# *Delineating MASS from conventional automation*

**IMO Seminar on Development of a Regulatory Framework for Maritime Autonomous Surface Ships (MASS)**
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MINISTRY OF TRANSPORT AND COMMUNICATIONS

# Outline of the presentation

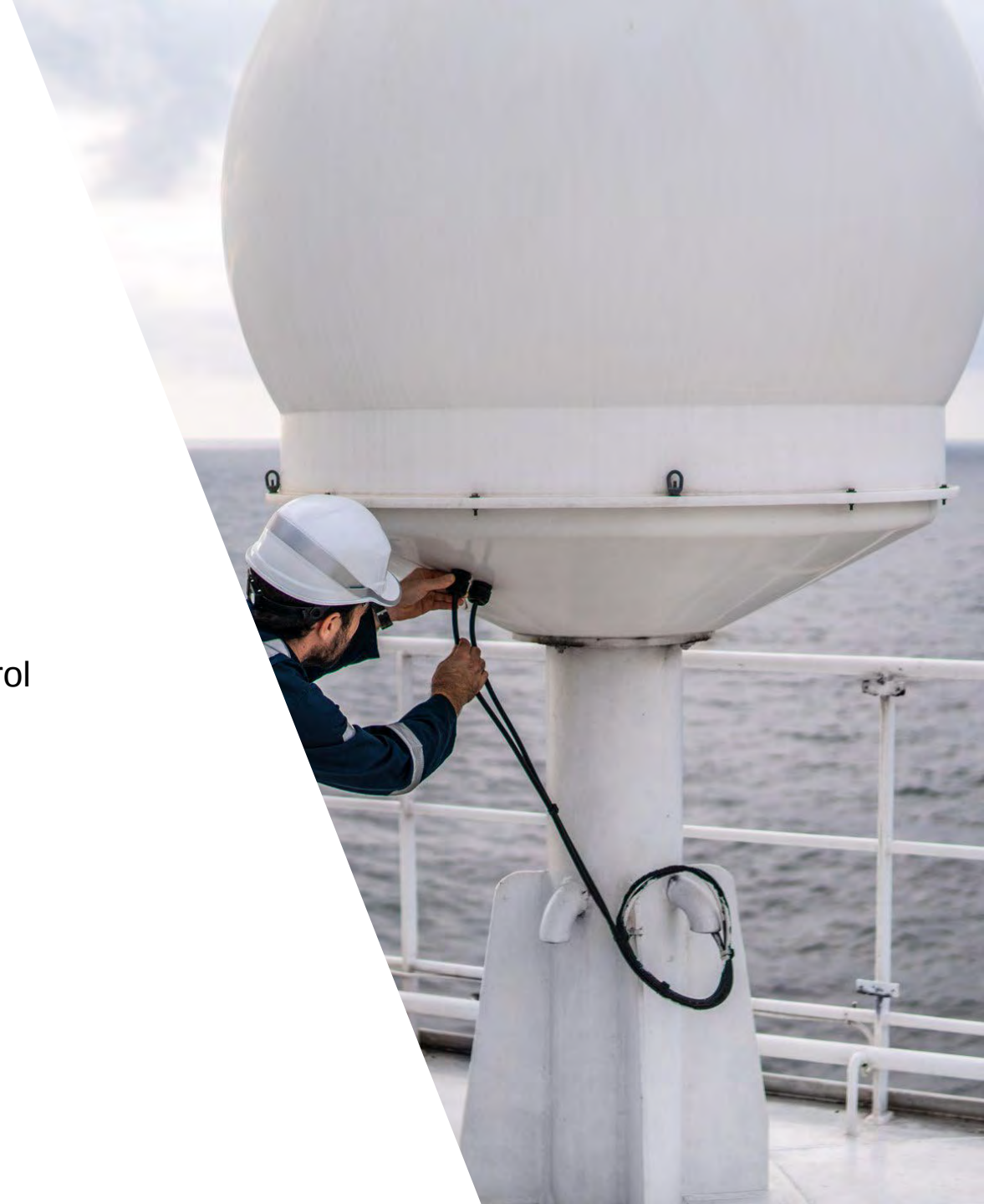
- What Do We Talk About, When We Talk About MASS concept in the context of MASS Code in order to determine its scope?
- Let’s be realistic with the incremental process of technology adaption, new use cases and human-machine interface
- Safe coexistence with MASS and conventional ships and MASS infrastructure
- An Example: From Electronic Lookout Function to common situational awareness – towards intelligent fairways
- Tools to enable trust are essential

# What Do We Talk About, When We Talk About MASS concept in the context of MASS Code?

- We need to have a common understanding on MASS concept in order to determine the scope of the MASS code

- MASS  in relation to technology in use today and in future and in relation to other vessels and MASS infrastructure in the future
- What is the level of automation that will trigger the need for and application of the future MASS Code?
  - Significant automation is already in use in e.g. machinery control and monitoring
  - What new technologies can be taken into use without a MASS Code by amending existing regulation?

-> The level of involvement of humans in decision-making and safe control change between man and machine as a trigger



# Let’s be realistic with the incremental process of technology adaption and human-machine interface

- The adoption of new technologies is an incremental process
- Technological development is ongoing and regulation should make it possible to take up new technologies in a safe, efficient and sustainable manner
- Technology will always work alongside humans performing certain tasks
  - Some ship functions may be more automated than others, there may be automated systems requiring supervision and ships of different automation levels will have to be able to co-exist in same waters
  - A realistic near-future goal: a manned ship supported by remote control station in different functions in varying degrees

# Co-existence of MASS with Conventional Vessels and MASS infrastructure

- MASS should be able to interact with conventional vessels. The level of automation of ships should not be a hindrance for navigation
- MASS should also be able to communicate with shore-based actors such as VTS, fleet management, ports and remote control centers/stations
- Both human-machine and machine-machine interface based on digital data required – standardized communications protocols and ways of forming situational awareness
- MASS should also be capable of voice communication through VHF possibly by relaying radio communications to remote control station
- VTS offering intelligent traffic control, data services and a platform to intermediate data as a trusted third party

# An Example: From Electronic Lookout Function to common situational awareness and intelligent fairways

- Where would the trigger for MASS-Code lie with regard to lookout function?
  - Possibility to improve efficiency, safety and sustainability
  - Seafarer: Better decisions and less fatique
  - A shipping company: reducing manning on watch

1. Using e.g machine vision and augmented reality to support seafarers onboard
   - COLREGs, SOLAS technological requirements

2. Periodically unmanned Bridge
   - STCW requires human watch at all times
   - requires more decision-making by machine and safe control change between machine and human

3. Lookout on a remotely operated vessel using sensors
   - Common situational awareness through sharing sensor information between ships and remote-operator
   - Connectivity, communications and data requirements

- Support of intelligent fairway, also digital ATONs and digital twin – requires standardisation

- Possible first, concrete case developing MASS code?

# Elements of trust as a key to acceptance

- Requirements needed for connectivity, communications and sharing of data

- Goal-based MASS code should include
  - Sharing of information on trial results and developing high-level verification
  - Authorities approval

- Public acceptance develops with trust and concrete examples

# In Summary

- We have to make a decision what we mean by MASS at this stage to be able to make a decision of the scope of MASS code
- The level of involvement of humans in decision-making and safe control change between man and machine as a trigger
- We can continue to develop MASS concept further in future as technologies and user cases evolve and possibly will be proved to improve efficiency, safety and sustainability
- We require to develop and adopt elements of trust
- Lookout function could be a concrete case that evolves in three phases: 1) electronic lookout, 2) periodically unmanned bridge and 3) lookout on remotely-operated ships
- Towards intelligent fairway = ship technologies, digital and physical infrastructure together improve safety but require standardisation

# Thank you!

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