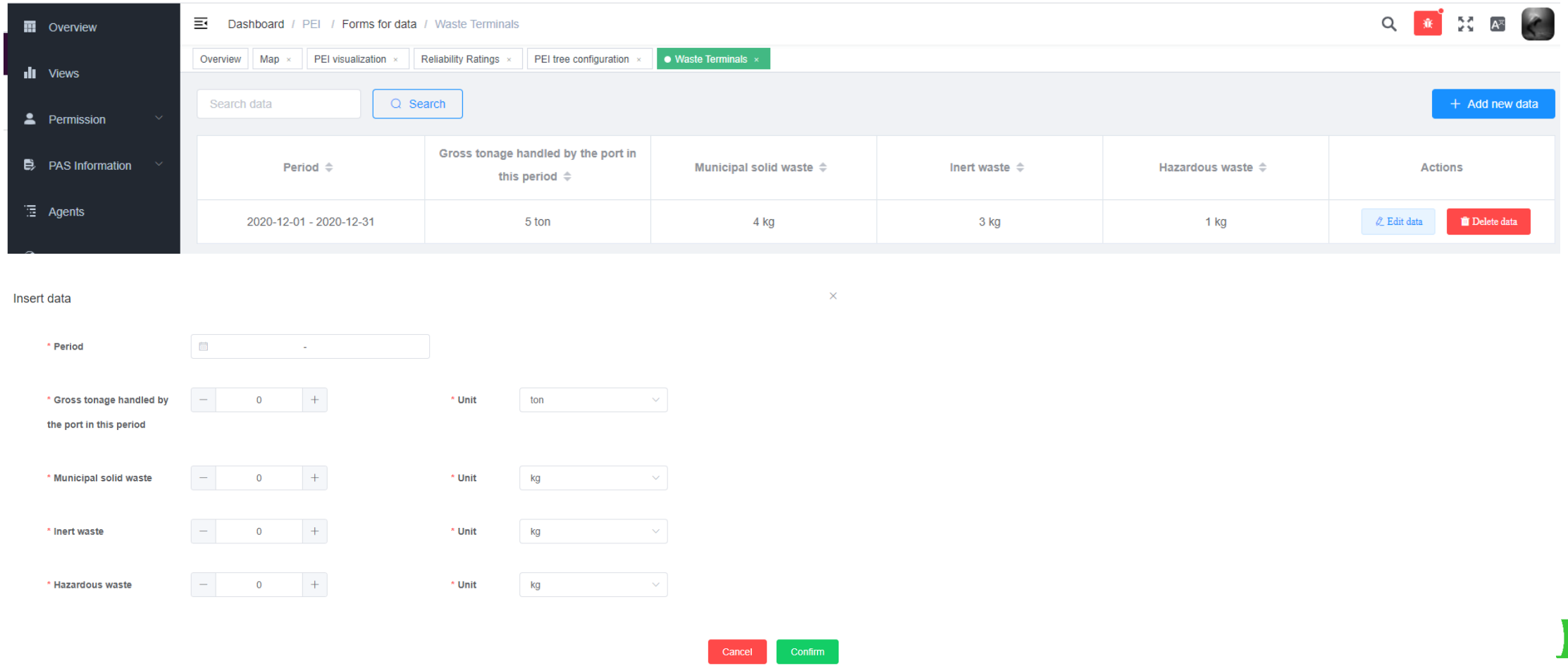
PEI Visualization – the PEI tree configuration

- How the PEI and the subindices are normalized and weighted



PEI Visualization – Data forms

- Inputting data for the PEI calculations- waste example



PEI Visualization – The index I

- After calculating the PEI, a downloadable report is created with all the needed information and calculations

Port Environmental Index Report

Calculation Period

- **Initial Date:** 2020-01-31T22:00:00.000Z
- **Final Date:** 2020-02-29T22:00:00.000Z

Configurations

- **Normalization method:** DISTANCE TO A REFERENCE PORT
- **Weighting Method:** EQUAL WEIGHTING
- **Aggregation Method:** ARITHMETIC
- **Update Strategy:** REPLICATE LAST VALUE
- **Data imputation approach:** HOT DECK

Global values

PEI value: 0.46441102 **RR value:** 66.49 %

PEI Indices values

SEI: 0.6471027 **TEI:** 0.54768777 **GEI:** 0.19844256

RR Indices values

SRR: 83.46 % **TRR:** 85.42 % **GRR:** 30.61 %

PIXEL Partners

Thank You + Questions?

This Communication is part of a project that has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°769355

Webinar 4 : The Port Environmental index

28th of September, 2021

Stjepan Piličić (MEDRI) - Researcher
Ignacio Lacalle Úbeda (UPV) - Researcher