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Dealing with novel and emerging threats in the maritime industry: The need for an alternative Life – Cycle Risk Management Framework

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Developments in the maritime industry, such as the increasing size of container and cruise ships, and the automated/autonomous ship concepts, yield technical and operational challenges throughout the life-cycle of ships. New interactions increase complexity, resulting in unforeseeable system states and risk fluctuations. Despite the development of approaches that address some of the limitations of current risk management, the human element and the ship are mostly treated separately with only partial consideration of interactions between risk factors. The main goal of this paper is to introduce a novel framework for managing life-cycle risk in the maritime domain, where the ship and the human factor are viewed as an integrated complex system that is subject to change throughout its life-cycle. The focus is on enhancing the adaptive capability of the system to respond to evolving dynamics and deal with unknown and emerging safety threats. In addition, to avoid potential problem shifting between life-cycle stages, interactions between risk factors and risk propagation are considered. In this context, a change in perspective for maritime safety is also proposed, based on the concept of biomimicry, considering that biological systems typically adapt in a dynamic environment to deal with emerging threats.

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