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The First Step in Regulating Autonomous Ships

An Assessment on the Interim Guidelines for Maritime Autonomous Surface Ships Trials
and its Legal Significance in the International Regulatory Landscape

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ABBREVIATIONS

AI	Artificial Intelligence
BIMCO	Baltic and International Maritime Council
CDEM	Construction, Design, Equipment, and Manning of Vessels
CMI	Comité Maritime International
COLREGs	Convention on the International Regulation for Preventing Collisions at Sea
EEZ	Exclusive Economic Zone
EU	European Union
GAIRAS	Generally Accepted International Rules and Standards
HMI	Human-Machine Interface
ICJ	International Court of Justice
ICJ Statute	Statute of the International Court of Justice
VCLT	Vienna Convention on the Law of Treaties
ILA	International Law Association
IMO	International Maritime Organization
Interim Guidelines	Interim Guidelines for Maritime Autonomous Surface Ships Trials
IoT	Internet of Things
ITLOS	International Tribunal for the Law of the Sea
LEG	IMOs Legal Committee
LOSC	The United Nations Law of The Sea Convention
MAS	<i>Mayflower Autonomous Ship</i>
MASS	Maritime Autonomous Surface Ship
MSC	IMOs Marine Safety Committee
MSR	Marine Scientific Research
MUNIN	Maritime Unmanned Navigation through Intelligence in Networks
NGO	Non-Governmental Organization
NYK Line	Nippon Yusen Kaisha Line
RSE	Regulation Scoping Exercise
SOLAS	International Convention for the Safety of Life at Sea
Strategic Plan	Strategic Plan for the Organization for the Six-Year Period 2018 to 2023
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
UN	United Nations
UNCLOS	United Nations Conference(s) on the Law of the Sea
USC	Unmanned Shipping Code
USV	Unmanned Surface Vessel

1 INTRODUCTION

1.1 The Objective of the Thesis

With concepts and rules going back hundreds of years, maritime law and the law of the sea are viewed as fields of international law that are robust and tried, and as a result, does not frequently change.¹ However, these law fields are known to develop through necessity and the evolution of technology and sciences.²

The technological evolution the world is witnessing has been called the fourth industrial revolution – an industrial revolution that the maritime industry is witnessing the effects of.³ Technological innovations such as artificial intelligence (AI), advanced robots, and the internet of things (IoT), has enabled new ships to be a reality. The traditional ships, operated by captain and crew, are being replaced by remotely controlled and autonomous ones.⁴ These ships have gained momentum because of the opportunities to reduce capital and operating costs, improve safety⁵, and reduce environmental impact using clean and green technologies such as electric propulsion systems.⁶ With the expected increase in international shipping the coming decades, these technological advances are welcomed by the shipping industry. Therefore, autonomous ships are receiving widespread attention from different parties in the international maritime community, such as stakeholders, manufacturers, policymakers, and academia.

With the introduction of these new types of ships, two opposing issues come to light: On the one hand, there is an absence of international legal instruments to regulate autonomous ships, and the operation of such ships is not lawful under the existing international rules and regulations. On the other hand, the international maritime community need to test such ships to ensure that the technologies are as safe as manned ships in the areas where they will be operating.

¹ Eric Van Hooydonk, 'The Law of Unmanned Merchant Shipping - an Exploration' (2014) 20 *The Journal of International Maritime Law*, page 1.

² Tullio Treves (ed), *Historical Development of the Law of the Sea* (The Oxford Handbook of the Law of the Sea, Oxford University Press 2017), page 1.

³ Klaus Schwab, *The Fourth Industrial Revolution* (Crown Business 2016), pages 19 and 22.

⁴ *Ibid*, pages 19-20.

⁵ It has been found out that 65,8 % of accidents on sea stems from human action and error, see European Maritime Safety Agency, *The Annual Overview of Marine Casualties and Incidents 2019*, 2019).

⁶ Kevin Heffner and Ørnulf Jan Rødseth, 'Enabling Technologies for Maritime Autonomous Surface Ships' (2019) 1357 *Journal of Physics: Conference Series* 012021, page 1.

In November of 2017, the International Maritime Organization (IMO) and its Assembly, at its 30th session, adopted the Strategic Plan for the Organization for the Six-Year Period 2018 to 2023.⁷ In the Strategic Plan, strategic directions were set out, an outspoken goal was to “[i]ntegrate new and advancing technologies in the regulatory framework.” The background for this was, amongst others, that the IMO’s Maritime Safety Committee (MSC) in June of 2017 decided to take a more proactive role regarding autonomous ships.⁸

For the maritime industry to succeed with automation in the maritime domain, experiments and trials need to be undertaken.⁹ Trials of autonomously operating ships are already being conducted on the seas and oceans, which shows that the technology for such ship’s operation is already more or less in place.¹⁰ However, as noted earlier, autonomous ship operation is currently unlawful under existing international law. Therefore, trials on operating autonomous ship have more or less been conducted in confined, national waters, “where there is a small risk of collision with other craft[s] and that is either monitored closely, [...] or are otherwise too remote to pose a risk to other users of the sea.”¹¹

Europe has been in the forefront to realize autonomous ships. One European State that has shown immense support for the development of autonomous ship operations and has dedicated several sea areas for testing is Norway.¹² The State has designated the world’s first autonomous ship testing area in the Trondheim fjord.¹³ This and other test areas aim to facilitate the testing and maturing of new concepts and full-scale programs related to autonomous shipping.¹⁴ Other

⁷ Assembly, 'Strategic Plan for the Organization for the Six-Year Period 2018 to 2023' [hereinafter the Strategic Plan].

⁸ MSC 98/23, 'Report of the Maritime Safety Committee on its Ninety-Eighth Session', [20.1 – 20.3].

⁹ R. Glenn Wright, *Unmanned and Autonomous Ships* (Routledge 2020), page 21.

¹⁰ Michael F. Merlie, 'Autonomous Ships: Regulations Left in Their Wake?' *The Maritime Executive* (20.07.) <<https://www.maritime-executive.com/editorials/autonomous-ships-regulations-left-in-their-wake>> accessed 03.06.2020.

¹¹ Robert Veal, Michael Tsimplis and Andrew Serdy, 'The Legal Status and Operation of Unmanned Maritime Vehicles' (2019) 50 *Ocean Development & International Law* 23, page 24

¹² Andrea Antolini, 'Autonomous ships: IMO MSC's steps forward on revising international regulations for including maritime autonomous surface ships (MASS)' (n.d.) *Maritime Issues*, page 4.

¹³ Norwegian Maritime Authority, 'World's First Test Area for Autonomous Ships Opened' <<https://www.sdir.no/en/news/news-from-the-nma/worlds-first-test-area-for-autonomous-ships-opened/>> accessed 13.06.2020.

¹⁴ *Ibid.*

States, such as Finland¹⁵, the Netherlands¹⁶, the European Union¹⁷, Japan¹⁸, Singapore¹⁹, and the Republic of Korea²⁰ are other parties supporting the development of autonomous ships in different ways. Eight of these States have recently joined forces in a network, called MASSPorts, to address the challenges and align standards for trials and operation of autonomous ships in ports.²¹

In June 2019, the IMO and the MSC adopted the Interim Guidelines for Maritime Autonomous Surface Ship (MASS) Trials²², intending to give recommendations for relevant authorities and stakeholders. The Interim Guidelines are the first step in regulating MASS and related systems and infrastructures to such ships. Its interim status emerges from the fact that it is a product of the ongoing Regulatory Scoping Exercise (RSE) happening at the IMO.²³ This exercise aims to finalize a more robust and encompassing framework for the regulations of these new types of

¹⁵ Finland made exemptions to minimum manning and watchkeeping requirements when it comes to autonomous ships under trials, see Finnish Government, *Legislative amendment promotes automation tests in maritime transport with regard to manning and watchkeeping* (2018).

¹⁶ Port of Rotterdam has set a goal to host autonomous ships by 2025 in cooperation with IBM, see Vincent Campfens and Charles Dekker, *Turning Rotterdam into the "World's Smartest Port" with IBM Cloud & IoT* (2018).

¹⁷ The European Commission co-founded the Maritime Unmanned Navigation through Intelligence in Networks (MUNIN) project to contribute to the realization of the vision of autonomous and unmanned vessels by developing and verifying concepts for such ships, which ran from 2012 to 2015, see MUNIN, 'About MUNIN' n.d.) <<http://www.unmanned-ship.org/munin/about/>> accessed 08.09.2020; under the Horizon 2020 project, EU is funding autonomous ship development projects, hereunder, the AUTOSHIP project and the AEGIS project, see European Commission, *Horizon 2020* (Work Programme 2018-2020, 2017); EU is also working on their own guidelines for MASS trials, see European Commission, 'High Level Steering Group for Governance of the Digital Maritime System and Services' (Governance of the Digital Maritime System and Services), pages 7-8.

¹⁸ The Japanese government stated in 2017 that by 2025, autonomous vessels will achieve practical use. Japan has approved projects to test automated berthing, collision avoidance, and remote monitoring systems, see Jamey Bergman, 'MOL autonomous shipping project targets 2025 for 'practical use' of vessels' *Riviera* (03.08.) <<https://www.rivieramm.com/news-content-hub/mol-autonomous-shipping-project-targets-2025-for-practical-use-of-vessels-23778>> accessed 08.09.2020.

¹⁹ In 2019, the Maritime and Port Authority of Singapore launched its Maritime Innovation Lab to serve as experimentation and test-bed of innovative port services for autonomous ships, see Mohit Sagar, 'MPA launches Innovation Lab to boost Singapore's maritime technological capabilities' *OpenGov* (10.04.2019) <<https://opengovasia.com/mpa-launches-innovation-lab-to-boost-singapores-maritime-technological-capabilities/>> accessed 08.09.2020.

²⁰ The Republic of Korea has conducted an assessment on the technology for MASS, and two companies announced in 2019 successful testing of the industry's first 5G-based autonomous and remote controlled navigation test platform and built a remote control center, see MSC 100/INF.10, 'Results of technology assessment on Maritime Autonomous Surface Ships (MASS)'; SK Telecom, SK Telecom and Samsung Heavy Industries Successfully Verified 5G-Powered Autonomous and Remote Control Navigation Test Platform Using a Test Ship (2019).

²¹ Zazithorn Ruengchinda, 'EU-Asia coastal and port authorities join forces to develop alignment and standards for autonomous ships' *ScandAsia* (07.08.2020) <<https://scandasia.com/eu-asia-coastal-and-port-authorities-join-forces-to-develop-alignment-and-standards-for-autonomous-ships/>> accessed 08.09.2020.

²² Interim Guidelines for Maritime Autonomous Surface Ship Trials, MSC.1/Circ. 1604 [hereinafter Interim Guidelines].

²³ See subchapter 2.3 of this thesis for more on this.

ships.²⁴ However, this type of work is known to take a long time at the IMO, and the Interim Guidelines are expected to momentarily be the leading instrument. Thus, it is important to identify the significance and relevance of the Interim Guidelines as the international efforts towards autonomy in the maritime industry is accelerating at a blistering pace.

Against this backdrop, the objective of this thesis is to look at the legal significance of the Interim Guidelines in the international legal system in accordance with the United Nations Convention on Law of the Sea²⁵ and selected IMO instruments, hereunder the International Convention for the Safety of Life at Sea²⁶, the Convention on the International Regulations for Preventing Collision at Sea²⁷, and the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers²⁸.

1.2 Research Question

This thesis aims to address the legal significance of the Interim Guidelines in the international regulatory landscape. This will be done by answering the following research questions:

1. What is the legal role of the Interim Guidelines?
2. How does the Interim Guidelines relate to the LOSC; does it alter the States' rights and obligations to undertake tests and other navigational rights?
3. How does the Interim Guidelines relate with existing IMO instruments; can the Interim Guidelines deviate from these regulations as long as the intent is complied with?

1.3 Terminological Clarifications and Delimitation

When researching this subject, several different terms describe autonomous ships, and the maritime community seems to struggle to agree upon an appropriate definition that includes all of variations of such ships.²⁹ The lack of a consensus on the use of terminologies can stem from

²⁴ Robert Veal, 'IMO Guidelines on MASS Trials: Interim Observations' (2019) 19 Shipping & Trade Law , page 5.

²⁵ 1982 The United Nations Convention on the Law of the Sea. Montego Bay, Jamaica. In force 1994 [hereinafter the LOSC].

²⁶ 1974 International Convention for the Safety of Life at Sea, London. In force 1980 [hereinafter the SOLAS].

²⁷ 1972 Convention on the International Regulation for Preventing Collisions at Sea, London. In force 1977 [hereinafter the COLREGs].

²⁸ 1978 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, London. In force 1984 [hereinafter the STCW].

²⁹ Ship Technology, 'Is It Time to Talk About Regulating Autonomous Ships?' (2018) <<https://www.ship-technology.com/features/time-talk-regulating-autonomous-ships/>> accessed 31.05.2020.

that there currently is no international definition on autonomous ships nor the various levels of autonomy.³⁰ Therefore, different terms are used interchangeably and cause confusion.

According to Cambridge Dictionary, ‘autonomous’ is defined as “independent and having the power to make [...] own decisions” and defines “an autonomous machine or system” as being “able to operate without being controlled directly by humans.”³¹

When defining autonomous ships, it is necessary to keep in mind that there are several feasible ways to operate such ships.³² On the one hand, they can be remotely controlled by humans operating at a remote location, hereunder a shore-based control center with a wireless connection to the ship and where radar, camera and satellite images, and other data is collected and interpreted. On the other hand, it can be autonomous in the way that it is self-guided and depends on preprogrammed instructions or AI. These ships process data collected by their on-board sensors and form independent opinions and decisions about navigation continuously. Furthermore, these ships can be something in-between these two, performing within the context of the instructions given to them before the voyage but are supervised by humans who can correct or override the ship if necessary. “[I]t is important to note that these modes of operation may be used consecutively on the same voyage, depending on the ship’s operational itinerary”³³ and, therefore, “the degree of autonomy can differ greatly”.³⁴ “A key feature [...] [for all these ways to operate] is the increased importance of tasks executed remotely, away from the ship itself.”³⁵

As mentioned, the IMO has taken a leading role in the international maritime community regarding the work needed for implementing these new ships into the shipping industry. In the work of the RSE, MASS has been defined as “a ship, which, to a varying degree, can operate

³⁰ Filip Koscielecki, 'Autonomous Shipping - Revolution by Evolution' (2019) July 2019 The UK P&I Club's Legal Briefings , page 3.

³¹ (Cambridge University Press n.d.).

³² The following description is based on: Dalaklis Dimitrios, 'Arctic SAR: Current Infrastructure and Opportunities for Maritime Autonomous Surface Ships (MASS)' (2019) ; Ingrid Bouwer Utne and others, 'Towards supervisory risk control of autonomous ships' (2020) 196 Reliability Engineering & System Safety 106757, page 1; Henrik M Ringbom and Robert Veal, 'Unmanned ships and the international regulatory framework' (2017) , page 100; Hooydonk, 'The Law of Unmanned Merchant Shipping - an Exploration', page 404.

³³ Robert Veal and Henrik Ringbom, 'Unmanned Ships and the International Regulatory Framework' (2017) , page 101.

³⁴ Hooydonk, 'The Law of Unmanned Merchant Shipping - an Exploration', page 404, with further reference.

³⁵ Henrik Ringbom, 'Regulating Autonomous Ships—Concepts, Challenges and Precedents' (2019) 50 Ocean Development & International Law 141, page 2.

independent[ly] of human interaction.”³⁶ Also, it has been established four degrees of autonomy for facilitating the RSE:

“[Degree one:] **Ship with 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 two:] **Remotely controlled ship with 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 three:] **Remotely controlled ship without seafarers on board:** The ship is controlled and operated from another location. There are no seafarers on board.

[Degree four:] **Fully autonomous ship:** The operating system of the ship is able to make decisions and determine actions by itself.”³⁷

It has been pointed out that the end-work of the scoping exercise, “[the] autonomous shipping operations should be able to deal with [...] variations [of levels] and should not be limited to a specified level of manning or autonomy.”³⁸ This applies both to the case if existing regulations are amended to fit autonomous ships or the case that a new instrument is adopted.

In addition, ship classification societies, such as DNV-GL and Lloyd’s Register of Shipping, also have prepared their own systems of classifying autonomous degrees and levels. DNV-GL categorizes degrees of automation separately for navigation and engineering functions.³⁹ Lloyd’s Register has conceptualized five automation levels, taking into account the advanced function’s degree, the location where an assistant function is provided, and the degree of human involvement.⁴⁰

Although this thesis refers to ‘autonomous’ as a broad term in the introduction chapter, the preliminary definition ‘MASS’, which under the auspices of the IMO’s MSC, have been established for the RSE, will be used as the overall working term in this thesis. The reason being that this is the closest the international maritime community has come to a settled

³⁶ MSC, 'Regulatory Scoping Exercise For the Use of Maritime Autonomous Surface Ships (MASS). Report of the Working Group.', Annex 1, page 1, paragraph 3.

³⁷ Ibid, Annex I, page 1, paragraph 4 (4.1 – 4.4).

³⁸ Ringbom, 'Regulating Autonomous Ships—Concepts, Challenges and Precedents', page 4.

³⁹ DNV GL, *Autonomous and Remotely Operated Ships*, 2018).

⁴⁰ Lloyd’s Register, *Cyber-enabled ships - ShipRight procedure assignment for cyber descriptive notes for autonomous & remote access ships* (Guidance document, 2017).

definition of the matter. The words ‘ship’ and ‘vessel’ will be used interchangeably, as they can be considered the same.⁴¹

Remotely controlled and autonomous vehicles, devices, and equipment that operates under and above the water surface have long been used for military, oil and gas, and marine scientific research (MSR) activities.⁴² For this thesis, only commercial autonomous ship operations and trials are discussed.

The thesis aims not to give a full assessment of the Interim Guidelines but highlight some of its provisions, and its place in the regulatory landscape. A comprehensive review of each of the international legal instruments regarding why MASS trials is unlawful will also not be done. This is beyond this thesis’s scope. The focus is more on highlighting some of the more general problematic provisions MASS operations and trials face today.

1.4 Method and Sources

This thesis adopts a legal doctrinal method to answer the research questions. This method is known to be described as one where the research “aims to give a systematic exposition of the principles, rules and concepts governing a particular legal field or institution and analyses the relationship between these principles, rules and concepts with a view to solving unclarities and gaps in the existing law”.⁴³ “Existing law” has been described as “the applicable law as it is understood and practiced in society at any time”.⁴⁴ Concerning what can be viewed as “existing law” this thesis uses a legal descriptive and analytical research approach to give the answers.

Given the legal nature of this thesis, the legal sources that will be used will be derived from the Statute of the International Court of Justice⁴⁵ Article 38, as this provision list the “the recognized [primary] sources of international law”.⁴⁶ Following the provision, international law must

⁴¹ Robert Veal and Michael Tsimplis, 'The integration of unmanned ships into the lex maritima' (2017) *Lloyd's Maritime & Commercial Law Quarterly* , page 307.

⁴² Malin Lokrantz and Lina Jönsson, *Smarta fartyg - En självkörande sjöfartsmarknad utan hinder?*, 2019), page 31.

⁴³ Jan M. Smits (ed), *What Is Legal Doctrine?* (Rethinking Legal Scholarship: A Transatlantic Dialogue, Cambridge University Press 2017), page 5.

⁴⁴ Jan Fridthjof Bernt and David Roland Doublet, *Vitenskapsfilosofi for jurister - en innføring* (Fagbokforl. 1998) [*Philosophy of Science for Lawyers - An Introduction*], page 18.

⁴⁵ 1945 Statute for the International Court of Justice, San Francisco. In force 1945 [hereinafter ICJ Statute].

⁴⁶ Anthea Roberts and Sandesh Sivakurmaran (eds), *The Theory and Reality of the Sources of International Law* (International Law, 5th edn, Oxford University Press 2018), pages 89 and 91.

derive from namely conventions, hereunder also treaties, international custom, general principles of law, and subsidiary sources of judicial decisions and legal teachings.⁴⁷

However, the list of the legal sources derived from Article 38 of the ICJ Statute is viewed as incomplete, and the existence of additional sources should be accepted.⁴⁸ Apart from those traditional sources found in Article 38 of the ICJ Statute, “other mechanisms[, adopted by amongst others international organizations,] have become increasingly important for the development of the international normative order.”⁴⁹ On account of this, there is a growing consensus that secondary law promulgated by international organizations forms part of sources that can be accepted.⁵⁰

Secondary law derives from primary law, such as treaties that constitute the organizations, and comprises acts produced by those organizations – ranging from resolutions, recommendations, declarations, standards, regulations, or guidelines – to, amongst others, their Member States.⁵¹ “These instruments [...] all [...] have a certain legal relevance, but at the same time they are not legally binding *per se* as a matter of law”.⁵² These non-binding sources are referred to as soft law and are “used in [the] legal literature to describe principles, rules, and standards governing international relations which are not considered to stem from one of the sources of international law enumerated in Art[icle] 38 (1) [of the] ICJ Statute.”⁵³ “Soft law should not be considered as an independent, formal source of international law, which extends the scope of the international order in its traditional sense.”⁵⁴

However, soft law instruments “may not be considered binding in a formal sense but are nevertheless expected to be followed.”⁵⁵ The background is that States often “resort to [soft law] in order to avoid the disadvantages which are [...] usually connected with the creation of

⁴⁷ ICJ Statute, Article 38 (1) (a) to (d).

⁴⁸ Alain Pellet and Daniel Müller (eds), *Part Three Statute of the International Court of Justice, Ch.II Competence of the Court, Article 38* (The Statute of the International Court of Justice: A Commentary, 3rd edition, edn, Oxford University Press 2019), part three, chapter II ‘Competence of the Court, Article 38’, paragraph 90; Roberts and Sivakurmaran (eds), *The Theory and Reality of the Sources of International Law*, page 100.

⁴⁹ *Max Planck Encyclopedias of International Law, Sources of International Law* (2011), [58].

⁵⁰ *Max Planck Encyclopedias of International Law, International Organizations or Institutions, Secondary Law* (2007), [2].

⁵¹ *Ibid*, [1, 2, and 6]; Pellet and Müller (eds), *Part Three Statute of the International Court of Justice, Ch.II Competence of the Court, Article 38*, part three, chapter II ‘Competence of the Court, Article 38’, paragraph 106.

⁵² *Max Planck Encyclopedias of International Law, Soft Law* (2009), [2] (emphasis added).

⁵³ *Ibid*, [5].

⁵⁴ *Ibid*, [36].

⁵⁵ *Max Planck Encyclopedias of International Law, Sources of International Law* (2011), [61].

legally binding” hard law.⁵⁶ Soft law serves as a form of a norm to guide the States in their international behavior while co-operating with each other.⁵⁷ Also, when there are uncertainties regarding the development of scientific, technological, economic, or social nature, “this non-binding form may be used deliberately to steer conduct in a desired direction to achieve generalized” goals between the States.⁵⁸ Moreover, with the principle of good faith, meaning that States do not contradict their conduct has the effect of legally protecting expectations produced by soft law norms so far as the conduct of the parties concerned justifies it.⁵⁹

Nevertheless, in the *Nicaragua* case⁶⁰, the Court “relied on various declarations and resolutions (which were, and are, perceived by many to be ‘soft[law]’ as material evidence of the perceptions and practice of States” regarding customary rules of law.⁶¹ By doing this, the Court laid down that “most of what is termed 'soft' law is not soft law, but simply evidence of what the law is on a given matter”.⁶² “When a legal solution to a specific problem in international relations cannot be reached, extralegal norms often provide a practical substitute or a basis for developing legally binding norms.” Consequently, one can consider soft law to be a source of law under Article 38 of the ICJ Statute.

The use of primary sources derived from the ICJ Statute Article 38 in this thesis include international treaties and conventions. When it comes to judicial decisions regarding MASS, it is non-existent, and limits the amount of customary international law.⁶³ As noted above, soft law can be considered a source under Article 38; thus, the Interim Guidelines are considered as such. Additionally, publications from highly qualified publicists are frequently referred to but are limited due to autonomous ships being a relatively new topic in the international law community. Given the limited quantities of formal sources, documents, reports, white papers issued by international organizations, industry organizations, companies, and governmental

⁵⁶ *Max Planck Encyclopedias of International Law, Soft Law* (2009), [6].

⁵⁷ *Ibid.*

⁵⁸ Patricia Birnie (ed), *The Status of Environmental 'Soft Law': Trends and Examples with Special Focus on IMO Norms*, vol 46 (Competing Norms in the Law of Marine Environmental Protection: Focus on Ship Safety and Pollution Prevention, Kluwer 1997), page 39.

⁵⁹ *Max Planck Encyclopedias of International Law, Soft Law* (2009), [27].

⁶⁰ *Military and Paramilitary Activities in and Against Nicaragua (Republic of Nicaragua v. United States of America)* (The ICJ), [202-205].

⁶¹ Olufemi Elias and Chin Lim, "General principles of law', 'soft' law and the identification of international law' (1997) 28 *Neth Yearb Int Law* 3, page 47.

⁶² *Ibid.*

⁶³ To the best of the author's knowledge.

agencies have been significantly used. Online sources and other non-legal scientific publications have also been utilized to get background information.

In the context of interpreting the legal sources used, the Vienna Convention on the Law of Treaties⁶⁴, Section 3, is provided as the basis. Therefore, the method of interpreting the legal sources has been done following the rules codified in, especially, Article 31 and 32 of the VCLT. Article 31 (1) establishes that '[a] treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in light of its object and purpose.'⁶⁵

1.5 Outline

Following this introductory chapter, a description of the Interim Guidelines background and relevant provisions will be given in chapter 2. Chapter 3 takes a closer look at the relationship between the Interim Guidelines and the LOSC. Followed by chapter 4, which highlights some examples of existing, relevant IMO instruments, which makes MASS operations, hereunder trials, unlawful. Chapter 5 concludes this thesis by looking at some existing trials, one who has followed the Interim Guidelines, and points out the Interim Guidelines' legal significance in the future.

⁶⁴ Vienna Convention on the Law of Treaties, Vienna. In force 1980 [hereinafter The VCLT].

⁶⁵ Which is related to Article 26 of the VCLT.

2 THE INTERIM GUIDELINES

2.1 Introduction

Considering that the Interim Guidelines are relatively new and unknown instruments for many, a more in-depth overview is needed. Therefore, this chapter first addresses the international organization from which the Guidelines is adopted from, the IMO, and its law-making role. Following this, the background for the adoption of the Interim Guidelines will be given with an assessment of some selected provisions. Lastly, a closer look at the legal role of the Interim Guidelines will be provided.

2.2 The International Maritime Organization

“Shipping is an international industry since vessels can fly the flag of any State and bear its nationality, and have rights in all sea areas⁶⁶, either of freedom of navigation or innocent passage and that, therefore, a system of international agreed regulation of the [maritime] industry is inevitable, [...] for the safety of navigation and protection of the marine environment.”⁶⁷

The IMO is a specialized agency of the United Nations (UN) on maritime affairs with exclusive competence in navigation and shipping matters and is viewed as the principal competent international organization regarding regulation of such.⁶⁸ The Organization is assigned to promote the adoption of conventions, protocols, codes, and recommendations concerning maritime safety and security, pollution prevention, and related matters.⁶⁹ Thus, IMO plays a central role in facilitating cooperation and harmony regarding maritime shipping matters. The MSC is one of the IMO’s Committees which has the mandate to propose safety regulations, recommendations, and guidelines to the Council of the IMO.⁷⁰

⁶⁶ Except of internal waters.

⁶⁷ Birnie (ed), *The Status of Environmental ‘Soft Law’: Trends and Examples with Special Focus on IMO Norms*, page 37.

⁶⁸ The Convention on the International Maritime Organization (1948), Geneva. In force 1958 [hereinafter the IMO Convention]; The IMO Convention, Article 2; Aldo Chircop (ed), *The International Maritime Organization* (The Oxford Handbook of the Law of the Sea, Oxford University Press 2017), pages 416-417.

⁶⁹ Wright, *Unmanned and Autonomous Ships*, page 190; Chircop (ed), *The International Maritime Organization*, page 418.

⁷⁰ The IMO Convention, Article 27 (a) and (b).

As noted in the introduction, laws and regulations adopted by the IMO can be divided into primary and secondary law.⁷¹ A common feature for the secondary laws is that they do not have a binding effect *per se* and cannot serve as a basis for enforcement or sanction within non-compliance.⁷² While not mandatory, they may have some effect as formal rules.

As for IMO instruments, they “carry a great weight since no other organization has authority in this field; [S]tates need global regulations both to create a level of playing field for the shipping industry and to maintain a sound image of their support for safety and environment protection”.⁷³ Furthermore, soft law instruments from the IMO often take form as recommendations to the Member States on matters “not deemed suitable for adoption as treaty measures”.⁷⁴ As noted above, these instruments may make it easier to press dissenting States into conforming behavior because international law permits States to use political pressure to induce others to change their practices, although generally States cannot demand that others conform to legal norms the latter have not accepted.⁷⁵ Furthermore, these soft law instruments may achieve binding status by, amongst others, widespread incorporation into national laws or by being incorporated through amendments in treaties.⁷⁶

2.3 Background to the Interim Guidelines

In February of 2017, a document, jointly submitted by Norway, Japan, the Netherlands, Denmark, Estonia, Finland, the Republic of Korea, the United Kingdom, and the United States, proposed that the MSC should undertake an RSE regarding MASS.⁷⁷

This proposal made the MSC put MASS on their agenda, with the aim to amend the regulatory framework to enable safe, secure, and environmental operation of MASS and co-existence with manned ships within the existing IMO instruments.⁷⁸ It was viewed as essential for the IMO to

⁷¹ *Max Planck Encyclopedias of International Law, International Organizations or Institutions, Secondary Law* (2007), [1].

⁷² Chircop (ed), *The International Maritime Organization*, page 420, with further references.

⁷³ Birnie (ed), *The Status of Environmental ‘Soft Law’: Trends and Examples with Special Focus on IMO Norms*, pages 48-49.

⁷⁴ *Ibid*, pages 47-48.

⁷⁵ Dinah Shelton (ed), *International Law and ‘Relative Normativity’* (International Law, Oxford University Press 2018), page 140.

⁷⁶ Birnie (ed), *The Status of Environmental ‘Soft Law’: Trends and Examples with Special Focus on IMO Norms*, pages 48-49.

⁷⁷ MSC 98/20/2, 'Maritime Autonomous Surface Ships Proposal For a Regulatory Scoping Exercise'.

⁷⁸ Note that the IMO's Legal Committee, Maritime Environment Protection Committee, and Facilitation Committee have also included the RSE on their agendas.

take a proactive and leading role in this field.⁷⁹ Therefore, under the 98th session, the MSC decided to include the RSE in its working program as the first action. This exercise was targeted to be completed at the 102nd MSC meeting in 2020.⁸⁰ However, because of the world pandemic, COVID-19, it has been postponed.⁸¹

The RSE aims to review the current IMO regulations to allow the implementation of MASS “to ensure that safety, security, environmental protection and efficiency of shipping are maintained, and potentially improved so that the flow of seaborne international trade continues to be smooth and efficient.”⁸² Furthermore, the RSE was divided into two phases. The first phase is to review the adequacy of potentially applicable instruments. In the second phase, suggestions are put forward on how to address the challenges identified from the first phase, then analyze and determine the most appropriate regulatory solutions towards addressing MASS operations.⁸³ Regarding this exercise, it is clear that “MASS represents a new development and involves many issues that IMO has never had to regulate before.”⁸⁴

At the 99th session, the MSC established a Working Group on MASS to undertake this exercise. The Working Group on MASS was set out to “develop a framework for the regulatory scoping exercise, including aims and objectives, methodology, instruments, type and size of ships, provisional definitions and different types and concepts of autonomy, automation, operations and manning to be considered.”⁸⁵ A cross-divisional MASS task force was also established to coordinate work efforts between different IMO bodies.⁸⁶

⁷⁹ 98/23, 'Report of the Maritime Safety Committee on its Ninety-Eighth Session' (2017), paragraph 20.2, section .1.

⁸⁰ IMO Webpage, 'Meeting Summaries: Maritime Safety Committee (MSC), 98th session, 7-16 June 2017' (2017) <<http://www.imo.org/en/MediaCentre/MeetingSummaries/MSC/Pages/MSC-98th-session.aspx>> accessed 01.06.2020 and 98/23, 'Report of the Maritime Safety Committee on its Ninety-Eighth Session' (2017), paragraph 20.2, section .1.

⁸¹ IMO, 'IMO Postpones Further Meetings due to COVID-19 but Begins Rescheduling Plans' (IMO, 2020) <<http://www.imo.org/en/MediaCentre/PressBriefings/Pages/14-meetings-postponed.aspx>> accessed 31.05.2020.

⁸² 98/20/2, 'Maritime Autonomous Surface Ships Proposal For a Regulatory Scoping Exercise' (2017), paragraph 3 to 5.

⁸³ Ringbom, 'Regulating Autonomous Ships—Concepts, Challenges and Precedents', pages 1-2.

⁸⁴ Henrik Ringbom, 'Legalizing Autonomous Ships' (2020) 34 *Ocean Yearbook Online* 429, page 438.

⁸⁵ MSC 99/5, 'Comments on the regulatory scoping exercise'; MSC 99/WP.9, 'Report of the Working Group', paragraph 5; Wright, *Unmanned and Autonomous Ships*, page 189; In the spring of 2018, the Legal Committee of the IMO began a work program for MASS with a target completion year of 2020, with the aim of carrying out a gap analysis of existing liability and compensation treaties and to scope the work required for MASS. This complements the work being carried out by the MSC.

⁸⁶ LEG 105/11/1, 'Proposal For a Regulatory Scoping Exercise and Gap Analysis with Respect to Maritime Autonomous Surface Ships (MASS)'.

At the 100th MSC session, the work continued with the RSE on MASS. Before this session, Norway and Baltic and International Maritime Council (BIMCO), as well as the Republic of Korea, had submitted documents related to the development of interim guidelines for MASS trials.⁸⁷ This gave rise to discussions during the MSC 100th session. During the discussions, it was expressed that, among other things, “the results of MASS trials were essential for an appropriate consideration of MASS requirements after the scoping exercise, in particular, those related to safety; manning should not be reduced during the conduct of the trials; a verification process was needed in order to ensure that MASS trials in international waters would be conducted in an appropriate and safe manner”.⁸⁸ Furthermore, it was expressed that such interim guidelines should be on a general level and not address specific technical issues in order to avoid prescribing functions or specific technical solutions, and having a higher or at least equal safety requirement compared to conventional ships.⁸⁹ Norway took on developing the interim guidelines for MASS trials ahead of the next MSC session.⁹⁰ Additionally, other interested Member States, non-governmental organizations (NGO), and classification societies were invited to join this work.

The MSC approved and adopted the Interim Guidelines at the 101st session. However, not without any drama: The MSC rejected the proposed document and its appendixes submitted by Finland, Japan, Norway, the Republic of Korea, and BIMCO.⁹¹ Some of the Member States felt like the proposed guidelines were too detailed and extensive. Therefore, the drafted version was not adopted, and a Working Group was established, which was a much more limited group than the initial one. This new Working Group prepared a new guideline in three working days⁹², which was not as extensive.⁹³ This draft was submitted and adopted by the whole MSC, as a circular, called the Interim Guidelines for MASS Trials.⁹⁴

⁸⁷ Confer MSC 100/5/2, 'Interim Guidelines for MASS Trials' and MSC 100/5/3 (the Republic of Korea MSC 100/5/3, 'Proposals for the Development of Interim Guidelines for Maritime Autonomous Surface Ships (MASS) Trials').

⁸⁸ MSC 100/20, 'Report of the Maritime Safety Committee', paragraph 5.21/.1 to .3.

⁸⁹ Ibid, paragraph 5.22/.1 and .4.

⁹⁰ Ibid, paragraph 5.32.

⁹¹ MSC 101/5/5, 'Interim Guidelines for MASS Trials'; MSC 101/INF.17, 'Draft Interim Guidelines for MASS Trials'.

⁹² Norwegian Maritime Authority, *MSC.1/Circ.1604 on "INTERIM GUIDELINES FOR MASS TRIALS"* (International Network for Autonomous Ships 2019), slide 3.

⁹³ The draft included six parts, each with several provisions, and 13 appendixes, see 101/INF.17, 'Draft Interim Guidelines for MASS Trials' (2019), annex, pages 1-23.

⁹⁴ MSC 101/24, 'Report of the Maritime Safety Committee on its 101st Session', paragraphs 5.16 and 5.21; The Interim Guidelines.

2.4 Selected Provisions of the Interim Guidelines

2.4.1 General

Following the Preamble of the Interim Guidelines, the provisions are outlined in Annex Part 1 and 2. The Annex starts with Part 1, which introduces the aim, scope, and application of the Interim Guidelines. Part 2 elaborated on the substantive provisions, which are principles and main objectives for ensuring that MASS trials are conducted the right way.

The Guidelines outline that trials should provide, as other relevant international instruments, ‘at least the same degree of safety, security, and protection of the environment’ when trials are conducted.⁹⁵ When it comes to MASS-related systems and infrastructure trials, the main objectives in Part 2 are meant to be a guide when planning, authorizing, and conducting trials for the relevant parties.⁹⁶

In general, the Interim Guidelines prescribe a broad range of objectives in Part 2, hereunder: Risk management, compliance with mandatory instruments, manning and qualifications of the personnel onboard or remote, sufficient cyber risk management and infrastructure, communication, and data exchange, and reporting and information sharing.

In the following subchapters, some selected provisions from Part 2 will be assessed.

2.4.2 Compliance with Mandatory Instruments

In the Interim Guidelines Subparagraph 2.2.1, it is clear that the parties to MASS trials should ensure ‘[c]ompliance with *the intent* of mandatory instruments’.⁹⁷ The meaning of “the intent” is uncertain, as well as “exactly how this may be deduced and how narrow or specifically” it should be done from the mandatory instrument.⁹⁸

In Subparagraph 2.2.2, it is left up to the flag State Administration to determine ‘[t]he scope of application of mandatory instruments, [...] in accordance with those instruments’ for ships involved in MASS trials. Therefore, the national Administration is given the right to determine an alternative way of how this can be done. However, following the same provision, the national Administration is asked to take into account ‘the objectives of the trial, the anticipated

⁹⁵ The Interim Guidelines, Part 2, Preamble (sentence one).

⁹⁶ Ibid, Part 2, Preamble (sentence two).

⁹⁷ (Emphasis added.)

⁹⁸ Veal, ‘IMO Guidelines on MASS Trials: Interim Observations’, page 3; In this article, the author argues that the preamble of a mandatory instrument might be the place from which “the intent” is to be deduced from.

capabilities and limitations of the ship and related systems and infrastructure during the trial, and the risk control measures adopted for the trial.’

2.4.3 Manning and Qualifications of Personnel

Paragraph 2.3 contains provisions about the manning and qualifications of personnel involved in MASS trials and is composed of three subparagraphs. The first subparagraph, 2.3.1, aims to ensure that the intent of minimum manning requirements is met, appropriate steps should be taken. In the second subparagraph, 2.3.2, ‘[o]nboard or remote operators of MASS should be appropriately qualified for operating MASS subjects to the trial.’ Subparagraph 2.3.3 contains the need for the personnel, whether remote or on board, to have appropriate qualifications and experience to safely conduct MASS trials.

At the same time, it can be pointed out that in Paragraph 2.4, ‘the human element should be appropriately addressed’; referring to Resolution A.947(23)⁹⁹ for the IMO.

2.4.4 Infrastructure and Communication

The Interim Guidelines Subparagraph 2.5.1 stipulates that for MASS trials to be safe, secure, and environmentally sound, ‘proper infrastructure should be established’. These infrastructures should implement ‘appropriate strategies’ ‘to mitigate the effect of incidents and/or failure of systems, technology and testing’. It follows from the broad, open wording of this provision that it should concern the overall infrastructure used to operate and supervise the MASS trials.¹⁰⁰

To ensure that the trials are safe, the information relating to the ship's performance and the judgments done by the automated systems ‘should be available to any personnel involved’ hereunder both onboard and remote operators.¹⁰¹

Under Interim Guidelines Paragraph 2.7, ‘[a]n appropriate means for communications and data exchange, including redundancy, should be provided for the safe conduct of the trial.’ Following in Paragraph 2.8, reporting requirements and information sharing are regulated in four subparagraphs. The two first ones, Subparagraphs 2.8.1 and 2.8.2, are regarding reporting requirements. The ‘[d]etails of trials should be reported to the relevant authorities, as appropriate, as early as practicable, so as to enable the dissemination of information on the trials

⁹⁹ The Human Element Vision Resolution.

¹⁰⁰ Veal, 'IMO Guidelines on MASS Trials: Interim Observations', page 4.

¹⁰¹ The Interim Guidelines, Subparagraph 2.5.2.

to all impacted third parties in the specified area.’¹⁰² Following in Subparagraph 2.8.2, the reporting requirements included in IMO instruments ‘should be complied with’. Along with the reporting requirements, information sharing is also seen as vital for the MASS trials, as Subparagraphs 2.8.3 and 2.8.4 declare that the relevant authorities and all stakeholders ‘are encouraged’ to share information.

The importance of communication exchanges can also be seen in Paragraph 2.6, which states that ‘[r]easonable steps should be taken to ensure that potentially impacted third parties are informed of MASS systems and infrastructure.’ From a safety perspective, it is essential to provide advance notice of any MASS activity that may present hazards to the interest of other parties who may be concerned.¹⁰³

2.5 The Role of the Interim Guidelines

The Interim Guidelines have been implemented to make sure that MASS trials conducted are ‘conducted safely, securely and with due regard for the protection of the environment’ in the same degree as other relevant instruments.¹⁰⁴ This aligns with the main goal for including MASS into operational use, that they are as safe as manned ships.

It follows from Paragraph 1.2 (1.2.1) that the guidance given is related to relevant authorities and stakeholders. The relevant authorities are coastal States, flag States, and port States.¹⁰⁵ Shipowners, authorized representatives, operators, and other involved parties are relevant stakeholders for the Interim Guidelines.¹⁰⁶ Following the wording “such as” shows that other parties can also be regarded as relevant stakeholders. Thus, “the Interim Guidelines have a broad scope in terms of the parties to whom they are addressed.”¹⁰⁷

Where a State decides to use the Interim Guidelines while conducting MASS trials, the flag State Administration has the responsibility ‘to authorize a ship to participate in a trail’.¹⁰⁸ It

¹⁰² Ibid, Paragraph 2.8 (2.8.1).

¹⁰³ Veal, 'IMO Guidelines on MASS Trials: Interim Observations', page 4; Ringbom, 'Legalizing Autonomous Ships', page 451.

¹⁰⁴ The Interim Guidelines, Paragraph 1.1 and Paragraph 1.2 (1.2.2).

¹⁰⁵ Ibid, Paragraph 1.2 (1.2.1) (1).

¹⁰⁶ Ibid, Paragraph 1.2 (1.2.1) (2).

¹⁰⁷ Veal, 'IMO Guidelines on MASS Trials: Interim Observations', page 2.

¹⁰⁸ The Interim Guidelines, Paragraph 1.2 (1.2.3) (second sentence).

follows further that '[w]here necessary, authorization should also be obtained from coastal State and/or port State Authority where [the] trial will be conducted'.¹⁰⁹

The Interim Guidelines have been adopted at a very general level when it comes to scope and application, principles, and main objectives. As stated in the Preamble of the Interim Guidelines, the instrument is to be kept under review and continuous amendment from experience with the application of it, as well as when the circumstances so warrant.¹¹⁰

The general level of the instrument can be seen in several provisions. "Trial" is defined in the Interim Guidelines as 'an experiment or series of experiments, conducted over a limited period, in order to evaluate alternative methods of performing specific functions or satisfying regulatory requirements prescribed by various IMO instruments [...]'.¹¹¹ "The Interim Guidelines include no geographical delimitation of the area where such trials may take place, indicating that they may be conducted both on ships engaged on [national and] international routes".¹¹² Thus, making coastal States free to conduct trials, or allow MASS trials in areas based on their sovereignty in those areas.¹¹³ The wording in Subparagraph 1.2.3 support this. It states that 'authorization [, where necessary,] should [...] be obtained from the coastal State and/or port State Authority where trials will be conducted'.¹¹⁴ Furthermore, the "limited period" in which the trial should be conducted over is not specified in the Interim Guidelines, which leaves "flexibility regarding the duration of any proposed trial" for the concerned parties.¹¹⁵

When conducting MASS-related systems and infrastructure trials, the Interim 'Guidelines *should* be used'.¹¹⁶ With the wording "should", indicates that "the Interim Guidelines are recommendatory" and not binding for the parties concerned.¹¹⁷ This intention can also be parsed from the Preamble, where it is stated that the '[m]ember States and international organizations are *invited* to use the annexed Interim Guidelines'.¹¹⁸ This is also consistent with what has been

¹⁰⁹ Ibid, Paragraph 1.2 (1.2.3) (third sentence).

¹¹⁰ Ibid, Preamble [2].

¹¹¹ Ibid, Paragraph 1.2 (1.2.2) (second sentence).

¹¹² Ringbom, 'Legalizing Autonomous Ships' page 450.

¹¹³ More on this in subchapter 3.2 of this thesis.

¹¹⁴ The Interim Guidelines, Paragraph 1.2 (1.2.3) (latter sentence).

¹¹⁵ Veal, 'IMO Guidelines on MASS Trials: Interim Observations', page 2; Ringbom, 'Legalizing Autonomous Ships', page 450.

¹¹⁶ The Interim Guidelines, Paragraph 1.2 (1.2.2) (first sentence) (emphasis added).

¹¹⁷ Veal, 'IMO Guidelines on MASS Trials: Interim Observations', page 2.

¹¹⁸ The Interim Guidelines, Preamble [3] (emphasis added).

previously mentioned; the Interim Guidelines were adopted as a circular by the MSC, which falls within the scope of soft law.¹¹⁹

To conclude, the Interim Guidelines are an instrument that is adopted under the auspices of the RSE work. It is a provisional guideline adopted to help relevant parties with sound practices of MASS trials until the RSE is completed. Therefore, it has a guiding role for the relevant parties.

2.6 Conclusion

The Interim Guidelines has been applicable for one year and has been viewed as “an important step on the road to an international approach to MASS regulation.”¹²⁰ It was necessary for the IMO to come with guidelines regarding MASS to avoid different national regulations on the area - which could have made maritime operation difficult.

Adopted as a soft law instrument, the Interim Guidelines cannot bind the Member States of the IMO. Still, as seen, secondary law forms a norm to guide States, which may achieve a binding status if several States follow it and feels bound to do so. Since the IMO is given the exclusive competence of maritime affairs, States may feel a particular need to follow the rules and standards which the Organization adopts. Nonetheless, it is easier for States to follow soft law instruments since it does not bind the States in the same way as hard law. In other words, the Interim Guidelines role is to make sure for a similar application when it comes to testing MASS.

Because of its short lifespan, its implications are uncertain. However, one can argue that on the one hand, the Interim Guidelines were adopted as a highly general, non-binding instrument for the relevant parties of MASS trials to use until the IMO completes its RSE. On the other hand, it shows an explicit endorsement on behalf of the maritime community that MASS operation and trials are welcomed.

¹¹⁹ See subchapter 1.4 of this thesis.

¹²⁰ Veal, 'IMO Guidelines on MASS Trials: Interim Observations', page 5.

3 THE INTERIM GUIDELINES RELATIONSHIP WITH THE LOSC

3.1 Introduction

In this chapter, a closer look at the second research question, the interaction between the Interim Guidelines and the LOSC, will be done.

Based on how the LOSC was adopted, the Convention provides the rights and obligations for the coastal State and third States regarding ships' operation. When it comes to MASS's operations and trials in different maritime zones, the question to be answered is whether the Interim Guidelines alter the jurisdictional regime set out in the different maritime zones. To structure the discussion, a distinction is made between States seeking to promote, and those seeking to prevent MASS's development through trials or otherwise. The focus regarding maritime zones will be on internal waters, territorial sea, exclusive economic zone (EEZ), and high seas. In the second last subchapter, an assessment on whether the Interim Guidelines can be considered as a generally accepted international rule or standard will be given.

3.2 MASS Operations and Trials in Different Maritime Zones

Because of the absence of international legal regulations on MASS, "the extent to which coastal State may permit such ships to navigate [...] depends highly on the sea area concerned".¹²¹ As a consequence, MASS trials are more or less only conducted in waters under territorial sovereignty since these waters are under the State territory.

3.2.1 General Considerations Regarding the LOSC

Traditionally the law of the sea consisted of a body of rules from customary international law.¹²² Through its United Nations Conferences on the Law of the Sea (UNCLOS), the United Nations (UN) has been able to codify the law of the sea into a framework convention. With the adoption in 1982, the LOSC has become to be accepted as the constitution of the law of the sea as it is widely accepted to govern all uses of the oceans, the resources, and the activities undertaken therein.¹²³ The Convention has been largely adhered to by States, given its aim is promoting a

¹²¹ Ringbom, 'Legalizing Autonomous Ships', page 444.

¹²² Yoshifumi Tanaka, *The International Law of the Sea* (3d ed. edn, Cambridge University Press 2019), page 3.

¹²³ Donald R. Rothwell, *The International Law of the Sea* (2nd ed. edn, Hart 2016), page 1; the Convention also enjoys a widespread formal acceptance worldwide, with 168 Member States, and is widely accepted as representing customary international law.

legal order for the peaceful use of the world's seas and oceans, 'with due regard for the sovereignty of all States'.¹²⁴

Following the Preamble of the LOSC, the Convention was adopted under the 'spirit of mutual understanding and co-operation, [on] *all issues* relating to the law of the sea'.¹²⁵ Thus, the LOSC form the framework for international regulation on, among other things, maritime safety, the diverting of marine areas into different zones, and rules regarding jurisdiction and enforcement measures for coastal and third States. When it comes to shipping, a characteristic feature of the Convention is the ambition to establish a uniform set of minimum rules that applies worldwide.¹²⁶

As a framework convention, many of the provisions in the LOSC are general and varying in their normative strengths.¹²⁷ Therefore, the provisions in the LOSC need to be implemented through more specific regulations, which is done by the 'rules of reference'.¹²⁸ This "[c]oncept refers to rules, regulations, standards[,] etc. that have been accepted within the framework of an international agreement, document or organization, which are then incorporated by direct reference into another international agreement and thus (potentially) become binding under its terms".¹²⁹ The task to adopt such 'generally accepted international rules and standards' (GAIRAS) is given to, among other the IMO, by referring them to as the 'competent international organizations'. This makes the Convention into a "living instrument", which can be developed through time with new developments, making it a dynamic and adaptable instrument.¹³⁰

An example of a development in the law of the sea is the matter of MASS. The technology which makes MASS operations possible were not conceivable to exist at that time. Thus, the existing rules which govern the seas were designed with manned ships in mind and pose problems in terms of compliance.¹³¹

¹²⁴ The LOSC, Preamble.

¹²⁵ (Emphasis added.)

¹²⁶ Ringbom, 'Legalizing Autonomous Ships', page 441.

¹²⁷ Robin R Churchill (ed), *The 1982 United Nations Convention on the Law of the Sea* (The Oxford Handbook of the Law of the Sea, Oxford University Press 2017), pages 29-30.

¹²⁸ Ibid, page 31.

¹²⁹ Alexander Proelss, *Implementation and the Law of the Sea* (Norwegian Centre for the Law of the Sea 2018).

¹³⁰ Churchill (ed), *The 1982 United Nations Convention on the Law of the Sea*, page 30.

¹³¹ Robert Veal and Michael Tsimplis, 'The Integration of Unmanned Ships Into the Lex Maritima' (2017) *Lloyds Maritime and Commercial Law Quarterly* 303, page 304.

The LOSC prescribes these rights and obligations to “ships” and “vessels”. Two terms which are not defined in the Convention. The terms are used throughout the Convention, and no clear distinction is made. An explanation behind the use of the different terms this way can be said to be “linked to the fact that the drafting of the [LOSC] was split among different committees and working groups which produced parts that were approved as a package deal.”¹³² Nevertheless, because of the increasing use of the “evolutionary approach” to treaty interpretation, it is arguable that MASS can be included as a ship and vessel under the LOSC framework.¹³³ It can also be argued that since there is no indication that a crew is an essential element of the definition of ships and vessels, the rules and regulations in LOSC applies to MASS. International scholars and reports seems to agree that MASS can be considered as ships and vessels under the LOSC and that they will enjoy the same rights and freedoms as traditional manned ships.¹³⁴ “[I]t would seem unjustified that two ships, one manned and the other unmanned, doing similar tasks involving similar dangers would not be subject to the same rules”.¹³⁵ However, if these new ships' characteristic does not fit within the definition of ships and vessels, a review of the application may be needed.¹³⁶ Regardless of the latter, as the likeliest outcome is that MASS do in fact fall under the framework of the LOSC, the obligations with respect to the rules laid down in the LOSC for manned ships also applies to MASS.

3.2.1.1 Flag States Jurisdiction

The flag State jurisdiction represents the traditional cornerstone of the regulatory authority over ships.¹³⁷ It is viewed as customary international law.¹³⁸ Any State may grant to a ship the right to sail under its flag.¹³⁹ Hence, the flag States enjoys the exclusive legislative and enforcement jurisdiction over ships flying its flag.¹⁴⁰ This jurisdiction applies irrespective of the ship's

¹³² Alexandros Ntovas and others, 'Liability for Operations in Unmanned Maritime Vehicles with Differing Levels of Autonomy' (2016) , page 11.

¹³³ The ICJ has found that where a general term is used, and where the relevant provision aims to settle a matter for an indefinite duration, treaty terms must be understood to have the meaning they bear on each occasion on which the treaty is to be applied, and not necessarily their original meaning, confer *Dispute regarding Navigational and Related Rights (Costa Rica v. Nicaragua)* ICJ Reports 2009 (ICJ) [63-64]; Veal, Tsimplis and Serdy, 'The Legal Status and Operation of Unmanned Maritime Vehicles', page 27.

¹³⁴ Hooydonk, 'The Law of Unmanned Merchant Shipping - an Exploration', pages 406-409; Ringbom, 'Legalizing Autonomous Ships', page 441; Veal and Tsimplis, 'The Integration of Unmanned Ships Into the Lex Maritima', pages 307-314; Advanced Autonomous Waterborne Applications Initiative Whitepaper, *Remote and Autonomous Ships - The Next Steps*, (2016), page 37.

¹³⁵ Veal and Ringbom, 'Unmanned Ships and the International Regulatory Framework', page 102.

¹³⁶ Aldo Chircop, 'Testing International Legal Regimes: The Advent of Automated Commercial Vessels' (2018) German Yearbook of International Law, Forthcoming , page 11.

¹³⁷ Veal and Ringbom, 'Unmanned Ships and the International Regulatory Framework', pages 3-4.

¹³⁸ Tanaka, *The International Law of the Sea*, page 189.

¹³⁹ The LOSC, Article 90.

¹⁴⁰ Ibid, Article 92 (1); though, some exceptions follow from this main rule, confer ibid Articles 94-111.

location but is concurrent with coastal and port State jurisdiction within their maritime zones.¹⁴¹ In the absence of any coastal State right to take action against a ship in its coastal waters, flag States enjoy prescriptive and enforcement jurisdiction regarding their ships.¹⁴²

Following Articles 90 and 91 of the LOSC, States have a right to sail ships flying their flag and fix the conditions for granting nationality to ships. “States usually grant nationality to ships by way of registration. This is always a matter of domestic law, and its precise operation varies from State to State.”¹⁴³ “The nationality of a ship is of central importance in order to establish the juridical link between a State and a ship flying its flag.”¹⁴⁴

Since the LOSC does not contain a uniform definition of “ship” nor “vessel”, Article 91 of the LOSC gives States the exclusive competence to determine the conditions under which it will grant a “ship” the right to fly its flag. Thus, as noted before, the LOSC defers the question of what constitutes as a “ship” to national law.¹⁴⁵ The International Tribunal for the Law of the Sea (ITLOS) ruled in *M/V Saiga No. 2* case¹⁴⁶ that third States cannot challenge the (in)validity of the registration, thus, will not be liable for granting its flag to a MASS which does not comply with the requirement of the genuine link as required by in Article 91 (1) of the LOSC.¹⁴⁷ When a State has made MASS legal in their national laws and has registered it, the ship will be subject to rights and duties, such as following the rules set out in the LOSC, among other things, the enforcement jurisdiction of the flag, coastal, and port State.

Article 94 (1) of the LOSC lays down several detailed duties for the flag State¹⁴⁸, hereunder: ‘[E]xercise [effectively] its jurisdiction and control in administrative technical and social matters over ships flying its flag’.¹⁴⁹ The rest of Article 94 elaborates on the specific duties which are imposed on the flag State.

¹⁴¹ Richard A Barnes (ed), *Flag State* (The Oxford Handbook of the Law of the Sea, Oxford University Press 2017), page 311.

¹⁴² *Ibid*, page 313.

¹⁴³ *Ibid*, page 309.

¹⁴⁴ Tanaka, *The International Law of the Sea*, page 193; The LOSC, Article 91 (1) (latter sentence).

¹⁴⁵ Veal and Tsimplis, 'The Integration of Unmanned Ships Into the Lex Maritima', page 309.

¹⁴⁶ *The M/V "SAIGA" (No. 2) (Saint Vincent and the Grenadines v. Guinea)* ITLOS Reports 1999 (ITLOS), [75-76].

¹⁴⁷ CIIMAR Report, page 49.

¹⁴⁸ The article set out a general and non-exhaustive range of duties for the flag State.

¹⁴⁹ Despite the location of this Article (part VII which regulates the high seas) it reflects customary international law and applies to all vessels regardless of their location and the flag States special duties.

In Paragraphs 3 and 4, States are required to take measures ‘to ensure safety at sea’, concerning, among other things, ‘the construction, equipment and seaworthiness of ships; the manning of ships [...]; the use of signals, the maintenance of communications and the prevention of collisions.’ These measures shall take further measures to ensure that the ship is ‘in the charge of a master and officers’ which possesses ‘appropriate qualifications’, and that the crew ‘is appropriate in [...] numbers for the type [and] size [...] of the ship.’¹⁵⁰

States are required ‘to conform to generally accepted international regulations, procedures and practices’ when it takes the measures provided in Paragraphs 3 and 4.¹⁵¹ Paragraph 5 of Article 94, thus, require flag States to practice their duties based on GAIRAS adopted under the auspices of, among others, the IMO.¹⁵² In this way, the LOSC “avoids the need to formulate more precise obligations of flag States by referring to an abstract, and continuous[ly] changing, set of international rules to be developed elsewhere.”¹⁵³ Thus, “it avoids ‘freezing’ the requirements at a given point in time or at a given technical level, while still preserving the international character of the rules in question.”¹⁵⁴ Hence, the IMO is given the task to develop such rules and regulations through its organ.

Therefore, flag States are obligated to follow Article 94 and apply GAIRAS as the bare minimum but can also go beyond these if they deem it necessary.¹⁵⁵

3.2.1.2 Coastal and Port State Jurisdiction

“The concepts “coastal State” and “port State” relate to different capacities in which a State can act to further safeguard its own interest, or to comply with international obligations or commitments.”¹⁵⁶ Neither terms are defined in the LOSC, but the terms can universally be understood as States with a coastline entitled to a territorial sea and other maritime zones and exercise jurisdiction associated to the different zones; while “port State” concerns compliance with standards within the coastal States ports and maritime zones which the port is located.¹⁵⁷

¹⁵⁰ The LOSC, Article 94 (4) (b) and (c).

¹⁵¹ Ibid, Article 94 (5); e.g. amongst others the SOLAS Convention and the STCW Convention.

¹⁵² Tanaka, *The International Law of the Sea*, page 191.

¹⁵³ Whitepaper, *Remote and Autonomous Ships - The Next Steps* (2016), page 38.

¹⁵⁴ Veal and Ringbom, 'Unmanned Ships and the International Regulatory Framework', page 103.

¹⁵⁵ See subchapter 3.3 of the thesis regarding the Interim Guidelines as GAIRAS.

¹⁵⁶ Erik J Molenaar (ed), *Port and Coastal State* (The Oxford Handbook of the Law of the Sea, Oxford University Press 2017), page 280.

¹⁵⁷ Tanaka, *The International Law of the Sea*, page 17; *Max Planck Encyclopedias of International Law, Port State Jurisdiction* (2014), [5].

The LOSC regulates maritime zones' establishment and delimitation, following detailed rules for these zones for States' rights and obligations.¹⁵⁸ “[M]arine spaces are divided into several jurisdictional zones” which gives the coastal States different jurisdictional rights.¹⁵⁹ The State's authority increases with its proximity to its shores.¹⁶⁰ In the following, a brief overview of the maritime zones will be provided.

According to Article 2 of the LOSC, the internal waters form part of the sovereignty of States. Thus, the coastal State has broad jurisdiction over foreign ships in this zone. The internal waters are landward of the baseline¹⁶¹; which is usually defined by the low-water line.¹⁶² A coastal State has jurisdiction to enforce domestic regulation in this zone since the internal waters subject to the coastal State's sovereignty.¹⁶³ Hence, foreign flagged ships do not enjoy the right of innocent passage, unless permitted by customary international law or a (bilateral) treaty.¹⁶⁴ Furthermore, the port States can prescribe laws and regulations regarding the conditions for entry of ships to its ports, provided that those laws and regulations are publicized and non-discriminatory.¹⁶⁵ The ICJ has recognized this in the *Nicaragua v USA* case.¹⁶⁶ Here the Court stated that “[i]t is [...] by virtue of its sovereignty that the coastal State may regulate access to its ports.”¹⁶⁷

Furthermore, all coastal States have the right to a territorial sea extending 12 nautical miles from the baseline.¹⁶⁸ The coastal States exercise sovereignty in its territorial sea, on the same level as its internal waters.¹⁶⁹ Therefore, it “can exercise complete legislative and enforcement jurisdiction over all matters and all people in an exclusive manner unless international law provides otherwise.”¹⁷⁰ However, unlike in the internal waters, the coastal state's right is not

¹⁵⁸ Veal and Ringbom, 'Unmanned Ships and the International Regulatory Framework', page 102.

¹⁵⁹ Tanaka, *The International Law of the Sea*, page 7.

¹⁶⁰ *Ibid*, page 5.

¹⁶¹ The LOSC, Article 8.

¹⁶² *Ibid*, Articles 5 and 7.

¹⁶³ *Ibid*, Article 2 (1).

¹⁶⁴ David Attard, *The IMLI Manual on International Maritime Law* (Oxford University Press 2014), page 10.

¹⁶⁵ Molenaar (ed), *Port and Coastal State*, page 283; The LOSC, Articles 25 (2), 211 (3), and 218.

¹⁶⁶ *Nicaragua v. United States of America (The Republic of Nicaragua v. The United States of America)* (ICJ).

¹⁶⁷ *Ibid*, [213].

¹⁶⁸ The LOSC, Article 3.

¹⁶⁹ *Ibid*, Article 2.

¹⁷⁰ Tanaka, *The International Law of the Sea*, page 104.

absolute.¹⁷¹ “Innocent passage” is viewed as such as long it is not ‘prejudicial to the peace, good order or security of the coastal State’.¹⁷²

When it comes to the coastal States legislative jurisdiction, LOSC Article 21 set out what the coastal State can and cannot do relating to innocent passage. According to Article 21 (1), the coastal State can regulate, among other things, ‘the safety of navigation’. For instance, the coastal State is well within its right to limit the right of innocent passage, even in the territorial sea. Following in Article 21 (2), coastal States cannot regulate construction, design, equipment, and manning (CDEM) of a foreign vessel, unless they give effect to GAIRAS. This would create an obstacle for maritime trade. The precise extent to which coastal States are entitled to adopt safety measures while regulating innocent passage is not detailed in the LOSC. However, under Article 24 (1) (a), the coastal State ‘shall not hamper the innocent passage of foreign ships through the territorial sea’ and not ‘impose requirements [...] which have the practical effect of denying or impairing the right of innocent passage’.

Furthermore, is the zone where the coastal State enjoys sovereign rights and functional jurisdiction, the EEZ. It can be claimed to the maximum extent of 200 nautical miles from a coast States baselines.¹⁷³ The EEZ can be viewed “a *sui generis* zone, as a transition zone between the territorial sea and the high seas.”¹⁷⁴ It follows from Article 56 of the LOSC that the coastal States only enjoy sovereign rights over the exploration, exploitation, conservation, and management over natural resources. The coastal States also enjoy certain jurisdictional powers, regarding among others ‘the protection and preservation of the marine environment’.¹⁷⁵ Such regulation might have an effect on the safety of shipping and, in that case, ‘shall have due regard to the rights and duties of other States’ and the coastal State ‘shall act in a manner compatible with the provisions of [the LOSC]’.¹⁷⁶ Here, the high seas freedoms concerning general navigation are applicable.¹⁷⁷ Hence, a coastal State cannot prohibit or limit navigation freedom in this zone, but other States ‘shall have due regard to’ the regulations laid down by the coastal State.¹⁷⁸ “The jurisdiction to prescribe national requirements is even more limited with respect to ships sailing” in its EEZ.¹⁷⁹ “The most express prescriptive jurisdiction of

¹⁷¹ The LOSC, Article 17.

¹⁷² Ibid, Article 19 (1).

¹⁷³ Ibid, Articles 55-57.

¹⁷⁴ Attard, *The IMLI Manual on International Maritime Law*, page 185.

¹⁷⁵ The LOSC, Article 56 (1) (b) (iii).

¹⁷⁶ Ibid, Article 56 (2).

¹⁷⁷ Ibid, Article 58 (1) confer Article 87.

¹⁷⁸ Ibid, Article 58 (3).

¹⁷⁹ Veal and Ringbom, 'Unmanned Ships and the International Regulatory Framework', page 104.

coastal States over foreign ships in the EEZ concerns laws aiming at the protection of the marine environment and even here, coastal States' jurisdiction is limited to prescribing rules that give effect to international rules", in accordance to LOSC Article 211 (5).¹⁸⁰ "Similarly, enforcement measures are limited to requiring information [...], save[d] for the most serious cases of pollution and damage where the coastal State may exceptionally interfere in the passage", under LOSC Article 220 (3) and (5).¹⁸¹

Lastly is the zone which lies beyond 200 nautical miles from the coast, namely the high seas.¹⁸² A zone that lies beyond any coastal State jurisdiction and where the principle of freedom of the high seas is applicable for all States, hereunder the freedom of activities.¹⁸³ The freedom of the high seas shall be exercised with due regard for other States' interests following LOSC Article 87 (2). "[E]very State has an equal right to enjoy the freedom to use the high seas in conformity with international law."¹⁸⁴ However, all actions taken in the high seas are reserved for peaceful purposes.¹⁸⁵ Because no State may extend its sovereignty over the high seas, the flag State has the primary jurisdiction over ships.¹⁸⁶

3.2.2 States in Favor of MASS Operation and Trials

3.2.2.1 Flag State and the Validity of Certification of MASS

A consequence of the flag States' right to register any class of ships as it pleases them, and third States not being allowed to challenge the (in)validity of the registration, is that the flag States are free to decide if they want to register a MASS.

The application of Article 91 of the LOSC to MASS means that each State retains the exclusive power to determine the criteria and procedures for granting and withdrawing its nationality to MASS flying its flag. However, when it comes to the requirements laid down through Articles 94 and 211 (1) of the LOSC, international law is clear; flag States are only allowed to exceed the minimum requirements adopted under the auspices of the IMO, but not go below these.

¹⁸⁰ Ibid, page 104.

¹⁸¹ Ibid.

¹⁸² The LOSC, Article 86.

¹⁸³ Ibid, Articles 89 and 87 (1). The term "*inter alia*" in Article 87 (1) suggests that the provision is not exhaustive.

¹⁸⁴ Tanaka, *The International Law of the Sea*, page 188.

¹⁸⁵ The LOSC, Article 88 confer Article 301.

¹⁸⁶ Douglas Guilfoyle (ed), *The High Seas* (The Oxford Handbook of the Law of the Sea, Oxford University Press 2017), page 209; The LOSC, Article 92 (1).

Since the international law does not require a minimum crew on board a ship, the flag State can authorize that crew shall be replaced with MASS technology.¹⁸⁷

In the Interim Guidelines Subparagraph 1.2.3, it is made clear that ‘the flag State Administration’ has ‘the responsibility’ ‘to authorize’ MASS for participation in a trial. This supports what is already set out in the LOSC Article 94, the flag States is given the primary responsibility to ensure its flagged ships’ safety.

3.2.2.2 Coastal and Port State

In the internal waters and ports, the coastal and port States have full sovereignty and exclusive jurisdictional rights. Hence, if the coastal State wants to let MASS operate or dedicate an area to such ships’ trials, it can exclusively determine that. The coastal State can also require other ships entering these waters to accept and respect MASS’s presence therein as a condition to enter.¹⁸⁸

When it comes to the territorial sea, the sovereignty of the coastal State extends to this zone, with the exception of innocent passage. The coastal State is entitled to regulate innocent passage through its territorial sea based on its territorial sovereignty.¹⁸⁹ “This suggests that the coastal States are free to introduce their own national rules to govern the presence of MASS in their territorial sea [...] as long as the right of innocent passage of other ships is maintained.”¹⁹⁰ If the coastal States wants, it can ‘require foreign ships exercising the right of innocent passage through its territorial sea to use such sea lanes and traffic separation schemes as it may designate or prescribe’.¹⁹¹ In this way, other States using their right of innocent passage in waters of a coastal State, operating and testing MASS, cannot argue that their right is being hampered with. This also gives the coastal State the right to designate testing areas, as long as the right of innocent passage of other ships is maintained. Article 25 (3) further stipulates that coastal States can, provided it has been ‘duly published’, temporarily suspend foreign ships the right of innocent passage ‘in specified areas of its territorial sea [...] if such suspension is essential for the protection of its security’. As stipulated in Article 24 (2) in the LOSC, the coastal State

¹⁸⁷ Provided that this satisfies that the replacement is as safe as manned ships as required by watchkeeping principles and requirements set out in IMO instruments, see chapter 4 of this thesis for more.

¹⁸⁸ Ringbom, 'Legalizing Autonomous Ships', page 444.

¹⁸⁹ The LOSC, Article 21 (1).

¹⁹⁰ Ringbom, 'Legalizing Autonomous Ships', page 445.

¹⁹¹ The LOSC, Article 22 (1).

‘shall give appropriate publicity’ to other States in case the State is allowing conduction of MASS operation and trials in its territorial sea.

When it comes to MASS operation and trials being conducted in the EEZ, the coastal States do not have the same jurisdiction as in the first two. In the EEZ, the coastal States only enjoy sovereign rights over the exploration, exploitation, conservation, and management over all kinds of natural resources. Moreover, the jurisdiction to have national rules and standards for permitting operation and trials of MASS does not reach out to this maritime zone.¹⁹² However, these sovereign rights are not confined to any particular ships or vessel.¹⁹³ Furthermore, the coastal State is required in Article 56 (2) of the LOSC to exercise ‘its rights and performing its duties’ with ‘due regard to the rights and duties of other States’ in the EEZ. The provision also makes it clear that the navigational freedoms from Article 87 of the LOSC, is applicable for the EEZ. Making MASS navigation, hereunder those under trials, free to navigate, as long as “due regard” is shown.

However, as mentioned above, the Interim Guidelines do not give any implications on which maritime zones trials are to be applied to. Therefore, one can argue that since the Interim Guidelines do not mention which maritime zones trials should apply to, the IMO did not intend to have such restrictions on where trials could be conducted. The coastal States are, therefore, in principle free to conduct MASS trials in areas beyond their territorial waters. However, it should be pointed out that, where necessary, third States should obtain authorization from coastal and/or port States Authority if the plan is to operate in other States maritime zones.¹⁹⁴

On the high seas, the freedom of the high seas is applicable for all States.¹⁹⁵ Including those States which exercise operations and trials with MASS. However, since MASS does not currently comply with existing international laws and regulations, it seems that such operations would not be able to take place. Although, as noted above, since the Interim Guidelines do not give any restrictions on where trials can be conducted, the high seas will also be a maritime zone where MASS can be tested. As long as “due regard” is shown to other States.

¹⁹² Ringbom, 'Legalizing Autonomous Ships', page 447.

¹⁹³ Veal, Tsimplis and Serdy, 'The Legal Status and Operation of Unmanned Maritime Vehicles', page 34.

¹⁹⁴ The Interim Guidelines, Subparagraph 1.2.3.

¹⁹⁵ The LOSC, Article 87 (1).

3.2.2.3 Summary

In summary, flag States in favor of MASS can register such ships to fly under its flag if their national laws allow it. Furthermore, the coastal State is free to let MASS operate and be tested in internal waters and territorial sea. In the latter one, as long as the right of innocent passage is not hampered with. When it comes to the EEZ and high seas, the existing international laws and regulations does not allow for operation and trials of MASS to be conducted. However, with the adoption of the Interim Guidelines, it can be argued that as long as the trials are conducted ‘with the intent of mandatory instruments’¹⁹⁶, which includes the regulations laid down in the LOSC, States can allow operation and trials of MASS to be undertaken.

3.2.3 States Opposing MASS Operations and Trials

3.2.3.1 Flag States and the Validity of Certification of MASS

When it comes to flag States that are not in favor of MASS operations and trials, their options are relatively straight forward. Since the flag States have the powers regarding which requirements and standards a ship has to meet to be authorized to operate under their flag, they have the authority to decide if they do not want to grant a MASS their flag.¹⁹⁷

3.2.3.2 Coastal and Port States

As elaborated on in subchapter 3.2.1.2, the coastal States sovereignty and exclusive jurisdictional rights expand from their land territory out past their internal waters and ports into the territorial sea.¹⁹⁸ Thus, it is up to the national Authority if MASS operations are lawful in these maritime zones. Coastal and port States, therefore, have broad discretion to impose conditions for entry on foreign ships and can deny foreign ships access to its territorial waters and ports. In the case the coastal States do not permit the operation of neither domestic nor foreign in these waters, MASS operation and trials are not allowed.

However, as noted before, a coastal State ‘shall not hamper the innocent passage of foreign ships through the territorial sea except in accordance with’ the LOSC.¹⁹⁹ Furthermore, the coastal State shall not ‘impose requirements [...] which have the practical effect of denying or impairing the right of innocent passage’.²⁰⁰ Nonetheless, the coastal States can require ships

¹⁹⁶ The Interim Guidelines, Subparagraph 2.2.1.

¹⁹⁷ The LOSC, Article 91 (1).

¹⁹⁸ With the exception of foreign States rights to innocent passage.

¹⁹⁹ The LOSC, Article 24 (1).

²⁰⁰ Ibid, Article 24 (1) (a).

exercising the right of innocent passage to use specific sea lanes, for such navigation to be determined as safe by them.²⁰¹

As stated in Article 21 (1) (a) of the LOSC, ‘the coastal State may adopt [national] laws and regulations, in conformity with the [LOSC] and other rules of international law, [...] in respect of [...] the safety of navigation and regulation of maritime traffic’. However, under the provisions second paragraph, such domestic laws and regulations ‘shall not’ regulate CDEM requirements²⁰² as long as they do not give effects to existing GAIAS. This could mean that the coastal States’ national maritime Authorities can decide that the MASS needs to follow the IMO regulations, which currently makes such operation unlawful.

When the time comes, and MASS (most likely) has become lawful, the coastal States will be limited to argue that MASS does not follow GAIAS. They will then have to argue that the innocent passage is not innocent since it is ‘prejudicial to the peace, good order, or security’ under Article 19 (1) of the LOSC. Which, has been argued by scholars, might very well be the case.²⁰³

For coastal States wanting to deny access in their EEZ, their jurisdiction is reduced since it is a *sui generis* zone.²⁰⁴ The most relevant provision in regulating MASS is Article 56 (1) (b) (iii) regarding ‘the protection and preservation of the marine environment’ in the EEZ. However, when exercising these rights, the coastal State ‘shall have due regard’ to the other States²⁰⁵, and the laws and regulations ‘must conform to and give effect to [GAIAS]’.²⁰⁶ It can also be mentioned that the coastal States enforcement powers only applies to severe cases of pollution, which give them the right to, among other things, require information or inspect the vessel.²⁰⁷ Nevertheless, in this zone, the coastal State cannot deny a MASS navigational rights, since Article 58 (1) states that ‘all States [...] enjoy [...] the freedoms referred to in [A]rticle 87 [(1) (a)]’, which stipulates the freedom of the high seas.²⁰⁸

²⁰¹ Ibid, Article 22 (1).

²⁰² This would potentially hamper the freedom of navigation for ships and vessels on “static matters”, see Ringbom, 'Legalizing Autonomous Ships', page 454.

²⁰³ Ibid, pages 455-456.

²⁰⁴ The LOSC, Article 55; Gemma Andreone (ed), *The Exclusive Economic Zone* (The Oxford Handbook of the Law of the Sea, Oxford University Press 2017), page 162.

²⁰⁵ The LOSC, Article 55 (2).

²⁰⁶ Ibid, Article 211 (5).

²⁰⁷ Ibid, Article 220 (3), (5), and (6).

²⁰⁸ (Emphasis added.)

As for the high seas, no State can argue against other States activities since freedom of the high seas applies. Even for MASS.

3.2.3.3 Summary

In summary, the flag State can resolve the conditions in order to grant a ship the right to sail under its flag, while if the flag State is against MASS, it can have laws and regulations which will not let such ships meet the conditions. Following, it is also clear that the coastal and port States can deny MASS access to their internal waters and ports. In the territorial sea, coastal States can adopt national regulations that require MASS to comply with the exercising of GAIRAS, which again makes such ships unlawful, and therefore deny MASS. For the EEZ of a coastal State, the jurisdiction is more limited. Because of this zone's special legal regime, a coastal State cannot deny a MASS its navigational rights, since it is the same as in the high seas; freedom for every State.

3.3 Can the Interim Guidelines be Considered as GAIRAS?

As noted above, the LOSC is made into a living instrument through the application of GAIRAS which implements more specific provisions by, amongst others, the IMO. However, “[t]he LOSC does not define [GAIRAS] or give any guidance as to which rules and standards are covered by [it]. [...] [Furthermore,] [i]nternational courts have not yet had occasion to consider the matter.”²⁰⁹

In the Final Report submitted by the International Law Association (ILA) Committee on Coastal State Jurisdiction Relating to Marine Pollution, a detailed analysis of the concept of GAIRAS was provided.²¹⁰ It was stated in this Final Report that “the ultimate purpose of [...] rule of reference is [...] to secure the primacy of international rules and standards over national laws and regulations.”²¹¹ Furthermore, States which becomes ‘States Parties’ to the LOSC²¹²

“*ipso facto* accept[s] the legal technique of law-making by reference inherent in the very notion of [GAIRAS]. This implies, on the one hand, that coastal [S]tates which are parties to the 1982 Convention may enact national laws and regulations up to a level not exceeding international rules and standards which are generally accepted. Flag [S]tates[, on the other hand,] bound by the 1982 Convention, [...] incur the obligation to prescribe in their national legislation norms which at least reach that

²⁰⁹ Churchill (ed), *The 1982 United Nations Convention on the Law of the Sea*, page 31.

²¹⁰ Erik Franckx and International Law Association Committee on Coastal State Jurisdiction Relating to Marine Pollution, *Vessel-Source Pollution and Coastal State Jurisdiction: the Work of the ILA Committee on Coastal State Jurisdiction Relating to Marine Pollution (1991-2000)* (Kluwer Law International 2001), pages 75-146.

²¹¹ *Ibid*, page 114.

²¹² The LOSC, Article 1 (2) (1).

same level. [...] Consequently, flag [S]tates, coastal [S]tates and port [S]tates can enforce concrete international rules and standards which are generally accepted irrespective of the form they have taken.”²¹³

For a rule or standard to be eligible as GAIRAS, it must be ‘established through the competent international organization or general diplomatic conference’.²¹⁴ The aim for GAIRAS is to make certain rules compulsory, “which [have] not taken the form of an international convention in force for the [S]tates concerned, but which [are] nevertheless respected by most [S]tates.”²¹⁵ In this case of determining if a specific rule or standard is generally accepted by States, one has to consider States’ practice and whether it is widely accepted, hereunder both quantitative and functional majorities.²¹⁶ “[T]he determining factor is the subsequent general acceptance of a rule or standard, not the general acceptance of the legal instrument in which this rule or standard is incorporated.”²¹⁷ Therefore, it can be argued that legally binding rules in both conventions, treaties, customary law, and non-legally binding instruments, such as recommendations and guidelines, may be eligible as GAIRAS.

As further concluded in the ILA Final Report, ‘[GAIRAS] cannot be equated with customary law nor with legal instruments in force for the [S]tates concerned.’²¹⁸ In the case they were to be equated with each other, ‘there would be no use for having this rule of reference in the [LOSC] since [S]tates would be bound by customary international law anyway.’²¹⁹

As noted earlier, the IMO is viewed as the principal competent international organization regarding prescription of rules and standards concerning shipping matters in the LOSC.²²⁰ It does so by providing ‘for drafting of conventions, agreements, or other suitable instruments’, such as recommendations and guidelines, and ‘encourage and facilitate the general adoption of [...] standards in matters concerning the maritime safety’.²²¹ It can therefore be argued that the rules and standards adopted under the auspices of the IMO, is to be regarded as GAIRAS. “However, not all IMO instruments [...] are [...] to be considered as generally accepted [...].

²¹³ Franckx and Pollution, *Vessel-Source Pollution and Coastal State Jurisdiction: the Work of the ILA Committee on Coastal State Jurisdiction Relating to Marine Pollution (1991-2000)*, pages 119-120.

²¹⁴ The LOSC, e.g. Article 211 (2) and (5).

²¹⁵ Franckx and Pollution, *Vessel-Source Pollution and Coastal State Jurisdiction: the Work of the ILA Committee on Coastal State Jurisdiction Relating to Marine Pollution (1991-2000)*, page 103.

²¹⁶ *Ibid*, pages 111-112.

²¹⁷ *Ibid*, pages 112-113.

²¹⁸ *Ibid*, page 107.

²¹⁹ *Ibid*, page 110.

²²⁰ See subchapter 2.2 in the thesis.

²²¹ The IMO Convention, Articles 2 (b) and 1 (a).

The general applicability of an instrument needs to be determined on an instrument-by-instrument basis.²²²

Regarding if the Interim Guidelines can be considered as GAIRAS, an assessment based on the findings above is necessary: On the one hand, it is clear that the IMO adopted the Interim Guidelines. Furthermore, the Interim Guidelines are to be viewed as a soft law instrument, which, as noted, can qualify as GAIRAS. On the other hand, the main issue regarding the Interim Guidelines as GAIRAS is whether States apply the Interim Guidelines when conducting MASS trials, and if a large number of States adhere to the Interim Guidelines. When it comes to the latter, the number of States accepting it is unknown; this, because of the Interim Guidelines being a guideline and not a convention or treaty that States decided to become a party or member to. Nevertheless, one can argue that the States, which stood at the forefront to get it implemented²²³, will adhere to the Interim Guidelines. Since the Interim Guidelines are a new instrument, it remains uncertain if States will apply the Interim Guidelines when conducting MASS trials or not. Per date, there have only been conducted one MASS trial following the Interim Guidelines.²²⁴ In conclusion, it is uncertain if the Interim Guidelines to become generally accepted and thus GAIRAS. Nevertheless, currently the Interim Guidelines is ineligible be considered as GAIRAS because of the lack of States following and accepting it.

3.4 Conclusion

The LOSC is a comprehensive framework that regulates the use of the sea in specific areas, and the duties for coastal and third States in respect of, amongst others, ship's operation. With the rules of reference, the Convention is kept up to date with changes in the international maritime community. Scholars' overall view is that the LOSC will regulate MASS since it can be viewed as 'ship' and 'vessel'. Consequently, the operation of MASS will be applicable to the rights and duties that follow from the LOSC.

Flag States enjoys the right to set the conditions and requirements for granting ships to fly under its flag. If a flag State registers a MASS under its flag, no third State can challenge this; making the MASS allowed to operate. Also making it clear that if a flag State wants to exclude MASS to sail under its nationality it can. This is in line with the Interim Guidelines.

²²² Chircop (ed), *The International Maritime Organization*, page 431.

²²³ Norway, Japan, the Netherlands, Denmark, Estonia, Finland, the Republic of Korea, the United Kingdom, and the United States.

²²⁴ See chapter 5 of this thesis for more.

Furthermore, the authorization by a coastal State for MASS to operate in its internal and territorial sea (both national and foreign) is by no means illegal following the existing international law. As long as the MASS complies with the coastal States laws and regulations regarding innocent passage in the territorial sea and does not carry out any activities identified in Article 19 of the LOSC, it shall be entitled to the right of innocent passage and operation in this maritime zone. For opposing States, imposing conditions which deny MASS in internal waters is allowed. In the territorial sea, they can require MASS to use specific lanes when conducting innocent passage in this maritime zone.

When it comes to other maritime zones, it has been argued that since it does not follow from the Interim Guidelines which maritime zones it applies to, trials can be conducted in all maritime zones. Contingent on the coastal States approving such.

The Interim Guidelines cannot be valid as GAIRES because of the nature of it being a guideline and an instrument which is meant to be used until the scoping exercise at the MSC is done. Therefore, it does not bind the States as a hard, legal act. But as a soft law instrument, it can make States feel obligated to comply with it and evolve into customary international law.

4 THE INTERIM GUIDELINES RELATIONSHIP WITH IMO INSTRUMENTS

4.1 Introduction

This chapter looks at the relationship between the Interim Guidelines and relevant IMO conventions. First, the chapter highlights examples of existing, relevant IMO conventions, which makes MASS operations, hereunder trials, unlawful. Subsequently, the chapter discusses whether the Interim Guidelines can deviate from these regulations granted “the intent” is complied with.

4.2 Examples of Legal Challenges

The current existing international laws regarding safety rules do not regulate MASS. Thus, the Interim Guidelines’ adoption has been an important step in how the international maritime community, in the most appropriate way, can accommodate for MASS operation, especially trials.

Under this section, some of the relevant conventions and provisions issued by the IMO will highlight why MASS is unlawful. Since it is not possible to cover all the relevant IMO instruments in this thesis, a selective choice has been made. The conventions that give rise to the most pressing legal questions are the SOLAS Convention, the COLREGs Convention, and the STCW Convention.

4.2.1 Safe Manning of Ships

One of the main challenges regarding legalization of MASS is ensuring the safety of ships and personnel. The SOLAS Convention stipulates the general safety of personnel and ships at sea. After entering into force in 1980, the SOLAS Convention, with subsequent amendments, has become one of the essential conventions governing maritime safety today. The Convention formulates and implements international regulations and standards intended to promote the ship's seaworthiness.²²⁵ This is done by stipulating the minimum requirements for the vessel's construction, equipment, and operation. The flag State is in charge of ensuring that ships under their flag comply with these minimum acceptable standards.²²⁶ However, the flag States are

²²⁵ Rothwell, *The International Law of the Sea*, page 388.

²²⁶ The SOLAS Convention, Article II.

given “considerable flexibility [...] when it comes to technical standards”, and flag States can imply stricter rules than those adopted in the SOLAS Convention.²²⁷

The conventions Chapter V specifies the standards on safety of navigation. The chapter seeks to give all vessels requirements to be sufficiently and efficiently manned from a safety perspective. Furthermore, the chapter applies to ‘all ships on all voyages’, hereunder ‘any ship, vessels or craft irrespective of type and purpose’.²²⁸ Chapter V’s provisions, due to this, has a broader applicability than other chapters of the Convention.²²⁹

In Chapter V, Regulation 14 of the SOLAS Convention, the essential part of MASS is challenged; namely, ships’ manning.²³⁰ In Regulation 14 (1), Contracting Governments must ensure that ‘all ships’ are ‘sufficiently and efficiently manned’. This obligation is further supplemented by requiring the national Administration to ‘establish appropriate minimum safe manning levels following a transparent procedure’ and ‘issue an appropriate minimum safe manning document’ which can serve as ‘evidence of the minimum safe manning considered necessary’.²³¹

The ‘appropriate minimum safe manning levels’ in Regulation 14 (1) expressly refer to the Principles of Minimum Safe Manning²³²; which is more detailed following its Annex 2. This Annex gives guidelines for determination of minimum safe manning. It “mention[s] a broader range of objectives with manning, including ship security, safety of cargo and environmental protection.”²³³ In the Annex 2 guidelines, it expressly states that high levels of ship automation, technical equipment, and shore-based support may serve to reduce a ship’s onboard crewing requirements and manning levels.²³⁴ Following the wording in the provision, other relevant factors can also be taken into account. These guidelines in Annex 2 of the Principles of

²²⁷ Ringbom, 'Legalizing Autonomous Ships', page 437.

²²⁸ The SOLAS Convention, Chapter V, Regulation 1 (1) and Regulation 2 (3).

²²⁹ AAWA White Paper Whitepaper, *Remote and Autonomous Ships - The Next Steps* (2016), page 43.

²³⁰ Maximo Q. Mejia and Jingjing Xu Proshanto K. Mukherjee, *Maritime Law in Motion*, vol 8 (WMU Studies in Maritime Affairs, Springer International Publishing, Cham 2020), page 710; Veal and Tsimplis, 'The Integration of Unmanned Ships Into the Lex Maritima', page 321.

²³¹ The SOLAS Convention, Regulation 14 (14) (2).

²³² Principles of Minimum Safe Manning, Resolution A.1047(27) [hereinafter Principles of Minimum Safe Manning].

²³³ Whitepaper, *Remote and Autonomous Ships - The Next Steps* (2016), page 43.

²³⁴ Principles of Minimum Safe Manning, Annex 2, Paragraph 1.1. (3), (4), and (10).

Minimum Standards indicate that the IMO is open for reducing certain manning conditions, although not directly towards MASS.²³⁵

Chapter V, Regulation 14 of the SOLAS Convention's scope and effect, is viewed as one of the main legal challenges when it comes to making MASS lawful. On the one hand, it does not prohibit MASS; on the other hand, there is an underlying assumption of a minimum manning onboard ships.²³⁶ As stipulated, the flag State Administration decides upon the adequate number of personnel required in order to man a ship's safety. Neither Chapter V, Regulation 14, nor the Principles of Minimum Safe Manning and its guidelines rule out that a flag State determines that the safe manning level for a particular MASS can be set at zero.²³⁷ Consequently, a State may "consider manning requirements to be significantly reduced, non-existent or replaced by shore-based controllers."²³⁸ As long as the adequate manning for the safety of life at sea can be shown to be complied with, there is a possibility for MASS to be viewed as safely manned by the national maritime Authorities.

4.2.2 Human Presence and Lookout Requirements

Different levels and modes of MASS, under navigation, challenges the crew's authority and role in operative decision-making, especially "when technology assumes the role of the crew" either onboard or remotely.²³⁹ This deviates from existing international regulations, which, to ensure ships' safe operation at all times, requires humans to be physically present. These types of requirements can be found in, amongst others, the COLREGs.

The COLREGs sets out various "rules for the road" and other navigational rules for ships and other vessels at sea in order to prevent collisions between two or more vessels. This includes safe speed, signals, lights with more, and regulations on maneuvering for different vessels in different situations. The Convention covers both the crew's core navigational task onboard a ship and operational decision-making regarding collision avoidance, priorities, and the speed

²³⁵ Rolf Skjong, 'Development of International Regulations for Autonomous Ships', page 5.

²³⁶ CMI, *Yearbook 2017 - 2018 Annuaire* (CMI Headquarters 2018), page 378.

²³⁷ Ringbom, 'Legalizing Autonomous Ships', page 438.

²³⁸ Ntovas and others, 'Liability for Operations in Unmanned Maritime Vehicles with Differing Levels of Autonomy', page 49; The Guidelines for Determination of Minimum Safe Manning expressly State that high levels of ships automation (Annex 2, Paragraph 1.1, Subparagraph 3) and shore-based support (ibid, Subparagraph 10) may serve to reduce a ship's onboard crewing requirements.

²³⁹ Ringbom, 'Regulating Autonomous Ships—Concepts, Challenges and Precedents', page 14.

with more. In other words, it requires decisions to be taken by humans. The COLREGs applies to all seagoing vessels used or capable of being used as a means of transportation on water.²⁴⁰

One of the most important provisions and principal hurdles is Rule 2 of the COLREGs, which sets out every seafarer's responsibility aboard a vessel.²⁴¹ Rule 2 (a) provides that

'[n]othing in these Rules shall exonerate any vessel, or the owner, master or crew thereof, from the consequences of any [...] neglect of any precautions which may be required by the *ordinary practice of seamen*, or by the special circumstances of the case'.²⁴²

Following in Rule 2 (b) 'due regard shall be had to [...] any special circumstances, including the limitations for the vessels involved, which may make a departure from these Rules necessary to avoid immediate danger.'

The provision reaffirms the importance of good seamanship "over a doctrinal compliance" with rules and regulations and can be viewed as "overarching [...] standard" when interpreting the Convention.²⁴³ In certain circumstances, an action contrary to what is provided in the COLREGs is mandatory.²⁴⁴

For MASS to comply with the provision, it must be "adjusted to reflect the absence of master and crew".²⁴⁵ However, since the provision requires human judgment in the decision-making loop – when to maneuver as required or from this – the distinction of remotely controlled and autonomous MASS must be drawn.²⁴⁶ Most scholars are under the view that autonomous MASS cannot yet comply with COLREGs Rule 2 if they are unsupervised.²⁴⁷ However, it is accepted that an autonomous MASS can comply with the seamanship standard to the extent that it is permanently supervised by remote controllers capable of assuming immediate remote control of the MASS' movement.²⁴⁸

²⁴⁰ The COLREGs, Rules 1 (a) and Rule 3 (a).

²⁴¹ Veal and Ringbom, 'Unmanned Ships and the International Regulatory Framework', page 110.

²⁴² (Emphasis added.)

²⁴³ Veal, Tsimplis and Serdy, 'The Legal Status and Operation of Unmanned Maritime Vehicles', page 38.

²⁴⁴ Veal and Tsimplis, 'The Integration of Unmanned Ships Into the Lex Maritima', page 324; Veal and Ringbom, 'Unmanned Ships and the International Regulatory Framework', page 110.

²⁴⁵ Aristotelis Komianos, 'The Autonomous Shipping Era. Operational, Regulatory, and Quality Challenges' (2018) 12 TransNav (Gdynia, Poland) 335, page 342.

²⁴⁶ Veal and Ringbom, 'Unmanned Ships and the International Regulatory Framework', page 110.

²⁴⁷ Veal, Tsimplis and Serdy, 'The Legal Status and Operation of Unmanned Maritime Vehicles', page 38.

²⁴⁸ Veal and Ringbom, 'Unmanned Ships and the International Regulatory Framework', Part 4.3; Veal, Tsimplis and Serdy, 'The Legal Status and Operation of Unmanned Maritime Vehicles', page 38.

Rule 8 (A) of COLREGs further requires, as in Rule 2, all seamen to take any action to avoid collision, and to do so ‘in accordance with the Rules of Part B and shall, if the circumstances of the case admit, be positive, made in ample time and with due regard to the observance of *good seamanship*’.²⁴⁹ Paragraphs B to F in Rule 8 prescribes how the observance of good seamanship shall be conducted. For remotely controlled MASS, the compliance with these provisions presents no difficulty. However, autonomous ships will not be able to meet the requirement regarding “good seamanship”.²⁵⁰

Under Rule 5 of the COLREGs, it is required that ‘[e]very vessel shall at all times maintain a proper look-out *by sight* as well as *by hearing* as well as *by all available means appropriate in the prevailing* circumstance and conditions so as to make a full appraisal of the situation and of the risk of collision’.²⁵¹

Following the wording in Rule 5, regarding “sight and hearing”, it is evident that human perception is required in the exercise with Rule 2 of the COLREGs.²⁵² Therefore, MASS, primarily the autonomous ones, would not satisfy these requirements. Nevertheless, the provision does not state whether the seafarers’ obligation can be performed onboard or onshore. Accordingly, one can argue that alternative technology can satisfy the remotely controlled ships, such as 360-degree camera coverage, optical and aural sensors, radars, Starlink, 5G, and more.²⁵³ It has been pointed out that the present generation of remotely controlled MASS satisfies the requirements of the provision with the necessary human input still firmly in the appraisal process, in the sense that the use of electronic aids does not transgress the spirit or wording of Rule 5.²⁵⁴ This is supported by case law, where the use of radar can fall under the wording of “all available means”.²⁵⁵

However, the use of radar and other technology has not made the human lookout requirements less relevant. Rule 5 is clear; *all available means* ought to be used *as well as* keeping a lookout

²⁴⁹ (Emphasis added.)

²⁵⁰ Veal and Ringbom, 'Unmanned Ships and the International Regulatory Framework', page 111.

²⁵¹ (Emphasis added.)

²⁵² Veal and Tsimplis, 'The Integration of Unmanned Ships Into the Lex Maritima', page 326.

²⁵³ Ibid, page 326.

²⁵⁴ CMI, *CMI Position Paper on Unmanned Ships*, 2018), page 14; Veal, Tsimplis and Serdy, 'The Legal Status and Operation of Unmanned Maritime Vehicles', page 39.

²⁵⁵ Danish Maritime Authority, *Analysis of Regulatory Barriers to Autonomous Ships*, 2017), page 47, with further reference in footnote 58 to the case law.

by sight and hearing. In conclusion, both remotely controlled and autonomous MASS will have problems with Rule 5 of the COLREGs.

4.2.3 Watchkeeping and Trial Exceptions

The STCW Convention was adopted in 1978 and entered into force in 1984. The Convention codifies proper ship management: It sets qualifications, requirements for masters, officers, and other watchkeeping personnel to ensure that all seafarers hold appropriate certificates. Following its Preamble, the Conventions aims to promote safety at sea and protect the marine environment by ‘establishing common international standards of training, certification and watchkeeping for seafarers’.²⁵⁶

It applies to those ‘seafarers serving on board sea-going ships entitled to fly the flag of a Party’.²⁵⁷ Therefore, according to the wording of the Article, the Convention does not, *prima facie*, apply to those operating MASS from a remote control center or the programmers who have pre-programmed the autonomous ship’s course.²⁵⁸ However, it has been pointed out “that the obligations of an operational nature imposed on seafarers by the STCW Convention will apply analogously to persons performing similar work functions related to autonomous ships as those prescribed by the STCW Convention, though these work functions will be performed from places other than on board the ship.”²⁵⁹ Nevertheless, since the Convention aims to promote the safety of life and property at sea and protect the marine environment, it is foreseeable that the Convention will be expanded to apply to shore-based personnel.²⁶⁰

When it comes to legal challenges for MASS operation concerning the STCW Convention, the main challenge is watchkeeping. Both the STCW Convention and the STCW Code have provisions which regulate watchkeeping and comes in conflict with MASS.

Chapter VIII of the Convention concerns watchkeeping. According to Regulation VIII/2 (2) (1), ‘officers in charge of the navigational watch are responsible for navigating the ship safely during their periods of duty, when they shall be *physically present* on the navigating bridge or in a directly associated location such as the chartroom or bridge control room *at all times*’²⁶¹.

²⁵⁶ The STCW Convention and Code, the Preamble.

²⁵⁷ Ibid, Article III.

²⁵⁸ Komianos, 'The Autonomous Shipping Era. Operational, Regulatory, and Quality Challenges', page 341.

²⁵⁹ Whitepaper, *Remote and Autonomous Ships - The Next Steps* (2016), page 25.

²⁶⁰ The STCW Convention and Code, the Preamble.

²⁶¹ (Emphasis added.)

In the STCW Code, more detailed requirements are laid down concerning watchkeeping. In its mandatory Part A, various provisions concerning watchkeeping regarding requirements on the lookout, bridge, and engine room, presents a difficulty for MASS. Some of the Code's main challenges follows from Part A, Chapter VIII, Part 4-1: Paragraph 18 (1), which states that the master, 'when deciding the composition of the watch on the bridge', shall, among other things, take into account the following factor that 'at no time shall the bridge be left unattended'. Also, Part 4 (4-1) (24) (2), states that a navigational officer in charge shall under 'no circumstances leave the bridge until properly relieved'.

The STCW Convention, Annex, Chapter I, Regulation I/13, regulates conceptions of trials and testing.²⁶² Paragraph 1 states that the Conventions regulations 'shall not prevent an [national] Administration from authorizing ships entitled to fly its flag to participate in trials'. "Trials" are defined as 'an experiment [...] conducted over a limited period which may involve the use of automated or integrated systems'²⁶³ – which is much in line with the Interim Guidelines definition of "trials".²⁶⁴ It has been pointed out that the STCW Convention may open up for "certain MASS and related infrastructure" trials.²⁶⁵ However, this only refers to the regulations provided in the framework.²⁶⁶ Furthermore, Regulation I/13 opens up for national Administrations to make exemptions for trials in certain conditions, one of which is that the trials are conducted in 'accordance with guidelines adopted by the [IMO]'.²⁶⁷ The IMO can therefore adopt interim guidelines that allow trial with MASS without amending the Convention.²⁶⁸ Following a successful trial, the national Administration may authorize the ship in a trial to continue the operations permanently, as long as the IMO adopts related guidelines that authorize such trials.²⁶⁹ Nevertheless, other Member States of the IMO "may object to the trials, which means that the trials cannot be conducted within the waters of an objecting coastal [S]tate".²⁷⁰

²⁶² Historically the provision have applied for something else than MASS trials, see more about this in Ringbom, 'Regulating Autonomous Ships—Concepts, Challenges and Precedents', page 11.

²⁶³ The STCW Convention and Code, Annex, Chapter I, Regulation I/13 (2).

²⁶⁴ The Interim Guidelines, Subparagraph 1.2.2.

²⁶⁵ Veal, 'IMO Guidelines on MASS Trials: Interim Observations', page 2.

²⁶⁶ Ibid.

²⁶⁷ The STCW Convention and Code, Annex, Chapter I, Regulations I/13 (3) and (8) (2); Ringbom, 'Legalizing Autonomous Ships', page 452.

²⁶⁸ Skjong, 'Development of International Regulations for Autonomous Ships', page 6.

²⁶⁹ GL, *Autonomous and Remotely Operated Ships* (2018), page 10.

²⁷⁰ Ibid, page 10.

4.3 How to Comply with “the Intent” of IMO Instruments

Based on the assessment above, it has been shown that a range of IMO Conventions and several of their provisions conflict with the operation, hereunder trials of MASS. However, with the Interim Guidelines’ adoption, a question is whether relevant authorities and stakeholders to MASS trials can deviate from the IMO Conventions when utilizing the Interim Guidelines.

It follows from the Interim Guidelines, Paragraph 2.2.1, that when parties to a trial use the Guidelines, ‘[c]ompliance with *the intent* of mandatory instruments should be ensured’.²⁷¹ The wording “should” is used to indicate obligations for the parties but is not as strict as “shall” – this is in line with the Interim Guidelines being a guiding instrument – and, therefore, is used to make less absolute compliance with relevant mandatory instruments. Nevertheless, it is uncertain “what “the intent” of any given mandatory instruments is, [...] how this may be deduced, and how narrowly or specifically” it is meant to be.²⁷² Can it be taken as far as meaning that parties to individual IMO Conventions can be said to have agreed to MASS trials involving deviation from their provisions, as long as the “intent” of those is ensured?²⁷³

When it comes to interpreting international treaties and regulations, the general rule of treaty interpretation is set out in VCLT Article 31. Article 31 (1) declares that interpretation shall be made ‘in good faith in accordance with the ordinary meaning [...] to the terms of the treaty in their context and the light of its object and purpose’. Meaning that the wording of the treaty shall be interpreted as it is naturally understood. Paragraph 2 mentions those agreements relating to the treaty at the time of its adoption, which can be used to interpret it.

According to Paragraph 3 (a) and (b) of Article 31, ‘subsequent agreements [...] regarding the interpretation of the treaty’, or ‘subsequent practice’ of the contracting States which establish some form of agreement ‘regarding its interpretation’ can be taken into consideration. In addition, Paragraph 3 (c) states that ‘any relevant rules of international law’ may also be considered. In the latter, the wording covers all sources of international law, including, amongst others, customary international law, and general principles.²⁷⁴

²⁷¹ (Emphasis added.)

²⁷² Veal, 'IMO Guidelines on MASS Trials: Interim Observations', page 3.

²⁷³ Ringbom, 'Legalizing Autonomous Ships', page 452.

²⁷⁴ Mark E. Villiger, *Commentary on the 1969 Vienna Convention on the Law of Treaties* (Martinus Nijhoff 2009), page 428.

In the Interim Guidelines case, it can be considered a subsequent agreement between the Member Parties to the existing IMO instruments under the VCLT Article 31 (3). As a consequence, it can impact the interpretation and help clarifying the IMO Conventions.²⁷⁵

One example is regarding the STCW Convention. It has been pointed out that the Convention, Annex, Chapter I, Regulation I/13, may open up for MASS trials. Since the IMO has adopted these Interim Guidelines, flag States wanting to conduct trials can argue that they are following this provision and, thus, are lawful, as long as the other Member States does not object to these trials. However, as mentioned above, this will only exempt the trial to be conducted in the objected States coastal zones. Here, an interesting note can be taken from the Report of the Working Group²⁷⁶ at the 101st MSC meeting. It provided in this report that the Working Group has

“agreed to take some parts of STCW [R]egulation I/13 as an additional reference to draw up these [Interim G]uidelines. In this regard, the [Working] Group also agreed, as instructed, to focus on objectives to be achieved when conducting MASS trials, thereby keeping the guidelines high-level. In this context, the Group noted that the “guidelines adopted by the Organization” referred to in [P]aragraph 3 of STCW [R]egulation I/13 *would be these interim guidelines in the context of MASS trials as and when they were approved*”.²⁷⁷

Taking this statement under consideration, it can be argued that the Working Group of MASS was under the opinion that the Interim Guidelines is a guideline under Annex, Chapter I, Regulation I/13, in the STCW Convention, which then makes it lawful for national Administrations to make exemptions on, amongst others, Chapter VIII and all the provisions regarding the condition regarding physical presence. However, these are just statements from the Working Group on the RSE for the use of MASS. It does not give any binding effect, but shows that the Working Group is open for making trials conducted under the Interim Guidelines fall in under this provision.

4.4 Conclusion

This chapter has pointed out some of the main IMO instruments, which makes MASS unlawful. The MASS’s failure to comply with these key international rules represents one of the principal legal obstacles for approving MASS in international shipping navigation. However, provided

²⁷⁵ Ringbom, 'Regulating Autonomous Ships—Concepts, Challenges and Precedents', page 20.

²⁷⁶ MSC 101/WP.8, 'Report of the Working Group'.

²⁷⁷ Ibid, page 5, Paragraph 27 (emphasis added).

that MASS becomes lawful, it is clear that they need similar or new regulations to ensure safe operations alongside manned ships.

The MASS trials' stated purpose is to enable alternative methods to comply with IMO rules, and the aim is to find mechanisms to ensure an equivalent level of safety. This suggests that all IMO standards cannot be complied with during the trial; thus, the Interim Guidelines fall short of requiring full compliance with every IMO instruments' provisions.²⁷⁸ Until MASS becomes lawful, the Interim Guidelines will be a guiding instrument, which will provide States with a way to conduct trials in a safe manner. However, because it is a soft law instrument, it cannot bind Member States of the IMO, and be used to change existing IMO Conventions. However, it can be used as a "subsequent agreement" and interpreted in the light of this.

Overall, it seems like remote controlled MASS trials will not be as problematic as the ones fully autonomous in both the SOLAS Convention and the COLREGs Convention. However, as a result of the findings in the Report of the Working Group²⁷⁹ it might seem like MASS trials falls under the application of Annex, Chapter 1, Regulation I/13. There is nothing in the provision which excludes trials conducted under the Interim Guidelines from its scope.²⁸⁰ As a result, trials, which meets the conditions in the STCW Conventions provision, is lawful. However, it does not solve the issues relating to the SOLAS and COLREGs Conventions.

²⁷⁸ Ringbom, 'Legalizing Autonomous Ships', pages 450-451.

²⁷⁹ 101/WP.8, 'Report of the Working Group' (2019).

²⁸⁰ Ringbom, 'Legalizing Autonomous Ships', page 452.

5 CONCLUSION

The objective of this thesis was to look at the legal significance of the Interim Guidelines in the international legal system in accordance with the LOSC and IMO instruments.

From the research undertaken, the following findings were done: Regarding the legal role of the Interim Guidelines, it has been seen that as a soft law instrument, it cannot bind the Member States of the IMO. Nevertheless, it can be influential in ensuring a guiding norm for States and other relevant parties to follow when conducting trials with MASS. Additionally, if several States feel the need to follow these guidelines, they may develop into customary law, which can assist in the development of legal norms that will emerge for amongst others, the RSE. All in all, the Interim Guidelines ensures an equal international execution of MASS operations and trials until the international maritime community establishes the required binding regulations for this field.

When it comes to the relations to the LOSC, it can be argued that MASS fall under its legal framework. Therefore, the rights and duties for coastal and flag States, which follows from the LOSC, is applicable for MASS. The Interim Guidelines provisions are in line with this when, for example, it states that the flag States Administration has the responsibility to authorize MASS, and that authorization should be obtained from the coastal and port States where the trial will be conducted. The Interim Guidelines does not specify which maritime zones trials can be conducted in. As a consequence of this, arguments have been made that as long as MASS follows the rules and regulations laid down in the LOSC, trials can not only be conducted in territorial waters where the States have sovereignty, but also in the maritime zones outside of this, such as the EEZ and the high seas.

Through rules of reference, LOSC adapts to developments in the international maritime community. The IMO that is viewed as the primary organization to adopt such rules and regulations. The three instruments which this thesis has highlighted are the SOLAS Convention, the COLREGs Convention, and the STCW Convention. It has been pointed out that the STCW Convention has a provision which enables trials to be conducted without being unlawful. Statements from a Working Group under the RSE have shown that the Interim Guidelines can be viewed to fall under this provision, thus, making it lawful. However, this only solves the Interim Guidelines' problems with the STCW Convention and not the other two.

When it all comes to an end, the Interim Guidelines is an instrument adopted for guiding States that desire to get a head start in operating and testing out the technologies for these new types of ships. Its relevance will depend on the usage of States and other relevant parties. To date, only one State has conducted a trial in accordance with the Interim Guidelines.

In September 2019, the Nippon Yusen Kaisha Line, otherwise known as the NYK Line, conducted the world's first MASS trial following the Interim Guidelines with the *Iris Leader*.²⁸¹ The trial was conducted under two separate periods: First, from Xinha, China to the port of Nagoya, Japan, and secondly, from the port of Nagoya to the port of Yokohama, Japan – areas which are “within the Japanese water”.²⁸² Following the Interim Guidelines Paragraph 2.8, Japan has submitted a report on this trial to the MSC 102nd session.²⁸³ The report states that the purpose of the trial was to “confirm validities of the MASS-related system and identify issues necessary to be addressed towards practical use of MASS-related system in actual sea conditions.”²⁸⁴ Furthermore, the report states that the Interim Guidelines “was very helpful [...] to clarify issues to be addressed and consulted with parties concerned to ensure the safe conduct of trials.”²⁸⁵ The report concluded that the guidelines are adequate “for safe and environmentally friendly trials” and that it also allows for “flexible” application for “individual trials”, and thus, that the guidelines “should be left as it is”.²⁸⁶ Before the trial, following Subparagraph 2.8.1 in the Interim Guidelines, relevant authorities were informed of the planned trial, hereunder the flag State Administration²⁸⁷, coastal State Authorities, and relevant stakeholders as classification society and insurance companies.²⁸⁸ Third parties were not informed beforehand, as it “was found that no information was necessary to be disseminated [...] because these [trials] would be conducted under the condition of regular navigational watch.”²⁸⁹ During the trial, the “personnel involved [...] were appropriately qualified and experienced”²⁹⁰, and officers where maintaining navigational watch, led by the supervision of Master of the ship.²⁹¹ The navigation mode switched between the system of normal steering

²⁸¹ NYK Line, *NYK Conducts World's First Maritime Autonomous Surface Ships Trial* (2019).

²⁸² Japan, *Report on MASS Trials Conducted in Accordance with the Interim Guidelines for MASS Trials*, (2020), Annex, page 7 and Section 3.1.

²⁸³ *Ibid*; as noted above on page 12, the MSC 102-meeting has been postponed.

²⁸⁴ *Ibid*, Annex, Section 1.2.

²⁸⁵ *Ibid*, Annex, Section 4 (1).

²⁸⁶ *Ibid*.

²⁸⁷ *Iris Leader* is registered under the flag of Panama.

²⁸⁸ Japan, *Report on MASS Trials Conducted in Accordance with the Interim Guidelines for MASS Trials* (2020), Annex, Section 1.4 and 2.2.

²⁸⁹ *Ibid*, Annex, Section 2.3.

²⁹⁰ *Ibid*, Annex, Section 3.2.

²⁹¹ *Ibid*, Annex, Section 1.2 and 1.4.

mode to autonomous operation mode under the supervision of the Master of the ship.²⁹² It used the Sherpa System for Real ship navigation system, which “[d]uring the trial [...] was monitored as it collected information on environmental conditions around the ship from existing navigational devices, calculated collision risk, automatically determined optimal routes and speeds that were safe and economical, and then automatically navigated the ship.”²⁹³ The safety measures established for the trial were as follows: Safety requirements, arrangement of watchkeeping, and emergency response.²⁹⁴ Following subsection 2.1.2, paragraph 2, crews performed typical duties, including watch-keeping, during trials.

To summaries this test, it can be argued that on the one hand, the Interim Guidelines were followed since, amongst others, it got the authorization from the flag, coastal, and port State Authority, qualified personnel was used, and they made a report to the IMO. On the other hand, it can be pointed out that the ship was not only monitored from a shore-based control center, but it also had a captain onboard which approved the navigations. Thus, operating more like a manned ship, and not as much as neither remotely controlled nor autonomous ship.

In August 2020, the *Unmanned Surface Vessel (USV) Maxlimer* had a successful three-week mission conducting deep-sea surveys on its voyage in the Atlantic.²⁹⁵ The mission was supposed to cross the Atlantic to America, remotely controlled in a trans-ocean project.²⁹⁶ Aiming to be the first of its kind. “However, due to travel restrictions and other planning complications resulting from COVID-19, this was ultimately not possible.”²⁹⁷ Also, the *Mayflower Autonomous Ship (MAS)*, which was supposed to “trace the rout of the original 1620 *Mayflower* to commemorate the 400th anniversary of the famous voyage” in September 2020, have had to postpone its voyage due to COVID-19 restrictions.²⁹⁸ However, the *MAS* and its AI Captain are being tested off Plymouth’s coast in England until it can set out for the

²⁹² Ibid, Annex, Section 1.4.

²⁹³ Line, *NYK Conducts World’s First Maritime Autonomous Surface Ships Trial*.

²⁹⁴ Japan, *Report on MASS Trials Conducted in Accordance with the Interim Guidelines for MASS Trials* (2020), Annex, Section 2.1 and subsection 2.1.2.

²⁹⁵ Jonathan Amos, 'Robot Boat Completes Three-Week Atlantic Mission' *BBC News* (15.08.2020) <<https://www.bbc.com/news/science-environment-53787546>> accessed 16.08.2020.

²⁹⁶ Stuart McDill and Alexandra Hudson, '12-meter ship aims to be first to cross Atlantic without a crew' *Reuters* (21.05.) <<https://www.reuters.com/article/us-shipping-crewless/12-meter-ship-aims-to-be-first-to-cross-atlantic-without-a-crew-idUSKCN1SR226>> accessed 08.09.2020.

²⁹⁷ Seawork, 'SEA-KIT USV Successfully Completes 22 Days of Offshore Operation in the Atlantic Ocean' (2020) <<https://www.seawork.com/exhibit/pr-and-marketing/press-releases/2020/sea-kit-usv-successfully-completes-22-days-of-offshore-operations-in-the-atlantic-ocean>> accessed 08.09.2020.

²⁹⁸ IBM, 'Sea Trials Begin for Mayflower Autonomous Ship’s ‘AI Captain’' (2020) <<https://newsroom.ibm.com/2020-03-05-Sea-Trials-Begin-for-Mayflower-Autonomous-Ships-AI-Captain>> accessed 08.09.2020.

pioneering Transatlantic voyage as one of the first fully autonomous vessels.²⁹⁹ These two latter examples show that both remotely controlled and autonomous ships make headway to test these new ships in international waters. As more States venture on with conducting trials outside internal waters, it will likely act as an incentive for other States to follow up with trials in waters beyond their own.

Looking forward, for the development of MASS to continue, trials need to be conducted. The Interim Guidelines aims to facilitate and enable States to conduct trials in areas where such ships soon will be operating. The Guidelines secures an international linkage with trials conducted by separate States to the international maritime community. Until the international regulatory authorities have caught up with the emerging technologies, the Interim Guidelines will play an important role in guiding the industry parties to prevent accidents and setbacks that may hinder progress in achieving MASS operations.

The IMO is known to be a slow-moving organization. The IMO's Secretary-General Kitack Lim has outlined a cautious timeline for this work to be finished, and others are saying it could take up to 2030 before it is regulated.³⁰⁰ If the IMO spends a prolonged time to come to an agreement on the issues regarding the regulation of MASS, the Interim Guidelines might develop from being a soft law instrument into becoming a customary international law. Nevertheless, it can be concluded that even in the form of an interim guideline, it represents the first and important step towards authorizing operation of MASS.

²⁹⁹ Robin Pagnamenta, 'Britain's first robot ship prepares to set sail - Autonomous vessels may offer solution to pandemic struggles' *The Telegraph* (06.09.2020) <<https://www.telegraph.co.uk/technology/2020/09/06/britains-first-robot-ship-prepares-set-sail/>> accessed 08.09.2020.

³⁰⁰ Costas Paris, 'Rules for Robot Cargo Ships Could Be Years Away, Regulator Says' *The Wall Street Journal* (06.06.) <<https://www.wsj.com/articles/rules-for-robot-cargo-ships-could-be-years-away-regulator-says-11559843777>> accessed 22.08.2020; Fathom World, *Aronnax Podcast* (2020).

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