Delineating MASS from conventional automation

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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 fatigue
  - 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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