

**INNOVATION ON THE WATERFRONT—THE REGULATION OF
AUTONOMOUS AND REMOTELY CONTROLLED COMMERCIAL
VESSELS¹**

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INTRODUCTION

The use of autonomous and remotely controlled vessels will certainly revolutionize the commercial shipping industry. Yet, regulatory and legal compliance will create challenges as autonomous and remotely controlled ships are routinely used in the context of commercial shipping and the global transportation of cargo. Several of the legal issues that may impact autonomous shipping are discussed below including (i) statutes and treaties for the common carriage of cargo; (ii) environmental concerns; (iii) marine insurance; (iv) regulations of commercial shipping; (v) liability to seafarers; and (vi) construction and design of commercial vessels. Accordingly, it is likely that the myriad of statutes, treaties, and regulations governing commercial shipping will be amended and that new legislation will be necessary to adapt to the exciting changes on the horizon.

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I. Legal Considerations of the Commercial Shipping Industry.

A. The Critical Importance of the Shipping Industry in World Trade.

The shipping industry is an indispensable element of global trade. The United Nations Conference on Trade and Development (“UNCTAD”) reports that 80% of all cargo in global trade by volume and 70% of all global cargo by value is transported by the shipping industry.³ In a 2018 review of maritime trade, UNCTAD referred to “*maritime transport*” as the “*backbone of international trade and the global economy*.”⁴ The International Chamber of Shipping (“ICS”) reports that approximately 11 billion tons of cargo are carried aboard commercial ships every year. The cargo transported across the world by commercial ships includes consumer goods as well as bulk cargo in vast quantities.⁵ Moreover, commercial shipping is an affordable mode of transport and the shipping industry has “*sophisticated logistics chains*.”⁶ The World Economic Forum (“WEF”) reports that over the past 20 years, the size and carrying capacity of many container ships has increased dramatically.⁷ Accordingly, maritime transport of cargo is integral to world trade.

B. Commercial Shipping and Cargo Carriage Is a Highly Regulated Industry.

All aspects of commercial shipping and common carriage of cargo in the United States are governed by statutes and federal regulations. For

³ UNCTAD, Review of Maritime Transport, <https://unctad.org/webflyer/review-maritime-transport-2018> (last visited Dec. 20, 2022).

⁴ *Id.*

⁵ ICS, “Shipping and world trade: driving prosperity,” <https://www.ics-shipping.org/shipping-fact/shipping-and-world-trade-driving-prosperity/> (last visited Dec. 20, 2022).

⁶ *Id.*

⁷ WEF, “Our economy relies on shipping containers. This is what happens when they’re ‘stuck in the mud’,” (Oct. 1, 2021, <https://www.weforum.org/agenda/2021/10/global-shortage-of-shipping-containers/>). In fact, the WEF reports some of the largest sailing ships today have a

example, the rights and duties of shippers of cargo aboard common carriers who issue a bill of lading for international voyages either originating from or arriving in the United States are controlled by the *Carriage of Goods by Sea Act* (“COGSA”), 46 U.S.C. § 30701.⁸ COGSA is a codification of the *International Convention for the Unification of Certain Rules relating to Bills of Lading, and Protocol of Signature* known as the Hague Rules of 1924.⁹ All bills of lading issued by a common carrier are controlled by the *Federal Bills of Lading Act*, 49 U.S.C. §§ 80101 – 80116. The *Shipping Act of 1984*, 46 U.S.C. §§ 40101, *et. seq.*, as amended by the *Ocean Shipping Reform Act of 1998* (“OSRA”) Pub. L. 105-258, 112 Stat. 1902, governs Vessel Owning Common Carriers (“VOCC”), Non-Vessel Owner Common Carriers (“NVOCC”), Shipper Associations, Ocean Transportation Intermediaries (“OTIs”), and publication and filing of ocean transportation rates. The Surface Transportation Board (“STB”)¹⁰ has regulatory authority over water carriers in domestic trade. The Federal Maritime Commission (“FMC”) is an independent agency that regulates terminal operators, ocean common carriers, as well as freight forwarders.¹¹

The design, construction, and operation of United States vessels is controlled by Title 46 of the United States Code in §§ 3101 through 4501 and

carrying capacity of 24,000 containers. WEF states that \$14 Trillion of cargo in global trade has been transported by containers.

⁸ COGSA was previously codified in 46 U.S.C. §§ 1300 – 1315.

⁹ The Hague Rules were amended in 1931, 1977, and 1982 and now are referenced as the Hague-Visby Rules. The *United Nations International Convention on the Carriage of Goods by Sea Act adopted in Hamburg in 1978* resulted in the *Hamburg Rules* which became effective on November 1, 1992. The United Nations Conference on Trade and Development (“UNCITRAL”) promulgated the *Convention on Contracts for the Carriage of Goods Wholly or Partly by Sea* in 2008 for the purpose of synthesizing laws of maritime nations in international trade. The *Rotterdam Rules* are not yet in effect.

¹⁰ STB, <https://www.stb.gov/> (last visited Dec. 20, 2022).

¹¹ FMC, <https://www.fmc.gov/about-the-fmc/> (last visited Dec. 20, 2022). The stated mission of the FMC is to “ensure a competitive and reliable international ocean transportation supply

the applicable regulations. The United States Coast Guard of the Department of Homeland Security maintains an Office of Design and Engineering Standards (“CG-ENG”) for the purpose of developing and promulgating national design standards. The CG-ENG consists of four divisions for (i) naval architecture; (ii) systems engineering; (iii) lifesaving and fire prevention; and (iv) hazardous materials.¹² The *Merchant Marine Act of 1920*, 46 U.S.C. §§ 50202, *et. seq.*, governs coastwise trade and the obligations of shipowners to *Jones Act* seamen. The requirements for vessels eligible for U.S. documentation are contained in 46 U.S.C. §12102 and 46 C.F.R. Part 67.

Environmental pollution of navigable waters of the United States caused by the shipping industry is a major concern and is highly regulated. Environmental contamination is enforced and regulated by the Coast Guard, Environmental Protection Agency and the Department of Justice. The United States Congress passed the *Ports and Waterways Safety Act*, 33 U.S.C. § 1221; and the *Prevention of Pollution from Ships Act*, 33 U.S.C. §§ 1901, *et. seq.*, to codify the United States ratification of MARPOL.¹³ The *Federal Water Pollution Control Act*, 33 U.S.C. §§ 1251, *et seq.*, and the *Oil Pollution Act of 1990*, 33 U.S.C. §§ 2701 to 2761 are critical statutes regulating environmental concerns and contamination originating from vessels.

C. The Hazards of the Commercial Shipping Industry.

Commercial cargo ships and barges laden with bulk commodities and consumer products ply the earth’s oceans, rivers, seas, and inland waters. During these voyages, however, there are common perils unique to the shipping industry that result in catastrophic damage or total loss of vessels, cargo containers, and the personal injury or death of crewmembers. Collisions,

system that supports the U.S. economy and protects the public from unfair and deceptive practices.”

¹² U.S. Coast Guard, CG-ENG, <https://www.dco.uscg.mil/CG-ENG/> (last visited Dec. 20, 2022).

¹³ The *International Convention for the Prevention of Pollution from Ships* (MARPOL).

turbulent weather or volatile sea conditions, fire, sinkings, breakdown of machinery, hijackings, vessel instability, and allisions are some of the common perils. In addition, the inherent risks in the ocean transportation of bulk cargo are common, including shifting cargo, loss of cargo, dust, oil spills, oxygen depletion, corrosion, breakdown of refrigeration equipment in containers of perishable food products, and contamination, often resulting in a total or partial loss of the cargo.¹⁴ These common hazards often culminate in large insurance claims, litigation, and declarations of general average.¹⁵

D. Maritime Losses Attributable to Human Error, Faulty Equipment, and Negligence.

Maritime losses are often attributable to human error. Marine Insight explains that the causes of human error are often attributable to fatigue, lack of knowledge, bad decisions, and poor communication of crew and individuals in the logistical chain.¹⁶ Some authorities, after examining marine accidents published by the National Transportation Safety Board (“NTSB”), assert that human error is the cause of more than 50% of marine casualties.¹⁷ Although the *International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers, 1978* (“STCW Convention”) is believed to have

¹⁴ Paromita Mukherjee, “9 Common Hazards Of Bulk Cargo On Ships,” *Marine Insight*, Apr. 11, 2021, <https://www.marineinsight.com/marine-safety/9-common-hazards-of-dry-bulk-cargo-on-ships/>.

¹⁵ In a general average claim, the ship and cargo share a percentage of the loss caused by the common adventure. See *York-Antwerp Rules 2016*, <https://transportrecht.org/wp-content/uploads/YorkAntw2016.pdf> (last visited Dec. 20, 2022).

¹⁶ <https://www.marineinsight.com/marine-safety/the-relation-between-human-error-and-marine-industry/>.

¹⁷ Marine Insight, “*The Relation between Human Error and Marine Industry*,” (Sept. 8, 2019), <https://www.sciencedirect.com/science/article/pii/S2666822X21000083>. Javier Sanchez-Beaskoetxea, “*Human error in marine accidents: Is the crew normally to blame?*” *Marine Transport Research*, Vol. 2, 2021, 100016. Carine Dominguez-Pary, Lakshmi Narasimha Raju Vuddaraju, Isabelle Corbette-Etchevers & Rana Tassabehji, “*Reducing maritime accidents in ships by tackling human error: a bibliometric review and research agenda*,” *Journal of Shipping and Trade*, Art. No. 20 (2021).

reduced human error substantially, human error remains the cause of many marine casualties. Accordingly, the question remains—are remotely controlled or autonomous ships a safer alternative for the future of the shipping industry?¹⁸

Negligence and human error in the shipping industry has a cost of personal injury or death. The United States provides an extensive spectrum of statutory and general maritime law protection to crewmembers who are killed, injured, or fall ill while in the service of the vessel. The *Jones Act*, 46 U.S.C. § 30104, provides that a seaman or his personal representative has a cause of action against his employer for negligence. A *Jones Act* seaman’s personal representative has a cause of action against the maritime employer under the *Death on the High Seas Act*, 46 U.S.C. §§ 30301 – 30308. A crewmember has a cause of action arising under the general maritime law for a breach of the warranty of seaworthiness for faulty equipment or the appurtenances that are not reasonably fit for their intended use.¹⁹ A seaman’s employer is required to pay maintenance and cure for a seaman who is injured or falls ill in the service of the ship until he reaches maximum medical recovery.²⁰ This complex network of statutes and the federal general maritime law will certainly need to be expanded or adapted as necessary to account for the emerging technology of autonomous vessels.

E. The Evolution of Marine Insurance Coverage for the Shipping Industry.

Marine insurance has evolved through the centuries to protect shipowners and shippers of cargo against fortuitous losses and perils of the seas. Lloyd’s of London (“Lloyd’s”) had its genesis in Edward Lloyd’s Coffee House on Tower Street in London in 1688 and the business of shipping was

¹⁸ Marine insurance also insures against the negligent acts and omissions of the crew and some risks that may occur during the course of shipping of cargo.

¹⁹ The seminal case is *Mitchell v. Trawler Racer, Inc.*, 362 U.S. 539, 550, 80 S. Ct. 926, 933 (1960).

²⁰ *Calmar S.S. Corp. v. Taylor*, 303 U.S. 525, 58 S. Ct. 651 (1938); *Atl. Sounding Co., Inc. v. Townsend*, 557 U.S. 404, 129 S. Ct. 2561 (2009).

discussed.²¹ Approximately 40 years later, Lloyd's moved to Lombard Street and began to dominate the industry of marine insurance in support of England's busy maritime industry.²² The purpose of marine insurance that evolved over the years was to insure against fortuitous losses to protect the insured's interest in the ship, cargo, as well as to protect crewmembers and defend against third party claims. Today, marine insurance is a major industry insuring against losses in the marine industry and providing insurance coverage against liability claims.

The English laws of marine insurance have changed in the recent past. For more than 100 years, the *Marine Insurance Act 1906* ("MIA") governed marine insurance claims and transactions in England. The plain language of the MIA was followed as persuasive authority in the United States and provided a uniform template of interpretation of the rights and duties of the insured and insurer.²³

On August 12, 2016, *The Insurance Act of 2015* came into force and applying to business insurance. *The Insurance Act of 2015* modified the remedies available to an insurer for a material non-disclosure by an insured in a case of the breach of *uberrimae fidei* or utmost good faith incorporated in all

²¹ See Lloyds, <https://www.lloyds.com/about-lloyds/history/> (last visited Dec. 20, 2022). See *Edinburgh Assurance Co. v R.L. Burns Corp.*, 479 F. Supp. 138 (C.D. Cal. 1979) for a detailed description of insurance placement at Lloyd's.

²² See Lloyds, <https://www.lloyds.com/about-lloyds/history/corporate-history> (last visited Dec. 20, 2022). Today, the Lloyd's market insures many types of risks and accounts for 25% of the world's insurance market.

²³ As an example, the United States adopted the doctrine of utmost good faith or *uberrimae fidei* into all insurance policies requiring the insured to affirmatively provide information to the insurer that would affect an insurer's decision to undertake the risk or set the premium. *Sun Mut. Ins. Co. v. Ocean Ins. Co.*, 107 U.S. 485, 1 S. Ct. 582 (1883). "It is the duty of the assured to place the underwriter in the same situation as himself; to give to him the same means and opportunity of judging of the value of the risks; and when any circumstance is withheld, however slight and immaterial it may have seemed to himself, that, if disclosed, would probably have influenced the terms of the insurance, the concealment vitiates the policy." *Id.* at 510-11.

marine insurance policies. *The Insurance Act of 2015* further modified the 1906 MIA concerning warranty provisions.²⁴

Unfortunately, marine insurance laws are no longer a matter of uniform federal law in the United States. In *Wilburn Boat Co. v. Fireman's Fund Insurance Co.*, 348 U.S. 310, 75 S. Ct. 368 (1955), the Supreme Court held that absent well-entrenched federal precedent, state law will apply to the construction of marine insurance policies. Therefore, in the aftermath of the *Wilburn Boat* decision, courts now apply a quilt of both state insurance laws and federal general maritime law principles in evaluating the rights and duties under a marine insurance policy.

The commercial use of remotely controlled and fully autonomous vessels will present new challenges for the marine insurance industry and courts. Traditional insurance policies may not offer adequate coverage for fully or partially autonomous vessels. Accordingly marine insurers will need to adapt with new policies designed to meet the requirements of this innovation for the future of commercial shipping of cargo.

II. The Emergence of Autonomous and Remotely Controlled Commercial Ships

A. Predicted Growth of Autonomous Shipping.

The autonomous shipping industry as well as the Global Ocean Surface Robot Market is predicted to grow at the rate of 26.7% from 2024 to 2035 and is forecast to generate \$2.9 Billion in revenue by 2028. Revenue from autonomous ships and remotely controlled ships is expected to increase to more than \$3.48 Billion by 2035.²⁵ Private industry, in collaboration with

²⁴ See Milan Kapadia, “*The Marine Insurance Act 1906 – Not Repealed but Radically Altered*,” RWK Goodman (June 24, 2016), <https://www.roydswithyking.com/info-hub/the-marine-insurance-act-1906-not-repealed-but-radically-altered/>.

²⁵ See ReportLinker, “*Global Autonomous Ship and Ocean Surface Robot Market: Focus on Mode of Operation, Subsystem, End User, and Application – Analysis and Forecast, 2018-2028*” (Aug. 2018), <https://www.reportlinker.com/p05483930/Global-Autonomous-Ship-and->

governments, are investing in autonomous ship technology. Autonomous ships and remotely controlled ships are expected to eliminate human error and meet the demand for environmental monitoring, seabed mapping, anti-submarine warfare, and search for underwater mines.²⁶

B. The Future Has Arrived—Autonomous and Remotely Controlled Ships Are in Operation Today.

Remotely controlled and autonomous commercial vessels are more than a distant pipedream and are in operation today. As detailed below, autonomous vessels now carry cargo and transport passengers.

1. FALCO.

On December 3, 2018, Finferries, the ferry system of Finland, in conjunction with private industry, demonstrated the FALCO, the world's first fully autonomous car ferry. The FALCO's maiden voyage between Pargus Finland and Nagu was completely autonomous and carried 80 passengers. On the return voyage, the FALCO was remotely controlled by an operator from a shore-based facility.²⁷

2. The MAYFLOWER.

The MAYFLOWER is a fully autonomous trimaran designed to sail the North Atlantic and trace the voyage of the Pilgrims. The 100-foot research vessel is powered solely by wind and solar technology and will carry drones on

[Ocean-Surface-Robot-Market-Focus-on-Mode-of-Operation-Subsystem-End-User-and-Application-Analysis-and-Forecast.h](#).

²⁶ *Id.*

²⁷ Press Release, FinFerries, "*Finferries' Falco world's first fully autonomous ferry*" (Mar. 12, 2018), <https://www.finferries.fi/en/news/press-releases/finferries-falco-worlds-first-fully-autonomous-ferry.html>; Institution of Mechanical Engineers, "*Inside the Falco, the car ferry with artificial intelligence at the helm*" (Feb. 8, 2019), <https://www.imeche.org/news/news-article/inside-the-falco-the-car-ferry-with-artificial-intelligence-at-the-helm>.

board.²⁸ The MAYFLOWER completed its new sea trials by March 8, 2022 and on May 20, 2022 left the Azores to continue on its voyage across the Atlantic.²⁹

3. The YARA BIRKELAND.

The YARA BIRKELAND is a battery-powered electric inland open top container ship with a capacity of 120 TEU (Twenty-Foot Equivalent Units). The YARA BIRKELAND will have “zero emissions.”³⁰ On November 19, 2021, the vessel departed for its maiden voyage to Oslo, Norway. The YARA BIRKELAND will carry mineral fertilizer this year between Porsgrunn and Brevik in Norway.³¹ The vessel was constructed by VARD in conjunction with Enova, a government enterprise for promoting renewable energy in collaboration with Kongsberg Group.³²

III. The International Maritime Organization Studies Autonomous Ships (MASS)

A. The Importance of the International Maritime Organization.

The International Maritime Organization (“IMO”) is the United Nations’ specialized agency establishing standards for the safety and security of shipping for all maritime nations. The IMO is the global standard-setting authority for safety standards for international shipping—including the design,

²⁸ Mayflower Autonomous Ship, <https://mas400.com/> (last visited Dec. 20, 2022).

²⁹ *See id.*

³⁰ *See* Wikipedia, *MV Yara Birkeland*, https://en.wikipedia.org/wiki/MV_Yara_Birkeland (last visited Dec. 20, 2022).

³¹ Press Release, Yara, “*Yara to start operating the world’s first fully emission-free container ship*” (Nov. 19, 2021), <https://www.yara.com/corporate-releases/yara-to-start-operating-the-worlds-first-fully-emission-free-container-ship/>.

³² *Id.*

construction, equipment, manning, technical cooperation, and energy efficient shipping operations. The IMO is based in London, England and participants consist of 173 Member States and various governmental organizations. The United States is a Member State and the Coast Guard has been a key participant in IMO for policy development and setting safety standards.

B. IMO Strategic Plan and Scoping Exercise.

The IMO has directed its focus on the analysis of the potential regulatory scheme that must be implemented to address the emerging technology of autonomous and remotely controlled commercial ships. The IMO Strategic Plan for the years 2018 through 2023 contains a Key Strategic Direction to “integrate new and advancing technologies into the regulatory framework.”³³ Specifically, this Key Strategic Direction entails weighing the benefits of new technology against safety concerns, security, cybersecurity, environmental risks, costs, and the facilitation of international trade. Commensurate with that goal, IMO is conducting an analysis of all applicable treaties in assessing the regulation of Maritime Autonomous Surface Ships (“MASS”).³⁴ Three IMO standing Committees, including the Marine Safety Committee (“MSC”), the Legal Committee (“LGL”), and the Facilitation Committee (“FAL”) have commenced a “Scoping Exercise” to analyze MASS against the backdrop of the international treaties that govern the world’s commercial shipping industry.

C. The IMO Scoping Exercise—4 Degrees of Vessel Autonomy.

The IMO Scoping Exercise recognizes four (4) Degrees of Autonomy for Marine Autonomous Surface Ships (“MASS”):

³³ Ship Technology, “*IMO Assembly adopts strategic plan for 2018-2023*” (Dec. 13, 2017), <https://www.ship-technology.com/news/imo-assembly-adopts-strategic-plan-2018-2023/>.

³⁴ See IMO, Autonomous Shipping, <https://www.imo.org/en/MediaCentre/HotTopics/Pages/Autonomous-shipping.aspx> (last visited Dec. 20, 2022).

- **Degree 1:** Partial automation and the crew can take over control of the vessel at any time.
 - **Degree 2:** The ship is controlled from a remote location, but a crew is onboard and ready to assume control as necessary.
 - **Degree 3:** The vessel is controlled remotely from another location and there is no crew on board.
 - **Degree 4:** This is a fully autonomous vessel controlled by artificial intelligence that makes decisions and controls actions.
- D. International Treaties Considered by MSC, FAL, and LGL Committees.**

During the course of the Scoping Exercise, the MSC, FAL, and LGL Committees considered the impact of the Four Degrees of MASS autonomy on international shipping treaties and shipping traffic. One primary underlying purpose was an analysis of any potential gaps in the existing treaties and regulatory framework that the Four Degrees of Autonomy MASS would create.

The **MSC Committee** examined the impact of autonomous shipping against the requirements of several important treaties. The treaties the MSC Committee studied included, but were not limited to, the following:

- *Safety of Life at Sea Convention (“SOLAS”);*
- *Collision Regulations; and*
- *Search and Rescue Convention (“SAR”).*

The **LGL Committee** evaluated the impact of MASS on 23 Treaties, including, but not limited to, the following:

- *BUNKERS 2001—International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001;*
- *LLMC PROT 1996—Protocol of 1996 to Amend the Convention on Limitation of Liability for Maritime Claims, 1976;*
- *HNS PROT 2010—Protocol of 2010 to the International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, 1996;*
- *SALVAGE 1989—International Convention on Salvage, 1989;*
- *SUA 1988—Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation, 1988;*
- *SUA PROT 2005—Protocol of 2005 to the Protocol for the Suppression of Unlawful Acts Against the Safety of Fixed Platforms Located on the Continental Shelf;*
- *Nairobi WRC 2007—Nairobi International Convention on the Removal of Wrecks, 2007;*
- *PAL PROT 2002—Protocol of 2002 to the Athens Convention Relating to the Carriage of Passengers and Their Luggage by Sea, 1974;*
- *NUCLEAR 1971—Convention relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material, 1971.*

The LGL Committee also considered the following treaties along with the FAL Committee and the MSC Committee:

- *INTERVENTION PROT 1973—Protocol Relating to Intervention on the High Seas in Cases of Pollution by Substances other than Oil, 1973; and*
- *International Convention on Maritime Liens and Mortgages, 1993.*

The **FAL Committee** analyzed MASS with respect to the *Convention on Facilitation of International Maritime Traffic* (“FAL”) and the foreseeable challenges that would likely arise from operation of autonomous ships.

E. MSC Committee Conclusions After Scoping Exercise.

The MSC Committee completed the Regulatory Scoping Exercise on May 25, 2021 at the 103rd Session.³⁵ MSC Committee identified high priority issues for future work and made recommendations:

- The IMO and 174 Member States should create a “MASS Code” to consider all four Degrees of shipping autonomy.
- Internationally accepted MASS terminology and definitions for MASS must be created.
- The identity, responsibility, and definition of any crewmembers aboard a partially autonomous or remotely controlled vessel must be specifically defined.
- The MASS should determine whether the shore-based Remote Control Station and Operators are considered seafarers.

³⁵ See IMO, “*Autonomous ships: regulatory scoping exercise completed*” (May 25, 2021), <https://www.imo.org/en/MediaCentre/PressBriefings/pages/MASSRSE2021.aspx>.

- The MASS Code should specifically address issues of firefighting, cargo care, stowage, watchkeeping, search and rescue and other safety issues.

The Scoping Exercise Reports of the LGL Committee and FAL Committee are complete.

F. LGL Committee Conclusions After Scoping Exercise

The LGL Committee’s primary objection for the scoping exercise was to analyze the degree to which existing framework of conventions would need to be modified. The Committee concluded:

It was noted that both the Maritime Safety and Legal Committees had concluded that the role and responsibilities of the master and the remote operator are high-priority issues that must be addressed as a foundation for any further work. Some specific legal terms required consideration in the context of harm caused by autonomous technology, like the concepts of “fault”, “negligence” and “intention”. The LEG RSE concluded that consideration of these issues would best be addressed jointly between the committees, so that both technical and legal aspects and questions of liability are taken into account, while keeping in mind the different purposes and functions of conventions under the purview of LEG and those under MSC.³⁶

Further, the LEG Committee concluded that the *United Nations Convention on the Law of the Sea* (UNCLOS) must be evaluated in connection with further study of the four degrees of autonomous and remotely controlled ships.

³⁶ IMO, Legal Committee, 108th session (LEG 108) (July 26-30, 2021), <https://www.imo.org/en/MediaCentre/MeetingSummaries/Pages/LEG-108th.aspx>.

CONCLUSION

The emergence of autonomous and remotely controlled vessels is an exciting development in the shipping industry. The technological advances will utilize green energy and promote safety in the global commercial shipping industry. But, as with all technological advancements, international laws as well as the United States must be amended, and new laws must be enacted to address the challenges of autonomous shipping.