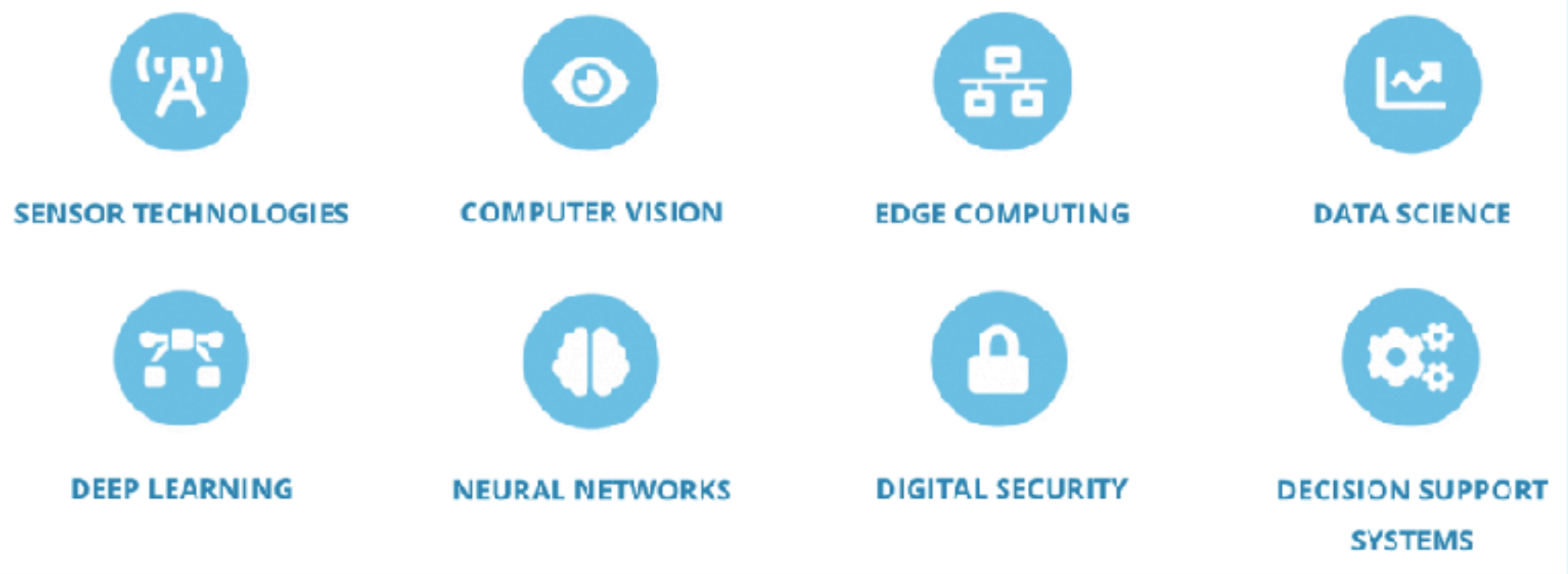
AI MARITIME INTELLIGENCE

SeaSonde HF Radar: Enhancing Maritime Safety and Security through Real-Time Vessel Detection, Identification and Visibility Monitoring

Vision: Data, technology and artificial intelligence for a smarter - sustainable, safer, more efficient - maritime space management

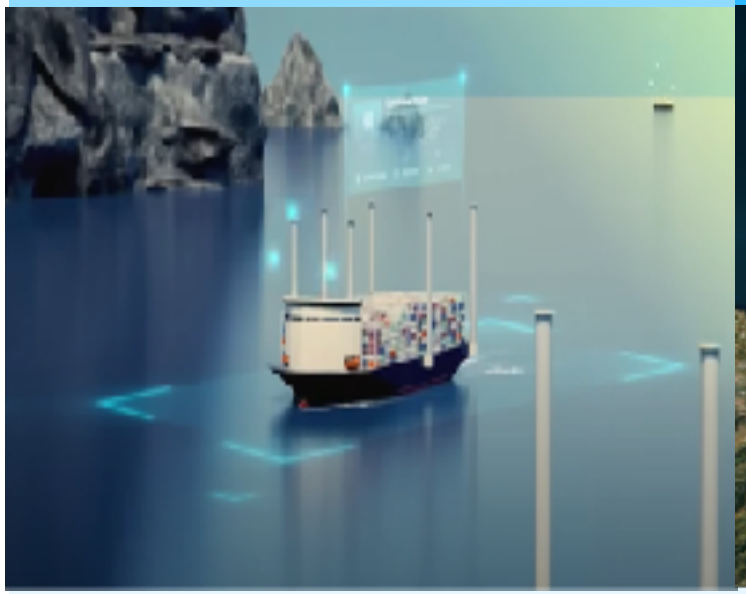


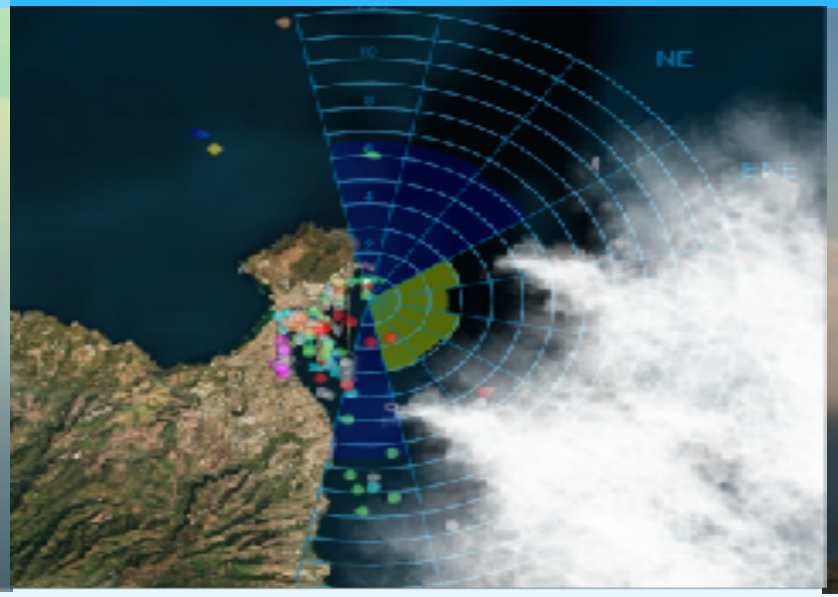

We are collaborating with our partner CTIM of Las Palmas de Gran Canaria University to help young researchers acquire new skills for industry 4.0
CTIM
CENTRO DE TECNOLOGÍAS DE LA IMAGEN
ULPGC
Universidad de Las Palmas de Gran Canaria

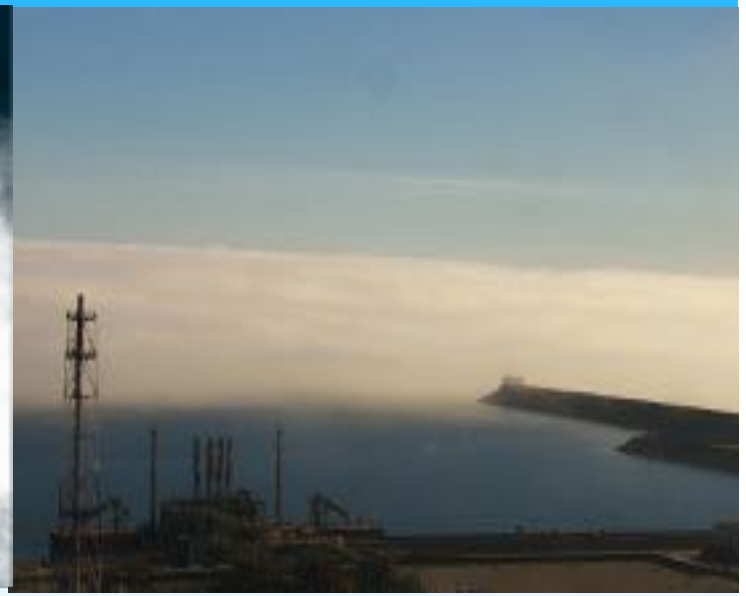
The need: Enhanced safety and efficiency

We need **enhanced safety and efficiency through advanced solutions.**

SeaSonde HF radar contributes to this by integrating sensor technologies and **artificial intelligence at the edge: "Computer vision and advanced deep learning models".**







Need 1. The Importance of Vessel Identification

Coastal Countries Have Increasingly Recognized

- The need for Strategic Surveillance of their Marine Space to balance environmental sustainability with safety and economic development

Marine Space Management

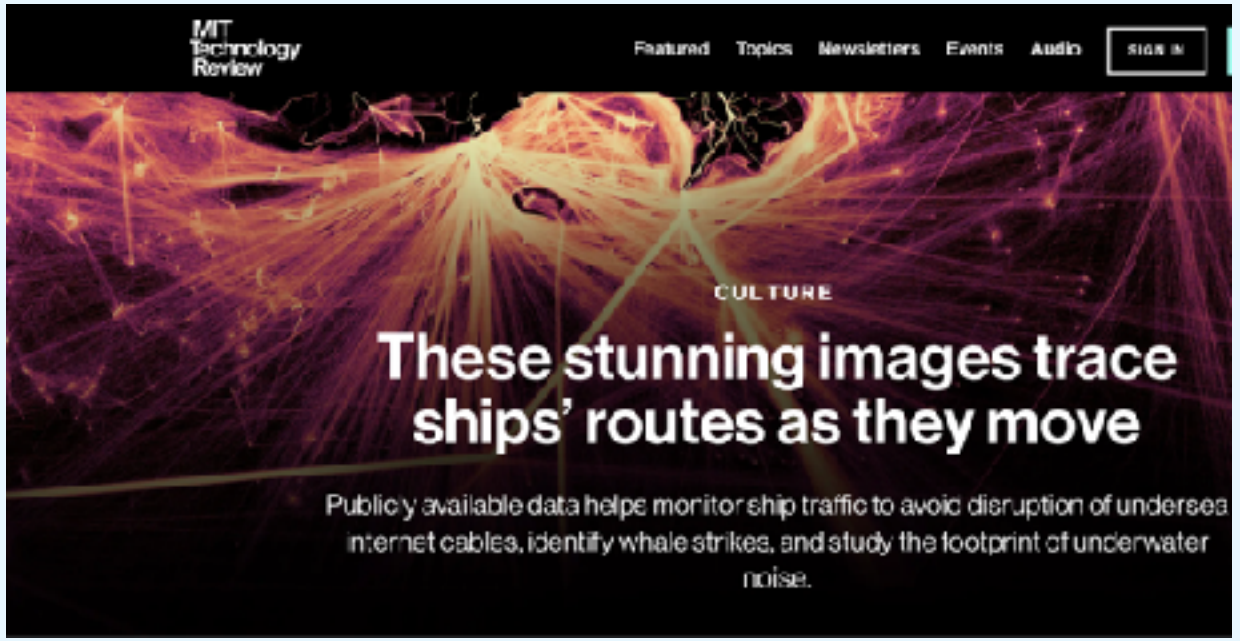
- Involves the allocation of observing resources along the coastal space to better understand the ongoing activities

Need 1. Current State of Art in Vessel Identification

Traditional vessel information provided by AIS offer localized precise data (ship's identification number, name, call sign, length and beam, type, and antenna location)

1. But private boats under 65 feet in length are not required to use AIS.

2. Unless you're trying to keep your ships' movements and cargoes secret.



*Knowing this known unknown risk is a need - In a **modern world** there must be a way to mitigate that*

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ELSEVIER

Digital Signal Processing

Volume 136, May 2023, 103983

Detection of AIS messages falsifications and spoofing by checking messages compliance with TDMA protocol

Need 2. The Importance of Visibility to Navigation

In 2020 **U.S. Coast Guard** reported

- 4,000+ Boating accidents
- 2,500 Injuries
- 750 Fatalities

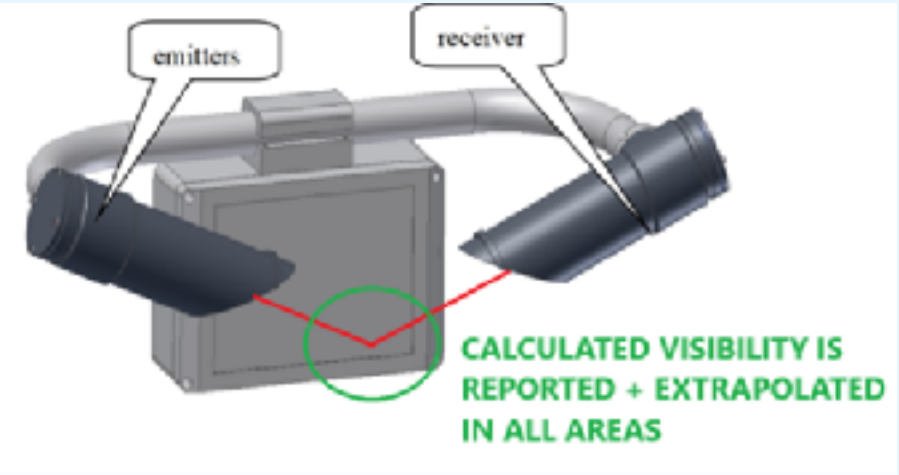
30% of **boating fatalities** are linked to collisions in **low-visibility** conditions

Need 2. Current State of Art in Visibility Monitoring

Traditional visibility sensors offer localized data but miss broader environmental changes, leading to risks.

1. Fog can be away from the monitoring point (MP)

2. Light fog at MP, no fog in one direction, high fog in another



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The solution: Port Authority Use Case

Vessel detection & identification for a more efficient and safer maritime space management and a more efficient port logistics.

PROBLEM

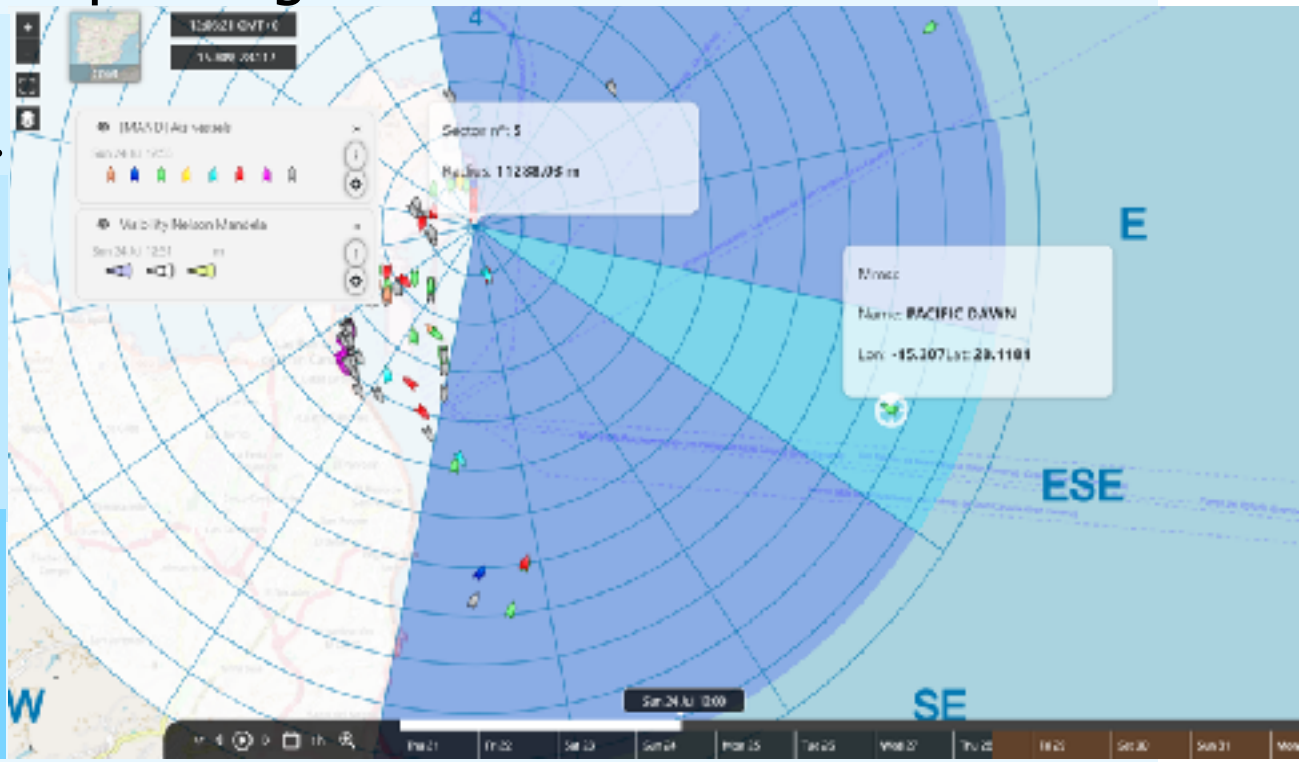
AIS information from vessels is not always available.

SOLUTION

AIMI analyzes optical images with AI at the edge providing the critical vessel information (class, position, OCR, etc.) authorities may want to confront this in real-time with the AIS information.

RESULT

Proactive vessel control towards a more acknowledged and efficient traffic management.



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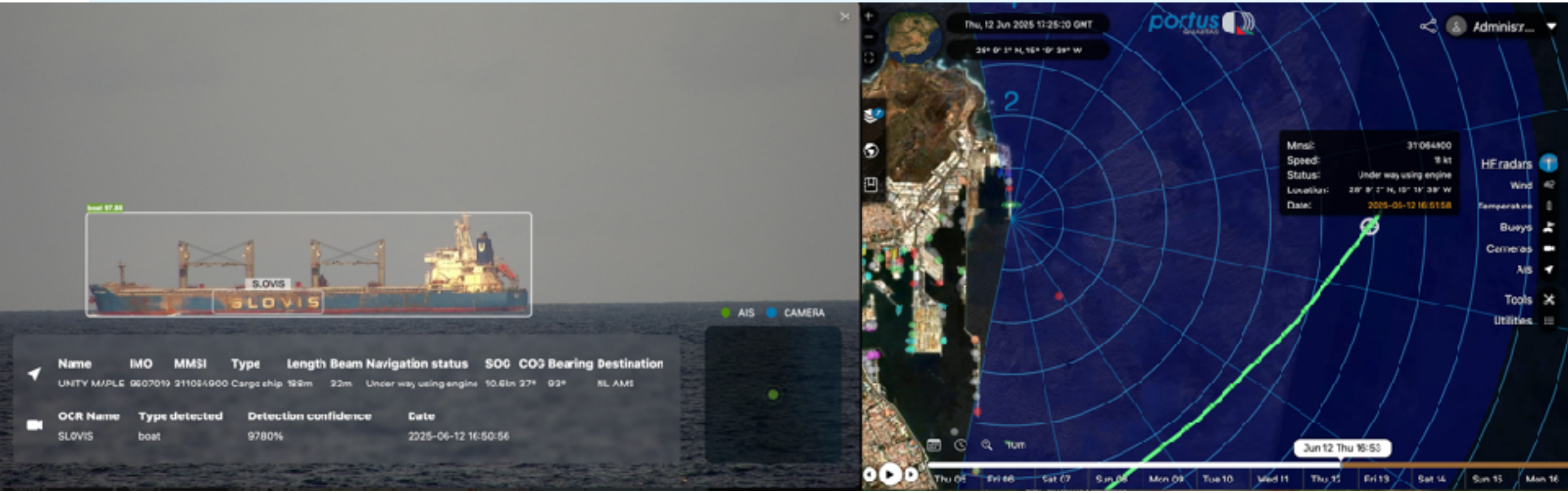

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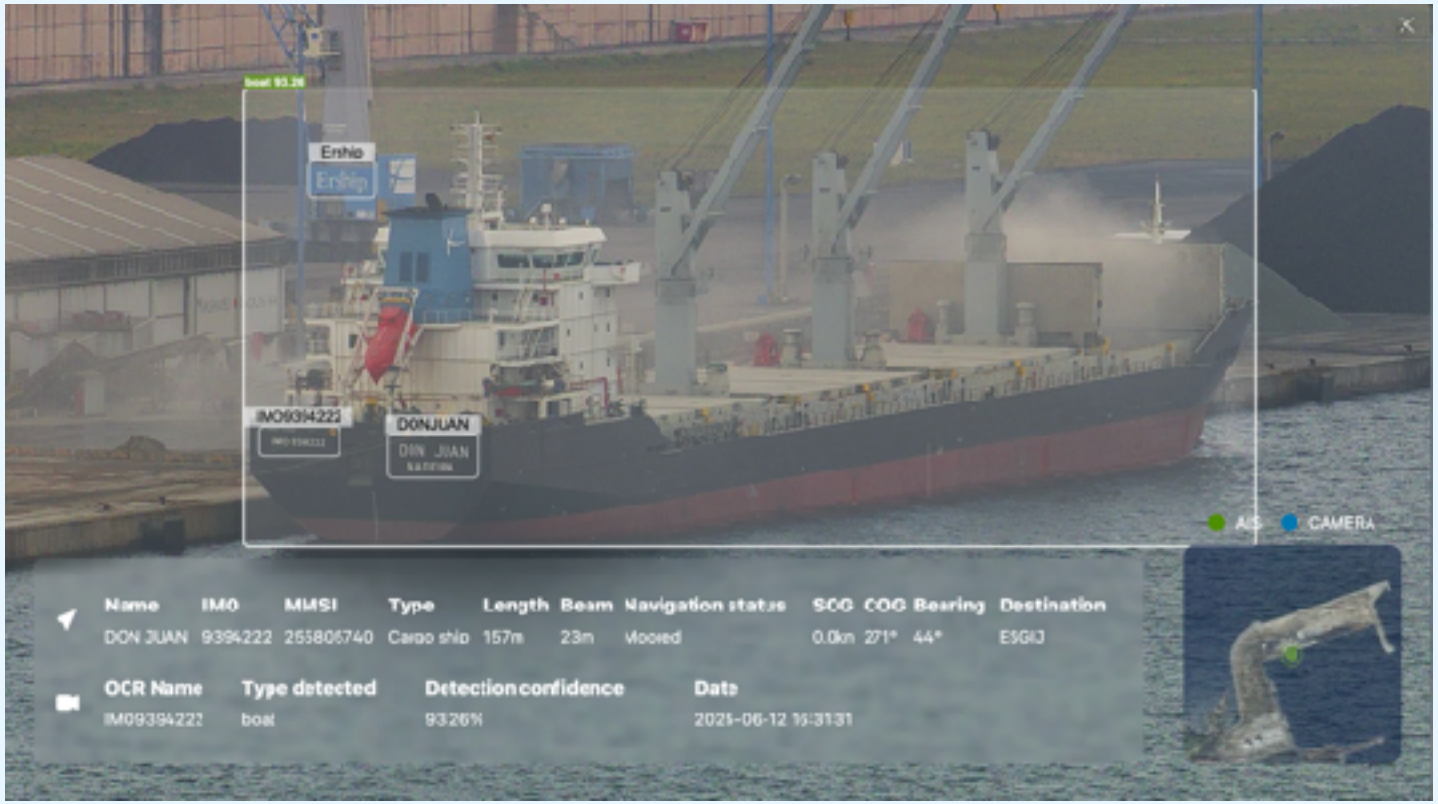
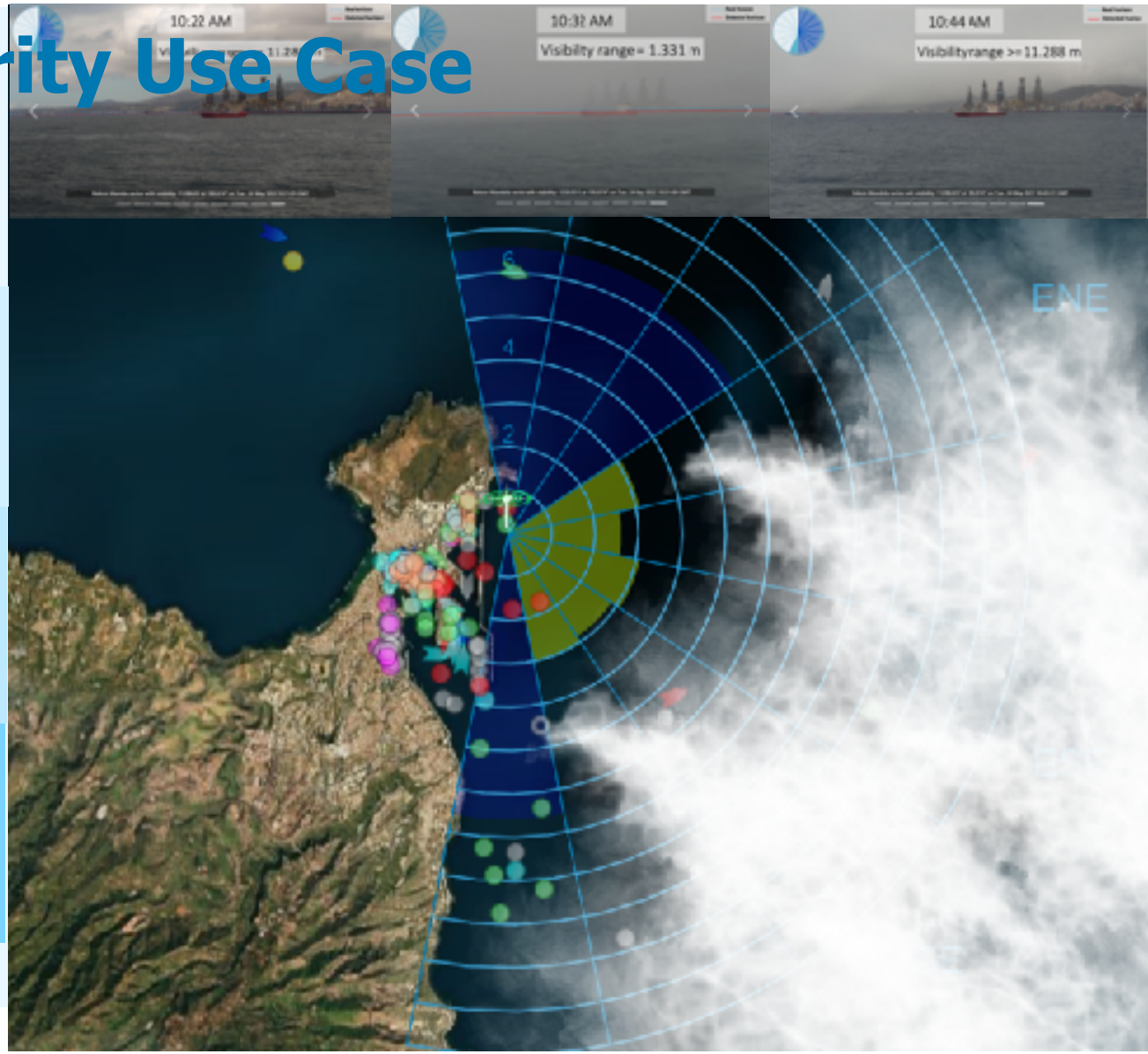


The solution: Port Authority Use Case

Enhancing Traffic Management.
Visibility range for a safer navigation.



PROBLEM

Heavy fog, rain or other meteorological situations cause delays and risks to navigation.

SOLUTION

AIMI detects and positions vessels and, at the same time, measures visibility range in real-time.

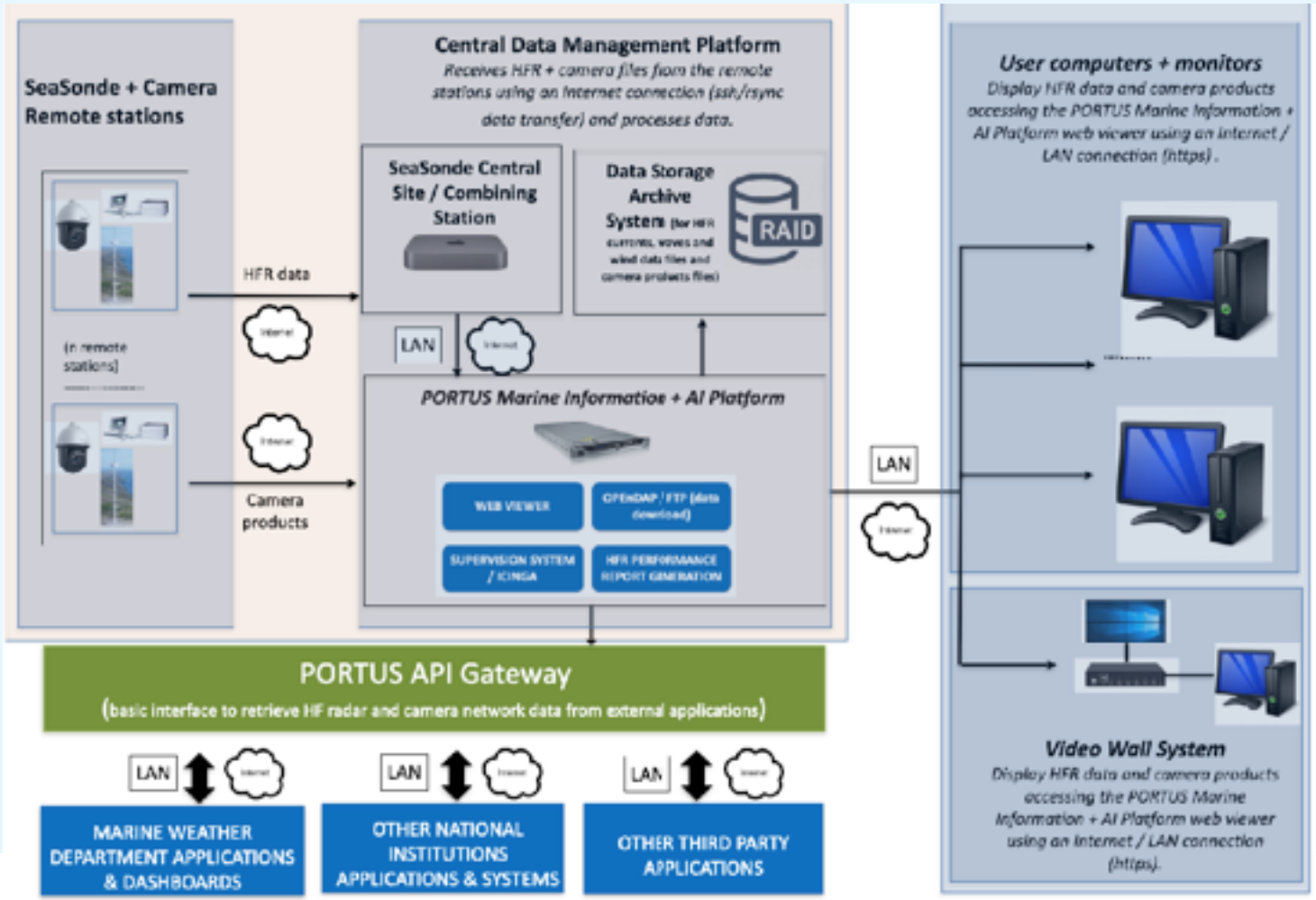
RESULT

Proactive vessel control for a reduction in collision risk.

The solution: Port Authority Use Case

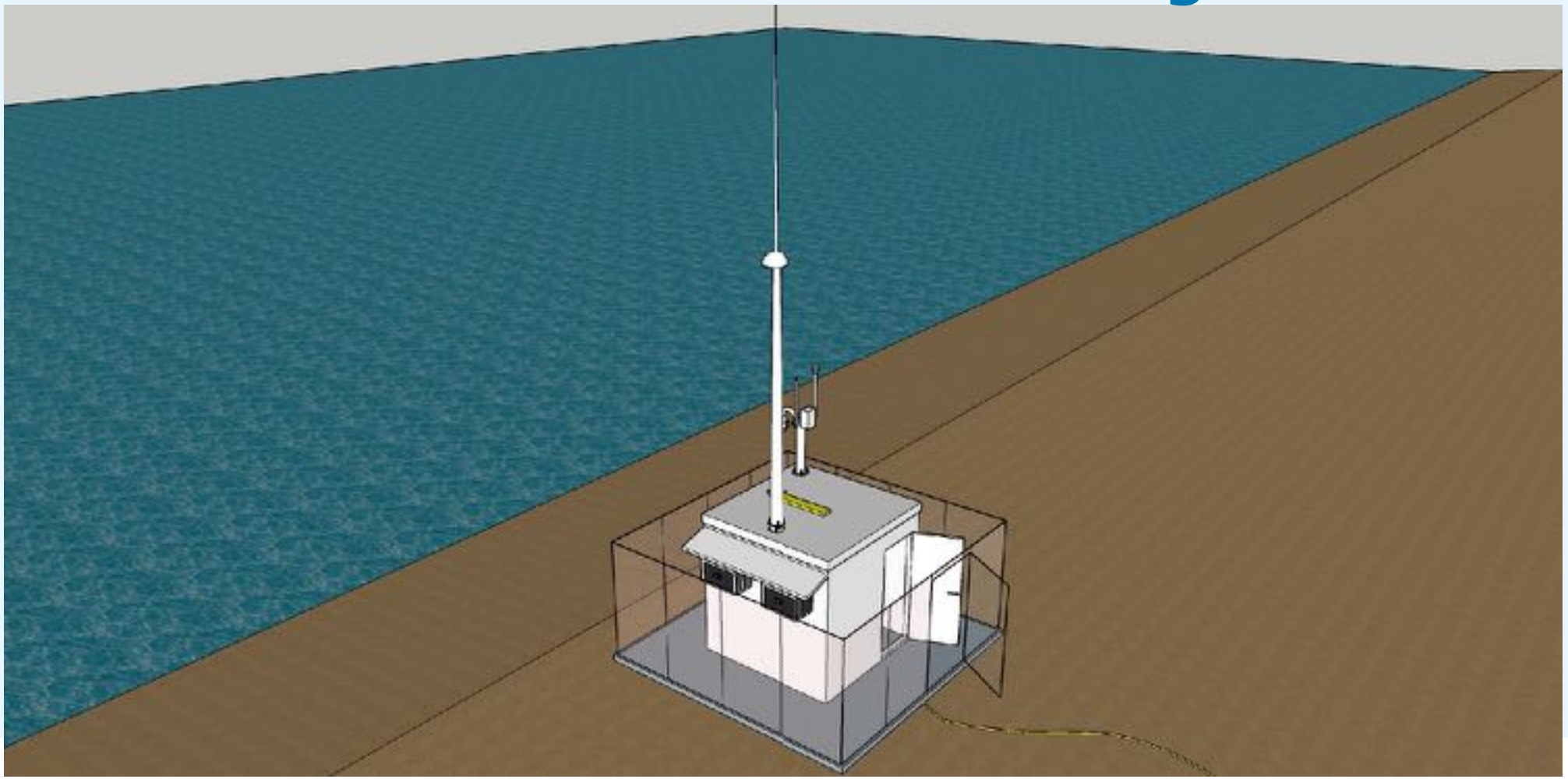
Enhancing Traffic Management.
Visibility range for a safer navigation.

The solution: Enhancing SeaSonde HF radar networks with AI Maritime Intelligence



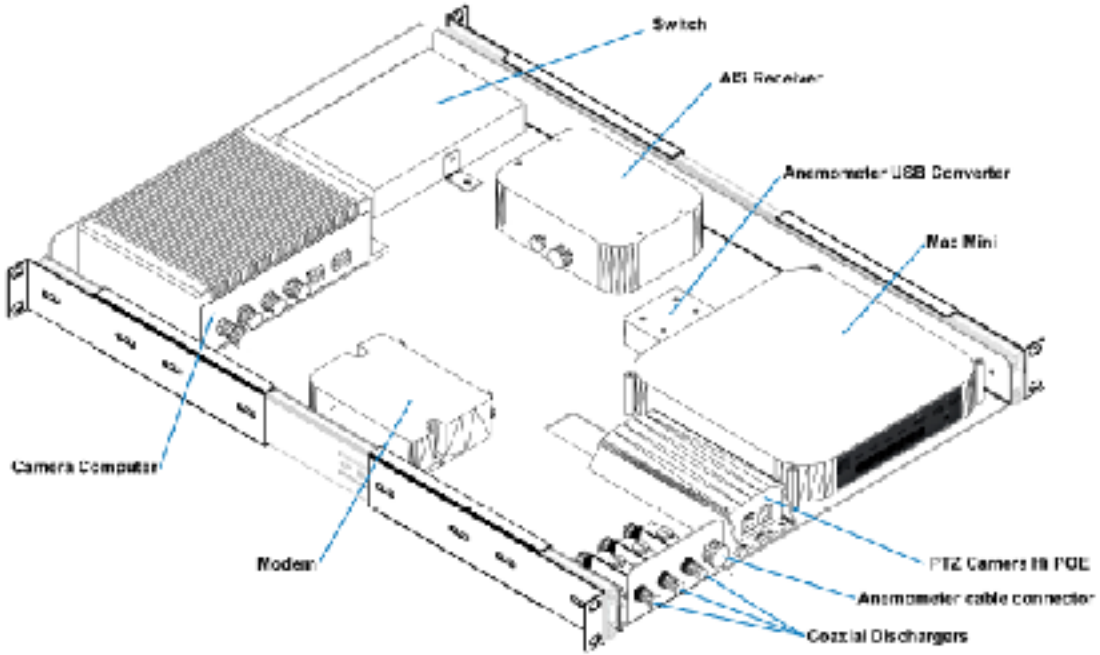
- SeaSonde HF radar station
  - HF radar
  - AIS receiver
  - Optical camera
- Central data management platform
  - Combine server
  - Marine information server
  - Data storage & archive
  - API Gateway

The solution: Enhancing SeaSonde HF radar networks with AI Maritime Intelligence



The solution: Enhancing SeaSonde HF radar networks with AI Maritime Intelligence

Layout of the electronic components in the tray



OR CH 24 002 Component layout diagram

The solution: Enhancing SeaSonde HF radar networks with AI Maritime Intelligence

OPTICAL MODULE

PTZ 360° movement range
IMAGE SENSOR Progressive Scan CMOS
RESOLUTION 1920 x 1080 or higher
MIN. ILLUMIN. Color: better than 0.005 Lux
OPTICAL ZOOM 30x (up to 60x)
WATER AND DUST RESISTANT IP67/ IP68, NEMA 4X, WF2
TEMPERATURE -40°C to 65°C
HUMIDITY: 95% or less

AIS + EDGE PROCESSING

AI at the edge based on 384-core NVIDIA Volta GPU (48 tensor cores) and 6-core NVIDIA Carmel ARM®v8.2 64-bit CPU for an AI performance of up to 21 TOPS
AIS RECEIVER Class A & Class B message compatible
COMMUNICATIONS LINK: 4G/5G, Wi-Fi, VHF radio, satellite, etc.

- ✓ **Qualitas Instruments**: Robust hardware for maritime environments
- ✓ **QAISC**: AI-driven software for real-time monitoring
- ✓ **PORTUS AI Platform**: Marine and vessel information system
- ✓ **Proactive safety**: Continuous monitoring reduces risks
- ✓ **Seamless integration**: Hardware and software work together for optimal performance

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Who benefits from this?

Ports and VTS

- ✓ Efficient control of entrance & departure
- ✓ Control of anchoring areas
- ✓ Regulation of autonomous navigation

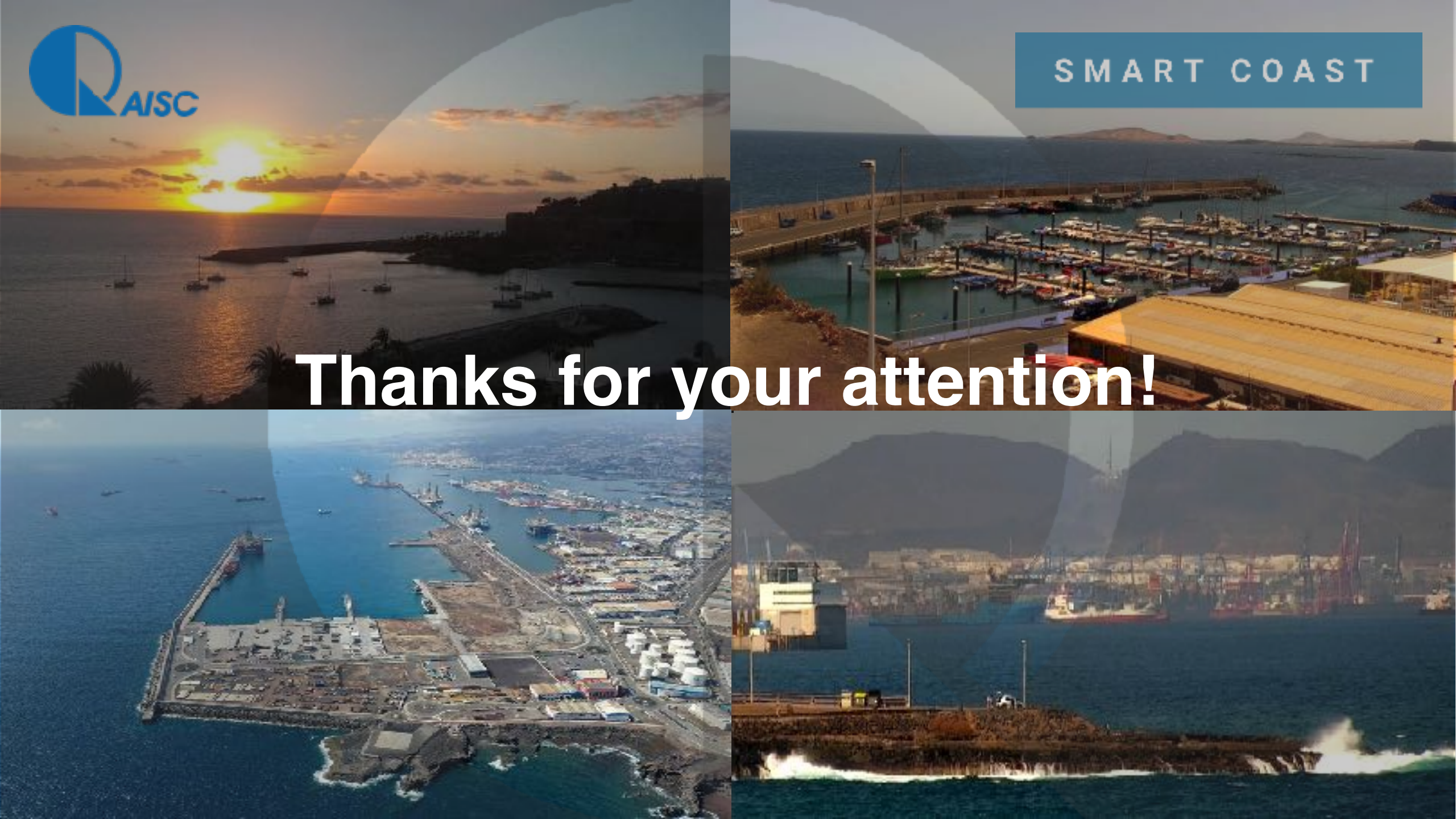
Metocean centers

- ✓ Enhanced visibility prediction models
- ✓ Real time data to sea goers
- ✓ And much more … wave run-up, longterm coastline changes, etc.

Coastal administrations

- ✓ More efficient management of maritime space
- ✓ Improved coastal area activity control

Conclusion: Let us adopt AI Maritime Intelligence today to increase operational safety and efficiency


AISC
SMART COAST
Thanks for your attention!