AGENDA

- WELCOME- 11:00 CET
  - Rita Rinaldo (ESA)
- LAUNCH EVENT - 11:05 CET
  - Rita Rinaldo (ESA)
  - Emily Gravestock (UK Space Agency)
  - Mohammad Lari (Department for Ditigal, Culture, Media & Sport (DCMS))
  - Jack Harrison (Department for Transport (DfT))
- KEY NOTEL SPEAKERS - 11:15 CET
  - Bill Biggs (Maritime Research and Innovation UK)
  - Trevor Anderson (Belfast Port)
  - Mark Simmonds (British Port Association)
- CALL FOR PROPOSALS SCOPE & Q&A - 11:30 CET
  - Rita Rinaldo (ESA - Overview of scope)
- Q&A

European Space Agency

ESA SPACE SOLUTIONS

The largest space innovation network in the world

- The go-to place for great business involving space to improve everyday life.

- Supporting European start-ups and SMEs to develop businesses using space technology and data.

- Offering funding, business and technical support to help to generate successful business and create jobs.

European Space Agency

ESA SPACE SOLUTIONS

- Zero-equity funding (from €50k to €2M+ per activity)

- A personalised ESA consultant

- Technical support and commercial guidance

- Tailored project management support

- Access to our international network of ESA and partners

- Access to our network of investors

- Credibility of the ESA brand

European Space Agency

MARITIME

HEALTHCARE

TRANSPORT

ENVIRONMENT

AGRICULTURE

MEDIA

ENERGY

EDUCATION

AVIATION

FINANCIAL

SPACE WEATHER

EARTH OBSERVATION

SATELLITE NAVIGATION

SATELLITE COMMUNICATION

HUMAN SPACEFLIGHT TECHNOLOGIES

esa
space solutions

ESA UNCLASSIFIED

European Space Agency

Strategic Partnerships

esa
space solutions

European Institutional Actors

Frontex
EMSA
EU SatCen
EDA
EASA

International Institutional Actors

UNICRI
IOM
Eurocontrol
WWF

Vertical Industry and associations

ENTSO   ENEL
Friends of the Supergrid
CarbonTrust
Indian Energy Storage Alliance
OneSea Alliance

National Governments

DCMS (UK)
DfT (UK)
MID (IT)
MISE (IT)
IT Ministry of Education
OPRED (UK)
Traficom (FI)

Technology toppers

Vodafone
AWS

Smart Cities/Regions

Roma
Torino
L'Aquila
Abruzzo
Groningen
Bari

Platforms

Toilet Board Coalition
The Plastic Bank
Mirpuri Foundation
Genius100 Foundation

European Space Agency

Next step…

Space for Smart and Uncrewed Shipping

to foster innovation enabled by space technologies and data

European Space Agency

- Promote the development of sustainable integrated downstream services in <u>the domain of smart shipping and/or uncrewed shipping</u>;

- Develop any necessary innovative space-based technologies such as converged 5G networks and advanced PNT (Positioning, Navigation, Timing),

- Advance the safe integration of uncrewed maritime vessels in the maritime traffic

- Provide pre-operational demonstrations to the prospective users and customers of the proposed services show-casing the benefits deriving from the utilization of space

Space for smart and uncrewed shipping downstream services enabled by 5G and advanced PNT

"Space for smart and uncrewed shipping"

Announcement of Opportunity (AO) aims to support the development of space based downstream services and solutions relying on advanced technologies such as 5G and PNT (Positioning, Navigation and Timing) in the smart and uncrewed shipping domain.

Discussions held with several stakeholders:

Germany, UK, Finland and Italy
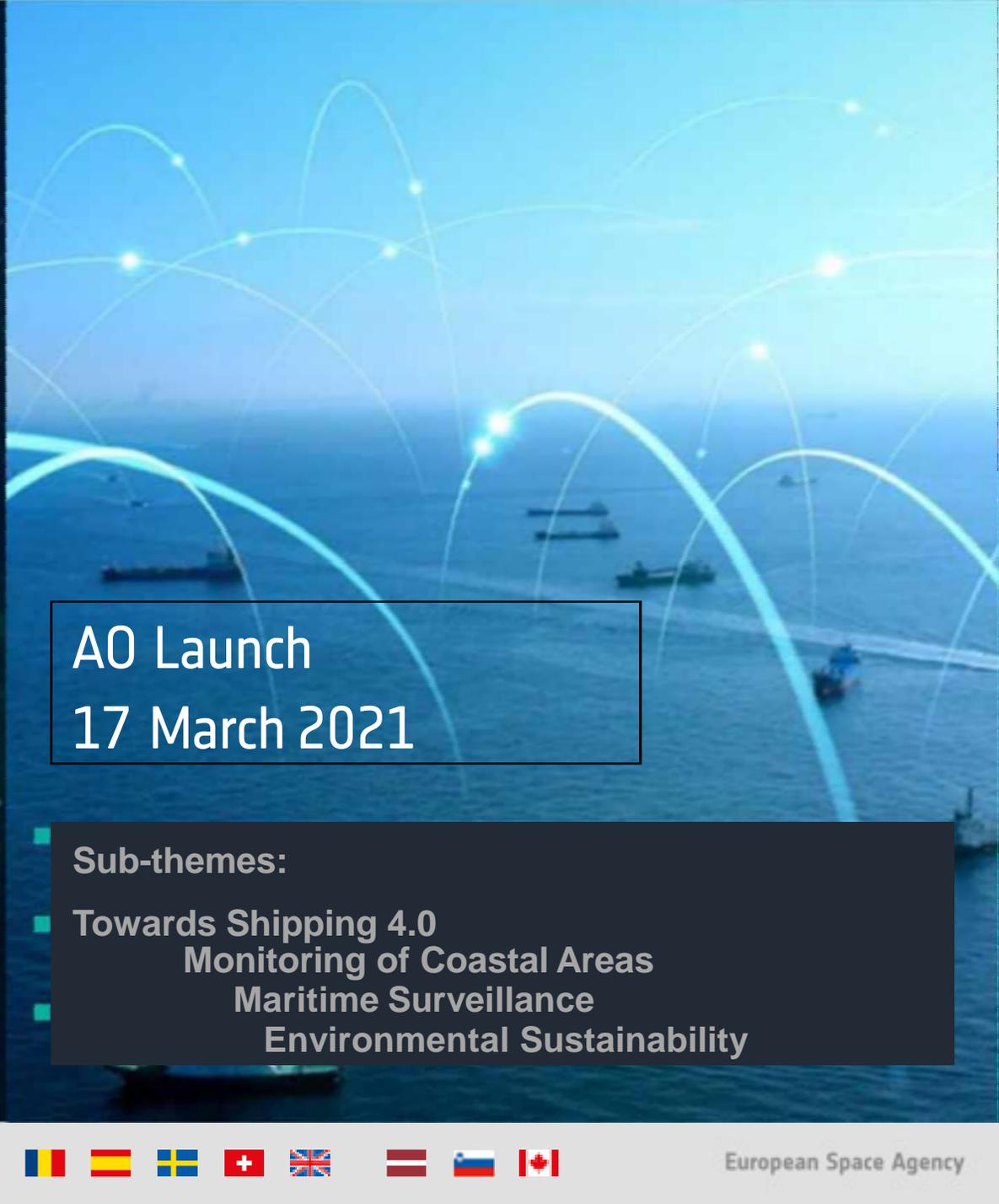
AO Launch
17 March 2021

Sub-themes:

Towards Shipping 4.0
Monitoring of Coastal Areas
Maritime Surveillance
Environmental Sustainability

Space for smart and uncrewed shipping: Use Cases

Sub-theme 1: Towards Shipping 4.0

• Digitalization of maritime services and data platforms at sea and ports
  • Developing predictive and digital maintenance solutions
  • Support to efficient remote operations at sea
  • Uncrewed shipping for inland waters and short term shipping
• Safe autonomous navigation and operations of uncrewed vessels

Sub-theme 2: Monitoring of coastal areas

  • Detection and monitoring of threatened coastal areas
  • Monitoring land and water infrastructure in coastal areas
 • Mitigating climate change impact risks along coastlines

Sub-theme 3: Maritime surveillance

  • Surveillance of maritime traffic
  • Detection of illegal actions related to illegal fisheries
  • Detection of oil-spilling and environmental pollution

Sub-theme 4: Environment sustainability

  • Impact of weather and current data on navigational footprint
  • Reduction of emissions and environmental footprint of maritime transport
  • Monitoring of marine-protected areas – preservation of biodiversity

Enablers:

➢ Secure converged 5G networks
➢ Precise navigation
➢ Situational awareness data
➢ AI/machine learning, Blockchain
➢ Robotics
➢ Micro constellations

→ THE EUROPEAN SPACE AGENCY

Possible applications include:

Digitalization of maritime services and data platforms at sea and ports

> ➤ Near real-time monitoring of port capacities and capacity-oriented statistical analysis of container ports, with the help of frequently updated high-resolution EO imagery that is interpreted by machine learning, to identify the number of shipping containers in the picture and used as input to statistical algorithms.

- Predictive and digital maintenance solutions

- Support to efficient remote operations at sea

> ➤ Real-time monitoring of cargo in individual containers, using cargo-specific sensors (temperature, humidity, motion, etc.) exploiting as example on blockchain-protected satellite link to transmit their data

European Space Agency

Towards Shipping 4.0: Digitalization at Sea and Ports

Possible applications include:

- Uncrewed shipping for inland waters and short term shipping

- Safe autonomous navigation and operations
  - ➢ Remote monitoring and operation of autonomous vessels, by combining blockchain-secured 5G with satellite links as well as using satellite positioning to achieve accurate and reliable navigation. Correspondingly, prevention of ship collisions in densely trafficked shipping lanes, by continuously monitoring the position and course of vessels, and externally inducing course corrections if necessary.

European Space Agency

Monitoring of coastal areas

Possible applications include:

- Detection and monitoring of threatened coastal areas

- Monitoring land and waterinfrastructure in coastal areas

- Mitigating climate change impact risks along coastlines

Maritime Surveillance

Possible applications include:

- Surveillance of maritime traffic
- Detection of illegal actions related to illegal   fisheries
- Detection of oil-spilling and environmental pollution

eesa
space solutions
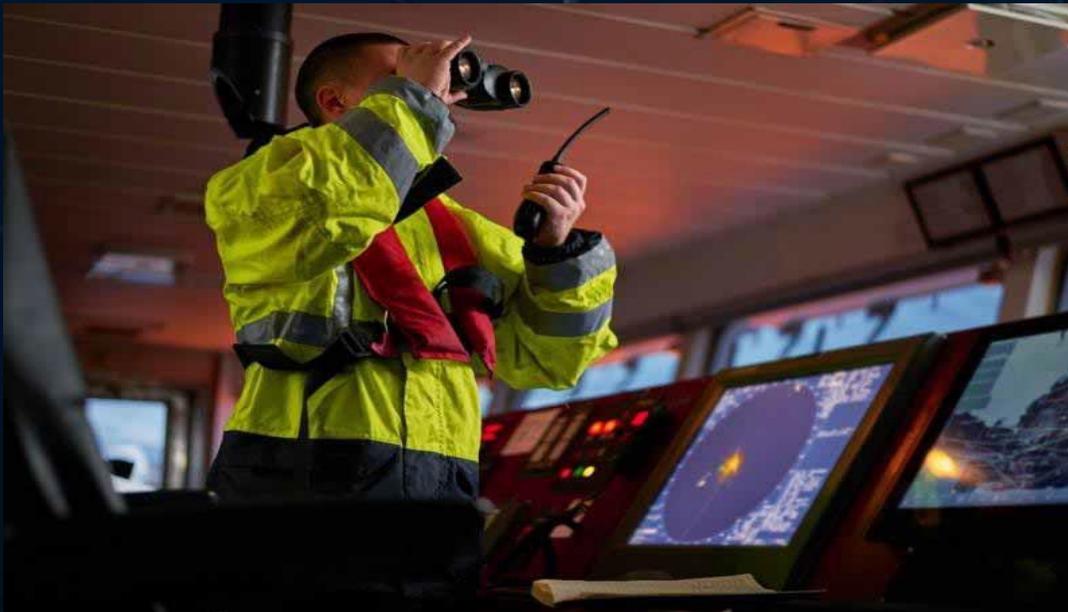
Possible applications include:

- Impact of weather and current data on navigational footprint

- Reduction of emissions and environmental footprint of maritime transport

- Monitoring of marine-protected areas – preservation of biodiversity

European Space Agency

Role of 5G

- Provision of low latency, high reliability data to support autonomous shipping

- Provision of high throughput data for remote piloting through travel corridors requiring it

- Support to port operations/logistics and surveillance through digital twins, massive IoT device (sensors, cameras...) network connectivity

- Support to port operations through robotics, automation and remote control

- Cargo/goods tracking and state monitoring

- High throughput data for AR/Immersive Reality construction support and/or maintenance

European Space Agency

The Power of Space

Advanced PNT

- Provide positioning, navigation and tracking capabilities to vessels, cargo and relevant machinery utilised at ports.

5G/Satellite Communications

- Provide connectivity to vessels out of range of terrestrial connectivity means.
- provides broadband internet, voice over IP, real-time video and reliable communications.
- Act as a back-up to terrestrial communications.

Earth Observation data

- Detecting and monitoring environmental impact such as coastal erosion, effects of dredging, water quality and pollutant output.
- Surveys of protected areas to ensure the safety of marine animal populations (with respect to shipping operations).
- Mapping, radar and bathymetry data to support navigation, and as input to shipping simulation models.

Department for
Digital, Culture,
Media & Sport

Mohammad Lari

Head of Cross-Government &
International Coordination

5G TESTBEDS & TRIALS PROGRAMME
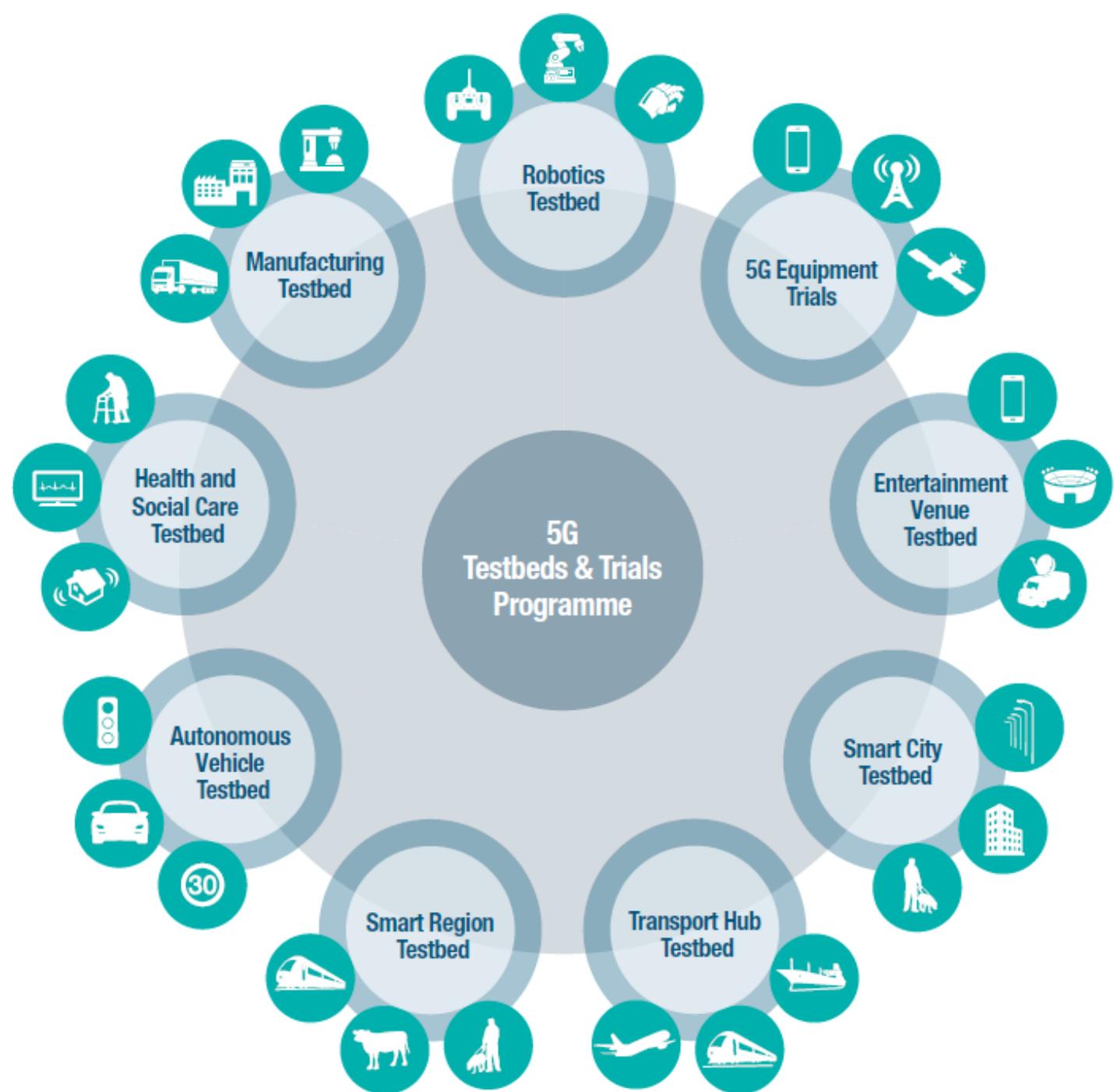
UK5G Innovation Network

4000+
Users

1600+
Organizations

UK5G is a 'network of networks' to facilitate, encourage and coordinate 5G activities across the UK.
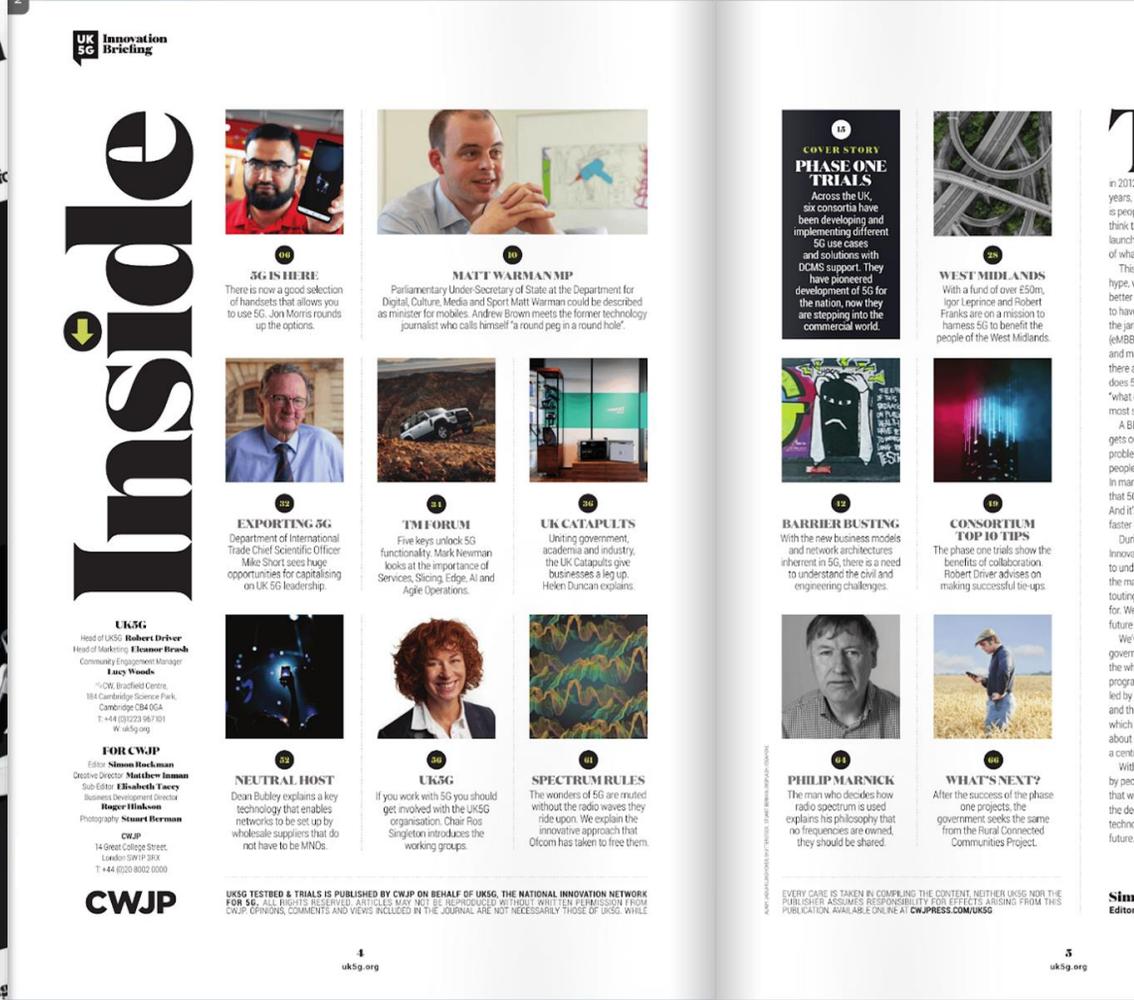
(Electronic copies available UK5G.org)

CW CONNECTING THE DIGITAL WORLD

UKRI Innovate UK

tmforum

Department for
Digital, Culture,
Media & Sport

Thank you

Mohammad Lari

Head of Cross-Government & International Coordination

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UK5G Innovation Network

https://uk5g.org/

Maritime
Research and Innovation
UK

Bill Biggs

info@marri-uk.org

Background to MarRI-UK

- As an island nation with a long seafaring tradition, the UK has an enviable heritage in technology and innovation in the Maritime Sector.

- Maritime research and innovation is fragmented and incoherent

- Other sectors have created centres or hubs to coordinate research that attract significant levels funding

- The Maritime 2050 strategy provides the UK with a real opportunity to regain a position as a leading innovator in maritime science and technology.

- MarRI-UK was initiated some years ago to address these challenges and provide a focus for R&I in the sector bridging academia, industry and government

Who we are

- MarRI-UK is a collaborative partnership between industry, academia and government formally established in July 2019

- Created to tackle innovation and technology challenges in the Maritime Sector.

- MarRI-UK is an open consortium, it is aimed at attracting Government investment into the maritime sector for innovation by demonstrating industry/academic willingness to cooperate and co-invest.

- Core team hosted at the University of Strathclyde

Our Aims

Provide a focus for Research and Innovation collaboration across the UK Maritime Sector:

1. Embed a culture of coherence and collaboration across the UK's Maritime Research & Innovation ecosystem

2. To drive the strong integration between industry, representative organisations and academia.

3. To amplify and develop rather than duplicate existing organisations.

4. Engage in multi-disciplinary research to achieve effective solutions

5. Focus on delivering demonstratable innovations that address the 'valley of death' between 'discovery and research' and 'commercialisation;

6. To accelerate technological innovation, optimising impact across the sector and in adjacent sectors;

7. To develop innovation leadership across the sector
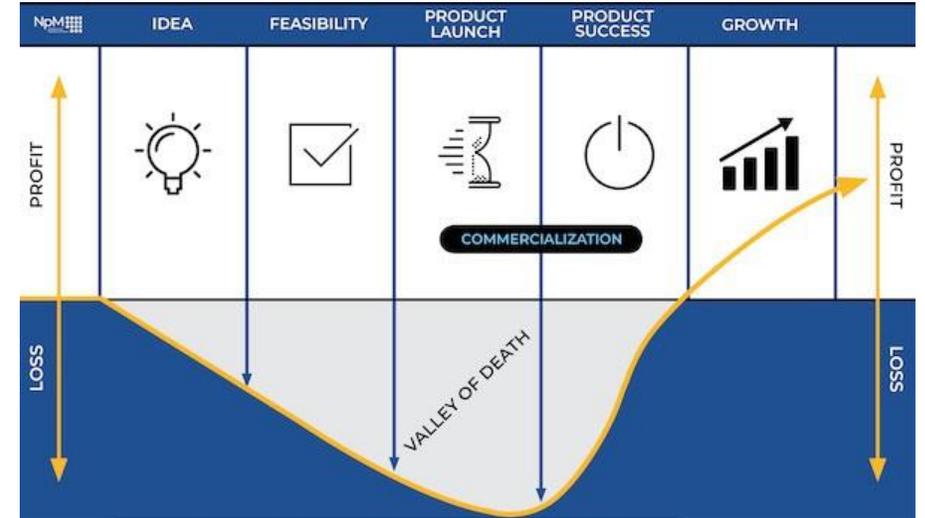
Research and Innovation Priorities

Maritime Autonomy

Clean Maritime

Design and Build (Including Integration)

Support Cost Reduction

Data and Decision Support

Socio-technical interaction

Discussion

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a port for everyone

Belfast Harbour
A Vision to 2035

Smart Ports

Belfast Harbour

- Handles two thirds of NI's trade

- 10th largest UK port by cargo

- Large Estate

- 8km of quays, 30km roads

- 700 businesses, 27,000 people

- 5 million tourist and leisure visitors

Smart Port within Our Strategy

1. WORLD'S BEST REGIONAL PORT
2. A GREEN PORT
3. A KEY ECONOMIC HUB
4. A SMART PORT
5. AN ICONIC WATERFRONT FOR THE CITY

Supporting our journey to be the World's Best Regional Port unlocking, new levels of agility, productivity and value generation for the Harbour and its Stakeholders through partnership, innovation, processes & technology

- Key enabler of our strategic ambitions

- Opportunity to partner with Belfast City

- Leverage the Harbour Estate as a testbed

- Stimulate the local knowledge
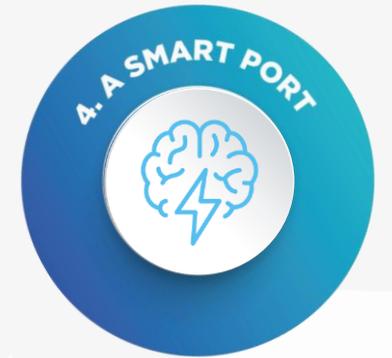
Technologies in current scope

A Vision to 2035: **A Port for Everyone**

4. A SMART PORT

Cyber

Digital Twin

Mobility

Cloud Computing

Big Data

Artificial Intelligence

Internet of Things

Port Community System

Connectivity

5G
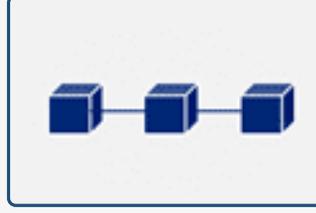
Automation

Enterprise Applications
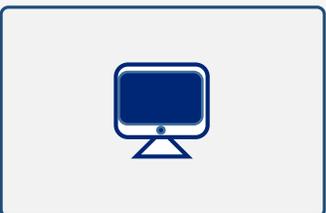
CCTV

VR / AR

Drones

Design

BIM

Digital Priorities

- Wireless Connectivity

- Mobility solutions

- Internet of Things and Environmental Sensors

- Digital Twin and GIS modelling and visualisation

- Automation and Autonomous equipment

- Information sharing across the wider Port Community

Mark Simmonds

Director of Policy & External Affairs

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Ports handle 95% of UK trade

Ports play a critical role in keeping the country supplied and facilitating world trade. As globalisation and international trade increases ports will need to facilitate more trade whilst reducing their impact on the environment.
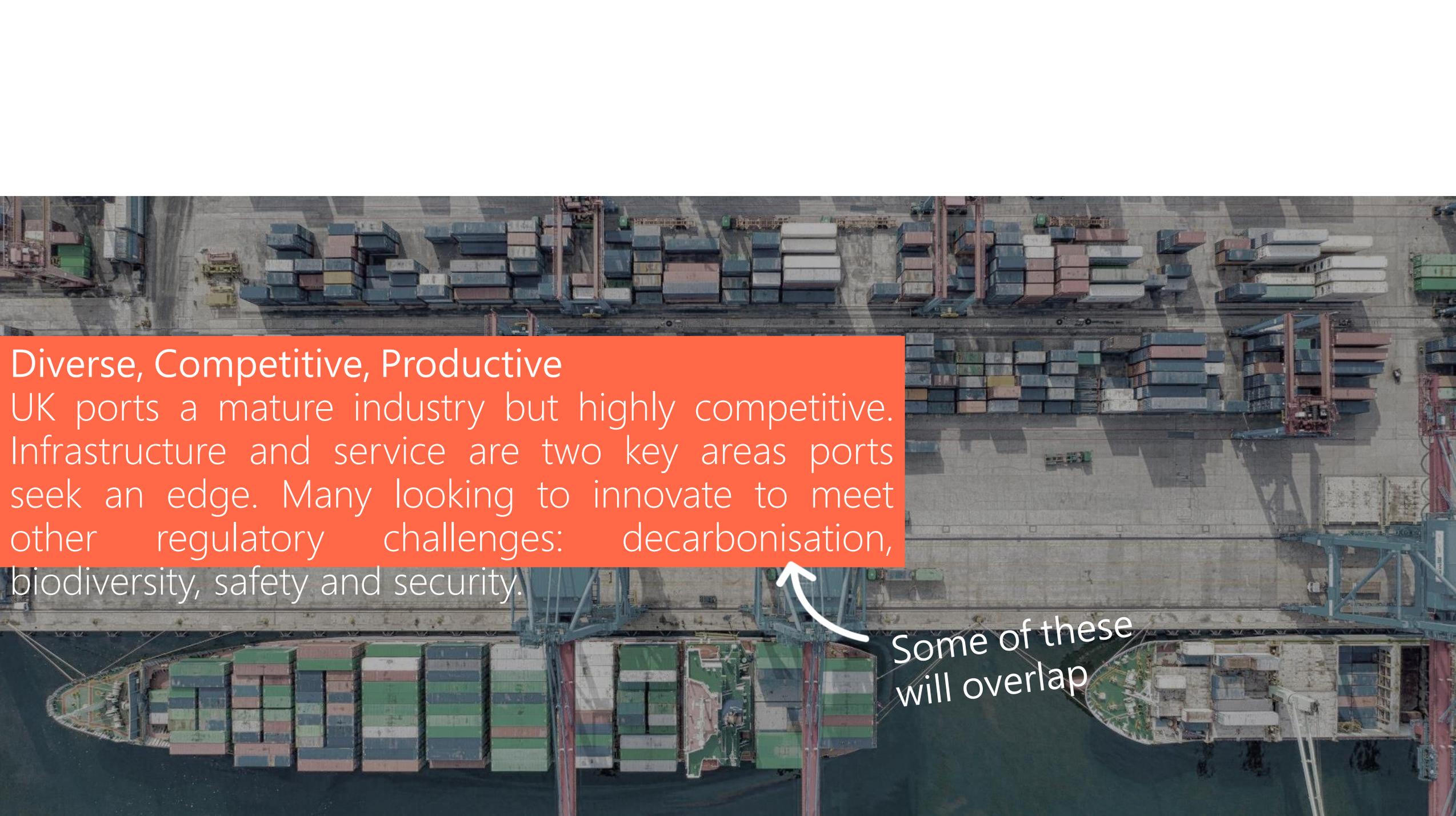
Diverse, Competitive, Productive
UK ports a mature industry but highly competitive. Infrastructure and service are two key areas ports seek an edge. Many looking to innovate to meet other regulatory challenges: decarbonisation, biodiversity, safety and security.

Some of these will overlap
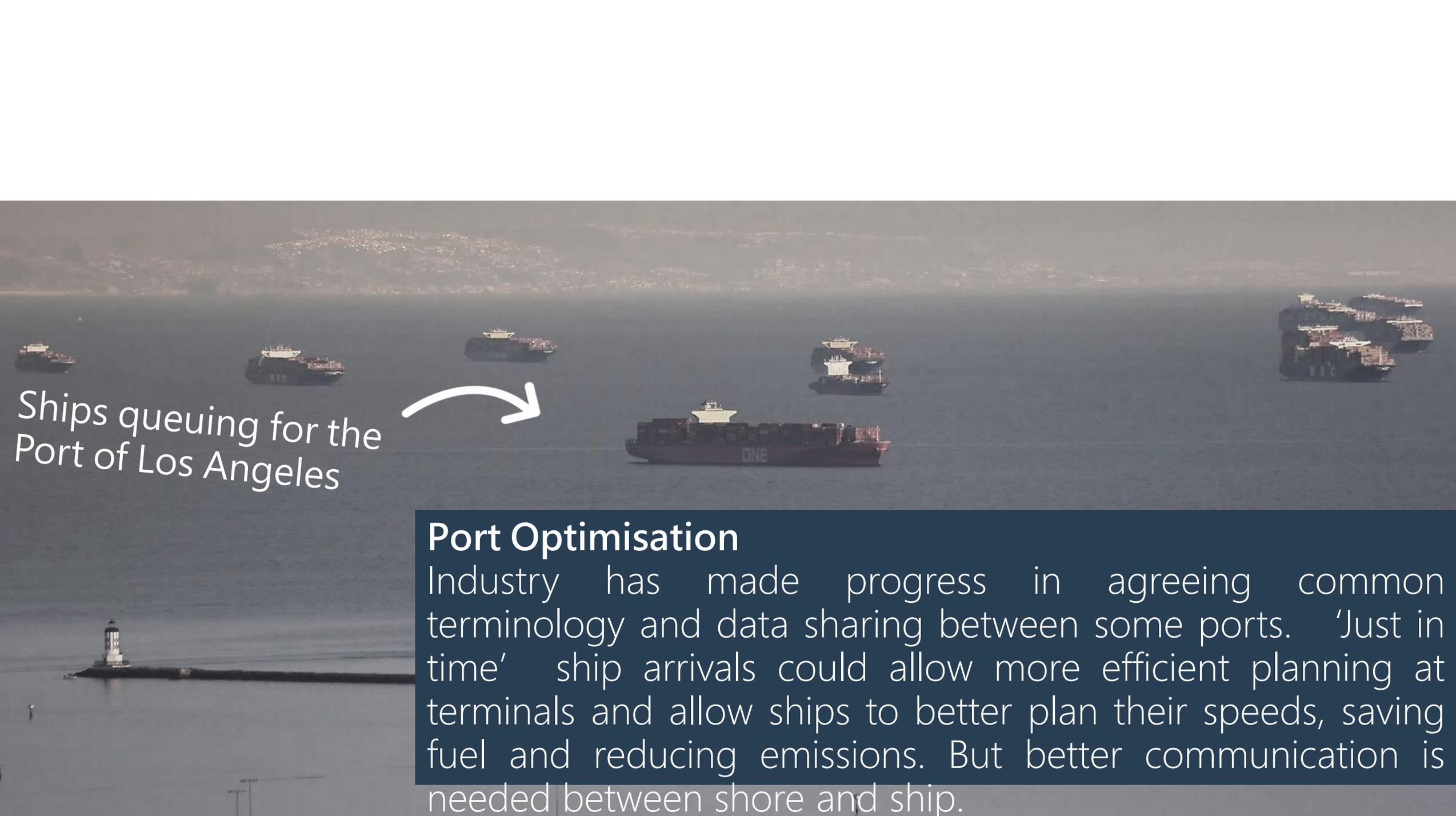
Ships queuing for the Port of Los Angeles

Port Optimisation
Industry has made progress in agreeing common terminology and data sharing between some ports. 'Just in time' ship arrivals could allow more efficient planning at terminals and allow ships to better plan their speeds, saving fuel and reducing emissions. But better communication is needed between shore and ship.

MV Wakashio
Ran aground and broke up off the coast of Mauritius. The vessel reportedly came too close to the coast searching for a better wifi signal

Navigational Safety

Most port authorities primary function is to conserve navigational channels. Ever-larger vessels and ever-tightening regulations mean every metre of depth counts.

Could space-derived bathymetry complement ports' efforts to monitor water depth and shifting sediments?

Improving Sustainability
Ports have big ambitions for reducing their environmental footprint and have a clear role in supporting the transition to greener shipping, but there are huge challenges.

Shipping already <u>by far</u> the most carbon efficient way to move freight

One trillion dollar challenge
Recent estimates say it will cost $1tn to decarbonise shipping

Emissions
Ports across Europe under significant pressure to do more to lower emissions from ships – both greenhouse gas emissions and other environmental pollutants such as sulphur and particulates. Remote monitoring of air and sea emissions from ships could help.
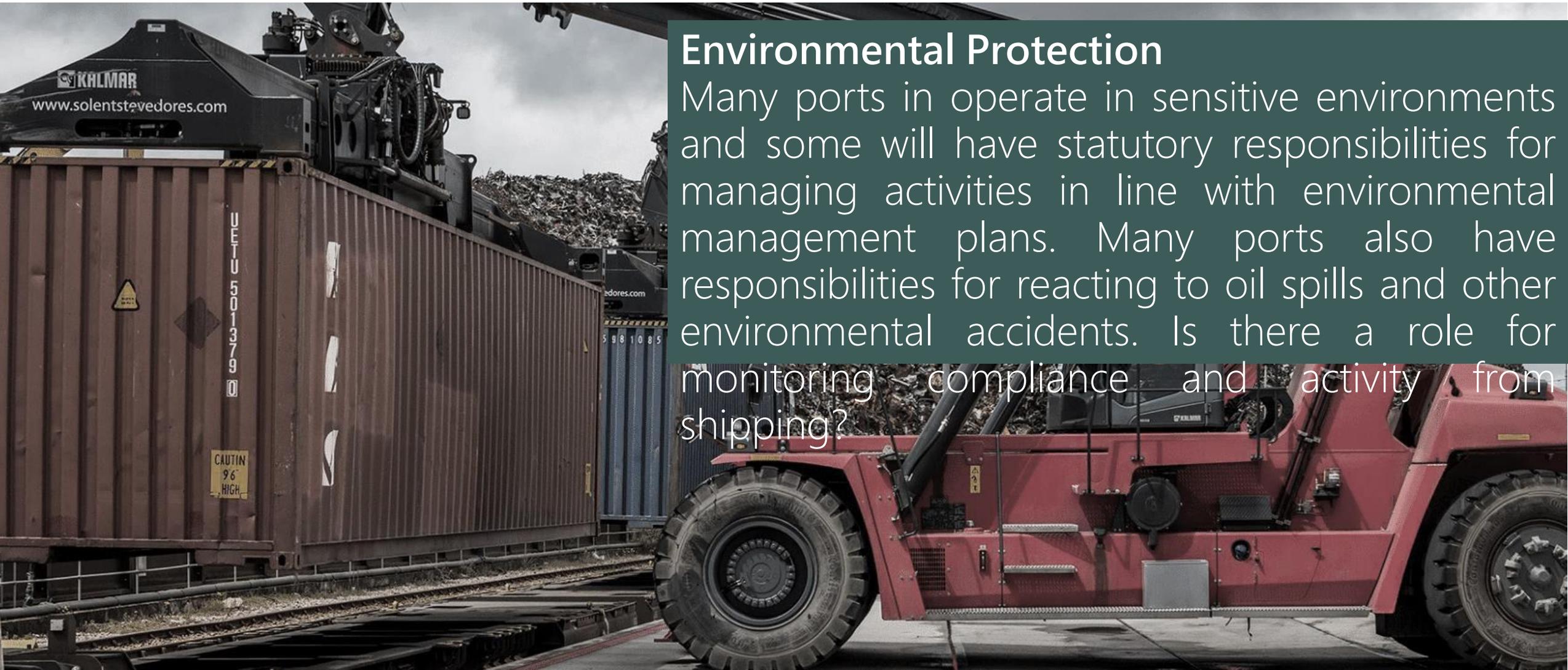
Environmental Protection
Many ports in operate in sensitive environments and some will have statutory responsibilities for managing activities in line with environmental management plans. Many ports also have responsibilities for reacting to oil spills and other environmental accidents. Is there a role for monitoring compliance and activity from shipping?

Energy Infrastructure

Ports are increasingly hubs for renewable energy generation and bases for offshore development and maintenance. Is there a role in supporting remote operations?
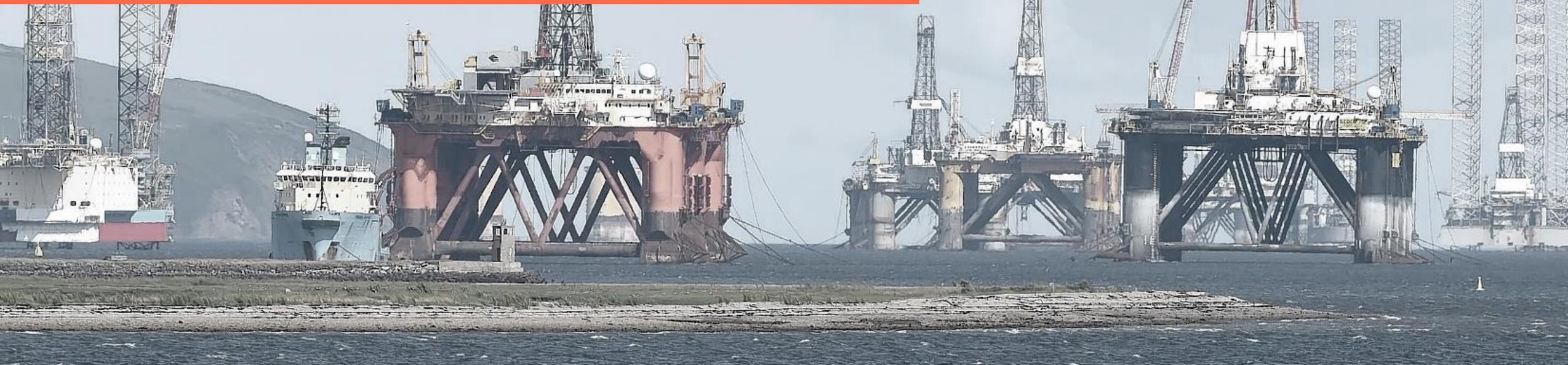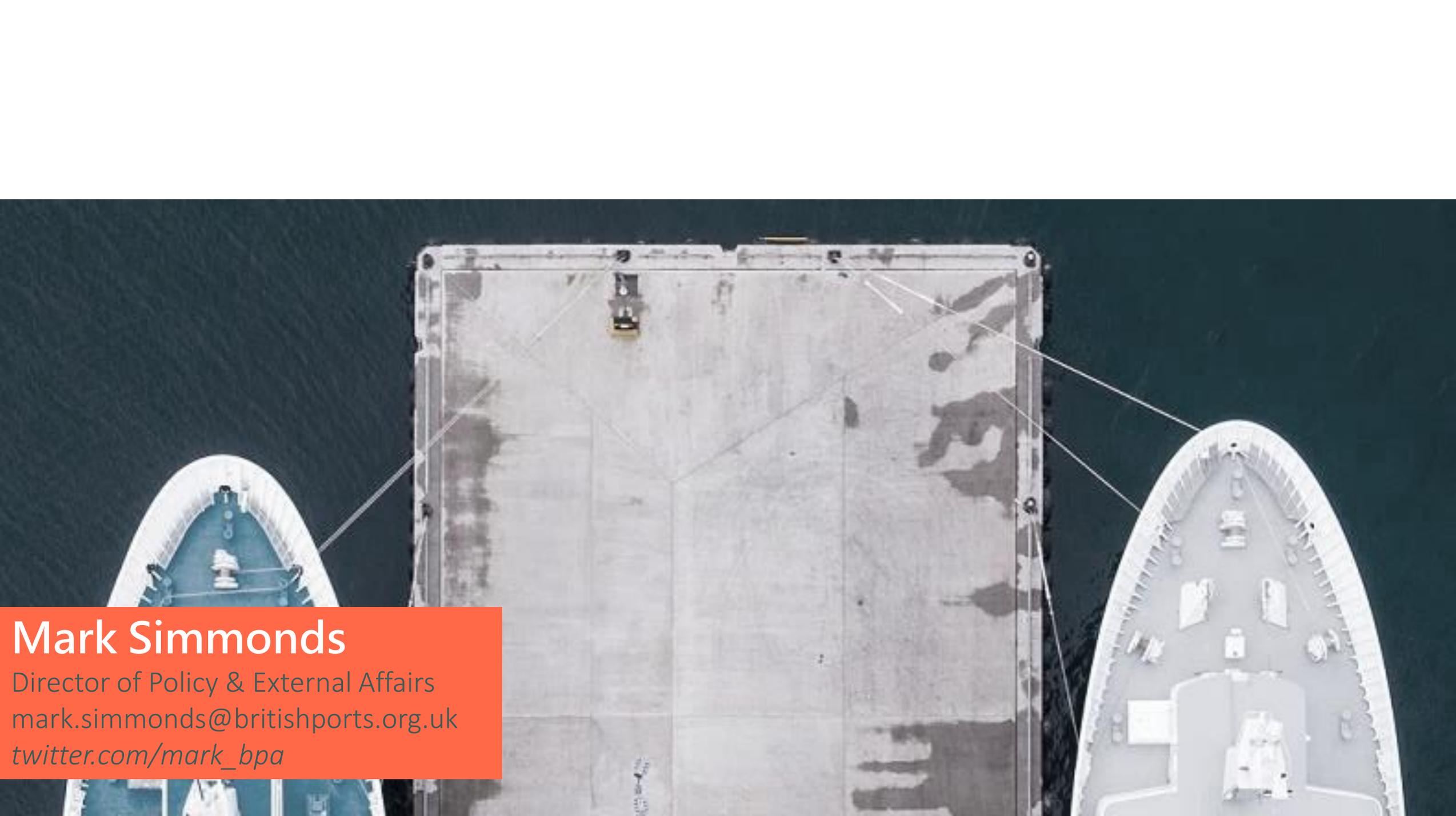
Mark Simmonds

Director of Policy & External Affairs

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How to apply:
Funding and Tender Information

ESA AO INFORMATION

- Funded participation is open to any company and/or organisation, be it as group of users, public body or non-governmental organisation, that have subscribed to BASS GPL or to the 5G SPL.

Smart and Uncrewed Shipping : first wave timeline

ACTIVITY	ESA PROJECT FUNDING (UP to % of ELIGIBLE COST)
Demonstration Project	50%** (BASS)

AO Open: 17th March → OP submission close: 15th June → FP submission close: 15th September

European Space Agency

BASIC PRINCIPLES - ESA-STAR

Registration (minimum 'light registration') on ESA-STAR Registration (https://esastar-emr.sso.esa.int)

Please note that esa-star allows two levels of entity registration: "Light" and "Full". This allows new users wishing to do business with ESA to carry out their registration in two steps. A "Light" registration will grant access to all esa-star services up to and including proposal submission. The award of ESA contracts requires "Full" registration.

- For more information, please visit :

business.esa.int

THANK YOU!

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