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# ABB's Stepwise Approach to Autonomy by Viewing a Ship as System of Systems

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# **ABB's Digital Solutions** Some highlights of our offering

- ABB Ability Marine Pilot Control One system for all operational needs that simplifies and optimizes ship control
- Keppel tug a technology demonstrators showing autonomous collision avoidance and remote control
- Remote Diagnostics Systems (RDS) for propulsion, switchboards, power and energy management systems, conditions-based monitoring
- **OVERSEA-** ABB and Wallenius Marine have established a joint service for fleet support an integration of shore side services in on board operations
- **OCTOPUS** A platform of software modules complemented by advanced analytical services.

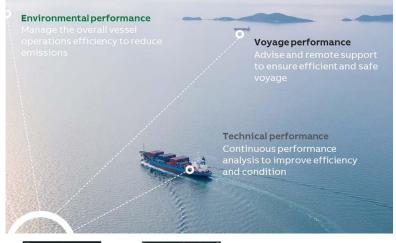






Monitoring

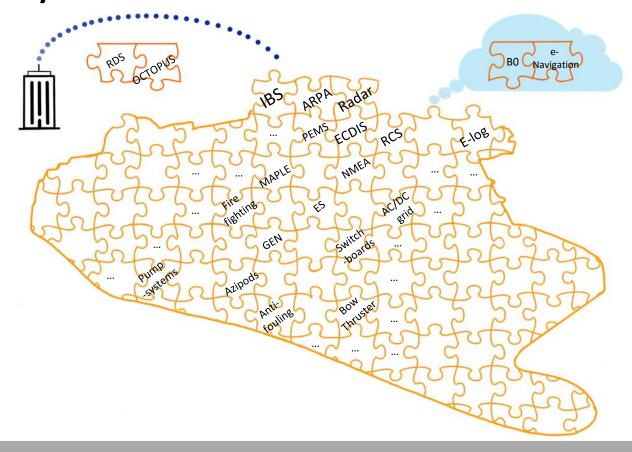
Monitoring





Forecast

## A Ship is a System of Systems



The increased complexity of integrated systems requires

- 1) more shore-based support services
- 2) understanding of the user experience to ensure safe operations

Technology Concepts



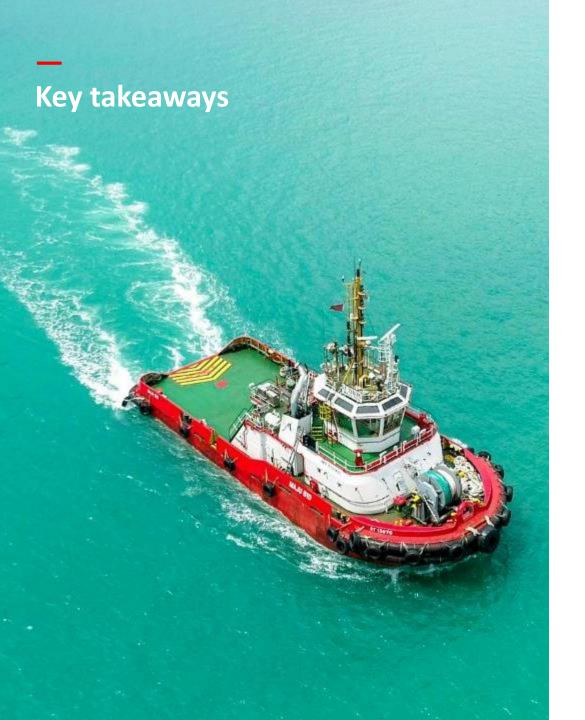
### **Projection of market adoption pathways**

# Deep sea and short distance vessels

203x 2025 2023 Level 2 Level 1 Level 3 Level 4 **Assisted Partial Conditional** High operation automation automation automation Hands-off (sometimes) Hands-on Eyes-off (sometimes) Mind-off (sometimes) **Conditionally and** Situational awareness **Assisted collision** Certified eperiodically unattended avoidance lookout **Advanced manual control** bridge (B0) Deep sea **Automatic dock-to-dock** Semi-autonomous dock-Remote operations (>1 Remote operations (>>1 to-dock vessel / crew) vessel / crew) **Teleoperation Short distance** MASS code E-lookout E-lookout in MASS code work starts work starts force in force



**IMO** milestones



The technology development evolves system by system. A ship needs to be viewed as: "A system of systems"



As a maritime industry, we need to come together and agree on the same definitions



Autonomous technology has come a long way we still a have a quite a road ahead to reach large-scale commercial applications



The increasing complexity of the integrated systems requires a focus on user experience to ensure safe and effective operations





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