

Legal Challenges for the Law of the Sea in the Light of Disruptive Technologies

Modular and Autonomous Submarines



Knowledge for Tomorrow



The MUM-2 Project

- MUM = Modifiable Underwater Mothership
- 3 innovative technologies combined in one new kind of ship
 - Autonomous and unmanned navigation
 - Modular structure
 - Underwater navigation
- Deep sea research activities
- Maintenance of offshore energy

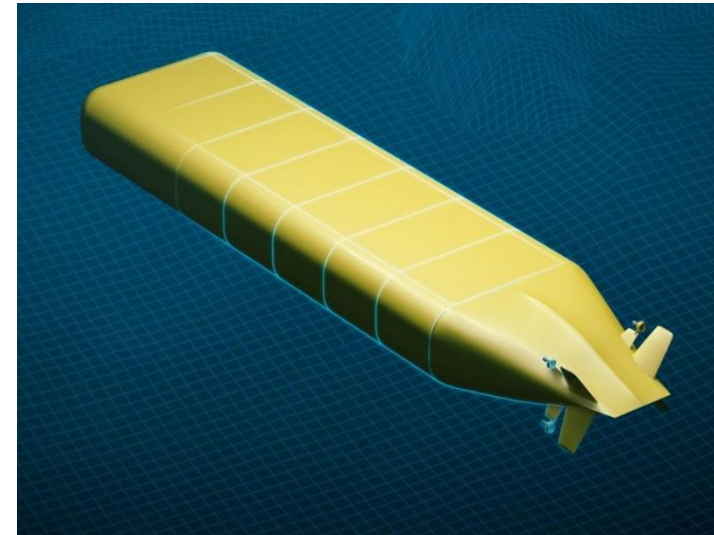


Photo: thyssenkrupp Marine Systems

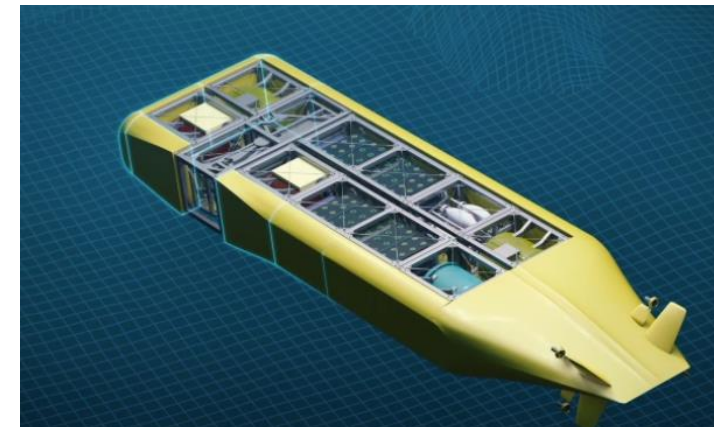


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Autonomous and Unmanned Navigation in the Law of the Sea (1)

- No seafarers or master on board, decision-making process is left to an AI
- Broadly debated in the law of the sea (academics, international organisations, IMO)
- Law of the sea and maritime law consists of treaties between states
 - Some treaties are several decades old
 - Presumption of a reality with seafarers and master on board
- Two examples:
 - United Nations Convention for the Law of the Sea (UNCLOS 1982)
 - Safety of Life at Sea Convention (SOLAS 1974)



Autonomous and Unmanned Navigation in the Law of the Sea (2)

UNCLOS, Art. 94: Duties of the flag State

Section 4: “[Every State shall take measures for ships flying its flag] necessary to ensure:

(b) that each ship is in the charge of a master and officers (...) and that the crew is appropriate in qualification and numbers for the type, size, machinery and equipment of the ship.”

SOLAS, Chapter V Regulation 24: Use of heading and/or track control systems

Section 1: “In areas of high traffic density (...), it shall be possible to *establish manual control of the ship’s steering immediately*“



Modular Design in the Law of the Sea

- Ship modularity is not widely addressed from technical or legal point of view
- “actions towards *subdividing the ship into well-defined parts and components that can later be recombined* according to given rules and procedures” – S.O. Erikstad
- Concept of ship Modularity is possible in three aspects of a ship’s life cycle:
 - Design phase
 - Production phase
 - Operation phase

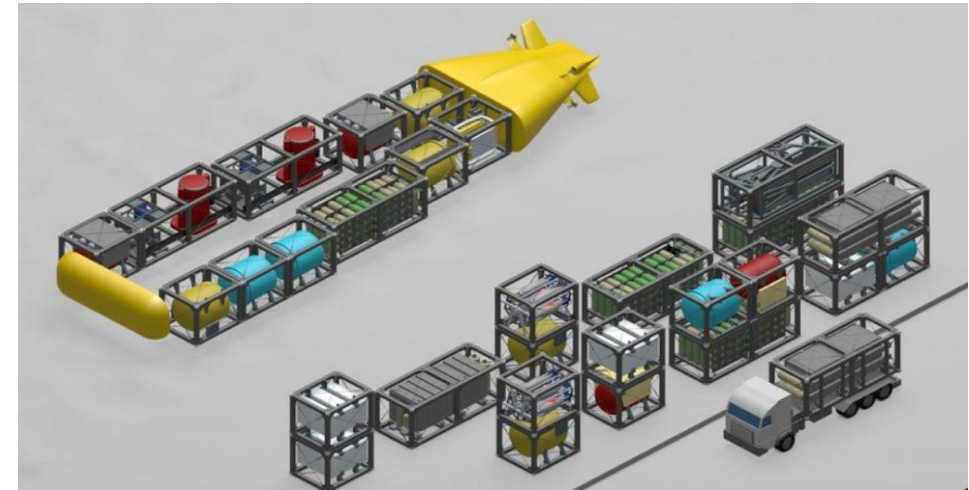


Photo: thyssenkrupp Marine Systems



Submerged Navigation in the Law of the Sea

- Almost no regulations on submarines in the law of the sea
- Existing treaties are incompatible with submerged navigation
 - Not drafted with underwater vehicles in mind
 - Large submarines (> 24m) have not been in use in the civil sector
 - Small ships and warships are exempt from many laws
- Example: Load Lines Convention
 - Load Line Marks = physical indication on side of a ship on how much it can be loaded
 - Otherwise it would sink too deep into the water



Interdependency of the Law and Innovative Technologies (1)

- Innovative technologies creating a new reality do not fit into the legal system
- Two possible ways to move forward
 1. Adapt technological innovation to the legal framework
 2. Adapt the legal framework in the light of disruptive technologies
- Change and Adaption through “Goal-Based Standards”
 - Legal rules only outline objectives to be achieved
 - Detailed means are left to the specific actor



Interdependency of the Law and Innovative Technologies (2)

- Importance of cooperation between natural and legal sciences
 - New technologies must adhere to the legal framework
 - Legal framework must be sufficiently flexible to allow innovation
- Escaping the “vicious cycle”: Cooperation is key
 - New legal framework relies on the details of new technologies
 - Innovative technologies are limited through the current legal framework



Thank you for your attention



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