



Legal Issues Relating to Autonomous and Remote-Controlled Ships

LT Nathaniel Eichler

U.S. Coast Guard

Office of Maritime & International Law

Washington, D.C.

David B. Sharpe

Adjunct Professor of Law – Tulane Law School

Shareholder – Lugenbuhl Wheaton Peck Rankin & Hubbard

New Orleans, Louisiana

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1. What are we talking about?

- a. Autonomous and remote-controlled vessels as distinguished from traditional watercraft.
- b. Autonomous and RC vessels as distinguished from one another.
- c. Taxonomy – four degrees of automation for the IMO Regulatory Scoping Exercise (RSE) (MSC 100/20/Add.1/Annex 2; LEG 106/16/Annex 3):

- **Degree 1:** Some Autonomous Technology

Ship w/ automated processes and decision support: Seafarers are on board to operate and control shipboard systems and functions. Some operations may be automated and at times be unsupervised but with seafarers on board ready to take control.

- **Degree 2:** Remote Operated Vessel, but seafarers onboard

Remotely controlled ship w/ seafarers on board: The ship is controlled and operated from another location. Seafarers are available on board to take control and to operate the shipboard systems and functions.

- **Degree 3:** Remoted Operated Vessel, no seafarers onboard

Remotely controlled ship w/out seafarers on board: The ship is controlled and operated from another location. There are no seafarers no board.

- **Degree 4:** Fully Autonomous Vessel, no seafarers

Fully autonomous ship: The operating system of the ship is able to make decisions and determine actions by itself.

2. What's happening now?

- a. Commercial front
- b. Domestic regulatory front
- c. International regulatory front

3. Commercial developments

- a. Domestic trials
 - i. Metal Shark
 - ii. Gulf Coast Shipyard
 - iii. US Navy trials
- b. International
 - i. *Folgefonn*, self-docking ferry in Norway
 - ii. *Yara Birkeland*, autonomous cargo ship in Norway
 - iii. DNV-GL Guidelines for Autonomous & Remote-Controlled Ships (12 Oct. 2018)
 - iv. Royal Navy trials

4. Domestic regulatory front

- a. University test sites: Michigan Tech and MIT
 - i. Presently being handled by local CG Units / Sectors
 - ii. To date, fairly small scale
- b. Potential future regulatory developments
 - i. MARAD recently issued a "Request for Information" to solicit public opinion on potential MARAD support of autonomous technologies at port facilities
 - 1. 15 responses from port operators, labor organizations, and other interested parties

2. DBS spoke on this subject recently in Southampton, England as part of Tulane Maritime Law delegation at conference on Automation of Shipping
- ii. OIRA has recently requested USCG initiate a Request for Information on autonomous shipping technology
- iii. Expected publication in the Federal Register in 2020
- c. Current Statutes and regulation with impact on Autonomous Vessels
 - Navigation Rules (Inland Nav Rules: 33 CFR Part 83) – mirror concerns as COLREGs; the status of the “lookout” in Rule 5
 - 46 CFR Part 15 – Credentialing requirements (e.g. masters/remote operators)
 - 46 U.S.C. §10101(3) – defines seaman engaged or employed on board a vessel
 - 46 U.S.C. § 8104(d) establishes a 3-watch requirement for a 100GRT merchant vessel at sea
 - 46 U.S.C. § 8104(e) prohibits individual alternating duty b/w deck and engineering departments
 - 46 U.S.C. § 8301 – minimum number of licensed officers
 - 46 U.S.C. § 8902 (Small passenger); § 8903 (freight); § 8904 (Towing) – require licensed operators
 - 46 U.S.C. § 8702 – Sets ratio for A/B to O/S crewmembers
- d. Anticipated Challenges (Known Unknowns)
 - Incorporating Autonomous Operations into Vessel (33 CFR Part 104) and Facility Security Plans (33 CFR Part 105)
 - Counter Maritime Drone Security Policy and Protocols
 - Cyber Security Reporting/Mitigation

- Landside infrastructure – who is going to regulate different components
- Pilotage (Prof. Martin Davies has spoken and written about this recently and continues to do so)
 - No international regulation of pilotage.
 - SOLAS Reg. 23, Chpt. V, addresses pilot ladders and pilot-transfers.
 - But autonomous ships may be designed to be un-boardable to deter pirates and others.
 - In many countries, not even uniform, national regulation of pilotage.
 - In the US, pilotage is governed by a patchwork of federal, state, and local laws
 - In the UK, pilotage requirements are delegated to over 90 different “competent harbour authorities”
 - In China, there are national regulations over competency standards, but 45 pilot organizations and over 1,700 pilots

5. International regulatory front – IMO Scoping Exercise

- a. Introduction to the IMO’s Scoping, a Two Staged Process
 - i. Highlight the major Marine Safety Committee Treaties and Legal Committee treaties being Scoped (e.g. SOLAS, STCW, COLREG, MARPOL, SUA)
 - ii. United States is lead reviewer on STCW
 - iii. United States is one of assisting nations on COLREG

- iv. SOLAS (and its codes) subdivided and different nations have responsibility
- b. IMO Scoping terminology (taxonomy discussed above)
- c. Coding for international comment and discussion of scoped provisions:
 - i. Prevents MASS operations
 - ii. Applies to MASS operations but does not need change
 - iii. Applies to MASS operations and poses potential gap/issue
 - iv. Does Not apply to MASS operations
- d. Example of a Scoped Provision (e.g. COLREG Rule 5 and/or SUA 8bis) demonstrates the process for Stage 1 of the RSE and highlights the challenges:
 - i. Potentially shifting role or identity of the ship's "Master"
 - ii. Role of the "Remote Control Operator" and
 - iii. Who constitutes a "seafarer"?
- e. Describe Stage 2 of the RSE
 - i. Comments & Responses
 - ii. Negotiations and Consensus

6. What's next?

- a. Technology improvements in the private, commercial sector
- b. Product of IMO Regulatory Scoping Exercise
- c. Mechanisms for dealing with concerns:
 - i. Do nothing?
 - ii. Interpretative guidance documents?
 - iii. Potential amendments?
 - iv. New codes?