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# Cyber Resilience of Automated and Autonomous Ships

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Modern automation systems on-board ships perform a variety of complex tasks, offering a great range of options for optimizing ship operation. Interaction between on-board computer-based automation systems and between on-board systems and remote monitoring or control stations has become a key factor for successful and economical ship operation, yet demanding high integration, connection, communication, and control of the interacting components.

Complexity and interconnection of computer-based systems on ships however open the possibility for cyber-attacks to affect personnel data, human safety, the safety of the ship, and threaten the marine environment.

It is then necessary to safeguard ships and shipping in general from current and emerging cyber threats adopting countermeasures to make ships cyber resilient.

With the advent of unmanned and autonomous ships (Maritime Autonomous Surface Ships - MASS), several tasks and functions traditionally carried out by humans are becoming blurred. While in conventional ship operation seafarers play a role in all functions and interact with ship's systems and the environment, MASS technologies bring changes in how tasks are carried out and how duties and responsibilities are assigned.

Partially or totally replacing the human element e.g. in decision making processes and/or interaction with traditional automation systems and the environment, MASS technologies bring new specific cyber-resilience and safety challenges that need to be addressed and require new approaches to risk management.

In this article, minimum requirements for cyber resilience of traditional ships are described, based on the work carried out by the International Association of Classification Societies (IACS) and new cyber-related challenges posed by MASS technologies are outlined.

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