



The SMARTSHIP Overview, Architecture, Tools

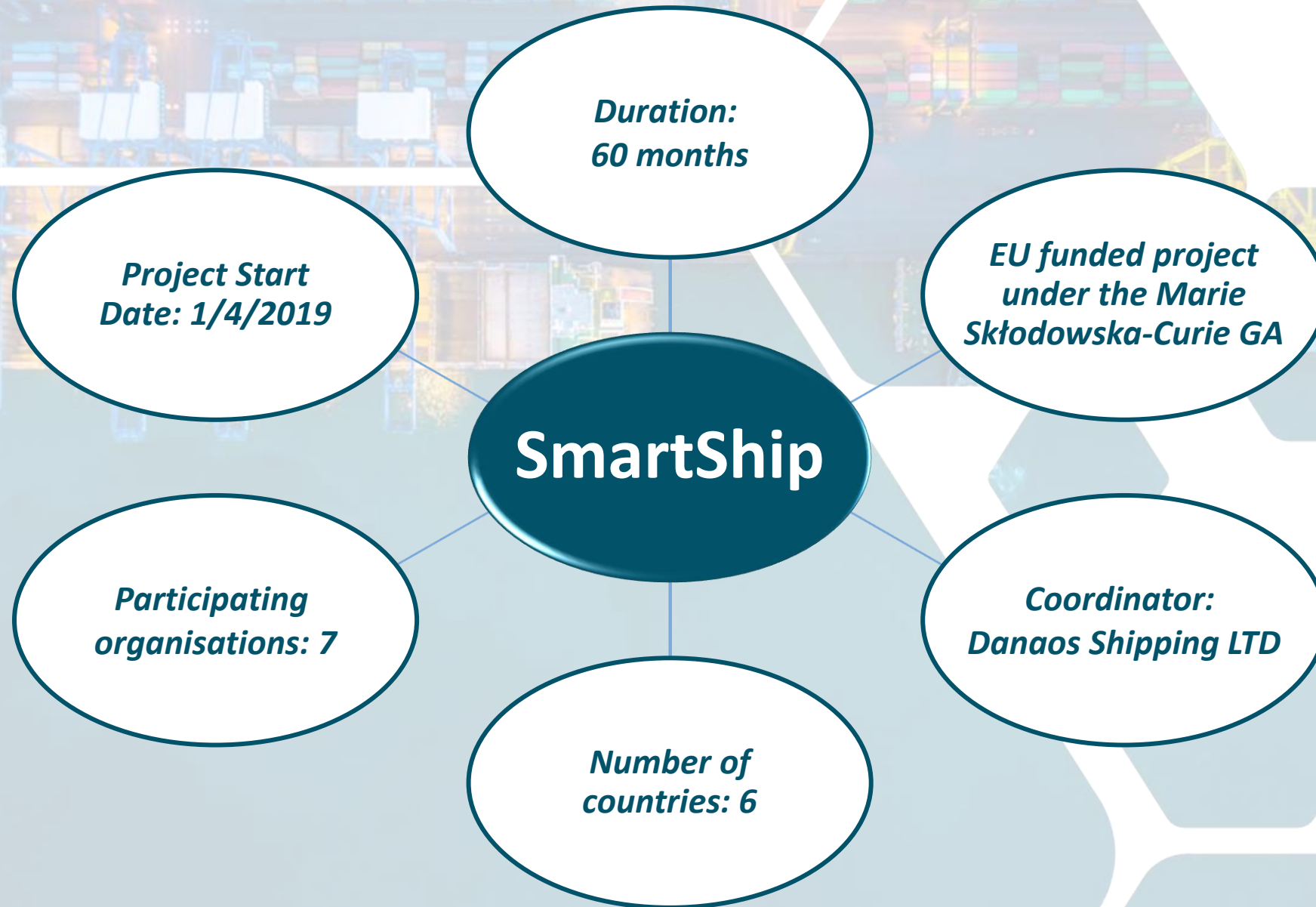
SMARTSHIP 4th Training session, Online, HS4U 13/12/2023

Presenter: Fotis Oikonomou, DANAOS Shipping



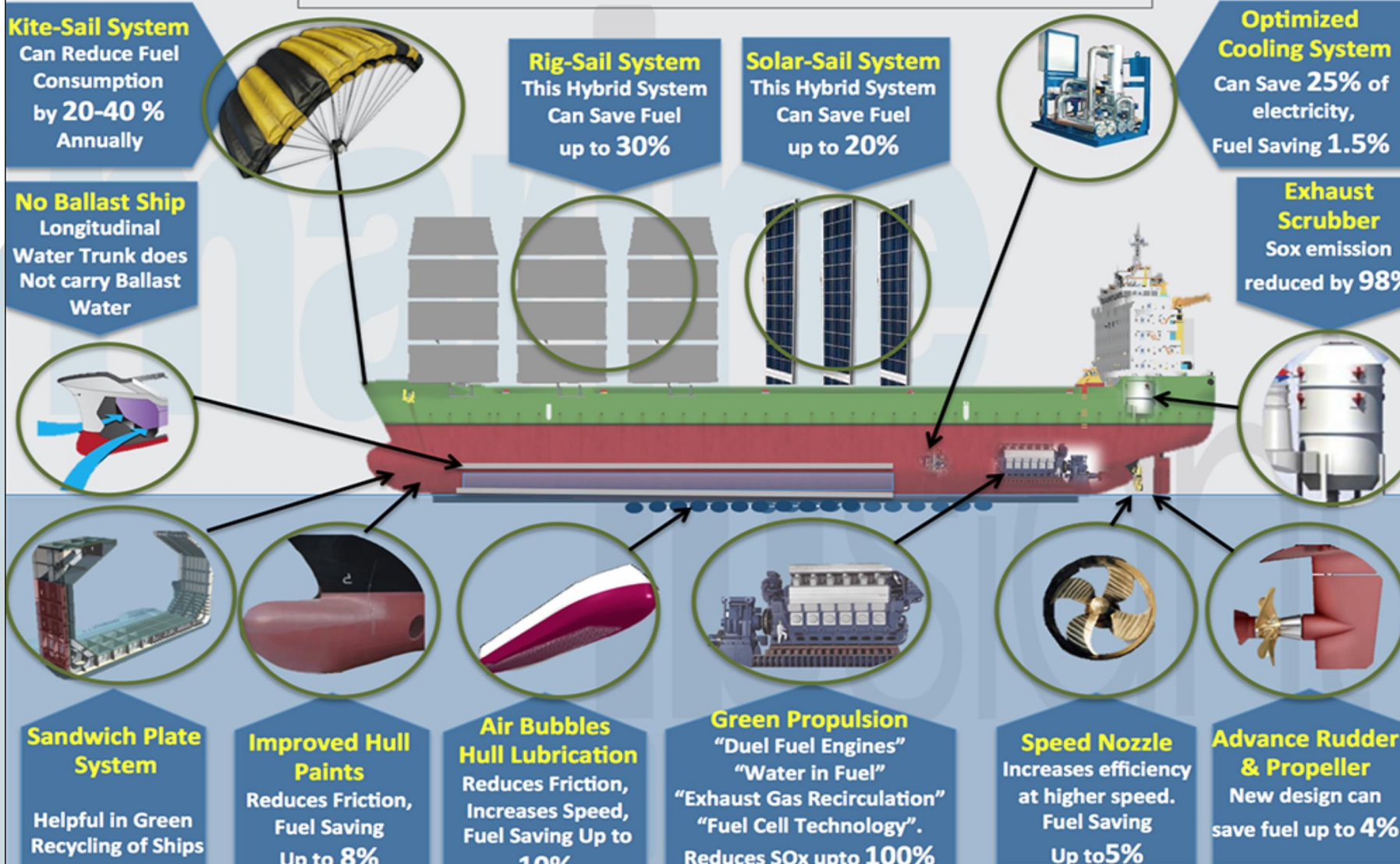
The SmartShip project has received funding from the European Union's Horizon 2020 research and Innovation programme under the Marie Skłodowska-Curie Grant Agreement No 823916

SmartShip at a Glance



Motive : Towards Green Shipping

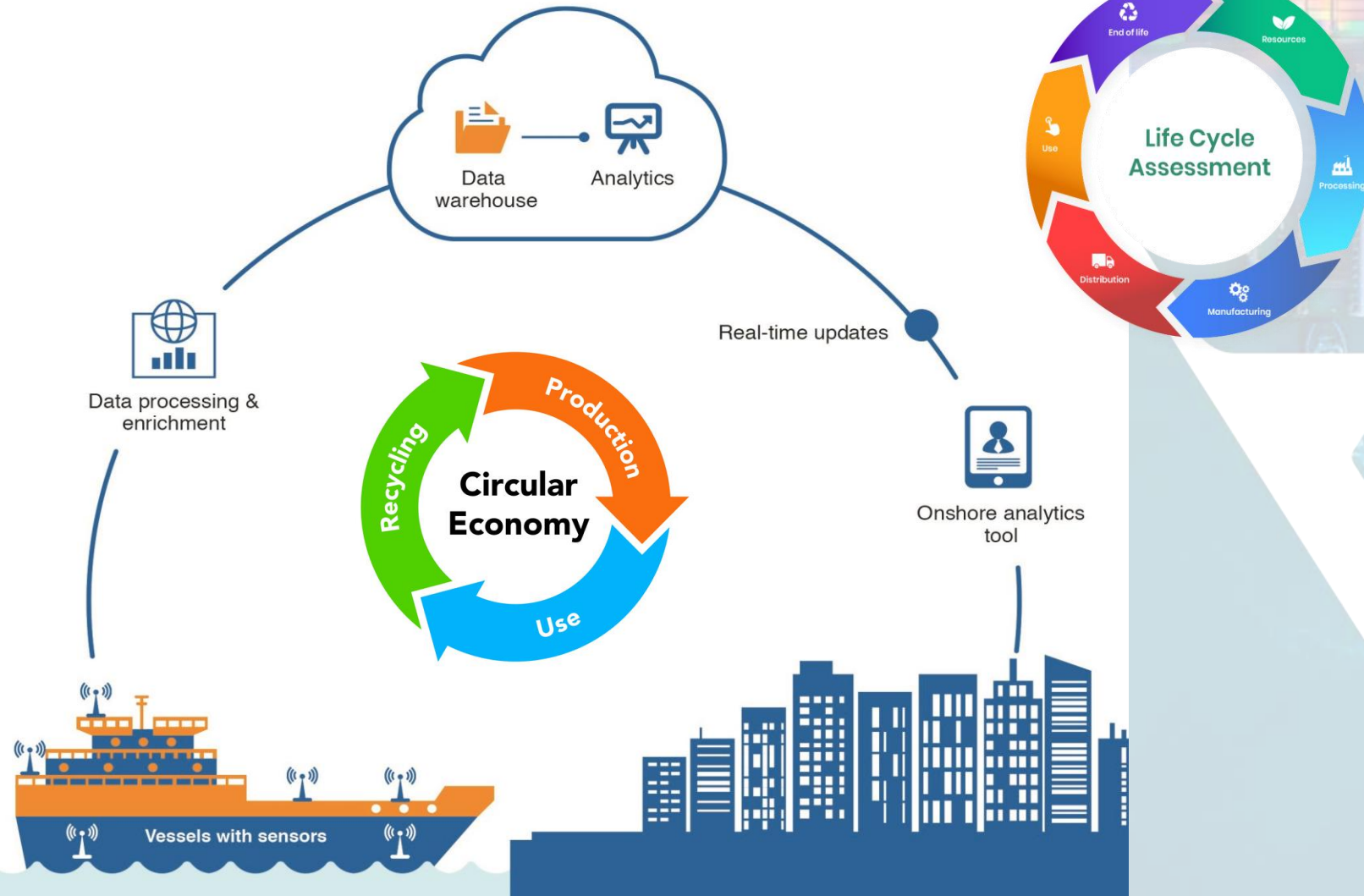
How to Make the Ultimate GREEN SHIP ?



TRADITIONAL APPROACH:
Hardware driven

- *Huge Capital expenditures*
- *Unpredictable Return of Investment*
- *Feasibility of solutions is under investigation*
- *Low Motivation for Investment from the owner*

Towards Green Shipping (Reducing GHG by 50% in 2050)



SMARTSHIP APPROACH:

Data Driven Model

- *Re-Thinking. Monitor, Analyze, predict and improve operation in a cost effective manner*
- *Life Cycle Multi-parametric Analysis for decision making*
- *Sustainability and Compliance*
- *Circular Economy design*

SmartShip Objectives

Describe and identify marine market needs in energy efficiency and emissions control.

Foster knowledge exchange between academic and non-academic experts in the fields of IoT, Data analytics, decision support and optimization.

Design and develop a Data Analytics and a Decision Support Tool.

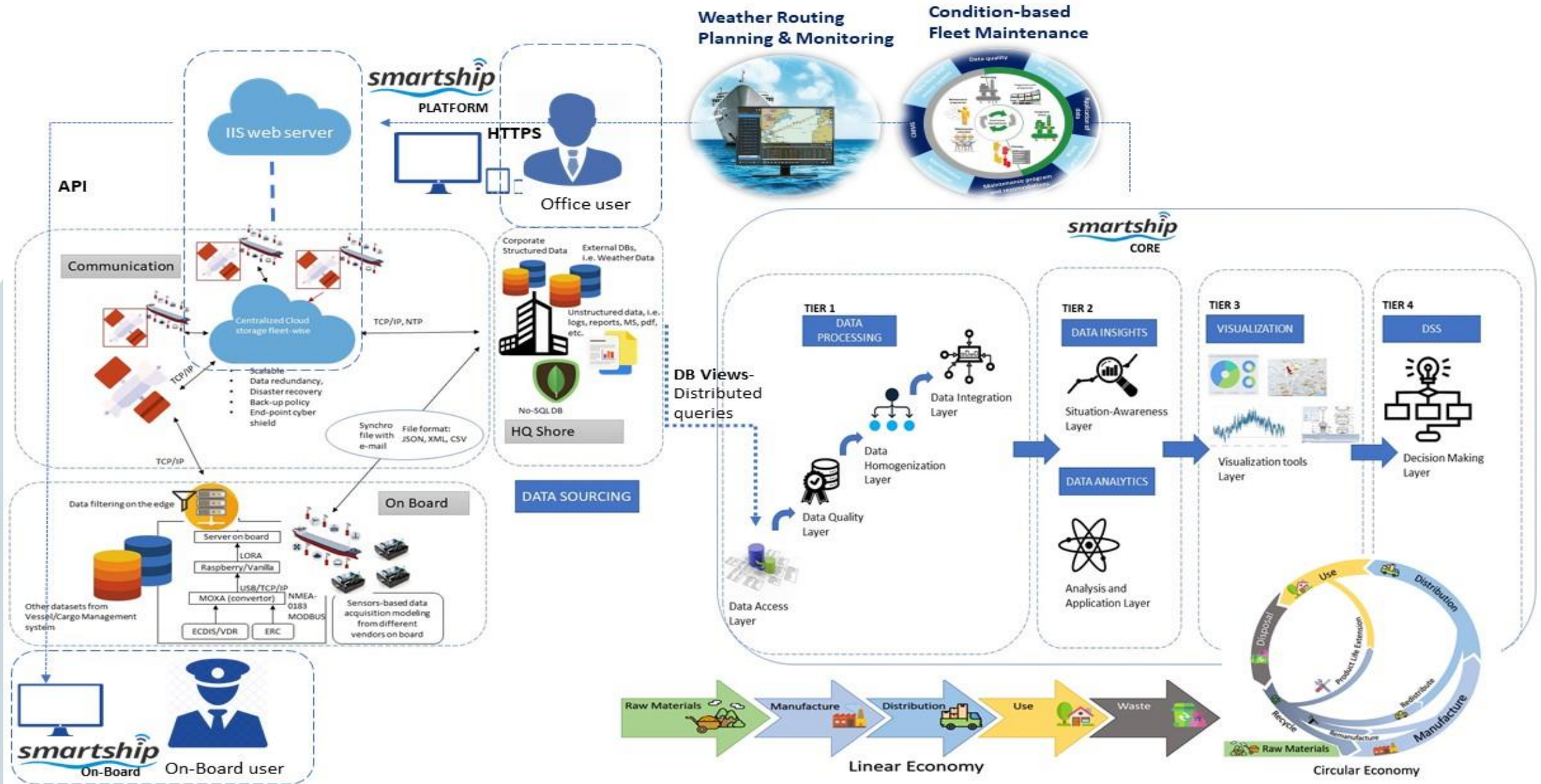
Enhance the implementation of Circular Economy in the maritime field in terms of management of engines' components.

Offer a holistic framework for energy efficiency and emissions control in maritime for optimizing the efficiency of daily operations.

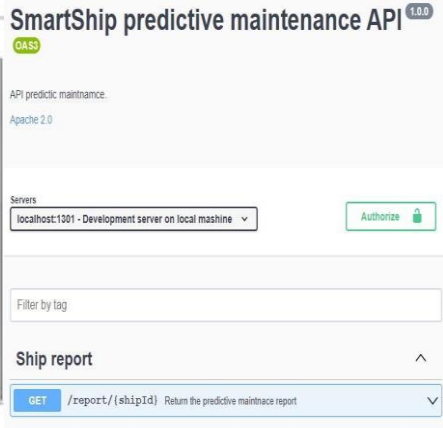
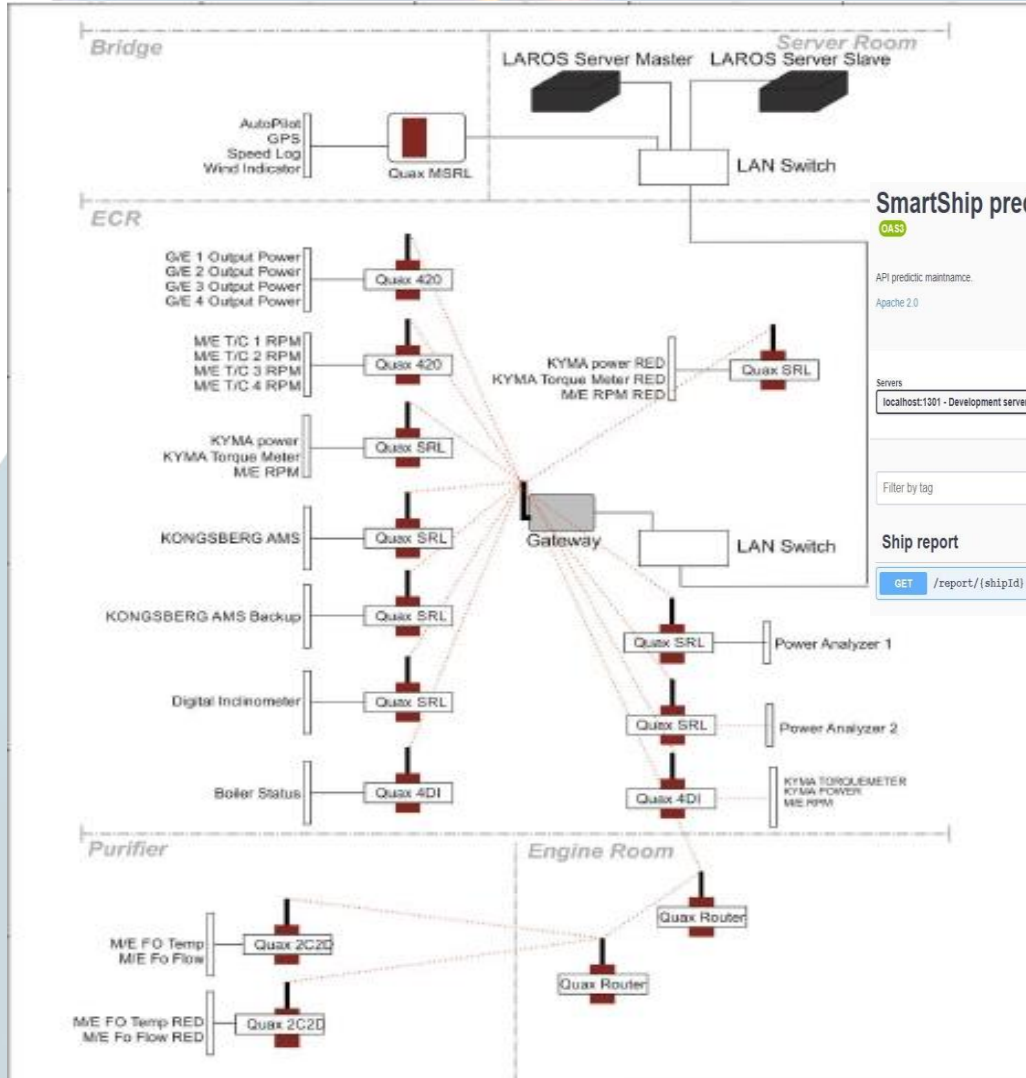
Demonstrate system effectiveness based on real-life use cases towards the reinforcement of the European Maritime Industry.

To develop new long-lasting research collaborations, achieve transfer of knowledge between participating organizations, and foster improved research and innovation potential.

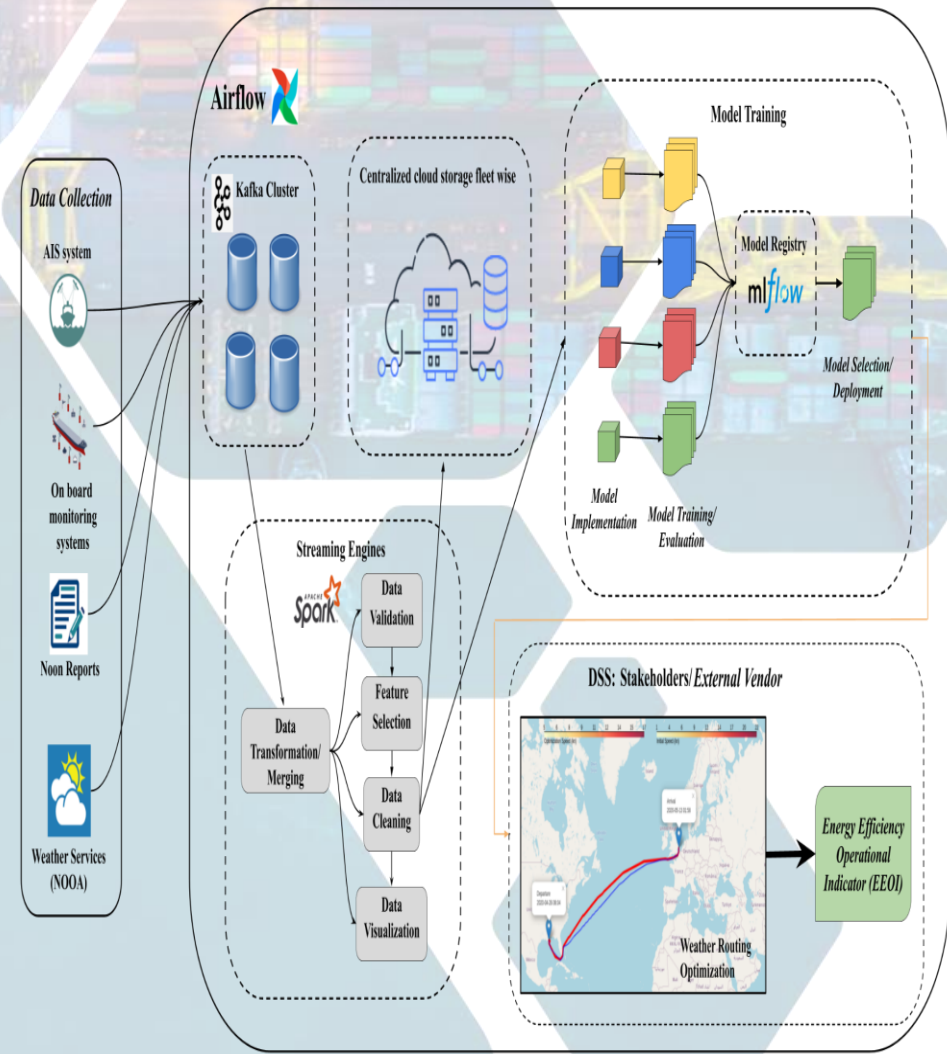
Architecture design and Use Cases



From Data Sourcing to Model deployment (DSS)

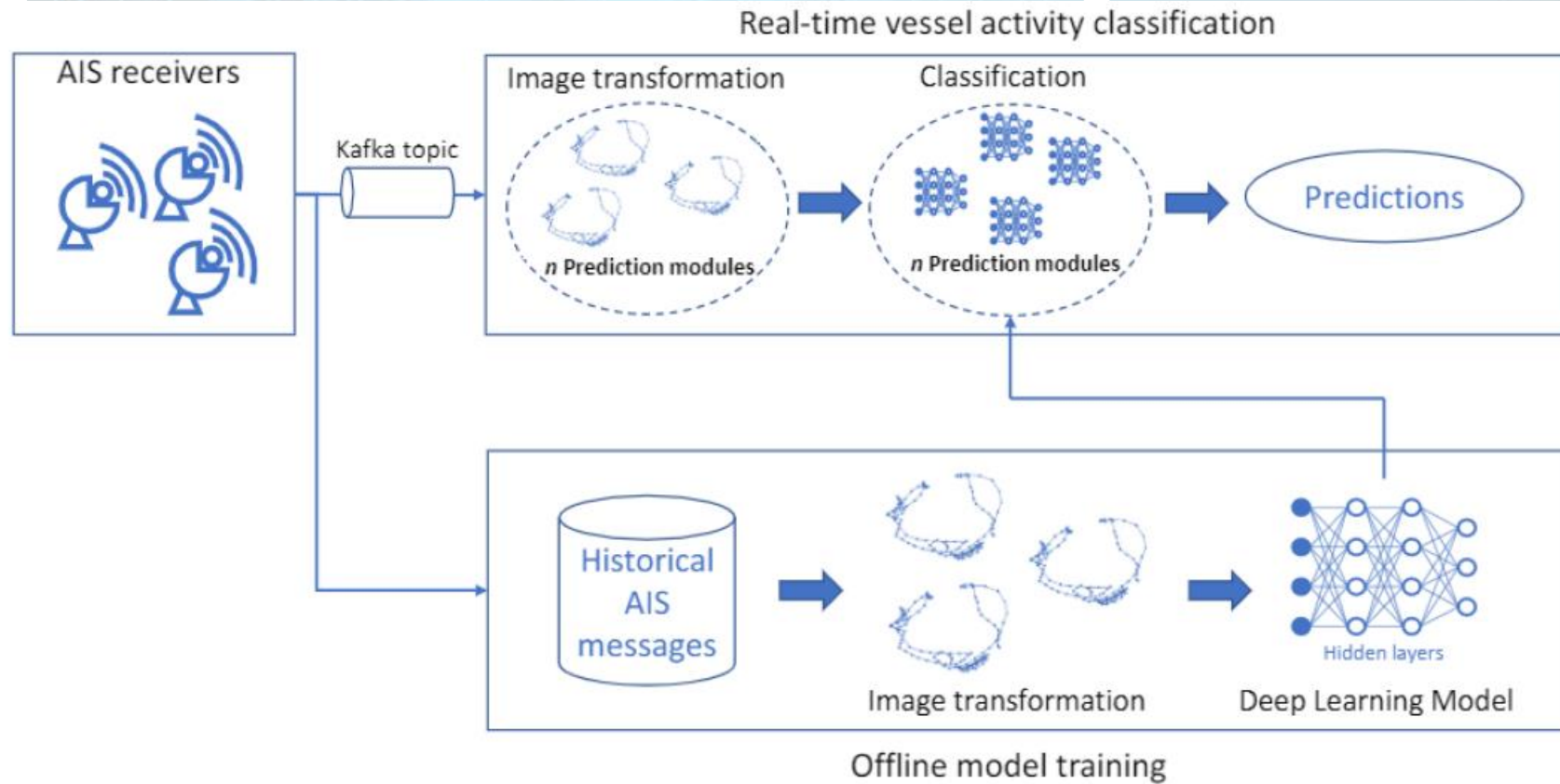


Sensors-Based Data Sourcing

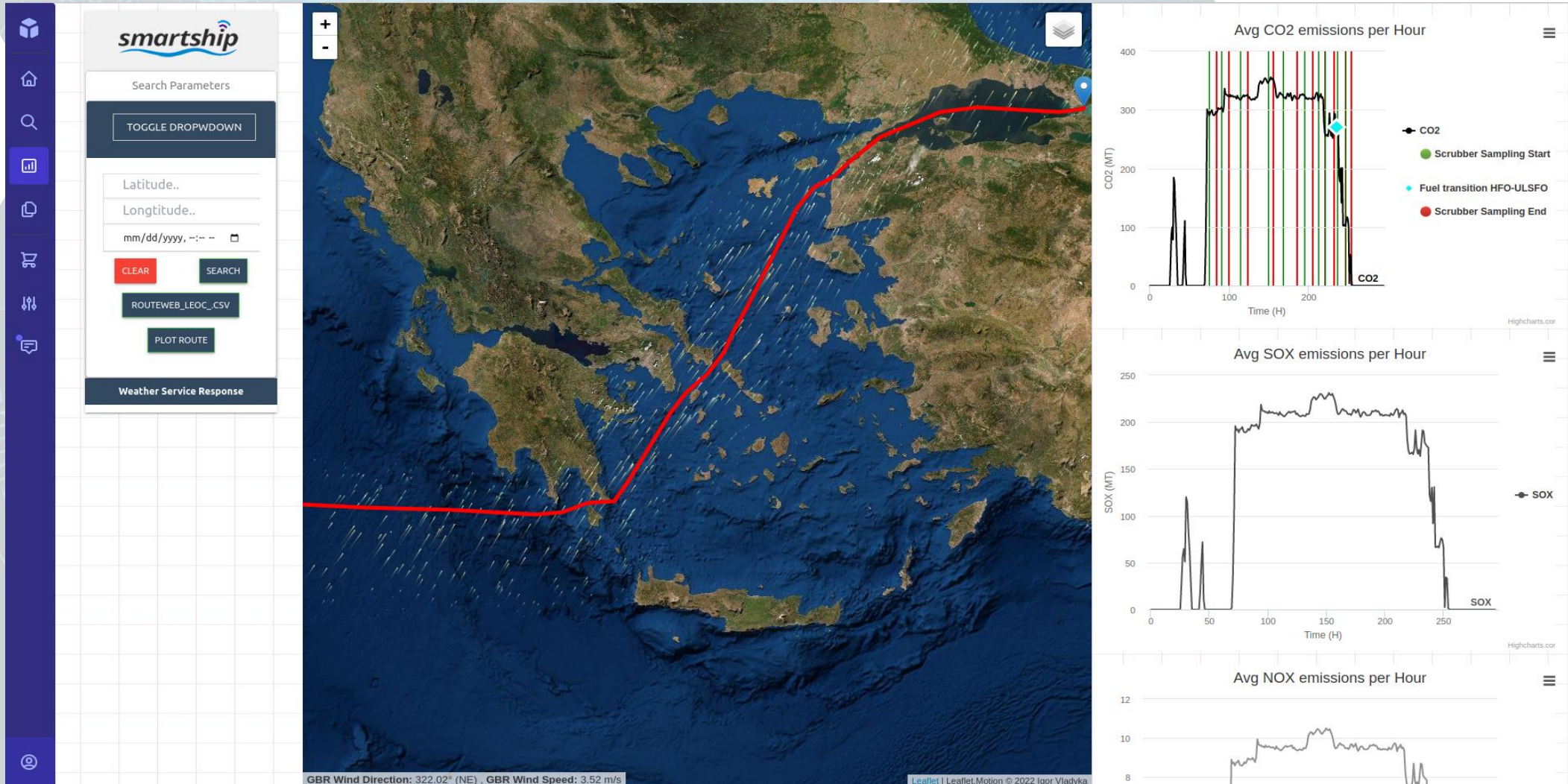


From Data Collection to Model Training

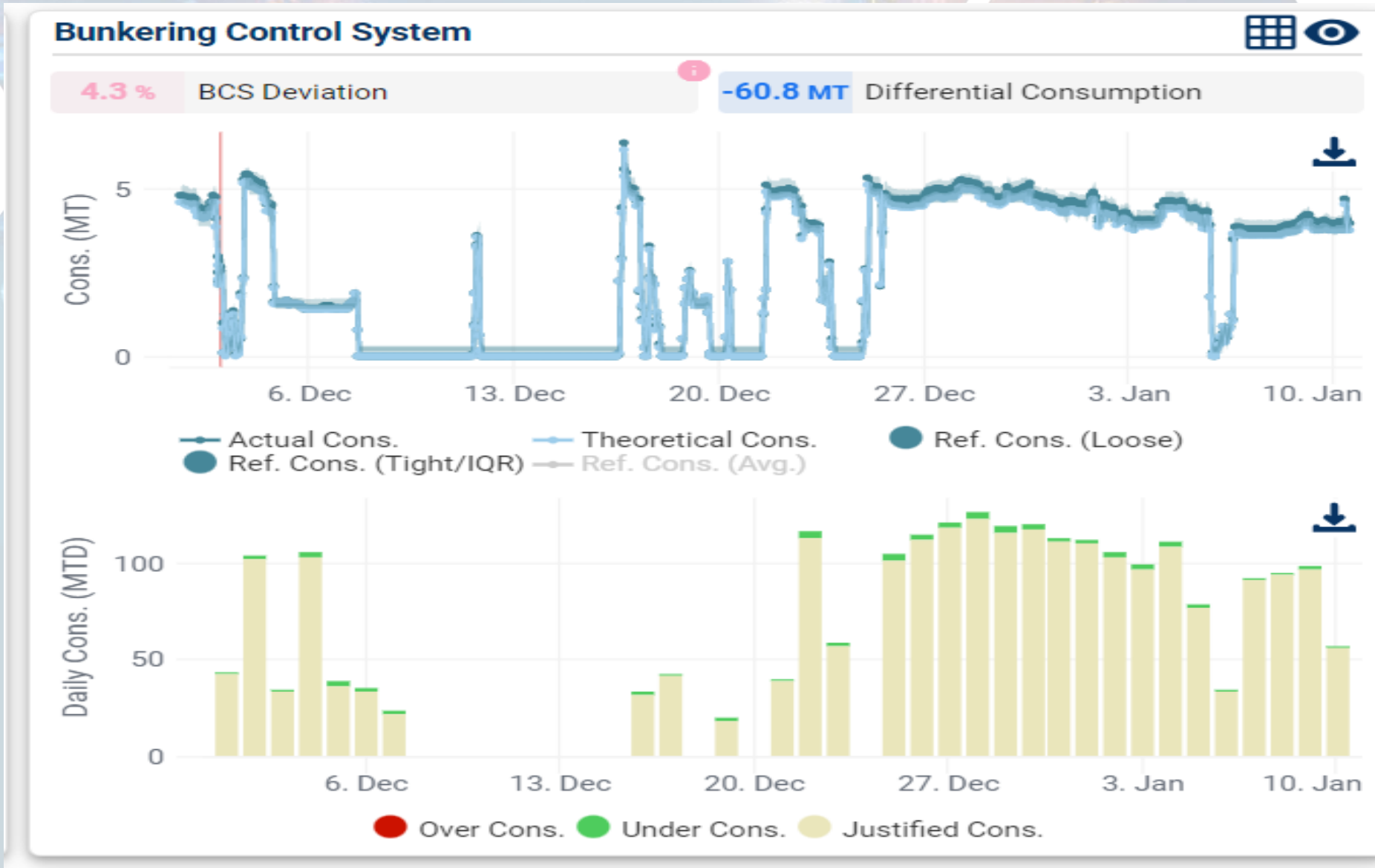
Showcase #1: External Service



Showcase #2: Voyage Performance Monitoring and Weather Routing Optimization



Reporting Deviation



Fleet Performance Dashboard

Instruments Checks

M/E Load Cross-check Torquemeter vs T/C RPM

— M/E Load — Calc. M/E Load
● Ref. M/E Load (Loose) ● Ref. M/E Load (Tight/IQR)
— Ref. M/E Load (Avg.)

LR Margin Cross-check against Same M/E Load

— LR Margin ● Ref. LR Margin (Loose)
● Ref. LR Margin (Tight/IQR) — Ref. LR Margin (Avg.)

STW Speedlog vs Tidetech vs Speed GPS

— Speedlog STW — Tidetech STW — Speed GPS

Performance Analysis

TideTech SpeedLog [?] [x] [o]

All C/P Filtered

— Power Penalty — M/E Load — dSlip
— M/E Load — LR Margin — Rudder Angle
— STW — Wind — Wind Angle
— LR — Trim — Draft
— dSlip — Draft Fore — Roll
— Wind — Pitch Crosses — Pitch Angle Range
— Wind Angle — Critical Draft — Normal
— Rudder Angle — Roll Crosses — Abnormal
— Critical Draft — Roll Angle Range

Performance Spots Inspector

TideTech SpeedLog [?] [x] [o]

All C/P Filtered

Design Zone - Draft [12.5,13.5]

— C/P (Draft: 13)
— QRef
— Expected Optimum (Draft: 12.8m, PP: 10%)
● Power

Slip Sisters Comparison

TideTech SpeedLog [?] [x] [o]

STW < 16kn STW >= 16kn

All C/P Filtered

Slip - Design Zone - Draft [12.5,13.5]

● Slip
— QRef Max Slip
— QRef Min Slip
● Ref. Slip - (CMA CGM ATTILA)
● Ref. Slip - (CMA CGM BIANCA)
● Ref. Slip - (CMA CGM MELISANDE)
● Ref. Slip - (CMA CGM SAMSON)
● Ref. Slip - (CMA CGM TANCREDI)

Compliance Performance Analysis

Performance Analysis

TideTech

SpeedLog

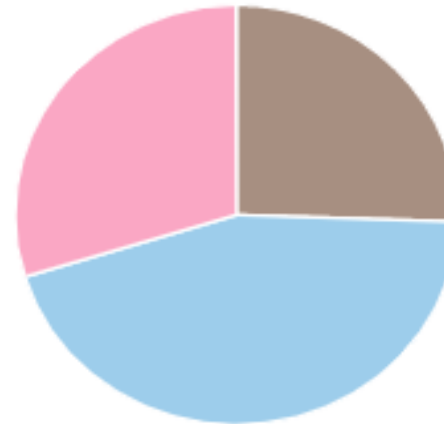
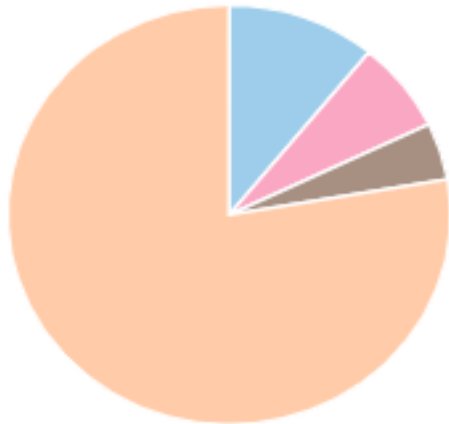


13.2 % Power Penalty

11.7 % Power Penalty (C/P Filtered)

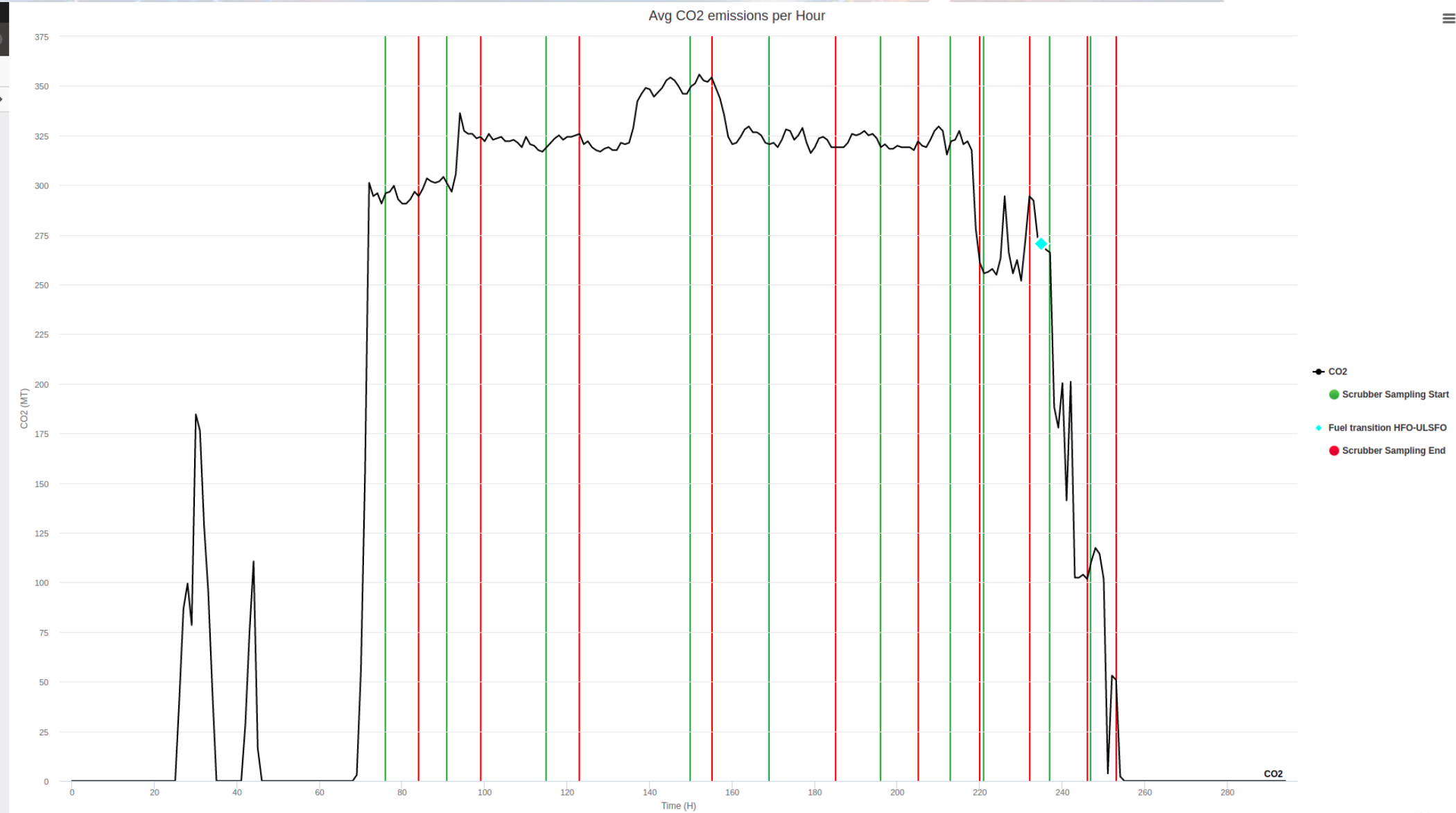
Critical draft

Normal



● Normal ● Abnormal readings ● Heavy ● Critical draft

Time series with voyage environmental performance



Circular By Design



Emerging Class of Smart Assets: Maximize sustainable vessel utilization and ensure long-lasting durability of the asset



Value Driven: Extract value from the large amount of data generated by smart maritime assets. Effective flow of Information for natural capital rebuild



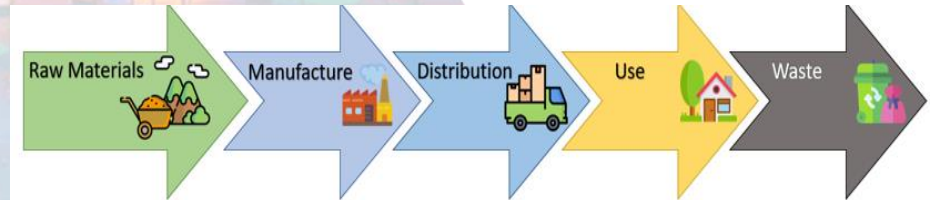
Eliminate Waste: Through Re-Using of data and lean management in decision making for fleet operation and maintenance



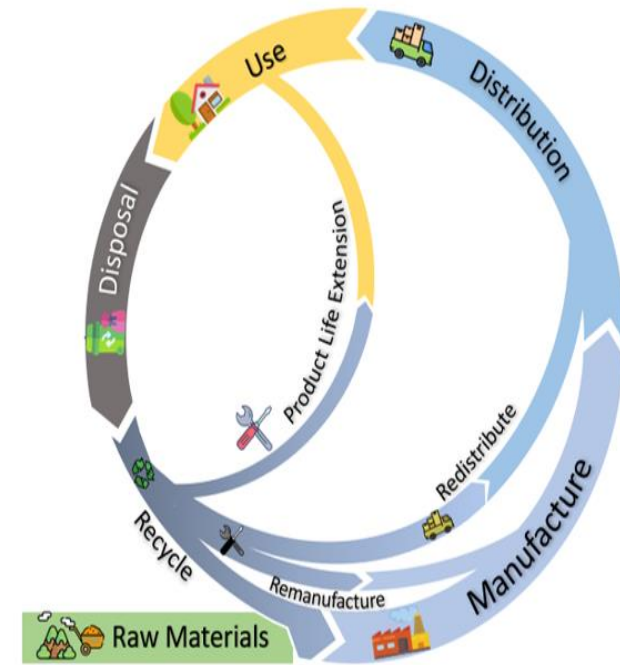
Green Thinking and Sustainability: Minimize energy consumption per unit by combining technologies effectively



Integrated Framework: Extends across the entire fleet and lifetime of the vessel. Values drivers are paired and efficiency is achieved through comparison analysis. Critical mission objectives are met.



Linear Economy



Circular Economy

SmartShip Consortium

danans
SHIPPING CO LTD



BLUESOFT
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Thank you!

