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REGULATORY APPROACH TO REMOTE OPERATOR AND REMOTE OPERATIONS CENTER: UNMANNED VESSELS DILEMMAS

Abstract

Remote operators and Remote Operations Centers (ROCs) are new agents which will participate in complex chain of persons involved in operations of new shipping involving Maritime Autonomous Surface Ship (MASS). Unmanned ships navigated by a remote operator (so-called degree three MASS according to the nomenclature adopted by the International Maritime Organization, IMO) will most likely be exploited on a larger scale sooner than ships operated and navigated by Artificial Intelligence. This article intends to discuss the legal status of Remote Operations Centers and remote operators. After discussing the current stage of developments on MASS at the regulatory international level (part 1), dr Igor Vio will put in focus several issues of the public maritime law. He will present the legal status of ROC (part 2), remote operator and MASS master (part 3), taking into consideration the proposed text of the Draft MASS Code. In part 4 dr Zuzanna Pepłowska-Dąbrowska will explore chosen problems of maritime liability conventions and their applicability to the remote operator and ROCs, including the question if operator of the ship as included in the Convention on Limitation of Liability for Maritime Claims, can be assimilated with the remote operator. The authors will also try to identify the regulatory gaps concerning the operation of the ROCs and suggest some solutions.

Keywords: Maritime Autonomous Surface Ship, MASS, remote operator, Remote Operations Center, UNCLOS, IMO, MASS master, operator of the vessel, servant, independent contractor, limitation of liability

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INTRODUCTION

The advancement in autonomous shipping represents a wide range of solutions to the maritime transport industry's main challenges: to keep operating costs as low as possible, to facilitate effective international trade, to reduce environmental impacts and greenhouse gas emissions, and to eliminate trivial operational tasks and free up crew. The autonomous vessel describes a ship equipped with modular control systems and communication technology that enables wireless monitoring and control, including advanced decision support systems and remote or autonomous operation capabilities. Although ships are already highly automated today, some new systems still need integration efforts to enable unmanned and autonomous operations. The implementation of autonomous ships will have an impact on all aspects of the shipping industry. It implies the economic improvement of the company activities because it contributes to increasing profits, reducing environmental pollution, and eliminating the number of maritime accidents. The main motive for the development of an unmanned and autonomous ship is to contribute to the goal of a more sustainable maritime transport industry. Currently, fierce competition between shipping companies puts a lot of economic pressure on all parties involved in shipping. At the same time, international legislation is increasingly imposing requirements to reduce the environmental impacts of ships and transport by sea.

The global shipping industry has accepted the necessity of defining and understanding the concept of autonomous ships, as well as creating related legal frameworks both at the international and national levels[1]. This requires analysis and research of the general concept of autonomous ships, its goals, and possibilities for realization. The first goal is to define the autonomy of the ship, the way the autonomous ship functions, its legal regime, the way of running an autonomous ship through a coastal control centre, operational procedures related to the autonomy of the ship, and the presentation of the project engaged in these investigations. Therefore, it is necessary to describe the autonomous ship

[1] More on autonomous ships and regulatory challenges see: C.H. Allen, The Seaboats are Coming Here: Should they be Treated as Vessels? The Journal of Navigation, Vol. 65, 2012, pp. 749-752; A. Chircop, Testing International Legal Regimes: The Advent of Automated Commercial Vessels, German Yearbook of International Law, vol. 60, 2017, pp. 110-143; J. Nawrot, I. Vio, Autonomous Vessels Based on Artificial Intelligence: Selection of Regulatory Approach – Main Challenges, [in:] P. Amižić – Jelovčić (ed.) Modern Challenges of Marine Navigation, University of Split Faculty of Law, Split, 2021, pp. 139-157; D. Osinuga, Unmanned Ships: Coping in the Murky Waters of Traditional Maritime Law, Comparative Maritime Law, No. 174, 2020, pp. 75-105; P.W. Pritchett, Ghost ships: Why the Law Should Embrace Unmanned Vessel Technology, Tulane Maritime Law Journal, Vol. 40. 2015, pp. 197-225; R. Veal, M. Tsimplis, *The Integration of Unmanned Ships into The Lex Maritima*, Lloyd's Maritime and Commercial Law Quarterly, 2017, pp. 303-335.

and examine existing relevant projects and the related operational, regulatory, and qualitative challenges posed due to the development and actual application of such vessels in the near future. The maritime autonomous vessel may be defined as an unmanned ship with advanced but limited automation and supervision and assistance from a remote control centre[2]. According to the Draft MASS Code, Maritime Autonomous Surface Ship (herein: MASS) means a ship that, to a varying degree, can operate independently of human interaction if at least all or part of the navigation tasks are automated or remote operated.

Autonomous vessels represent a way out of the shortage in the supply of seafarers due to the perceived unattractiveness of work and the growing demand for seafarers caused by an increase in transport volumes. On one hand, this could reduce the expected pressure on the labour market for seafarers, as this would allow, at least in part, reducing the intensity of operation of ship operations. On the other hand, routine tasks on board would be automated, and only demanding but interesting navigation and technical tasks would be transferred from the ship to the land operations centre, making maritime affairs more attractive and family-friendly than today.

This paper is dedicated to ships operated remotely, either from a center located on land or from other ships, which were named during the works of the Joint Working Group of the FAL, MSC, and LEG Committees as Remote Operations Centers (ROCs) [3]. The fact that there is a human agent involved in the operation of such ships makes them easier to assimilate into the current legal framework than fully autonomous MASS. Nevertheless, there are multiple issues that require policy decisions in the form of amendments to the existing legal instruments. The below paper will highlight some of them.

1. REGULATORY FRAMEWORK FOR MASS

Before determining a definition for an autonomous ship, we should be aware of the absence of a general definition of the term ship. Whereas the United Nations Convention on the Law of the Sea, 1982 (herein: UNCLOS) as the most important global treaty regulating inter alia the duties of flag states and port states, does not define the concept of ship, other international conventions that regulate standards of maritime safety, protection of human lives at sea, preven-

[2] Ø.J. Rødseth, D.A. Nesheim, A. Rialland, E.A. Holte, *The Societal Impacts of Autonomous Ships: The Norwegian Perspective, Autonomous Vessels in Maritime Affairs – Law and Governance Implications*, [in:] T.M. Johansson, J.E. Fernández, D. Dalaklis., A. Pastra, J.A. Skinner (eds), Autonomous Vessels in Maritime Affairs. Studies in National Governance and Emerging Technologies, Palgrave Macmillan, Cham, 2023, p. 358.

[3] IMO, MASS-JWG 2/WP.1, para. 25.

tion of marine pollution, as well as a number of maritime private law conventions, depending on the issues they regulate and the purpose they wish to achieve, use a wide spectrum of definitions of the term ship or vessel. These definitions very often determine the concept of a ship or a vessel by including a wide number of objects exploited at sea and apply exclusively to the implementation of a particular instrument[4].

According to the wording of these various definitions, we may conclude that they essentially can relate to autonomous ships since they retain the main characteristics and determinants of the ship. Whether they will have and possess the legal status of a ship or other craft will eventually depend on the conditions regulated by the national legislation of the state whose nationality such an object seeks to achieve.

However, it is understandable that national regulations are not yet oriented toward the contemporary development of autonomous ships and regulations related to them. National maritime legislation of the majority of states has not sufficiently covered unmanned vessels, which is caused by the recent conception of this technology. A good example is the Maritime Code of Croatia, which provides definitions of various maritime objects, including vessel or craft, floating facilities, and fixed offshore facilities, and among vessels, it contains the notion of autonomous vessel[5]. Its definition was introduced in the 2019 amendments of the Croatian Maritime Code: "Autonomous vessel shall be a vessel which, depending on the degree of automation and the requirements for immediate control of the permanent service, may sail without a crew boarded or with a reduction in the number of crew members[6]". On the other hand, some authors

[4] D. Ćorić, M. Pajković, Autonomni brod - nova vrsta broda u pomorskom zakonodavstvu, [in:] P. Amižić Jelovčić (ed), Modern Challenges of Maritime Navigation, University of Split Faculty of Law, Split, 2018, p. 109; J. Symonides, Kilka uwag w sprawie prawnomiędzynarodowego statusu platform, sztucznych wysp, instalacji i konstrukcji morskich, Prawo Morskie 2014, t. XXX, pp. 131-145; https://journals.pan.pl/dlibra/publication/107664/edition/93338/content, (accessed: 10.12.2023); more on problems with defining ship see: B. Sözer, Is It a Ship or Not? If Not – Then What?, [in:] B. Soyer, A. Tettenborn (eds), Maritime Liabilities in a Global and Regional Context, Informa Law from Routledge, London, 2018, pp. 118-131; S.F. Gahlen, Ship revisited: a comparative study, Journal of International Maritime Law, Vol. 20, 2014, pp. 252 – 303.

[5] Pomorski zakonik (Maritime Code). Official Gazette 181/04, 76/07, 146/08, 61/11, 56/13, 26/15, 17/19 provides that maritime vessel can be a ship, warship, submarine, yacht, boat and autonomous vessel. The classification of maritime facilities is relevant for the size of the application of the relevant maritime regulations. Ship is defined as a vessel intended for sea navigation, the length of which is more than 15 meters, or it is authorized to carry more than 12 passengers (Art. 5.2. Code). More on Croatian maritime law, see: I. Vio, *Maritime Safety – Croatian Legal Framework*, [in:] J. Nawrot, Z. Peplowska-Dabrowska, (eds) Maritime Safety in Europe – A Comparative Approach, Informa Law from Routledge, London, 2020, pp. 74-93.

[6] Art. 5.1. of the Croatian Maritime Code, Official Gazette 17/19.

noted the gap in Croatian national legislation, which provided just the definition of the autonomous vessel without any other provisions with regard to its construction, operation, safety, security, protection of the marine environment, or liability for damages caused by its use[7]. This gap has not represented a problem so far since for the time being there are no shipping companies in the Republic of Croatia developing autonomous technology with the intention of introducing such ships into the national shipping industry, and their inclusion in international shipping will eventually occur only after the International Maritime Organization (herein: IMO) adopts the appropriate regulatory framework.

As for the EU level definition, the European Technology Platform describes the autonomous ship as the next generation of modular management and communication technologies that will enable wireless monitoring and control functions on and off the ship. This will include advanced decision support systems that will enable remote control of ships by partially or fully autonomous control[8].

Besides the above-mentioned UNCLOS, the global legal framework is comprised of various international conventions adopted by the International Maritime Organization. The most important is the International Convention on the Safety of Life at Sea (SOLAS 1974/88), which sets minimum acceptable standards for the construction, equipment, operations, and necessary ship certificates. Responsibility for compliance is given to the flag state where the vessel is registered, with the right to inspect foreign ships visiting their ports through the system of port state control[9]. Since autonomous vessels are not excluded from Chapter I of SOLAS, the terms 'must be sufficiently and efficiently crewed' and 'must have an appropriate document on the minimum number of crew members or equivalent', should be adapted to reflect the new reality of the unmanned ship without crew on board. On the other hand, most autonomous ship projects will include at least one remote operation centre, and these centers will have to be equipped not only with special technical infrastructure but also with a suffi-

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[7] I. Savić, *Autonomous Vessels in Croatian Maritime Law*, [in:] P. Amižić Jelovčić (ed.), Modern Challenges of Maritime Navigation, University of Split Faculty of Law, Split, 2021, p. 256.

[8] European Commission, (2012). Maritime Unmanned Navigation through Intelligence in Networks, at: http://www.unmanned-ship.org/munin/wp-content/uploads/2015/10/MUNIN-D9-3-Quantitative-assessment-CML-final.pdf, (accessed: 7.12.2023).

[9] The first version of SOLAS was adopted after the sinking of the Titanic by a diplomatic conference convened by the British government in 1914 and was supplemented repeatedly to the latest version. It provided that signatory governments (flag states) must ensure that all ships under their flag meet the requirements of SOLAS. The current version in force is International Convention for the Safety of Life at Sea, which was adopted by the International Maritime Organisation in 1974, with the SOLAS Protocol that was subsequently adopted in 1978. The Second SOLAS Protocol was adopted by the IMO in 1988 (Official Gazette – International Treaties No. 13/1999 and Decision on Entry into Force of the Protocol, Official Gazette – International Treaties No. 4/2000).

cient number of well-trained personnel. The task of the IMO is to develop the standards for their training and certification. The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), which was adopted in 1978 and amended in 1995 and 2010, applies only to crewmembers on board but not to personnel responsible for operating an autonomous ship from a ROC located on land or in any other relevant location, other than the ship itself, nor the developers who create programs for its autonomous navigation equipment before its departure. These personnel members are not regulated by the STCW, although they have been granted the authority to control autonomous ships[10].

At the national level, for example, in accordance with Croatian regulations and legal basis, the crew of the ship does not represent an important element of the concept of the ship, so autonomous ships, if covering various other conditions, can obtain the legal status of the ship. This will be subject to a maritime law regime relating to all conventional ships that will need to be properly modified and completed.

1.1. ACTIVITIES OF THE INTERNATIONAL MARITIME ORGANIZATION WORKING GROUP ON MASS

After the adoption of the Interim Guidelines for MASS Trials[11] in 2019 and since the completion of the four-year regulatory scoping exercise which was launched in 2017 at the Maritime Safety Committee, the IMO has developed a plan for the creation of a goal-based MASS Code with guidelines and rules for autonomous shipping at the global level. To continue the commitment to perform this important task within the International Maritime Organization, the Joint Working Group (herein: MASS-JWG) was set up in 2022, combining the efforts of the MSC with the competencies and expertise of the Legal and Facilitation Committees. Their common activities have been focused on adapting the existing international conventions through assessment of their potential amendments or new interpretations as well as on conceiving new ones in order to create an adequate legal framework for the new technological developments already achieved in autonomous shipping. The following step in this IMO strategy would be the adoption of a mandatory legal instrument by the end of the decade.

Through the scoping exercise that was performed between 2017 and 2022, IMO has recognized the importance of creating the international legal regime for these vessels and has been using the term "maritime autonomous surface

[10] International Convention on Standards on Training, Certification and Watchkeeping of Seafarers, 1978 with Resolutions (STCW 1978/95).

[11] MSC.1/Circ.1604, 14 June 2019.

ships" (MASS) in all the materials, in which four various degrees of autonomy were considered: crewed ship with automated processes and decision support (degree one); remotely controlled ship with seafarers on board (degree two); remotely controlled ship without seafarers on board (degree three); and fully autonomous ship (degree four)[12].

MASS-JWG held the first meeting from 6 to 8 September 2022. During its 47th session held from 13 to 17 March 2023, the Facilitation Committee requested the Secretariat to draw the attention of the MASS-JWG to the following potential common gaps and themes identified: the roles and responsibilities of the master and crew, the roles and responsibilities of the remote operator, definitions/terminology of MASS, certificates and other documents, sharing of information, and issues related to connectivity and cybersecurity in remotely controlled operations.

The second session of the MASS-JWG, which was held in hybrid mode from 17 April to 21 April 2023, addressed the common issues identified in the RSEs of the three Committees and discussed the possible ways how best to address them.

Meanwhile, work at the MSC on the MASS Code develops, with a special Working Group asked to consider the common potential gaps and/or themes. This Working Group tasks include developing positions on any common issues for submission to the MASS-JWG in the future. For the time being, development of the non-mandatory MASS Code will be limited to cargo ships with a view to considering the feasibility of application to passenger ships at a future stage[13].

During the second meeting of the MSC Intersessional Working Group on MASS, which was held at IMO Headquarters in London from 30 October to 3 November 2023, the Draft International Code of Safety for Maritime Autonomous Surface Ships (Draft MASS Code) was discussed and developed. The Code has been based on a holistic approach and has a preamble and three parts (introduction, principles, and functional requirements). The delegates agreed that provisions of this Code should be implemented for individual remotely controlled or autonomous functions even where persons are on board to handle other functions. There was also a consensus that the MASS Code should take into account the fact that certain operational functions may be controlled from a location, or locations, remote from the MASS and address necessary aspects of such ROCs.

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[12] IMO MSC, Autonomous Ships: Regulatory Scoping Exercise Completed, available at: https://imo.org/en/MediaCentre/PressBriefings/pages/MASSRSE2021.aspx, (accessed: 10.12.2023).

[13] Maritime Cyprus, Progress on autonomous ships Code from the IMO, available at: https://maritimecyprus.com/2023/06/27/progress-on-autonomous-ships-code-from-the-imo/ (accessed: 10.12.2023).

2. REMOTE OPERATIONS CENTRE

Some of the crucial issues, that should be regulated by MASS Code, are related to the structure and functioning of the ROC. The autonomous ship is operated from a remote area by an operation centre where all information related to the route and ship can be retrieved. Monitoring and management functions outside defined boundaries are performed by an onshore operator at this centre. The entire management is supported by modern available satellite-based technology, on which all information is obtained in real-time, thus symbiosis of computer and remote control. It is evident that sensors ship handling simulation, engine control, and monitoring system, remote control system and control coastal centre play a role in this management[14].

During the second meeting of the MASS-JWG in April 2023, the delegation of the United Kingdom submitted the report with a summary of developments on MASS: research, legislation, and industry projects. This report contained a proposal for the ROC definition: "Remote Operations Centre" is a place or location from where at least one remote operator is operating a MASS. The key part of the definition of ROC is that it should focus on the function of the ROC rather than the location of the ROC which could be a mobile location and is simply the place where the MASS is controlled and is not on the MASS itself. Thus, an ROC may be based on another ship or a land-based location including portable cabins, buildings set up as permanent ROCs (this could be purpose-built or repurposed office space), portable devices (for example but not limited to laptops and mobile phones) accessible from different locations. A MASS during one voyage may be operated from more than one ROC. Finally, the Draft MASS Code adopted the following definition: "Remote Operations Centre means a location remote from the MASS that can operate some or all aspects of the functions of the MASS[15]."

As one of the key aspects of the safe operation of MASS, the MSC Working Group considered the survey and certification requirements for both, MASS and the ROC and agreed that remote operation should be addressed. With respect to the certification of an ROC, which may operate a number of MASS flying the flags of different States, each of the flag States would have responsibility for the safe operation of its MASS. In this respect, the Group noted the presentation by Belgium introducing the concept of Remote Operation Management by which a flag State exercised oversight over an ROC, even if located outside its jurisdiction, i.e., ROCs would be subject to inspections and control by the flag Administration that have authorized the remote operation of ships flying their

[14] W.C Bruhn, H.C. Burmeister, *Process map for autonomous navigation*, 2013 see more at: www.unmanned-ship.org, (accessed on 7.04.2021).

[15] MSC 108/4/1, Annex 7.49, p. 10.

flag[16]. In order to ensure the safe operation of a MASS when remotely operated from a ROC, in particular when the ROC host State was different from the flag State of the MASS, the Group considered the oversight mechanism under the ISM Code as a potential template for the MASS Code[17]. Consequently, the Working Group agreed on the concept of the ISM Code safety regime as the basis. The Group acknowledged that legal considerations on the matter of jurisdiction would be undertaken in the Legal Committee. Mindful of the novelty of the approach whereby a flag State would have to oversee an ROC in another State, it was stated that new competencies for a flag State authorizing an ROC to remotely operate MASS flying its flag were needed, as well as and for the host State's Administration, so as to ensure that ROC operates MASS safely.

The Draft Code defines remote control as functions within the ship, which are operated from outside the controller area network of the ship without interference from anyone on board the ship. Remote control may have direct control of actuators on board, or may just give functional commands to an autonomous function (system). Remote control may have varied complexity, from simple communication of setpoints to full real-time control including full virtual feedback from the ship/function[18].

"Main Principles for MASS Functions and Remote Operations" is the title of Part 2 of the Draft Code. It regulates operational context, risk assessment, system design principles, software principles, connectivity, and human element. The connectivity issues between MASS and ROC are especially important concerning the need to establish reliable, stable and secure connectivity with ROC and other external stakeholders such as MRCC, ports, VTS, etc. The provisions have the goal to ensure that connectivity between MASS and ROC should be fault-tolerant so that it operates at full capacity even in case of failure in a single component, as well as established using redundant communication channels, including main and backup channels, preferably using different communication technologies and service providers.

Part 3 of the Draft Code, which is titled "Goals, Functional Requirements and Provisions" contains seventeen chapters covering the whole spectrum of issues (that remind somewhat of those regulated by the SOLAS Convention), such as navigation, remote operations, communications, subdivision, stability and watertight integrity, fire protection and safety, life-saving appliances and equipment, management of safe operations, security, search and rescue, cargo handling, personnel safety and comfort, towing and mooring, marine engineering and machinery installations, electrical and electronic engineering, maintenance and repair, and emergency response.

[16] MSC 108/4/1, p. 5.

[17] *Ibidem* p. 6; MSC/ISWG/MASS 2/2.

[18] MSC 108/4/1, Annex 7.46, p. 9.

The goal of the Chapter 2 of the Part 3 is to ensure the safe remote operation of a MASS from a location, which is not on board the ship, taking into account the modes of operation and the number of persons on board. In order to achieve this goal, the following functional requirements are embodied in this chapter:

1) MASS should be able to be operated from an ROC at a secure location to ensure the safe, secure, and effective operation of MASS at any time when they are in service;

2) the location should provide the ROC with facilities that are secure and protected from unauthorized access, means to enable reliable connectivity and communication between the ROC and the MASS, third parties and any ship-board personnel, and with facilities to authorize access to, and sharing of, certificates and other mandatory documents required to demonstrate MASS are compliant with international, national and regional requirements;

3) safe remote operation should provide a mechanism by which failure and recovery of the ROC would not result in an unsafe state or intolerable risk on or around the MASS in service, including the use of redundancy or backup measures,

4) ROC should be equipped with validated and verified systems to support the execution of effective remote operation of MASS, and with sufficient and relevant qualified personnel to enable safe operation of MASS, taking into consideration the total number of MASS that are operated from the same ROC[19].

The provisions of Chapter 3 titled "Communications" prescribes that MASS should meet the functions required by Regulation IV/4 of the SOLAS Convention. MASS should establish reliable and secure connectivity with one or more designated ROCs throughout their entire voyage. The remote operator should be able to seamlessly switch and distribute different vessel data between the different communication channels without a negative effect on the operations. There is an additional explanation that the essential requirement of communication is to meet the needs of the ship, including but not limited to bandwidth, speed, time delay, redundancy, etc.[20]

The following Chapter 4 provides for the need that the ROC should be supplied with real-time information as is necessary to control the ship draughts and stability at all times, including ship movements in 6 degrees of freedom. The stability control system and the supervising control system should be able to detect existing or predictable intact stability failures, as well as damaged stability failures if in damaged condition, and alarm the ROC if the rolling accelerations or amplitudes exceed prescribed limits[21]. Chapters 7 and 9 have the goals to

[19] MSC 108/4/1, Annex, p. 36-37.

[20] *Ibidem* p. 39.

[21] *Ibidem*. p. 40.

fulfil the safety objectives for the management of safe operation of SOLAS Chapter IX and the ISM Code taking into account the mode of operation and the number of persons on board, as well as to fulfil the security objectives of SOLAS Chapter XI-2 and the ISPS Code, taking into account the number of persons, the property on board and the level of autonomy or mode of operation.

The aim of Chapter 17 of the Code is to provide measures for adequate responses in emergency situations in a reasonable time, taking into account the modes of operation in order to ensure the safety of human lives, property, and the environment. An effective emergency response plan and command structure should be established to respond sufficiently to any hazards that may arise from the ship or ROC and to ensure that they do not result in intolerable risk. The timely handover of command-and-control functions between people and machines, between vessels and ROC, as required by the emergency response situation should be available according to established procedures.

3. REMOTE OPERATOR AND REMOTE MASTER

Remote operator means a qualified person who is employed or engaged to operate some or all aspects of the functions of a MASS from an ROC. The purpose of this definition is to define the individual or role responsible for operating all or any function of a MASS remotely. The role and responsibilities have a broad scope and cover any role that could be undertaken by seafarers on board a vessel, and any new roles that may be required for MASS. A remote operator may be involved in the operation of more than one MASS at a time, or swarm operations. The implications and the limits of this possibility will have to be considered in more detail as per STCW requirements, and any specific new requirements for new roles in the future.

Under the Maritime Labour Convention, 2006 (herein: MLC), the seafarer has protection and has to comply with requirements concerning hours of work. The local health, social security, and employment regulations would apply to remote operators. If remote operators were considered seafarers this could also cause issues with calculation and qualifying sea-time (how it is counted and recognized for certification of competency or re-validation of certificates of competency), financial implications, as well as health and safety implications if MLC requirements are different to land-based HSE regulations.

In addition, according to UNCLOS, Art. 94 (4) (b), flag States shall ensure that each ship is 'in charge of the master holding the appropriate qualifications, in particular in maritime affairs, navigation, communications and marine engineering'. As some authors argue, the obvious question is whether it is possible

for an unmanned ship, by its definition, to have a master.[22] Furthermore, the amount of work for onshore staff at the ROC is expected to be very large. "MASS master on land" with the help of one to three operators can simultaneously control a small fleet of autonomous vessels. The minimum number of such vessels permitted to operate at once has not yet been set. Conditions, which vary depending on the geographical area, type of cargo, weather conditions, arrival or navigation of the ship from the port facility, safety, operator fatigue, accepted minimum prior experience on the same or similar types of ships, and updated competency tests, will have to be considered. Those preconditions must be included as amendments to the existing STCW or similar convention specifically adapted to the needs of autonomous ships. Finally, while the labour law would apply to remote control centre operators or developers of a fully autonomous ship, specific rules similar to those applicable to seafarers (such as the duty to report distressed signals, etc.) may also need to be adapted and applied.

The definition of "remote master" or "MASS master" was discussed during the second session of the MSS-JWG. It was concluded that in relation to an automated ship, this term means a person (except a pilot) who has command or charge of the ship without being on board[23].

There was a consensus that there should be a single remote master with overall responsibility. Whilst the remote master may not always be directly controlling the ship, he or she is always in command, bears ultimate responsibility for the ship, and is responsible for overall decision-making. This mirrors the understanding of the role of the master on a non-MASS ship. The remote master must be able to hand over responsibilities to another remote master.

However, the delegates agreed that the remote master when based at a ROC onshore, should not be considered a seafarer in this role, although the same person may be a seafarer when serving on a MASS they are operating or in other ships (autonomous or manned). Currently under the MLC, and most national legislation based on MLC, ship masters are seafarers so they have labour law protection and have to comply with hours of work rules under the MLC. MASS masters who work on a shore-based location will be covered by local health and safety, and local employment regulations.

There was a common opinion that a definition of a remote master must be based on the following principles:

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[22] R. Veal, M. Tsimplis, The Integration of Unmanned Ships into The Lex Maritima. Lloyd's Maritime and Commercial Law Quarterly, 2021, p. 331, available at: https://eprints.soton.ac.uk/411256, (accessed: 10.12.2023).

[23] The Draft Code contains the following definition: "Remote Master means a master who is in a Remote Operations Centre outside the MASS", MSC 108/4/1, Annex 7.50, p. 10.

a) the MASS master does not need to be on board a MASS (he or she should be able to be located anywhere, including on board the MASS they are the decision maker for);
b) the MASS master must be a natural person; therefore, it cannot be a machine based on artificial intelligence.

The goal of Chapter 12 of the Draft MASS Code is to ensure the health, safety, and comfort of any personnel on board a MASS or at a Remote Operations Centre. It prescribes that Remote Operations Centres and workstations should be developed using Human Centred Design "where systems are designed to suit the characteristics of intended users and the tasks they perform, rather than requiring users to adapt to a system"[24]. ROCs and workstations should be ergonomically designed including visual ergonomics. The use of wearable technologies should adhere to health and safety requirements. Personnel working at a ROC should have suitable hours of work and rest.

4. A FEW COMMENTS ON MARITIME LIABILITY CONVENTIONS AND REMOTE OPERATORS

When it comes to the issues or liability for the accidents caused by the navigation of the remote operator, there are multiple issues that need attention. Below, there are some comments referring to the problems that have been signalized as requiring further analysis during the IMO work on MASS.

4.1. OPERATOR EQUALS REMOTE OPERATOR?

First of all, there is a question of accommodation of this new figure into the existing legal framework. One of the issues raised during the work conducted within the IMO on MASS was the requirement for further research on the liability of the remote operator and its status, specifically, can it be assimilated with the terms "operator of the ship" as adopted under several of international maritime liability conventions.[25]

The international conventions which refer to the operator of the ship as one of the figures of their regulatory schemes include the Convention on Limitation of Liability for Maritime Claims, amended by the Protocol of 1996, (herein: LLMC 1996) which refers to the operator of the ship as one of the parties who may benefit from a limitation of liability[26]; the International Convention

[24] MSC.1/Circ.1512.
[25] IMO, MASS-JWG 1/2/1; LEG.1/Circ.11.
[26] Art. 1.2 LLMC 1996.

on Civil Liability for Bunker Oil Pollution Damage of 2001 (herein: Bunker Convention) which makes it a party, who is included in the definition of the owner[27] or the International Convention on Civil Liability for Oil Pollution Damage of 1992 (CLC 1992)[28] which prevents parties from direct claims against the operator of a ship.

We believe that an interpretation aligning "remote operator" with "operator of the ship" cannot rely merely on the coincidental similarity of words. Instead, the analysis should center around the intended meaning of the term when adopted under a particular international convention.

Neither of the conventions defines the phrase "operator of the ship" and there is no extensive discussion on the meaning of it found in the *travaux préparatoires*. The most extensive comments made in the literature and case law concern the LLMC. Some authors suggest that the words "manager" and "operator", both included in art. 1.2 of the LLMC, should be interpreted as parties who are interested in possession of the ship, as understood under the previous Convention on limitation of liability of 1957[29]. It is therefore proposed that, on the contrary, the term "operator of the ship" should not include any person who has had dealings with the vessel, as such reading would be too liberal[30]. When it comes to the case law, the term "operator" has gained relatively little judicial attention. According to the judgments of the common law courts, by whom a ship is 'operated' will vary with the facts of each case. It has been suggested however by the Australian Administrative Appeals Tribunal in Re Bergvall and ASP Ship Management Pty Ltd, that a company closely involved with the actual navigation of a ship and its daily activities will frequently answer the description[31]. This decision has been subsequently appealed to the Australian Federal Court which noted that the phrase "a ship which is operated by" and the word "operator" of a ship did not carry precise content from maritime law or history. At the same time, it maintained that various dictionary definitions suggested that the phrase 'to operate a ship' has technical and commercial aspects. The court observed that, although the meaning of the term can encompass someone who physically attends to the working of the ship, the context requires more: the notion of management and control of the ship[32]. The Federal Court noted the tripartite division: commercial, technical, and crewing activities which are operational responsibilities, and rejected the contention that the word

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[27] Art. 1.3 Bunker Convention 2001.

[28] Art. III.4(c) CLC 1992.

[29] N.A. Martínez Gutiérrez citing P. Griggs, R. Williams, J. Farr, in N.A. Martínez Gutiérrez, *Limitation of Liability in International Maritime Conventions*, Routledge 2011, p. 31.

[30] P. Griggs, R. Williams, *Limitation of Liability for Maritime Claims*, 3rd ed., LLP 1998, p. 8.

[31] Re Bergvall and ASP Ship Management Pty Ltd [2005] AATA 305.

[32] ASP Ship Management Pty Ltd v Administrative Appeals Tribunal [2006] FCAFC 23.

"operator" related "only to the entity that has the commercial disposition of the ship or who has the final authority on operational matters". According to the Federal Court, merely providing the crew and being their employer was not, in itself, sufficient to make the employer an "operator". It was more important who had control over the identity of the master and crew and its qualifications[33].

A recent case, Stema Barge II from 2021 is another judgment of a common law court that provides an interpretation of the word "operator" by a common law court. The case involved a rock armour transport on the barge Stema Barge II, which damaged an undersea electrical cable between England and France by dragging its anchor in a storm. In limitation proceedings, three companies sought limitation of liability: Splitt Chartering APS (Splitt), the registered owner of Stema Barge II, Stema A/S, the charterer or operator of the vessel, and Stema UK, which was contracted for the provision of the rock armour and acted as a receiver of the rock armour from the dumb barge. In the performance of the contract, Stema UK placed two employees on board the dumb barge to drop the anchor and to carry out other necessary work, under the supervision of the third one, located ashore. This led Stema UK to submit its claim to limitation of liability as the ship's operator, in the meaning of art. 1 of the 1976 LLMC. At the first instance, Tear J granted limitation to Stema UK which, in his opinion, directed its employees to board the ship and operated her in the ordinary course of the ship's business, with the permission of the owner. The judge was of the view that those who cause an unmanned ship to be physically operated indicate to have some management and control over the ship[34]. In his opinion, operating the ship could be satisfied solely by physical operation, while it could also include commercial operation of the ship. The argument of the opponent, that "to operate" equals direct responsibility for the management and control of the ship" as regards "the commercial, technical and crewing operations of the ship" operation of the ship, and not physical presence on board, was rejected. This judgment was welcomed by some authors as commercially reasonable by clearly providing the benefit of limitation to entities physically controlling the vessel[35].

The Court of Appeals held, however, that the term "operator" entailed more than the mere operation of the machinery of the vessel, or providing personnel

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[33] J. Tarrant, *Case Note: ASP Ship Management Pty Ltd v Administrative Appeals Tribunal [2006] FCAFC 23*, Australian and New Zealand Maritime Law Journal, 20, 2006, available at: https://classic.austlii.edu.au/au/journals/ANZMarLawJl/2006/6.html (accessed: 10.12.2023).

[34] M. Suri, *Who is an operator within LLMC? The Stema Barge II*, [2022] Lloyd's Maritime and Commercial Law Quarterly, p. 181.

[35] A. Tettenborn, *Limitation — not everyone who operates a vessel is an operator*, The Institute of International Shipping & Trade Law (IISTL) Blog, available at: https://iistl.blog/2021/12/15/limitation-not-everyone-who-operates-a-vessel-is-an-operator/ (accessed: 10.12.2023).

to operate that machinery with no other role in the broader operation of the vessel[36]. Similarly, as in the Australian case, Phillips LJ noted that the terms "the manager" and "the operator" are more open-textured and may be overlapping. In the Court's opinion, the proper interpretation of the word "the operator" required a higher level of abstraction, involving management or control of the vessel. The Court went on to analyze the *travaux préparatoires* of the 1976 LLMC which reflected that the proposal to provide to all persons rendering services in direct connection with the navigation, management or the loading, stowing or discharging of the ship was eventually rejected[37]. Thus, extending the benefit of limitation to those who only physically operate the machinery of the vessel would be contrary to the spirit of the Convention. As Stema UK was only assisting the ship's operator, Stema A/S, in the operation of the barge, it was held not to be an operator in the sense of art. 1 of the 1976 LLMC.

What seems specifically important for the future interpretation of the remote operator's status, the Court observed that there should be no distinction in reading the term in the case of unmanned ships[38]. While Phillips LJ referred to a dumb barge in this case, a similar interpretation should be applied with regard to vessels operated from ROCs. As in the case of the remote operator and MASS, here as well Stema UK had no commercial interest in the barge and was only operating it physically. Thus, the case indicates that assimilating the remote operator or the ROCs of the MASS with the "operator of a seagoing ship" from art. 1.2 of the LLMC might be too exaggerated interpretation of the Convention. As the business model for the ROCs and remote operators develops, we shall witness what type of activities they will perform for the MASS. It is however doubtful that they will be involved in a real, substantial, and direct role in the management and control of the commercial, technical, and crewing operations of the ship as required in the ASP Ship Management Pty Ltd v Administrative Appeals Tribunal or the Stema Barge II[39]. It is rather expected that the remote

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[36] Splitt Chartering APS and Others v Saga Shipholding Norway AS and Others (The "Stema Barge II") [2021] EWCA Civ 1880.

[37] See: Comité Maritime International, *The travaux préparatoires of the LLMC Convention, 1976 and of the Protocol of 1996*, available at: https://comitemaritime.org/wp-content/uploads/2018/05/Travaux-Preparatoirse-of-the-LLMC-Convention-1976-and-of-the-Protocol-of-1996.pdf (accessed: 10.12.2023), p. 33. On different interpretation of the LLMC's *travaux préparatoires* see: M. Suri, *Who is…*, pp. 182-183.

[38] H. Stones, *Splitt Chartering APS and Others v Saga Shipholding Norway AS and Others (The "Stema Barge II") [2021] EWCA Civ 1880, [2022] 1 Lloyd's Rep 170. Limitation of liability: what is an operator?*, Lloyd's Shipping & Trade Law, 1.02.2022, p. 11.

[39] N. Gaskell, *LLMC 1996: Living with Limitation of Liability*, Australian and New Zealand Maritime Law Journal, 36(2), 2022, p. 47.

operator will be a person responsible for some or all aspects of the functions of a MASS from a Remote Operations Centre[40].

In all, the above judgment of the Court of Appeals indicates that assimilating remote operators with the 'operator of the seagoing ship' under the LLMC seems to be unlikely. This does not mean that the remote controllers will not be afforded the benefit of limitation of liability. In his ruling, Phillips LJ noted that the employees of the associate company might be found under the protective umbrella of the LLMC as long as they are seconded to the owner or the operator and the owner or operator is responsible for the actions of the associate. Similarly, the remote operators who are shipowner's or operator's employees are covered by the LLMC provisions[41]. This is not the case of the remote operators of the ROC's which act as independent contractors[42].

Returning to the issue of the interpretation of the word "operator" under maritime liability conventions, it is important to note how this term has been interpreted beyond the common law jurisdictions. Some national maritime laws distinguish ownership from control over the vessel. In those states, a central figure of their maritime law is a person who possesses a vessel and uses it for navigation in its own name and under its responsibility, irrespectively from its ownership (e.g. *armator* in Polish, *armador* in Spanish, *brodar* in Croatian). In those states, the term operator of the ship under maritime conventions is interpreted to reflect that figure. The explanation of the word "operator" under the LLMC as made by the Court of Appeals in the Stema Barge II is therefore close to the interpretation of the term in those states.

4.2. SERVANT, AGENT, ANY PERSONS FOR WHOSE ACTS SHIPOWNER IS RESPONSIBLE OR AN INDEPENDENT CONTRACTOR?

The way the remote operators or ROCs develop organizationally will impact the operation of today's liability scheme. Remote operators might be employed by the shipowner or ship's operator, act as its agents, or might perform services for MASS as independent contractors.

Once the remote operator is an employee of the shipowner (or the employee of the charterer, manager, or operator of the seagoing ship), the latter will be often held liable for his/her acts. This will be true for the carrier's liability for the loss or damage of a passenger or its luggage. While it is probable that initially MASS will be employed rather in cargo carriage, its advantages might be highly

[40] MASS-JWG 2/WP.1, 21 April 2023, para. 35. However, for a different prediction see: M. Suri, *Will LLMC apply to Remote Control Centre Operators? The Stema Barge II*, [2022] Lloyd's Maritime and Commercial Law Quarterly, p. 12.

[41] Art. 1.4 of the LLMC 1996.

[42] N. Gaskell, *LLMC 1996...*, p. 48; see more below.

suitable for passenger carriage, especially on short distances which do not involve additional services on board of a ship. Under the Athens Convention relating to the Carriage of Passengers and their Luggage by Sea (PAL 2002) the carrier is strictly liable for death or personal injury originating from a shipping accident up to 250,000 SDR. Above that threshold or for death or personal injury not caused by a shipping incident, the carrier's liability is fault-based[43]. The Convention assumes that the fault or neglect of the servants of the carrier is the fault or neglect of the carrier himself when they act within the scope of their employment[44]. This is also important for the liability for damaged or lost luggage which is fault-based under the Convention[45]. Therefore, when passenger ships are remotely operated, their carriers will be held liable for the fault or neglect of the remote operators. The 1974 Athens Convention provides only fault-based liability, making the carrier liable for the fault or neglect of his/her servants or agents acting within the scope of their employment[46]. Noteworthy, PAL 2002 does not explicitly provide the carrier's liability for fault or neglect of its agents but makes a reference to the fault or neglect of its servants only[47]. It is suggested, however, that this omission is not indicative and other provisions of the Convention, *inter alia* art. 12, indicate that the carrier will be liable also for fault or neglect of its agent[48].

However, the remote operators may not be servants or agents of the carrier but they may act as independent contractors. In those instances, the carrier will not be liable for their fault of neglect under the Athens Conventions. In such cases, the claimants may bring claims outside the Athens Convention against the remote operator (or the corporate entity, the ROC, providing operating services for a MASS). It is for the national court to decide whether, in a particular case, a remote operator or ROC acted as a servant, an agent, or an independent contractor of the carrier, the Convention does not include those definitions.

Therefore, another question is whether the remote operator or the ROC will be able to limit its liability under the LLMC. The Convention provides such right to any person for whose acts, neglect or default the shipowner is respon-

[43] In case of death or personal injury caused by a shipping incident, fault or neglect is presumed, art 3.1 PAL 2002.

[44] Art. 3.5(b) PAL 2002.

[45] Liability for luggage other than cabin luggage is based on presumed fault, while in case of cabin luggage it is presumed if caused by a shipping incident.

[46] Art. 3.1 PAL 1974. The burden of proving fault or negligence lies on the claimant, except for loss of or damage to luggage other than cabin luggage or when death of or personal injury to the passenger or the loss of or damage to cabin luggage arose from or in connection with the shipwreck, collision, stranding, explosion or fire, or defect in the ship.

[47] See art. 3.5(b) PAL 2002.

[48] F. Berlingieri, *International Maritime Conventions, Volume I: the carriage of goods and passengers by sea*, 1st ed., Informa Law from Rutledge 2014, para. 4.2.

sible[49]. It does not precise which parties are included in the ambit of this provision. However, the *travaux préparatoires* of the LLMC Convention reveal that there was no doubt that shipowner's servants ought to be covered by this term. In such cases, the legal position of remote operator employed by the shipowner will not be much different from those navigating a conventional ship on board[50]. The fact that the remote operator is not on board a vessel should not preclude the ability to avail himself of the limitation of liability as a servant of the shipowner. Whether the remote operator acting as an independent contractor might be regarded as any person for whose acts, neglect or default the shipowner is responsible is not clear, and – in lack of clear intervention in the form of convention's amendments – it will be for the national courts to decide on the interplay of national rules on vicarious liability and LLMC's phrase: "any person for whose acts, neglect or default the shipowner is responsible". The *travaux préparatoires* do not serve as a clear indication of how to interpret this wording. On one hand, the 1976 Convention (as well as its 1996 Protocol) is more generous than its predecessor, the 1957 Limitation Convention.[51] The latter provided limitation only to the owner, charterer, manager and operator of the ship, and to the master, members of the crew, and other servants of the owner, charterer, manager or operator acting in the course of their employment[52]. Thus, there was the intent to broaden the scope of the parties who have a right to limit their liability. On the other hand, the proposal to afford limitation to any person rendering service in direct connection with the operation (or navigation or management) of the ship was rejected during the LLMC 1976 Conference[53]. It was clearly indicated that the idea behind broadening the personal scope of the LLMC was to include a person for whom the principal is vicariously liable in order to prevent circumvention of the principal's own protection[54].

In light of no clear indication by the LLMC, it is for the national laws to decide whether the shipowner is vicariously liable for the acts of the remote operator acting as the independent contractor, and, consequently, if the latter should be allowed to limit his/her liability. And those solutions may vary from one jurisdiction to another. A better solution would be a policy decision on whether to include all remote operators within the ambit of limitation

[49] Art. 1.4 LLMC 1996.

[50] N. Gaskell, *LLMC 1996…*, p. 49.

[51] P. Griggs, R. Williams, J. Farr, *Limitation of Liability for Maritime Claims*, 4th ed., LLP 2005, p. 13.

[52] Art. 1 and 6 of the International Convention relating to the Limitation of the Liability of Owners of Sea-Going Ships (Brussels, 10 October 1957).

[53] *The travaux préparatoires of the LLMC Convention…*, pp. 37-38.

[54] Id., p. 35.

of liability. The benefit of a such solution would be to promote a newly developing industry, allowing the ROCs to obtain affordable insurance on the market.

CONCLUSIONS

The above study reveals that, despite substantial developments, there are milestone decisions ahead of the MASS regulatory bodies. They will include, but not be limited to, whether (and if so, how) a flag state is able to entertain jurisdiction over a ROC located in a non-flag state. This obligation derives from UNCLOS and future MASS flag states will be bound to fulfill it. In terms of liability, there are multiple policy decisions to be taken. It would be more appropriate if the applicability of certain rules or legal institutions was considered by the states, instead of relying on varying interpretations of courts in different jurisdictions. Without clear indication in the convention, national courts will refer to national rules (e.g., on vicarious liability). This runs against the certainty of legal consequences and uniformity of law, which are the foundations of maritime international legislation.

PODEJŚCIE REGULACYJNE DO ZDALNEGO OPERATORA I ZDALNEGO CENTRUM OPERACYJNEGO (ROC): DYLAMATY STATKÓW BEZZAŁOGOWYCH

Słowa kluczowe: statek bezzałogowy, MASS, zdalny operator, Zdalne Centrum Operacyjne, UNCLOS, IMO, kapitan MASS, armator statku, podwładny, kwotowe ograniczenie odpowiedzialności

Abstrakt

Zdalni operatorzy (*remote operators*) oraz zdalne centra operacyjne (ROCs) to nowe podmioty, które będą uczestniczyły w skomplikowanym łańcuchu jednostek zaangażowanych w nowoczesną żeglugę morską statkami bezzałogowymi (MASS, *Maritime Autonomous Surface Ship*). Bezzałogowe statki nawigowane przez zdalnego operatora (tzw. MASS stopnia 3 wg nomenklatury Międzynarodowej Organizacji Morskiej, IMO) będą zapewne wcześniej wprowadzone do żeglugi morskiej niż statki całkowicie autonomiczne, sterowane przez Sztuczną Inteligencję (SI). Poniższy artykuł ma na celu omówienie statusu prawnego zdalnego operatora i zdalnych centrów operacyjnych (ROCs). Po przedstawieniu dotychczasowych prac nad regulacyjnym podejściem do MASS na po-

ziomie międzynarodowym (część pierwsza), dr Igor Vio skupi się na kilku wybranych zagadnieniach z zakresu morskiego prawa publicznego. Omówi status prawny ROC (część druga), zdalnego operatora oraz kapitana MASS (część trzecia), mając na uwadze rozwiązania przyjęte w projekcie Kodeksu MASS. W czwartej części artykułu, dr Zuzanna Pepłowska-Dąbrowska przedstawi wybrane zagadnienia morskich konwencji o odpowiedzialności cywilnej. Rozważy m.in. czy pojęcie operatora statku morskiego, występujące m.in. w Konwencji o ograniczeniu odpowiedzialności za roszczenia morskie, może być stosowane do zdalnego operatora. Autorzy postarają się zidentyfikować luki prawne obecnej regulacji i zaproponować rozwiązania zmierzające do ich usunięcia.

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