PORT DECARBONISATION AND ENVIRONMENTAL SUSTAINABILITY

11:55 – 13:10

Delivery Pathways and Funding Opportunities

European Space Agency

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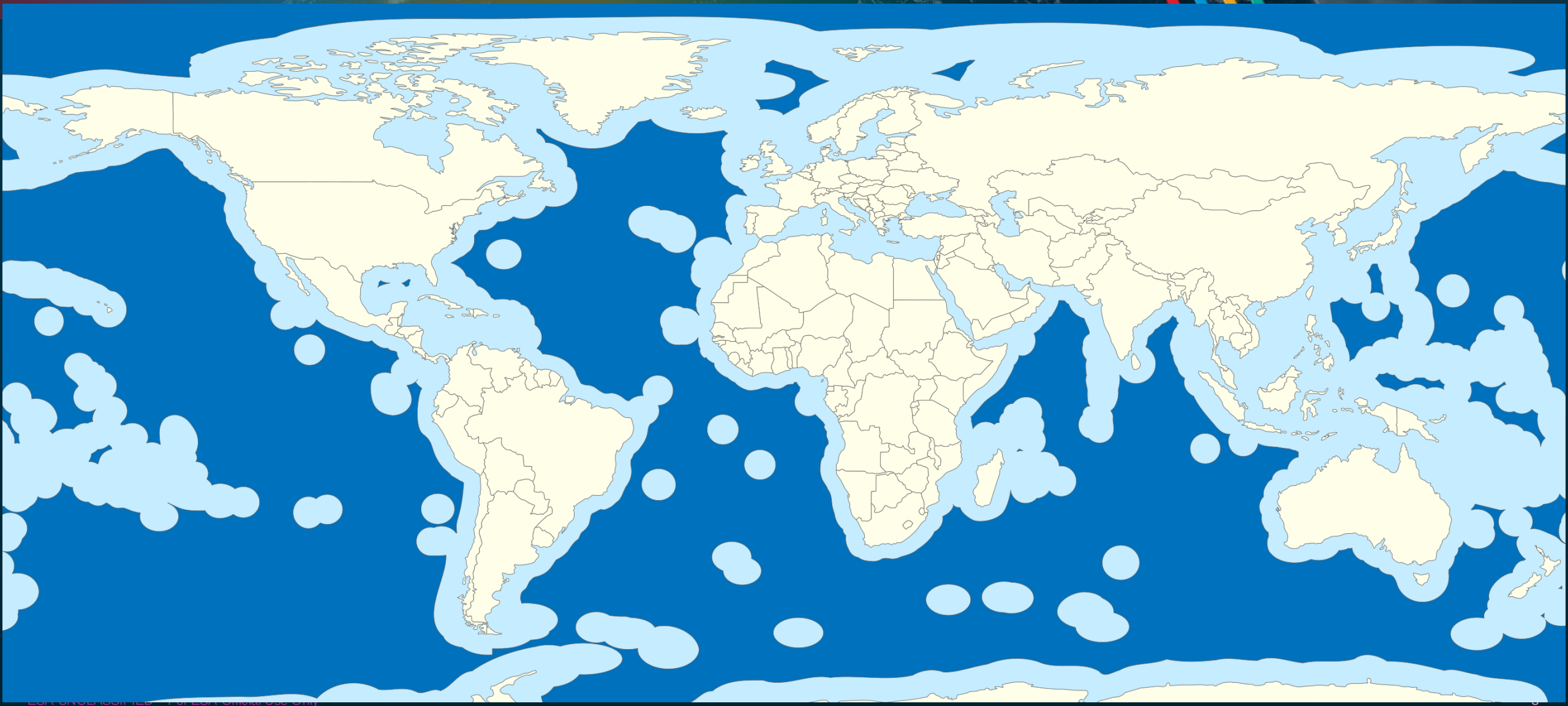
UK SPACE AGENCY

In association with **Redshift Associates**

Space for Ports

ESA BASS activities for the maritime sector and ports

SPACE & MARITIME



Space for Maritime

SatCom is essential to ensure communications whenever the terrestrial communications are absent or not reliable, to connect offshore activities and to support digital solutions. Satellite IoT (including 5G based) to connect sensors for on field monitoring and connected vehicles.

IoT solutions

Connectivity

Virtual and Augmented Reality

GNSS enables ubiquitous high accuracy PNT technologies to support accurate and seamless positioning. Accurate PNT is vital to ensure navigation safety and continuity of maritime operations, e-Navigation, Sea Traffic Management and Maritime Autonomous Surface Ships

Autonomous vessel

Container Tracking

E-navigation

SatEO is used for mapping and monitoring environmental conditions, to assess the environmental impact of ports activities, support spatial marine planning, coastal management, verification of AIS messages, detection of dark vessels, validation of insurance claims, detection of oil spills, prevention smuggling and monitoring of IUU amongst others.

Costal management

Air Pollution

Illegal fishing

ESA Business Applications and Space Solutions

ESA BASS SUPPORT COMPANIES IN DEVELOPING COMMERCIALLY VIABLE APPLICATIONS:

- Zero-Equity Funding (€50K-€2M+)
- Tailored Project Management Support
- Access to our Network and Partners
- Use of ESA Brand for credibility

AND **ACHIEVE** OUR DESIRED **OUTCOMES**

Social, green value and economic sustainability

Utilisation of space in new markets and user communities

Strengthen European Industry competitiveness on global space and non-space markets

BASS Maritime Portfolio

100+

Projects over the last 10 years

16

Projects currently running

5

Projects in preparation

Cooperations in the maritime sector

Users and customers

EMSA European Maritime Safety Agency
Porto de Aveiro
SINTEF
Port of Antwerp
Autorità di Sistema Portuale del Mare di Sardegna
OLDENDORFF
GRIEG STAR
OFFIS INSTITUT FÜR INFORMATIK
RHENUS CUXPORT
DST
aivp
PARK WIND
PORTO DE SETUBAL
CHNL CENTRE FOR HIGH NORTH LOGISTICS
UNIVERSITÄT DUISBURG ESSEN
Hapag-Lloyd
VIKING ICE CONSULTANCY
RheinCargo
AUTORITÀ DI SISTEMA PORTUALE DEL MAR TIRRENO CENTRALE
NAPOLI-SALERNO-CASTELLAMMARE DI STABIA
ONE SEA Autonomous maritime ecosystem DIMECC
WORLD OCEAN COUNCIL

Industry

inmarsat
Fraunhofer IOSB
ORBCOMM
MARITIME ROBOTICS
Arthur D. Little
OPTIPORT
MARLINK ABOVE AND BEYOND
Oceanbolt
SEA-KIT
KONGSBERG
SPACE NORWAY
KSAT KONGSBERG SATELLITE SERVICES
OHB
CLS
GERMAN ORBITAL SYSTEMS
akquinet WIR. WISSEN. WIE.
HawaDawa The future of air quality management
NIFRO NORSK INDUSTRIFORUM FOR ROMVIRKSOMHET
OHB LUXSPACE
spire
telenor
KVH
e-geos AN ASI / TELESPAZIO COMPANY

Maritime Sustainability Task Force

Maritime Sustainability Task Force

The focus of the Task Force is on enhancing the environmental sustainability of the maritime sector. This includes, but it is not limited to, measures that alleviate the impact of greenhouse gas emissions, air pollution, water pollution, noise pollution, and the spread of non-indigenous species.

- Promote developments
- Facilitate adoption and scale up.
- Establish partnerships
- Reach out to non-space communities
- Support pre-operational demonstrations

Task Force Members

DNV

Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping

Wallenius Wilhelmsen

IWSA International Windship Association

OCEAN AUTONOMY CLUSTER

msc

GRIMALDI GROUP

ONE SEA

TMA BlueTech

DAMEN

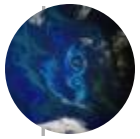
EMSA European Maritime Safety Agency

esa

ESA and EMSA workshop on VDES

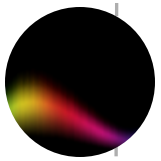
VDES – A channel to drive Green Maritime

- Two-way, low-cost connectivity
- Dedicated Satellite channel
- Authenticated messages
- Improved capacity









2023
2024
2025

Focus of interest

Maritime safety and security

- Search and rescue
- Enhanced situational awareness
- MASS/USV integration into non segregated traffic
- Smuggling of goods, drugs, weapons, waste, and people
- IUU fishing
- Marine crime and piracy
- Unauthorised entry
- Tax evasion

Maritime sustainability

- Alternative fuels (Green hydrogen, ammonia, electricity, LPG, LNG)
- Digital Time of Arrival
- Wind Assisted Propulsion
- Predictive Maintenance
- Ballast water management and invasive species
- Underwater noise pollution
- Emissions monitoring and verification
- Biofouling and antifouling

Ports

- Port Automation
- Digital and connected ports
- Sustainable dredging
- Port safety and security
- Enhanced intermodal logistics
- Port emissions monitoring
- Water quality prediction
- Optimised berthing

Blue Economy

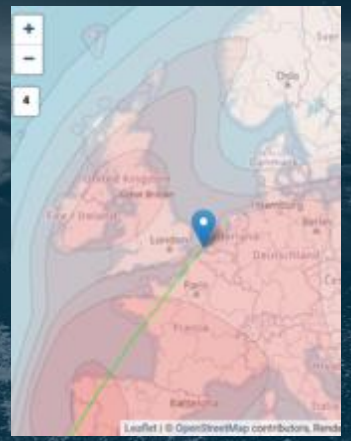
- Fisheries
- Aquaculture
- Coastal Management
- Offshore Oil and Gas
- Offshore renewable energy
- Marine Spatial Planning
- Offshore green hydrogen production
- Marine mining

CACHE NET-ZERO

- **CACHE NET-ZERO** – Demonstrates the market viability of two services for port sustainability:
  - the air quality service for managing and reducing air pollution and carbon emissions in relation to shipping and transport,
- Collected geospatial data and pilot in the port of Belfast
- Developed an interactive dashboard to enable users to understand the underlying conditions, model future trends and simulate the impacts on mitigation strategies

SEANEXT-PORT OF FUTURE

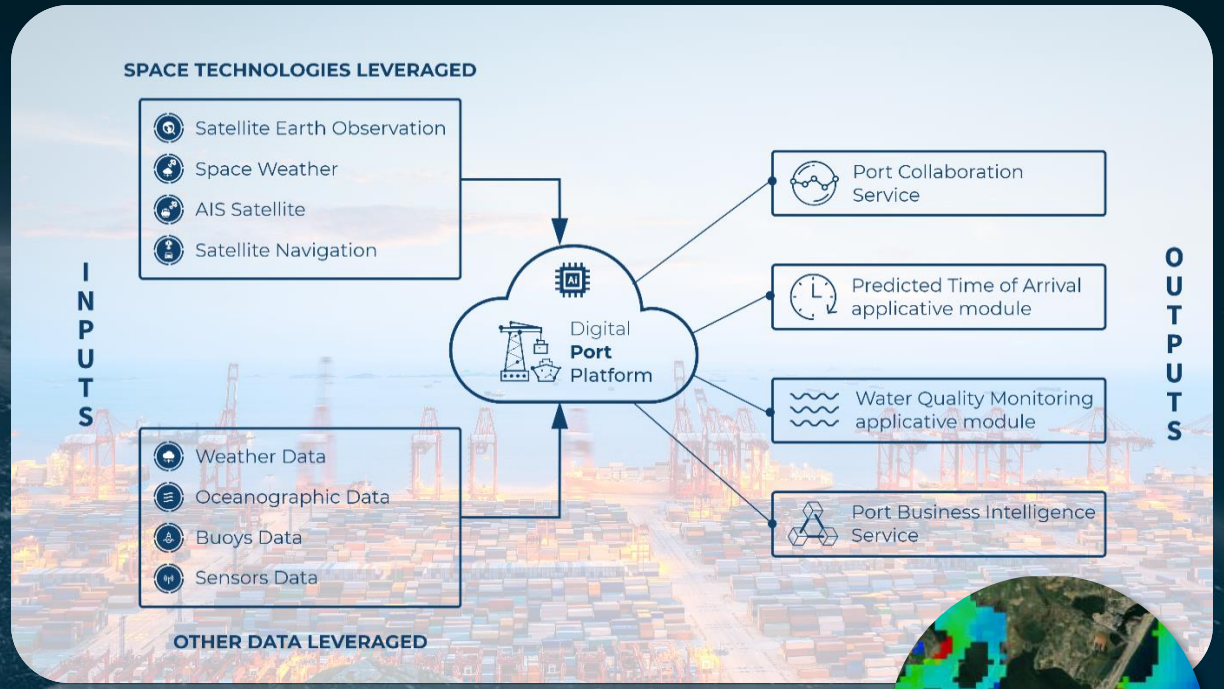
- **SeaNext** – develop a semi-autonomous shipping service for short-sea shipping utilizing satellite communications to improve maritime efficiency by forming heat maps indicating seamless connectivity
- solutions for navigation

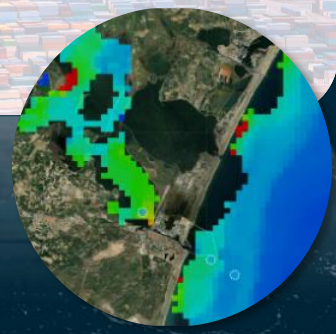


- Pilot in the port of Antwerp
- Users: A2B Online, Fast Lines, Port of Antwerp and Bruges, FPS DG Navigation, Tharsis

DIGITAL PORT PLATFORM

- **Digital Port Platform** – solutions to assist port authorities regarding two big challenges:
  - Enhancing Logistic Optimization
  - Minimizing Environmental Impact

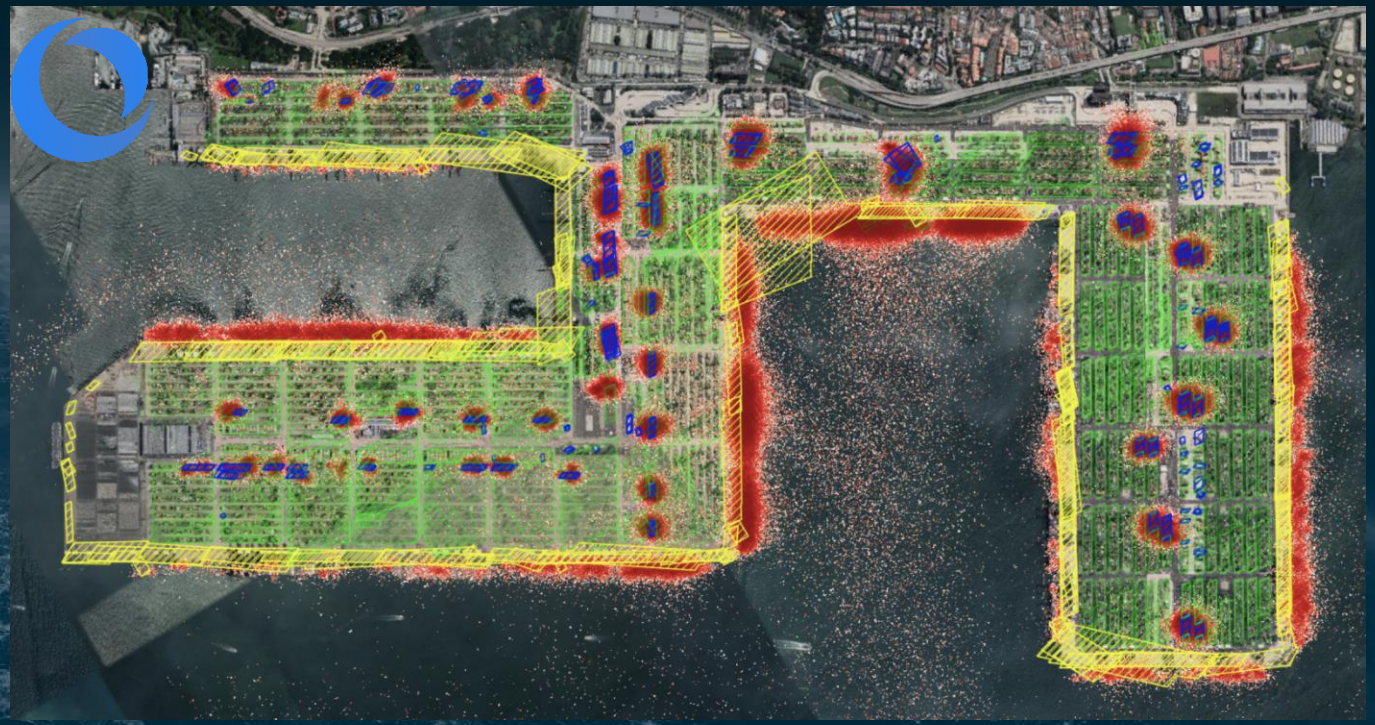




REEFERPULSE

- **REEFER PULSE** – Leverages AI to enhance supply chain operations and reduce risk by quantifying real-time events based on their locations within the supply chain.

- Image classification algorithms to label each zone defined by



- Over 1000 maritime terminals geofenced.
- Catalogue of over 100.000 polygons

AWAKE.AI

COMMANDER is platform for smart port and smart shipping services. The marketplace offers a **"one-stop-shop" for all smart port services**, including service purchases ships are making with port calls, trucking (cargo hauling) or even ordinary operations.

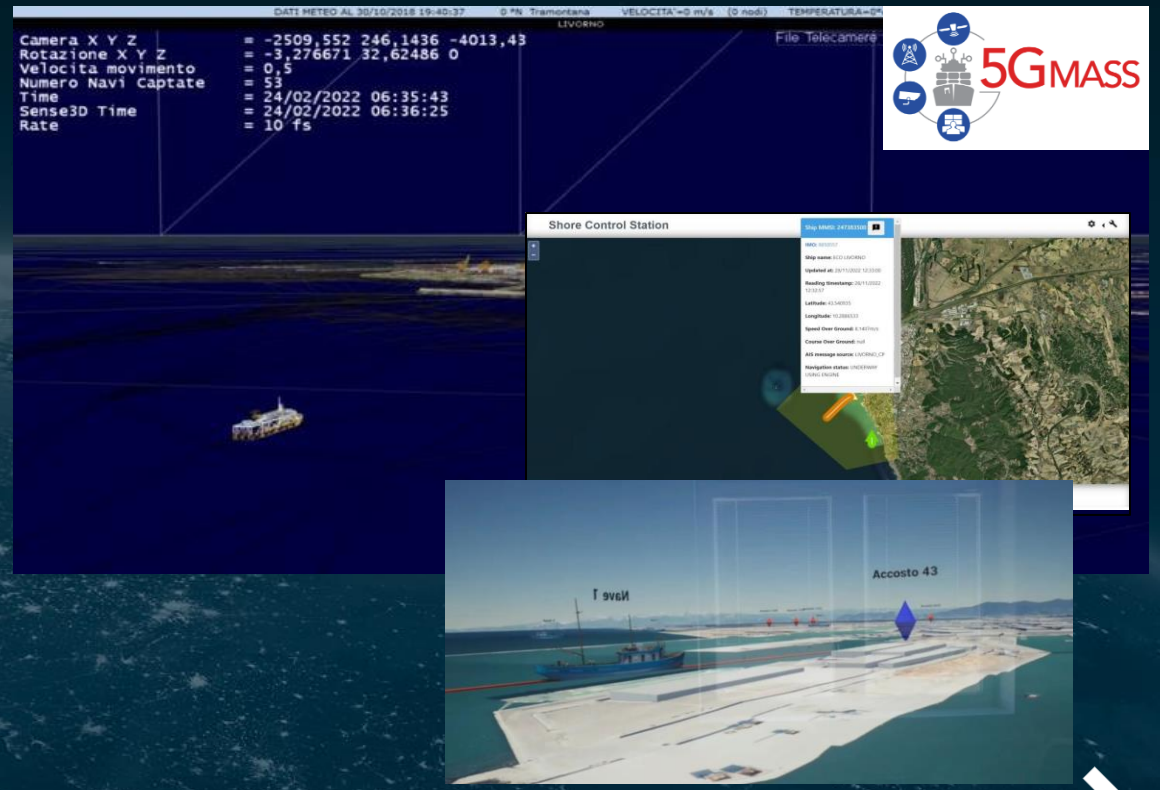
AWAKE.AI has partnered with Fintraffic to promote MSW (Maritime Single Windows) in Finland. The service has won the innovation and product launch awards at **Ship Technology Excellence Awards 2023**.

WHATS NEXT? Leveraging on the results from COMMANDER, AWAKE.AI is preparing a follow up project together with leading ports, shipping companies, and routing firms to implement a **Just in Time Arrivals** service. The application has the potential to reduce between **15-20% of ships emissions** while without journey duration penalties by preventing "rush and wait" behaviours.

GNSS is used for determining ship position and associated service needs. SatEO is used for weather information. SatCom is used for ship connectivity

5G MASS

5G MASS is digital platform shared between ship and the port to enable an assisted and autonomous navigation in port waters, predicting the manoeuvring path of a ship approaching the port and docking, and adopting mitigation actions against eventual malfunctions and failures occurring onboard and ashore.



- 5G MASS uses terrestrial and satellite 5G networks to guarantee connectivity during autonoumous operations in ports.

5G MASS

5G MASS 2022-2024

- integration of on-board, land-based and nomadic equipment;
- first deployment of a 5G mm-wave network supporting shipping;
- exploitation of SatCom and enhanced PNT technologies;
- field trials at the Port of Livorno and risk assessment;

Trials on autonomous shipping with the Grimaldi Eco-Savona vessel under the supervision of the Italian Coast Guard:

- prototype of Remote Operation Center for Autonomous Ships

Planned scaling up following the recommendation by the Italian Coast Guard :

- **other vessels (w/ higher autonomy, deep sea sailing and navigation in port waters), more ROC's, other Ports;**
- **prepare for the upcoming MASS Navigation code by IMO (2025 TBC)**

PORT SENTINEL

SERVICE:

- Port Sentinel is a Seabed Port Monitoring system integrating satellite navigation data with standard bathymetric instruments. The proposed system is a small and manoeuvrable vessel that provides Port System Authorities and its specialists with up-to-date seabed information.
- **OBJECTIVES:**
- Tracing and tracking of UMS, performing measurement campaigns.
- Measurement data collection and archiving.
- Automatic update of bathymetric maps.
- Creation of predictive models of seabed variations caused by large ships traffic and spring tides.

Advanced PNT provides accurate positioning for the unmanned platform.

Maritime Decarbonisation Call

Fixed Call – Maritime Decarbonisation

Fixed Call for Proposals aimed at supporting the development of sustainable space-based services and applications that address challenges related to the decarbonisation of the maritime industry.

Additionally, the call seeks to assist the maritime sector in adapting to and complying with new European and international regulatory frameworks.

- 4 themes opened subsequently from 1 May to 31 Jan (25)
- Funding: up to 50% (80% for SMEs) of development costs
- No IP or equity retention
- Open to Feasibility Studies and Demonstration Projects

Maritime Decarbonisation Call

Digitalisation and operations optimisation

Port decarbonisation

Decarbonisation through maritime autonomy

Green Fuels (well to wake)

Maritime Decarbonisation Call

Port Decarbonisation

- Ports bear responsibility for a range of both direct and indirect carbon emissions within logistic activities.
- From diesel-powered shore-side infrastructure used for moving containers and cranes, as well as non-renewable electricity consumption powering buildings, lighting, and various machinery.
- There are opportunities for decarbonisation using renewable energy sources, optimisation of operations, as well as the integration of smart technologies to streamline delivery of clean energy to docked ships.
- Global connectivity allows real time operations optimisation, SatEO provides monitoring, inputs to digital twins, and accurate positioning allow port automatization e.g. container cranes.
- This sub-theme focuses on initiatives addressing: Optimisation of Port Operations, Dock Electrification, Ports as a gateway to offshore energy, Green fuels storage, distribution, and usage.

Open Date: November 2024

New: PORT WORKING GROUP

1. To facilitate exchange of methods, tools and knowledge among port authorities and port stakeholders with the objective of enhancing the performance, digitalization and development of ports thanks to the added value of space assets and digital technologies

2. To develop strategic partnerships among key players in supply chain, energy, transport, logistics and other port related industries. To foster synergies with other working groups, e.g. ESA BASS Task Forces on smart cities and energy, identifying common challenges for dedicated actions

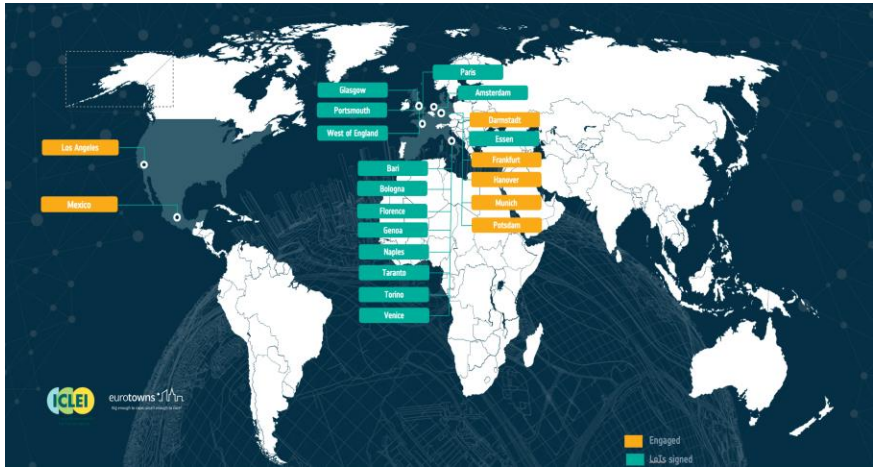
3. To foster the initiation and delivery of innovative space applications, including development, pilot and scaling of space solutions for a safe, sustainable and green maritime port sector

4. Monitor the projects outcomes and assess their socio, economic and environmental advantages for the users and the involved industry; identify scaling and growth opportunities

ENERGY TASK FORCE

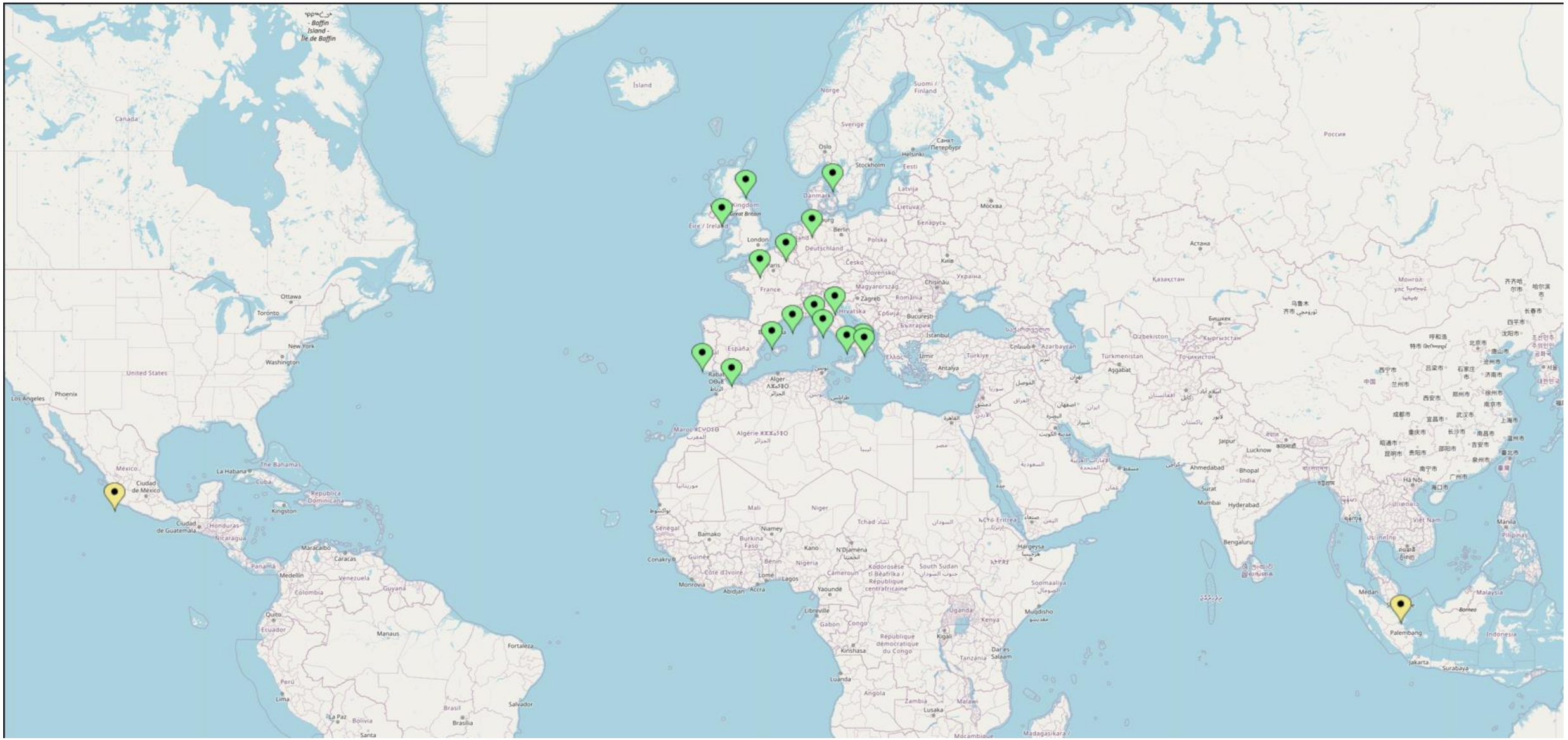
MARITIME TASK FORCE

SMART & GREEN CITIES TASK FORCE



Port Working Group

On-going ports collaborations/engagement



- *Thank You*

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