

Justyna Nawrot\*\*

Zuzanna Peptowska-Dąbrowska\*\*\*

## REVOLUTION OR EVOLUTION? CHALLENGES POSED BY AUTONOMOUS VESSELS FOR THE NATIONAL AND INTERNATIONAL LEGAL FRAMEWORK\*\*\*

### Abstract

*The emergence of autonomous vessels raises considerable challenges from the legal perspective. Questions relate, inter alia, to their status (whether they can in fact be considered as a vessels), the possibility of their registration under respective flags, and the fulfillment of the requirements posed by international maritime law. This article commences with a short presentation of the current technological development of autonomous vessels. It discusses terminology issues, commenting on the assessments made on the International Maritime Organization's forum. It continues with an attempt*

---

\* Assistant professor in the Maritime Law Department, Faculty of Law and Administration, University of Gdansk. In 2015 she was nominated a member of the Polish Codification Commission for Maritime Law. She is a vice-president of the Polish Maritime Law Association, vice editor of 'Prawo morskie' and an arbitrator in maritime disputes; ORCID: 0000-0003-2538-0524; e-mail: justyna.nawrot@prawo.ug.edu.pl.

\*\* Assistant professor at the Maritime Law Unit of the Law and Administration Faculty at the Nicolaus Copernicus University in Toruń. Between 2015 and 2019 she was a member of the Polish Codification Commission for Maritime Law. She is a vice-president of the Polish Maritime Law Association, a member of the Maritime Law Commission's board, and an arbitrator in maritime disputes; ORCID: 0000-0003-4348-2962; e-mail: zpeplow@umk.pl.

\*\*\* Research for this paper has been financed by the National Centre for Science under the contract UMO-2016/22/E/HS5/00050.

*to accommodate autonomous vessels under the current legislative landscape, providing an analysis of chosen national laws as well as the international conventions.*

## Keywords

*autonomous vessels – maritime law – UNCLOS – maritime code – international conventions*

## I. INTRODUCTION

It is the subject of autonomous vessels that has recently dominated maritime law doctrine. There have been multiple conferences and even more papers relating to the prospect of unmanned shipping. Why has that topic raised so much activity? Our answer to that question is the challenges it bears for maritime law, which is traditional in its nature.

Since the dawn of time, man has been navigating, first on rivers and then at sea, near coasts and then transoceanically. The interest in safe navigation was due to the growing importance of sea trade in the economies of ancient empires. This economic aspect set the direction of maritime law development for many millennia. The merchant's axiology and profit have become a determinant of the evolution of maritime law institutions since the earliest times and have led to the fact that the ship's safety issues have turned out to be, in a sense, a tool for economic goals, not the main purpose of maritime law.

The traditionality of maritime law is understandable if you realize that – contrary to other modes of transportation – when the XIXth century technological revolution arrived – private maritime law rules had already been developed<sup>1</sup>. On the other hand, public law norms are more dynamic. We have witnessed the explosion of maritime safety and security, as well as environmental protection norms in the XXth century and nowadays the volume of maritime public law norms exceeds private maritime law regulations<sup>2</sup>. Examples of maritime law resistance to changes can be seen

---

<sup>1</sup> J. Łopuski, *Maritime law in the second half of the 20<sup>th</sup> century*, Toruń: Wydawnictwo Naukowe UMK, 2008, p. 323.

<sup>2</sup> J. Łopuski, *Tradycja i nowoczesność: czynniki wpływające na kształt współczesnego prawa morskiego (Tradition and modernity: factors influencing the shape of current maritime law)*,

for instance in the institution of limitation of liability. Nowadays it lacks moral justification. One of the underlying reasons for the institution of limitation of liability is that there is no actual control by the shipowner or ship operator over the vessel. Today however, this is no longer true. Thus, risks borne by parties involved in maritime carriage are not so different in kind from risks borne by parties in other modes of transportation and there is no special need for the preferential position of the former. Obviously, the firm position of the traditional institutions of maritime law is due to the strong interests of the shipping world supporting them. However unsuccessful attempts to change the normative reality of maritime regulation, as happened in the case of the Rotterdam Rules, indicate how difficult it is to change the legislative landscape of the maritime world and how maritime law may struggle to adapt its settled rules to challenges posed by autonomous vessels. Nevertheless, one thing has not changed – owing to the international character of shipping, new rules need to obtain an international acceptance.

## II. AUTONOMOUS SHIPS: FUTURE OR PRESENT?

Whether autonomous ships become common reality depends on economic calculation<sup>3</sup>. It appears that they have a potential to be profitable, although, initially new technology will be quite expensive. There are potentially several savings that ought to be reconsidered, not limited merely to crew wages. As there is no need for bridge, deck house, crew quarters, ventilation, heating, or sewage systems, more space is opened for additional cargo. Moreover, vessels will be lighter and more aerodynamic which will impact their fuel consumption and make them more environmentally friendly. Additionally, they are thought to be more

---

[in:] A. Nowicka, M. Kępiński (eds), *Prawo prywatne czasu przemian: księga pamiątkowa dedykowana profesorowi Stanisławowi Sołtyśsińskiemu (Private law of the time of change: essays in honour of professor Stanisław Sołtyśsiński)*, Poznań: Wydawnictwo Naukowe UAM, 2005, p. 976.

<sup>3</sup> R. Veal, M. Tsimplis, *The integration of unmanned ships into the lex maritima*, "Lloyd's Maritime and Commercial Law Quarterly", 2017, p. 303.

pirate-resistant with no crew or fewer crew on board and a design which will make boarding more difficult than in the case of conventional vessels<sup>4</sup>. Finally, it may be expected that unmanned ships will be involved in fewer accidents as the statistics show that from 75% to 96% of marine accidents can be attributed to human error<sup>5</sup>. As nowadays collecting good crew is a difficult task, unmanned vessels seem to be an interesting alternative<sup>6</sup>. The above indicates that autonomous ships have a lot of benefits and they have the ability to revolutionize shipping as we know it. Paul Pritchett claims that this new technology has the potential to change the maritime landscape like no other advancement since the first engine was placed in a vessel<sup>7</sup>. What is more, that revolution seems to be just around the corner. In early December 2018 Finferries performed the first autonomous voyage of the Falco ship in the Turku archipelago. Falco, with no crew on board, used sensors and artificial intelligence for collision avoidance, as well as an autonomous navigation system<sup>8</sup>. In Norway, the container ship, Yara Birkeland<sup>9</sup>, is expected to be launched in 2020, reaching full autonomy gradually in 2022<sup>10</sup>. Both in Norway and Finland, there exist test areas for autonomous and unmanned ships. Also, in other parts of the world,

---

<sup>4</sup> P.W. Pritchett, *Ghost Ships: Why the Law Should Embrace Unmanned Vessel Technology*, "Tulane Maritime Law Journal" vol. 40:197, 2015, p. 210; F. Cain, M. Turner, *Autonomous ships: are we ready?*, "Maritime Risk International", 14 May 2018.

<sup>5</sup> Allianz Global Corporate & Speciality, *Safety and shipping. 1912–2012. From Titanic to Costa Concordia. An insurer's perspective from Allianz Global Corporate & Speciality*, 2012, p. 7, available at: <https://www.agcs.allianz.com/content/dam/onemarketing/agcs/agcs/reports/AGCS-Safety-Shipping-Review-2012.pdf> [last accessed 1.07.2019].

<sup>6</sup> M. Chwedczuk, *Analysis of the Legal Status of Unmanned Commercial Vessels in U.S. Admiralty and Maritime Law*, "Journal of Maritime Law and Commerce", vol. 47 no 2, 2016, p. 124.

<sup>7</sup> Pritchett, *supra* note 4 at p. 199.

<sup>8</sup> Finferries, *Finferries' Falco world's first fully autonomous ferry*, 2018, available at: <https://www.finferries.fi/en/news/press-releases/finferries-falco-worlds-first-fully-autonomous-ferry.html> [last accessed 1.07.2019].

<sup>9</sup> The ship will operate within Norway's territory, thus it is designed for a cabotage purposes. As a consequence Yara Birkeland will operate within the limits of the national jurisdiction.

<sup>10</sup> Yara, *Yara Birkeland press kit*, 2018, available at: <https://www.yara.com/news-and-media/press-kits/yara-birkeland-press-kit/> [last accessed 1.07.2019].

autonomous ships technology is being developed. Advanced projects are being proceeded with in China (also accompanied by a “test field” for first operations). The Japanese shipping company, NYK Line plans a demonstration of remote-controlled a vessel across the Pacific in late 2019. The Korean companies – Samsung and Hyundai – are developing smart ships’ operation systems<sup>11</sup>.

### III. TERMINOLOGY

Preliminary deliberations ought to start with the definition of the concept of an autonomous vessel. Specifying its characteristics allows for verification as to whether it can be assimilated with conventional vessels or does it constitute another category of navigable objects. The terminology may be confusing. There are multiple proposals on the classification of different types of autonomous vessels. Recently, the International Maritime Organization (IMO) has taken up the issue of autonomous technology on its agenda. This should not be surprising, as the IMO’s task is to enable the advancement of shipping while addressing challenges of developments in technology and world trade. In 2018 the Maritime Safety Committee (MSC) commenced its regulatory scoping exercise to consider the suitability of extant IMO instruments for remotely controlled and autonomous ships, aiming at – inter alia – providing uniformity in the understanding of the important concepts<sup>12</sup>. The scoping study aims at the identification of current provisions in certain IMO conventions and the assessment of their application to autonomous ships<sup>13</sup>. As a second step an analysis will be conducted to determine the most appropriate way to address the operation of the autonomous vessels. A general term has been proposed to encompass all types of ships which, to a varying degree, can operate independently of human interaction – MASS standing for Maritime Autonomous Surface Ships. As it follows, the above definition is quite general. Behind the idea of taking such a general definition

---

<sup>11</sup> Cain & Turner, *supra* note 4.

<sup>12</sup> R. Veal, *Unmanned ships on the IMO work agenda*, “Lloyd’s Shipping & Trade Law” vol. 17 no. 5, 2017.

<sup>13</sup> *IMO moves on autonomous vessel*, “Maritime Risk International”, 20 July 2018.

an assumption stands of taking under consideration a broad variety of possible technological solutions. Attached to it are four degrees of autonomy that are included under the MASS term:

- I. *A ship with automated processes and decision support.* Seafarers are on board to operate and control systems and functions. Some operations may be automated.
- II. *A remotely controlled ship with seafarers on board.* The ship is controlled and operated from another location, but seafarers are on board.
- III. *A remotely controlled ship without seafarers on board.* The ship is controlled and operated from another location. There are no seafarers on board.
- IV. *A fully autonomous ship.* The operating system of the ship is able to make decisions and determine actions by itself<sup>14</sup>.

As that broad definition of MASS is acceptable for the purpose of the scoping study, the cautious categorization has already raised considerable concerns<sup>15</sup>. This April, France and Finland issued a document<sup>16</sup> in which they alerted the MSC to mistakes inherent in the proposed categorization. They claim, *inter alia*, that the adjective “autonomous” – as included in MASS – ought to be reserved for degree 4 only (a fully autonomous ship). Indeed, looking closely we may see a different level of control over the vessel in the cases of degrees 1 to 3 (on board or being remotely controlled). Thus, France and Finland propose to use “automated” in the general definition, instead of autonomous. Also, a reasonable argument is given by R. Veal who notes that the difference between degree 2 and 3 may be illusory, as it all depends on the role of seafarers on board the ship as their mere presence without any possibility of influencing the operation of the ship does not render them less autonomous<sup>17</sup>. Moreover, one should realize that technology might develop so as to allow hybrid versions of

---

<sup>14</sup> MSC 100/20/Add.1, 12 December 2018, Annex 2, p. 1.

<sup>15</sup> H. Ringbom, *Regulating Autonomous Ships – Concepts, Challenges and Precedents*, “Ocean Development & International Law” vol. 50, Issue 2–3, 2019, p. 149; R. Veal, *Maritime Autonomous Surface Ships: autonomy, manning and the IMO*, “Lloyds’ Shipping and Trade Law”, vol. 18 no. 5, 2018, p. 1.

<sup>16</sup> MSC 101/5/4, 2 April 2019.

<sup>17</sup> Veal, *supra* note 14 at p. 2.

the above categories, for example degree 4 “a fully autonomous” vessel changing into degree 3 – remotely controlled vessel – when difficulties at sea arise. Having made these observations, we will continue to use the term “autonomous vessel” as a general category in this paper and specifically relate to remotely controlled or fully autonomous vessel if necessary, for further deliberations.

#### IV. ACCOMMODATION OF AUTONOMOUS VESSELS UNDER THE CURRENT LEGISLATIVE LANDSCAPE

The ship continued to be the key focus of maritime law, being a specific link between civil (commercial) maritime law and much more recent public maritime law. Therefore, traditionally the sea itself was not the subject of maritime law regulation; it was the ship as a tool for navigation. The sea, as a subject of the legal regulations, appears for the first time in an area that we define as the Law of the Sea being part of public international law. The birth of the Law of the Sea should be dated to the seventeenth century, when the issues of state power and freedom of navigation became the subject of regulations and legal treatises. Until then, however, the common maritime law was a kind of *ius gentium*, the law of the seas, which, because of its similarities, was common to all the people of the sea. It was not until the eighteenth and nineteenth centuries that these common sea customs, similar in their foundations, lost their significance. Thus, as a first step of analysis devoted to autonomous shipping one should concentrate upon the concept of a ship as well as the legality of autonomous shipping in the area of the law of the sea.

Whether autonomous ships may sail through the seas depends on their legal qualification and, following that, their fulfilment of the requirements presented by the law to that kind of crafts. UN Convention on the Law of the Sea (UNCLOS) does not contain a definition of a ship (in fact, the terms “vessel” and “ship” are used interchangeably in the convention).

It does however oblige States to determine conditions for registration of such a ship under their respective laws and demands the existence of a genuine link between State and the ship. Most problematic from the perspective of autonomous ships are the manning requirements.

UNCLOS provisions<sup>18</sup> 4b that refer to the manning of a vessel do not make it an absolute condition, as long as safety at seas is guaranteed. It might be more difficult to assess the suitability of autonomous vessels to the requirement of rendering assistance of UNCLOS article 98(1)(a). It is difficult to establish now, how the technology of autonomous ships will develop and whether it will be possible for such ships to render assistance. However, also that provision is conditional – requiring assistance from the master as long as he can do so without seriously endangering the ship and only as far as it can be reasonably expected from him. There is a broad consensus that it is crucial to make sure that the duty to assist people in distress is applied also to unmanned ships. Under the Polish legal system, no vessels are discharged from providing the assistance to people in distress. However, the scope of assistance depends of circumstances as well as the risk that the assistance might cause for the vessel itself. That could be applied also to a special nature of unmanned ships and possibly reduce the scope of assistance, however, as was emphasized above, an unmanned vessel should be obliged to provide assistance.

Since UNCLOS referred qualification of a vessel to national law it is necessary to investigate whether under national legislation any restrictions exist that could potentially preclude registration of autonomous vessels<sup>19</sup>. It follows from the answers to the questionnaire of the Comité Maritime Internationale (CMI), attached to an MSC document, that out of 19 responses by national maritime law associations, none undermined the status of autonomous vessels as ships under respective national law<sup>20</sup>. However, a number of associations raised concerns as to the possibility of registration of such ship under their laws. As in some instances registration is dependent on accordance with maritime safety norms, concerns were expressed as to possibility of registration. Answering whether a remote controller or pre-programmer of an autonomous ship

---

<sup>18</sup> Art. 94(3) and 94(4)(b) and (c).

<sup>19</sup> R. Veal, M. Tsimplis, A. Serdy, A. Ntovas, S. Quinn, *Liability for operations in Unmanned Maritime Vehicles with Differing Levels of Autonomy*, available at: [https://www.academia.edu/38566149/Project\\_title\\_Liability\\_for\\_operations\\_in\\_Unmanned\\_Maritime\\_Vehicles\\_with\\_Differing\\_Levels\\_of\\_Autonomy\\_Deliverable\\_Final\\_Report](https://www.academia.edu/38566149/Project_title_Liability_for_operations_in_Unmanned_Maritime_Vehicles_with_Differing_Levels_of_Autonomy_Deliverable_Final_Report), p. 13 [last accessed 10.07.2019].

<sup>20</sup> MSC 99/INF.8 13 February 2018, Annex 1, p. 1.



(or other designated person not immediately involved with the operation of the ship) could be assimilated into the notion of a master under national laws, maritime law associations also were divided, noting often that the national definition of a shipmaster requires his presence on board of the ship. It is also suggested that a potential inconsistency between domestic requirements flows from the UNCLOS article 94 provision on manning and the operation of unmanned vessel can be resolved through measures adopted by the IMO as the article 94 of UNCLOS establishes a general obligation aimed at avoiding conflicts between international and national legislations, while the precise safety (including manning) standards are to be developed by instruments adopted by the IMO. Such an interpretation seems to be justifiable in the light of article 94(5) of UNCLOS according to which States are obliged to conform to generally accepted international regulations, procedures and practices.

Against that background, the Polish Maritime Code of 2001<sup>21</sup> also adopts a definition wide enough to encompass autonomous ships. Its article 2 contains a definition of a seagoing ship, which is defined as any floating structure appropriated for or used in, maritime shipping. The above definition indicates that it is enough for the floating structure to fulfil one of the mentioned prerequisites to be qualified as a ship. Qualification therefore depends either on the intention and will of the ship's operator to exploit a ship on the sea or on the fact that a ship is used in such way. It does not mention manning or other requirements that would render autonomous vessels not ships under the Polish Maritime Code. Nor does the Code (or its executive acts) require any information on the crew on board a vessel for the registration under the Polish flag. Similarly, a project of a new Polish Maritime Code, delivered by the Codification Commission for Maritime Law to the proper Ministry in 2017 does not preclude autonomous vessels.

There is however a number of provisions that would require modification. For example, the Polish Maritime Code requires keeping documentation of the ship on board. That norm, if interpreted literally, is difficult to obey in the case of autonomous vessels. On a different

---

<sup>21</sup> Act of 18 September 2001 Kodeks morski (Maritime code) (Consolidated text in Polish O.J. 2018 item 2175).

note, a proposal for a new maritime code prepared by the Codification Commission for Maritime Law mitigates that obligation, providing that this requirement may be waived by specific provisions and thus seems to be better equipped for the emergence of autonomous vessels. It is proposed that a remote controller might be identified with a shipmaster and thus, national norms regulating the role of a shipmaster ought to be applied to a remote controller, who – being in a controlling centre instead on board a vessel – controls the navigation of a ship. However, currently the Polish norms on the shipmaster could not be applicable to a remote controller and their modification would be required. Article 58 of the Polish Maritime Code of 2001 prohibits the shipmaster from leaving a ship which is at sea, with the exclusion of moments when the ship is on the roadstead. There is no possibility of interpreting that norm as applicable to a controlling centre on land from where the controller operates the ship remotely. Moreover the ability of a remote controller to fulfil the master's obligation to render assistance to any person found in danger at sea is uncertain. This obligation is an individual obligation of a shipmaster and as such it seems to be pertinent for him. At the moment it is unclear how the technology will develop to allow a remote controller to render such assistance. Even more so, if we analyse a fully autonomous vessel navigating by means of the operational system, neither the pre-programmer of the vessel, nor any other designated person could be recognized under Polish law as a master. The norms of the Polish Maritime Code on the position of a shipmaster – drafted in mind for conventional master – express the idea that a shipmaster is personally involved in the navigation of the vessel. Moreover, it is unlikely that other remote controllers could constitute a crew under the Polish legal system, which stipulates that a crew consists of mariners who are employed “on the ship”<sup>22</sup>. That wording prevails in acts regulating the employment and qualification of the crew and thus, excludes remote controllers from the ambit of a crew as understood in Polish law.

It follows from the above that generally national laws are ready to accommodate an autonomous vessel under the idea of a ship. However,

---

<sup>22</sup> Act of 5 August 2018 o pracy na morzu (on labour at sea) (Consolidated text in Polish O.J. 2018 item 616).

often national laws have to be amended to allow for the registration of such vessels. Also, applying national norms of a shipmaster to a remote controller, or – even more so – to a pre-programmer of a vessel would be impossible without changes.

Assuming that autonomous vessels are eligible for registration, to be able to navigate internationally they ought to fulfil legal requirements designed for ships<sup>23</sup>. One of the issues that needs clarification is whether the national laws implementing the safe manning requirement established under the International Convention for the Safety of Life at the Sea (SOLAS) can be interpreted as satisfying the international safety standards in respect of unmanned ships, if the equal level of safety is ensured. According to the answers given by the national maritime associations collected by the CMI, most of the domestic legal orders are oriented towards onboard crew. However, the opinion that it may be possible for a national authority to allow unmanned operations prevails in most of the States. Nevertheless, it is crucial to notice that SOLAS safety requirements are premised on personnel manning the bridge<sup>24</sup>. As a consequence, the solutions adopted for an autonomous vessel require minor changes for ships operated by a reduced crew or operated from the shore, while the operation of fully autonomous vessel would demand significant changes. Under Polish law two legal acts regulate the issue of safe manning requirements: the Polish Maritime Safety Act 2012<sup>25</sup> and the Regulation on the proper manning of a ship of 2015<sup>26</sup>. None of the mentioned acts, precisely describe the exactly number of crew required on board. The Maritime Safety Act refers to the requirements set in chapter V SOLAS (in relation to proper manning) and the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW). According to articles 61 and 62 of the Maritime Safety Act, a ship

---

<sup>23</sup> Veal & Tsimplis, *supra* note 3 at p. 314.

<sup>24</sup> A. Chircop, *Testing International Legal Regimes: The Advent of Automated Commercial Vessels*, "German Yearbook of International Law", vol. 60, 2017, p. 130.

<sup>25</sup> Act of 18 August 2011 o bezpieczeństwie morskim (on maritime safety) (Consolidated text in Polish O.J. 2019 item 1452).

<sup>26</sup> Regulation of the Ministry of Maritime Economy and Inland Navigation of 9 December 2015 w sprawie bezpiecznej obsługi statku (on proper manning on ship) (Polish O.J. 2015 item 2104).

is not allowed to operate if it is not properly manned. However, the Act refers to SOLAS, STCW, STWC – F and the Maritime Labour Convention (MLC). Thus, in the case of working out an international compromise, it is possible that the Polish courts would follow the internationally harmonized interpretation. Also, it should be noted that according to article 80 of the Maritime Safety Act and the Regulation on proper manning, the director of the Maritime Office (which is a first instance of the Polish maritime administration) is obliged to take into account the level of automatization of a ship, while determining the composition of the crew. This also obviously refers to SOLAS. Nevertheless, it seems not possible to interpret the mentioned authority as applying to unmanned ships.

As to the requirement referring to the presence of the crew on the bridge under the regulation 15 of chapter V SOLAS and the watchkeeping duty under part 4 of Section A-VIII/2 STCW, the question arises whether the remote control of ship's operation would satisfy the mentioned requirements by using the equivalent shore-based facility with a visual and aural stream of the ship's vicinity. In other words, one of the questions that requires clarification is whether the shore-based bridge can be assumed as a "bridge" under SOLAS. The opinion among States is varied and often self-contradictory. National provisions that require the physical presence of the shipmaster as well as the literal "onboard bridge" are indicated as denying such a possibility. Nevertheless, there are also opinions that the developments of the remote-controlled tasks of ship's daily operation require a new interpretation of the traditional rules and in the case of the functional equivalency of the shore base bridge, the relevant requirements of SOLAS can be assumed as satisfied<sup>27</sup>.

It should be noted that chapter V of SOLAS, regulation 3(2) grants relevant national maritime authorities the ability to prescribe exemptions from and equivalence to the standards established in chapter V, as long as their introduction is not "unreasonable or unnecessary". Polish law does not precisely regulate the issue of "equivalent means". As the Maritime Safety Act refers to SOLAS, the Polish legal system would follow the changes or uniform interpretations adopted under international law. If

---

<sup>27</sup> Veal & Tsimplis, *supra* note 3 at p. 321.

a more precise compromise in relation to „equivalent safety means” were to be adopted and full technological equivalency were achieved, it seems that there would be no obstacles under Polish law to considering them as satisfying regulation 15 of chapter V SOLAS. It should be emphasized that in reference to “functional” or “equivalent” means, the new risk-based approach adopted by the IMO within the goal-based standards of safety offers space for the adaptation of the current safety regime to new technological solutions<sup>28</sup>.

Similar difficulties also arise in reference to the STCW requirements of watchkeeping, according to which officers ought to be physically present on the bridge and engine room control room. As the STCW applies to seafarers serving on board of seagoing ships, it seems not possible to apply conventional rules to the personnel on shore or personnel responsible for remote control. The Polish Maritime Safety Act, implementing STCW, requires the physical presence of the watchkeeping officers on the bridge. In the Authors’ opinion the similarities between watchkeeping duty in case of poor visibility and the activities of the remote controller on shore are not enough to satisfy the requirements of Part 4 of Section A-VIII/2. The situation would be interpreted differently in a case of reduced manning according to the IMO categories of MASS 1 and 2. According to Polish law, it is possible to reduce the number of the crew adequately to the level of the ship’s automatization (article 80 of the Maritime Safety Act). The decisive question herein would be how to fulfil the MLC requirements dealing with the working hours of seafarers.

Similar objections were articulated by most of the States in the CMI Unmanned ships questionnaire. Only a few national maritime associations stated that the STCW convention could be applicable to shore-based personnel in circumstances where there was no new specific legislation. For most of the States it seems obvious that the requirement of the physical presence of watchkeeping officers on the bridge cannot be satisfied in the case of fully unmanned ships. In a few cases, the need of a new definition of a “seafarer” was raised, allowing the inclusion of personnel on shore.

---

<sup>28</sup> J. Nawrot, *Międzynarodowe prawo bezpieczeństwa morskiego (International law of maritime safety)*, Warsaw: C.H. Beck, 2019, pp. 355–356.

Having in mind that the ship's definition and the status of personnel on shore are important issues, navigational safety seems to be crucial for a new regulatory approach. This matter is closely connected with the level of autonomy of unmanned ships and the decision making in case of the appearance of navigational threats. The basic collisions avoidance norms are contained in the Convention on the International Regulations for Preventing Collisions at Sea (COLREG) and they presume human involvement in decision making by referring to the "good seamanship" standard<sup>29</sup>. As COLREG itself does not refer to "crew" or "shipmaster", but to "vessel", it seems possible to apply COLREG to the "good seamanship" requirement in the case of an unmanned ship with a shore-based vessel controller. Polish law requires that a shipmaster is obliged – before departure and during the voyage – to take care that the vessel complies with (among others) the principle of good seamanship (article 57 of the Polish Maritime Code). As such – it seems that under the Polish law, operation of an unmanned ship with a remote controller would not necessarily be contrary to the duty of "good seamanship" under COLREG, if the controller on shore is in a position to respond and control the operation of a vessel and if he is assigned the shipmaster's responsibility.

As to the unmanned vessel with no human supervision, the question should be raised as to whether nautical skills can be applied to "software". At the moment it seems that it should be considered as contrary to the principle of "good seamanship" under COLREG.

According to the answers of the national maritime association given to the CMI questionnaire, similar opinions prevail in most of the cases, stating that COLREG's principle of "good seamanship" may be satisfied by unmanned vessel operation if such a ship would be at least as safe as a conventional ship with crew onboard. More diverse opinions appear in relation to fully autonomous ships. The variety of answers exposes the need for clarification of terminology, and a clear distinction between two terms: "automatization of ships" and "autonomous ships". The possibility of human intervention into navigational decisions seems crucial for future changes in maritime law. A high level of autonomy

---

<sup>29</sup> Ringbom, *supra* note 14 at p. 145.

of the operational system is associated with reducing possibilities of human intervention. As a consequence, new regulatory challenges will arise, as traditional navigational practices will not be able to respond to autonomous decision-making systems, with no human interaction<sup>30</sup>.

It is suggested in the literature that maritime liability conventions seem to be well-fitted for the operation of autonomous vessels<sup>31</sup>. The definition of a ship under private law instruments does not refer to a crew on board of the vessel, and so conventions would be applicable to unmanned vessels<sup>32</sup>. Concerns are expressed as to suitability of the seaworthiness concept in relation to an unmanned ship.<sup>33</sup> Whether there is a need for a whole new liability regime in respect of autonomous vessels owing to the fact that the current legal framework has been drafted with conventional (manned) ships in mind,<sup>34</sup> seems questionable. Obviously, many particular provisions become obsolete or will require modification. However multiple liability instruments (the International Convention on Civil Liability for Oil Pollution Damage, CLC; the International Convention on Civil Liability for Bunker Oil Pollution Damage, BOPC or the Nairobi International Convention on the Removal of Wrecks) rely on the strict liability of the shipowner (also bareboat charterer, manager, and operator of the ship in the case of the BOPC). Thus, primarily they are suitable for attaching liability for damage caused by even fully autonomous vessels, where no human interference is involved in a ship's operation. The question arises whether in the case of a fully autonomous vessel, greater exposure to liability of the pre-programmer or manufacturer of the autonomous ship should be considered. Despite channeling provisions of the CLC, in *Commune de Mesquier v. Total*

---

<sup>30</sup> H. Ringbom, *Regulating Autonomous Ships – Concepts, Challenges and Precedents*, "Ocean Development & International Law", vol. 50, 2019, pp. 141-169.

<sup>31</sup> E. Van Hoydoonk, *The law of unmanned merchant shipping – an exploration*, "Journal of International Maritime Law", vol. 20, 2014, pp. 418-422.

<sup>32</sup> J.P. Rodriguez-Delgado, *The Legal Challenges of Unmanned Ships in the Private Maritime Law: What Laws would You Change?*, [in:] M. Musi (ed.), *Port, Maritime and Transport Law Between Legacies of the Past and Modernization*, Bologna: Bonomo Editore, 2018, p. 499.

<sup>33</sup> *Ibid.* at p. 521; T. Karlis, *Maritime law issues related to the operation of unmanned autonomous cargo ships*, "WMU Journal of Maritime Affairs" vol. 17, 2018, p. 124.

<sup>34</sup> As seemed to suggested by J.P. Rodriguez Delgado in J.P. Rodriguez-Delgado, *supra* note 29, p. 499.



*France*<sup>35</sup> the Court of Justice of the European Union held that when the compensation limits of the International Fund for Compensation for Oil Pollution Damage are exceeded, claimants should have a chance to demand liability on the basis of the European law instruments in order to be fully compensated. Thus, a precedent exists where claimants were allowed to reach for parties protected by channeling provisions on the basis of the national laws implementing the European Union directive<sup>36</sup>. In relation to manufacturers of autonomous vessels the relevant legal provision would be product liability directive 85/37<sup>37</sup>, however its applicability as basis for compensation of oil pollution damage raises considerable concerns. The most significant doubt relates to the scope of damage under the directive as it regards mainly death or personal injury, while damage to property is limited to private property used in private consumption. Additionally, although it provides for strict liability, it does require a plaintiff to prove a defect in a product.

## V. CONCLUDING REMARKS

The answers gathered in the CMI questionnaire, despite the discrepancies, demonstrate that it is possible to achieve a broad consensus to enable operation of autonomous ships within the current regulatory regime. The law of the sea framework, namely UNCLOS, does not prevent the operation of unmanned ships. It can be interpreted functionally and makes it possible to accommodate unmanned ships within the existing legal framework. A major obstacle results from the lack of a possibility to adapt current safety requirements, with a special attention to SOLAS and COLREG. There will also be a challenge to find common ground

---

<sup>35</sup> *Commune de Mesquer v. Total France SA, Total International Ltd.*, Case C-188/07, Judgment of 24 June 2008, E.C.R. 2008.

<sup>36</sup> F. Collin, *Maritime Product Liability at the Dawn of Unmanned Ships – the Finnish Perspective*, “UTULAW Research Paper Series” 2/2018, p. 15; available at: <https://pdfs.semanticscholar.org/93b7/b87852779305a32c66c8113377de6470f8fc.pdf> [last accessed 1.12.2019].

<sup>37</sup> Council Directive 85/374/EEC of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products, *OJ L 210, 7.8.1985, p. 29–33*.



for a further regulatory approach, as it should be globally accepted. Considering the variety of economic interests of States (i.e.: seafarer supply countries), differences in technological development, social dimension, and the consequences of autonomous ships usage, it will take a lot of time and work to develop regulatory guidance for the use of autonomous ships.

A check upon liability conventions ought to take into account the need for prompt and full compensation of victims, but also the preventive function of the liability instrument. Also, in the area of liability rules, the level of human intervention in the decision-taking process ought to be considered and reflected in the liability scheme. It seems that in the case of fully autonomous vessels with no human interference, greater exposure to liability of the manufacturer or pre-programmer ought to be considered. In cases of large damage it is perceived that victims will seek outside the scope of liability conventions to obtain full compensation. Thus, they could turn to product liability rules to seek compensation from the vessel's manufacturer or programmer. Due to the current scope of the product liability directive there is no uniform European solution allowing product liability claims for compensation of property damage other than to private property used in private consumption.