

## International navigation rules governing the unmanned vessels

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### Abstract

Shipping by unmanned ships is a future matter of the maritime transport and has many benefits to ship owners, shipping industry, the environment, and so on. The prototype of unmanned commercial ships will enter the international maritime trade in the coming years. The entry of these ships will increase navigation safety, and consequently the various marine events will decrease significantly. One of the innovations of these ships is to remove of the crew on board of directors. One of the most important issues is the rules governing these ships. In according to that the technology of these ships is modern, and most of the marine laws are in the same way in the nineteenth century, the lack of a proper legal framework is very certain. In this study, various international maritime conventions will be discussed. Also, it is a summary of whether the current rules include the unmanned ships or not? Do these conventions create challenges for the unmanned ships? And how do the unmanned ships comply with the rules of these conventions? This article will first look at the state of transport on the unmanned ships. Afterward, it will address the benefits and challenges of these ships, and finally, legal challenges and barriers to the use of unmanned ships will be discussed. In particular, this section will investigate whether an unmanned ship is still a ship or not, and how it can handle the duties and responsibilities of the shipping laws? Furthermore, this is an attempt to identify the various aspects of lack of legality by using existing legal frameworks and international conventions. The results showed that the unmanned ships, like other ships, should comply with the current rules and regulations governing shipping.

**Keywords:** Navigation Rules; Unmanned Ships; Legal Framework; Shipping Industry.

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## 1. Introduction

When you would ask people in 1970 about how the future of the world is in 2020, they would talk to you about robots, monorails, self-driving cars, and even flying cars. Furthermore, all other technologies are ready to come into our daily life within 3 years from now. Mobility is about to face a huge evolution driven by digitalization and automation. The road transport industry is preparing itself for self-driving passenger vehicles and ‘platooning’ or autonomous trucks. Platooning is a system that reduces distances (Zabat *et al.*, 2011).

The same is happening in the shipping industry. Advanced software systems and IT technology increase available data and enable ships to use remote control or autonomous systems. There are currently several research and testing projects in the field of maritime transport. Often, these studies are expected to throw off their first ships of remote control in 2020. However, there is still no legal framework for unmanned shipping for this evolution. Many maritime laws and regulations are still in the same order of the nineteenth century (Deketelaere, 2017). The concept of the unmanned ship, except for its design, is so new that there is still no definition. Actually, for analysis, the level of automation requires a clear definition. The emergence of automation in the industry has led to progress in conceptual classifications and the development of several frameworks (Frohm *et al.*, 2008). Various current projects that are exploring the various aspects of unmanned transportation are discussed as follows.

### 1.1. MUNIN Project

The MUNIN project is a research study funded

by the European Union to provide the technical, economic, and legal capabilities of unmanned ships operations between 2012 and 2015. “MUNIN” stands for Maritime Unmanned Navigation through Intelligence in Networks project, which began with the development of unmanned ship technology. The project was a part of the Waterborne TP Strategic Research Program, a group of European stakeholders in maritime affairs. The group presented an article on the prospects for the development of the maritime industry. In this paper, the Unmanned Ships is considered as one of the key suggestions for the European Marine Research Program (MUNIN, 2016).

The overall objective of this project was to develop and review the concept of autonomous vessels; showing how this concept could have direct benefits and provides benefits for productivity, safety, and sustainability for short-term ships. In this project, they tested a dry bulk carrier with a capacity of 75,000 Dwt on a long voyage at 16 knots. Shallow and Close to the land waters were not part of the test because they believed that floating guidance should be carried out by humans when crossing the ship from these areas.

The project presented a concept in which the ship operates using autonomous developed systems, thereby monitoring and controlling the ship in the coastal tower that the operator is on the shore. The project also defines several concepts that are necessary for unmanned transportation. For example, an advanced sensor unit, according to the search functions on the circuit board, is an automated navigation system, after a predetermined voyage that is able to route itself according to applicable rules, good sea-going rules, and coordinates several other concepts (Caccia *et al.*, 2008).

### 1.2. Project “ENABLE-S3”

This project is also a European project designed to test, research and certify the safety of autonomous vehicles in Europe. The project was primarily focused on the safety of self-driving cars. The European Union further expanded the scope of the project to the entire transport industry, as the project involved automated and autonomous systems in different areas facing similar challenges (Meyer, 2016). The project started in July 2016 and is expected to be completed in October 2019. The project also created a consortium of experts in six fields (aerospace, automotive, agriculture, health, maritime and rail), along with suppliers and academics, to find the right solution to the challenges of their autonomous systems. The consortium consists of 71 companies (such as RENAULT, TOYOTA, IBM, SIEMENS, AIRBUS) from 16 European countries. The scope of the consortium enables the project to provide a network of experts for the research and approval of autonomous systems in different regions, because with these companies, the scheme will have a broad coverage of the supply chain. The main purpose of this project is to create a virtual program (principles) and methods for automated and control processes (Consortium, 2017).

### 1.3. Legal Definition of Unmanned Ships

In order to discuss the unmanned ships, it should be determined what flotation can be defined as an unmanned ship. An unmanned ship can be called a unmanned ship capable of moving from one point to another without the need for a crew on board. For this paper, only unmanned commercial ships are discussed.

The military use of the unmanned industry will not be discussed. However, unmanned ships can be classified according to their automation level. The first type is the remote control ship. They are controlled by humans through the Shore Coast Control (SCC). The ship is wirelessly connected to the Shore Coast Control. The Shore Coast Control is where employees receive information and data from radars, sensors, satellites and other systems on board the ship. Coastal operators interpret all the data, transfer their commands to the ship, and direct the ship to the destination. Then these commands will be performed by the ship’s electronic system. The second type of unmanned ships is fully autonomous. By using unmanned ships, an operator (humans) will only provide the destination point to the system and will ship its ship to this destination without the need for more human interaction. These types of ships rely on pre-programmed instructions and artificial intelligence to move automatically. The ship collects the information from different sensors on the circuit board and continuously sends them to the computer screen, which is capable of processing data and sending commands to engines, platform and other navigation and loading equipment. The Unmanned ships may be connected to a monitoring or command center on the coast to navigate the vessel in emergency conditions.

### 1.4. Opportunities and benefits

The first and most important advantage is the cost savings of the crew. No crew is required to move these ships. Therefore, the owner of the ship can save on crew costs. Generally, these costs, depending on the nationality of the crew, can reduce 30% - 60% of the operational

costs of the ship. The ship could also be saved because there is no need for accommodation for the crew.

### *1.5. Obstacles and disadvantages*

In unmanned shipping, new risks appear with remote control problems and autonomous. As previously mentioned, unmanned ships have the benefits that may be anti-piracy with the aim of stealing cargo or hijacking the ship to compensate for further damage. It should also be noted that a new type of piracy emerged as cybercrime attacks that allows hackers (pirates) to illegally capture a remote control system. Therefore, ICT systems require more security than today to withstand these cybercrime attacks that may be carried out through the ICT infrastructure. The second unfavorable result is that due to the large number of sensors installed on the ship, there may be too much data. Excessive data can create a dangerous situation when the operator does not have the ability to understand the entire situation and is unable to control the ship. The probability of such a situation increases when only one person monitors and controls several depots at a time. As a solution, you can install the software that is able to process all sensor signals so that the system is completely clear to the operator.

## **2. Materials and methods**

### *2.1. Legal challenges*

What are the legal challenges for autonomous and remote control ships? Are current (to some extent) offshore laws or need to adapt allowing unmanned transportation? In what way should

some laws and regulations be amended to resolve legal issues? This part of the paper addresses all these questions and forms the main part of this article.

### *2.2. No crew no ship?*

Looking at the legal status of the unmanned ships, the first question to ask is, under which legal system do unmanned ships operate? The connection to this question relates to the fact that ships can benefit from the rights and freedoms of the maritime conventions. If an unmanned ship is to be considered as a ship, it must comply with the duties of the existing rules and enjoy the rights of the international conventions, such as the Innocent passage, freedom of the sea, limitation of liability, and uniform standards. If an unmanned ship can't be considered a ship, it is unclear whether it can still benefit from these rights (Veal, 2016).

To find out whether unmanned ships are under a maritime law system, we need to examine the basics of using different maritime conventions. In particular, we should look at the definition of the term "ship" to determine whether a ship without crew can still be considered a ship. But, despite the fact that the "ship" is the main objective of various conventions and laws, there is no uniform international definition of a ship. The meaning of what can be defined as a ship depends on the scope of conventions and laws (Tetley, 2002).

### *2.3. International definitions*

First of all, the maritime law lacks a comprehensive definition for the ship (Vessel). Sometimes the United Nations Convention on the Law of the Sea (1982) is referred to as the

“Law of the Sea treaty”, even this convention does not have a definition for the ship. However, the convention is very important for navigational rights and ship responsibilities. This is one of the reasons most writers believe that unmanned ships will be the same for using the law of the sea with other ships. After this view, unmanned ship can enjoy the rights and freedoms and must be similar to the rules of traditional ships with applicable duties (Kraska, 2010). This view should be supported, since there is no indication in the United Nations Convention on the Law of the Sea 1982 (UNCLOS) that a crew is an essential element of the definition of a ship. Therefore, the rules of this convention, the definition of the rights and duties of countries, in relation to international transport, also apply to unmanned ships. Also, several multilateral conventions dealing with various issues of the law of the sea apply their scope to Ships do not restrict the presence of seafarers. Most of these conventions have their own definitions and are tailored to the specific issue they are considering (Van Hooydonk, 2014). First of all, according to The Hauge Rules (1924), a ship means “every vessel used for the carriage of goods by sea” and, according to the Athens Convention, 1974, a vessel means “Only one seagoing vessel, except for a vehicle without airbags”. These definitions are consistent with the subject matter and do not impede the use of unmanned ships. For example, the International Convention for the Prevention of Pollution from Ships (MARPOL, 1973) refers to “Ship” means a vessel of any type whatsoever operating in the marine environment and includes hydrofoil boats, air-cushion vehicles, submersibles, floating craft and fixed or floating platforms.” is defined. Obviously, this full definition includes unmanned ships. The International Convention

on Civil Liability for Oil Pollution Damage (CLC) seems to have the same definition, defining the ship’s convention as follows: “Ships means any sea-going vessel and any sea-born craft of any type whatsoever, actually carrying oil in bulk as cargo: Given that the ship is able to carry oil and other shipments, it is in fact the transport of oil indirectly as a shipment and during any journey after such shipment unless proved. There is no barrier to the transportation of oil in bulk”. This definition relates more to the scope of the convention, but the unmanned tanker ship can be qualified under this definition. The London Convention provides another definition. Vessels and Air Vessels can be an air or sea carrier. This includes hovercraft and floating, whether it is self-propelled or not (London Convention, 1975). The United Nations Convention on the Registration of Waters has defined such a ship, but has not yet been implemented. This Convention of Ships As “any seagoing vessel used for international maritime commerce, for the carriage of goods, passengers or both, with the exception of ships of less than 500 tons tonnage”. Again, this excludes ships unmanned aerial vehicles do not fall within the scope of this Convention. The International Law for the Prevention of Collision at Sea has provided another definition for the ship. The term “floating” Means any floating unit that moves on the water, such as the hovercraft and the airplane, so that it can be used for transportation or capable of doing so (COLREG, 1972). Clearing the characteristics of an unmanned ship is also covered by this definition. An overview of all definitions of all international conventions on maritime law clearly leads us further. The definitions of “ship” and “float” are slightly different, which is mainly due to the issues discussed in the



convention. Changes to definitions will only depend on the water craft to be discussed in the conventions. In the conventions above, there is no need to have a crew on board in any of the definitions, so there are no conventions that exclude the use of unmanned ships. It can be assumed that this is about all international maritime conventions (Tetley, 2002). Therefore, unmanned ships will be entitled to the same rights and will be responsible for the execution of all similar tasks.

#### 2.4. National definitions

It's clear that under a maritime international law, a unmanned ship will be treated like other ships (crew) and will be subject to international regimes. To determine if this is also a national maritime law, we will look at different definitions of several national laws. The US Marine Law provides a standard definition of a "float" and states that "a float is anything that is characterized by a blue device or anything built with skill and ingenuity and used for marine transport. Takes place ". Similar definitions have been used in several other laws, such as the 1974 deep water ports law, the 1977 International Navigation Act and 1990 Oil Pollution Act (Tetley, 2002). According to this definition, the unmanned ship will be regarded as an ordinary ship. If there is a debate as to whether a particular ship can be regarded as a ship, the US courts will "test the purpose" to decide on "what is a ship?" Have it developed. This test is to analyze the following questions: (1) Is a moving structure capable of carrying all waters? (2) Does this matter depend on the dangers of the sea? (3) Is the designed structure permanently in a constant position? And (4) Does the status of the ship coincide with legal

considerations or other policies? (Schoenbaum, 2001)

On this test, if the question of the unmanned ship is asked from an American court, then the answer to these four questions is likely to be positive, and the result is that an unmanned ship is like other ships.

The UK has a more basic definition of "What is a ship?" According to the 1995 Commercial Shipping Act, a flotilla of each ship or boat, or any other means with which is used for this maritime character. In French law, the ship is defined as "any device on the water used to navigate the ocean" (Rodiere and Du Pontavice, 1997). In Dutch civil law, ships include everything that is not blue. And they are floated due to their structure. The Spanish maritime decree defines the distinction between a vessel and a vessel, as "any vehicle whose structure or capacity to carry persons or objects at sea, which has a full deck and a length equal to or greater than 24 meters ". The Belgian law of the SeaWorld considers ships of 25 tons to be used for the transportation of passengers, goods or for other purposes, such as fishing and towage, or any other profitable activity at sea. Belgium's maritime law commission has also prepared a draft new draft for Belgian commercial shipping. A new definition has been proposed in the draft version, which is based on a broad legal alignment study (Van Hooydonk, 2014). According to this definition, "any vehicle with or without its own propulsion, or with or without it, or floated or floated, is used for naval transport, which includes Hawker Kraft, but fixed structures, watercraft Indigenous and other means used both in land and in water, so-called "bi-biological", are excluded from this definition. This list of various national definitions was "What is a

ship?” Several pages were presented. But this is not the purpose of this article. The goal is to clearly demonstrate that an unmanned ship like any other ship would qualify as “being ship”. All of these definitions are one more comprehensive and slightly different. But there is one thing about these definitions that is specific to unmanned ships; none of these definitions refers to the condition that the crews are unmanned. Hence the presence of a crew is not an essential element for a ship. Therefore, unmanned ships fall under the definition of a ship, and as a result, unmanned aerial vehicles are subject to international conventions and national laws.

### 2.5. *Law of the Sea*

The United Nations Convention on the Law of the Sea, adopted in 1982, is the basis of existing laws in the sea, which is in the process of implementation and is a major achievement of international law that, due to its comprehensive nature, correctly “the constitution Seas” (Freestone *et al.*, 2006). The United Nations Convention on the Law of the Sea is presented as a “set of rules” under which Governments must comply with all its rules, since the rights and responsibilities of the flag, coastal and coastal states have been formulated in a balanced manner. Given the fact that unmanned ships are eligible under the United Nations Convention on the Law of the Sea as a ship, they will enjoy the rights of the Convention. Unmanned ships will be fully able to use navigation rights, such as freedom of navigation on the high seas and the exclusive economic zone and the right to pass through harmless land in the territorial sea (Kraska, 2010). According to the same rules, unmanned

ships should match the same duties as other ships. However, 35 years after the conclusion of the “Seas Constitution”, it is not surprising that a lot of new issues and challenges have arisen. One of these challenges is the future of unmanned ships. When it comes to unmanned ships, the question arises as to how these ships and their flag states will carry out some of the duties set out in the United Nations Convention on the Law of the Sea. In particular, we fulfill the obligations of flag states and ships that require communication.

### 2.6. *Flag State functions*

Under Article 87 of the United Nations Convention on the Law of the Sea, the Free Seas are governed by the “principle of liberty”. This means that the free seas are independent of the national jurisdiction of the countries, and the freedom to operate on the high seas is subject to international law (Tanaka, 2015). According to Article 92 of the United Nations Convention on the Law of the Sea, the inference of this principle is the exclusive jurisdiction of the flag State. This means that the flag state has a statutory executive and judicial authorization to raise the flag.

### 2.7. *Responsibility*

Autonomous technology is one of the most important issues in the transportation sector. A car lets you work while you can still sleep on a chair. An unmanned ship in the ocean runs from far the east to the western ports to deliver a large amount of goods. When an unmanned ship arrives at the destination port, an automatic crane is ready to evacuate the ship. A truck transports these goods from the harbor to the distribution

center, and an unmanned ship will deliver your package from the distribution center before it arrives home in the back yard. One of the main concerns in various modes of transport is still the responsibility of autonomous vehicles. At present, the technology of these autonomous systems exists, but the legal framework is still a big question mark. There is a lack of legal certainty regarding the responsibility for the transfer and transport of self-employed persons. For this reason, current legal systems and the idea of responsibility for self-porting are discussed at the beginning of this section of the paper. Secondly, the existing principles of liability in maritime law are briefly examined. Third, probable solutions will be explored to establish responsibility for unmanned ships.

### *2.7.1 The responsibility of autonomous systems*

As current vehicles controlled by humans, autonomous vehicles are also likely to be involved in the accidents. But compared to current vehicles, human errors are rarely the cause of the accident. Autonomous vehicles must be reliable at any time without the need for human intervention and be able to move in difficult conditions. Accidents with autonomous vehicles are likely to be due to defective products, hardware, or software. However, the dominant responsibility framework is essentially based on negligence and human action (Deketelaere, 2016). Today, the law does not provide valid responses to the damage caused by autonomous systems, so we need to examine the existing laws to formulate a solution. Independent product liability can be related to different actors; owner, user, manufacturer or individual components manufacturer. When looking at transport from

a technical point of view, autonomous systems operate from different modes of transportation in a similar way.

## **3. Results**

### *3.1. Unmanned ships from the point of view of international conventions*

The purpose of this part is to examine the issue of an unmanned ship from the perspective of maritime law and insurance. We specifically focus on the international regulations relating to the ship's crew, and in particular the Sea-Life Act, the Convention on Standards of Training, the Certification and Maritime Guard, and the Maritime Labor Convention, which includes the core provisions of the staff of the International Maritime Law Framework. This inevitably has to be addressed in the management of the ship in terms of navigability, as well as affecting the ownership of the ship.

### *3.2. The Maritime Labor Convention and the Unmanned Ship*

The legal issues surrounding the unmanned ship crew, at first glance, seem to be a vague issue. However, there are aspects of hiring crew members and the unmanned ship operations. The word "seafarer" is used when referring to the ship's crew. However, this definition does not legally refer to a sailor or a specialty on a ship. The term "seafarer" is used in international conventions (ILO, 2017). Most conventions use the term "seaman". The ILO Working Group has identified a different definition of "Seafarer" in the Maritime Conventions adopted by the International Labor Organization (Lielbarde, 2017). Given the fact



that remote controlling ships are operating, the definition of crew is important in relation to the application of various conventions to the crew of the Coast Control Tower. The amendment to the 2016 Marine Labor Convention states in its second article that a seafarer is working on any of the vessels whose capacity includes the Convention.

This definition assumes that the use of the term “seafarer” in the Maritime Labor Convention applies only to seafarers working on the ship. However, unmanned ships are driven by personnel in the coastal control tower. These personnel should be as large as sufficient snooker skills (Chwedczu, 2016). So the Coast Guard Tower crew will take on board the ship, but will not be on the ship. This issue raises the question of “whether or not the requirements of the Maritime Labor Convention apply to the Coastal Tower personnel?” This question poses a doubt to the ship’s officer for ship operations. If the maritime labor convention is enforceable by the flag State 1, the owner of the ship will be required to comply with all the requirements for financial security, ship building, and welfare on board the ship. These requirements match and naturally, unmanned ships do not need to meet these requirements. One of the benefits of the unmanned ship is their greater capacity, which is created by the complete removal of the crew’s place of residence. If the Marine Labor Convention for the unmanned ship is not used by the flag of the registration vessel, then the owner is not required to comply with the requirements of the Convention. In this case, though, there is a question as to whether such a vessel is able to cross the “PSC” inspections during hijacking in a port country that adopts a different approach to the application of the convention.

### *3.3. Unmanned ships and Convention on Training, Certification and Watch-keeping Standards*

The conditions for ship registration are exclusively determined by the flag State (UNCLOS, 1982). Therefore, this issue is created for the flag state to reclaim the conditions for the registration of unmanned ships. However, this process may not directly affect the various parts of the ship registry conventions. Article 3 (b) refers to “guiding the ship by the manpower”, which raises the question of whether the crew of the coastal tower will meet this obligation? In addition, the flagship government must take the necessary measures in relation to the training of staff, taking into account internationally mandated instruments. The most important of these is the STCW Convention, which defines the minimum standards for training, certification, and seafarers’ observation (IMO, 2017).

Nowadays, in the various countries, the provision of maritime apprenticeships has become a challenge. This challenge will be more effective when trainees will not be able to train on unmanned ships due to their type. From an operational point of view, it is difficult for a ship-owner to handle educational challenges, and on the one hand, it must be equipped with certified seafarers, which is a requirement for flag states to be protected by the United Nations Convention on the Law of the Sea. If this obligation is not fulfilled, the ship will not be able to participate in international trade. On the other hand, in order for the crew to receive a license, they must take on board the training (internship) that cannot be provided by the owner of an unmanned ship. This situation can affect the maritime labor market. Due to the

lack of qualified and accredited officers on a global scale, it is possible to compete to attract approved seamen between companies that manage vessels with manpower and companies that have their own ships. Companies operating on board ships are the only options for seafarers who can take a marine service (internship). Firms that manage unmanned ships need to confront previous maritime certifiers who cannot afford a space for cadets (maritime workers). This can lead to increased management costs by the manpower for all ships is certified for seafarers due to a war between sailing and unmanned ships. However, seagoing ships, according to their definition, will be more vulnerable to rising manpower costs. A number of manned ships will be pushed out of the market, which will reduce the opportunities for maritime service (training) and the availability of future seamen (Karlis, 2018). The above scenario creates a challenge for the international transport industry. Flagged countries that are responsible for ensuring safety at sea need to develop training plans to adapt to the needs of beach-based staff while complying with the requirements of the Convention on Standards of Education, Certification, and Sentinel. If this is not achieved, the maritime labor market and shipping market can be unstable. This can be achieved by amending the Convention on Training, Certification, and Watch-keeping Standards, and replacing the requirement for service at sea during training with alternative training, such as determining the timing of use on the simulator. However, although this convention can be amended, this question arises as to the suitability of the beach tower control personnel and the ability to sail on the ship legally.

### *3.4. International Convention for the Safety of Life at Sea (SOLAS)*

The Convention on the Safety of Life at Sea states that the ship should be adequately and effectively deployed by manpower. This Convention does not specify the number of crew members who fulfill this obligation. The United Nations Convention on the Rights of the Sea follows a similar approach indicating that the flag State has to take the necessary measures to ensure the safety of the sea, taking into account the following: ship navigation by a certain number of personnel for the crew of existence. The different jurisdictions apply different approaches to the number of crew members required. The jurisdictions of Singapore for each type and size of the ship have special conditions regarding the requirements for vessel guidance by the manpower (Carey, 2017). In the UK, the owner of the ship is required to provide a “safe manpower 3” document, which must be applied before the ship enters the sea. The flexibility of the flagship government with regard to the requirements of the safe management by the manpower creates an ambiguity for the owner of the ship from the operational point of view. If different jurisdictions adopt a different approach to the requirements of a safe management by the manpower, this will increase the complexity of the operation and create barriers to entry. If the jurisdictional areas impose different requirements for the command of the ship by the manpower for the coastal tower, this can be complicated.

## Conclusion

Modern technologies have been anticipated since the 1970s and before. An important maritime technology, which will definitely affect many shipping operations around the world in the future, is the discussion of autonomous or unmanned ships. The unmanned ships are an issue in the future of maritime transport and will have many advantages for ship-owners, marine environment, and in particular the maritime shipping industry. The reason for this technology comes from mobility, which is due to automation and digitization. Different modes of transportation are preparing themselves for adopting this technology. Many study projects have been carried out by companies active in the field of marine technology. One of the transportation methods that is heavily influenced by this technology is the maritime shipping industry. Therefore, the creation of legal areas for the adoption of these technologies is very important. However, there is still no legal framework for the unmanned shipping for this evolution, because many maritime laws and regulations are still in the same way as the nineteenth century. To discuss the creation of legal areas, and specifically the acceptance of these ships in the maritime shipping industry, should at first be aware of whether existing laws include the unmanned ships? In this paper, it has been proven that these ships should obey the rules of the law, because by examining the definitions, most of the laws and conventions have identified the concept of “ship” as including these definitions. There are many issues in the discussion of these ships, including their liability in maritime accidents, insurance issues and other matters that in any case give rise to liability. One of the

main concerns in various modes of transport is still the responsibility of autonomous vehicles. At present, the technology of these autonomous systems exists, but the legal framework is still a big question mark. There is a lack of legal certainty regarding the responsibility for the transfer and transport of autonomous persons. For this reason, the current legal systems and liability ideas for autonomous vehicles are still under discussion. Currently, there is no uniform monopoly convention for the unmanned ship seafarers. Therefore, it is expected that future investigations should focus on what specific rules and regulations for these ships should be formulated and which of these current rules should be reviewed.

## References

- Caccia, M., Bibuli, M., Bono, R. and Bruzzone, G., 2008. Basic navigation, guidance and control of an unmanned surface vehicle. *Autonomous Robots*, 25(4): 349-365.
- Carey, L. 2017. All hands off deck? The legal barriers to autonomous ships. [ebook] Singapore: National University of Singapore, p.8. Available at: <http://law.nus.edu.sg/cml/pdfs/wps/CML-WPS-1706.pdf> [Accessed 24 September 2017].
- Chwedczu, M. 2016. Analysis of the legal status of unmanned commercial vessels in US admiralty and maritime law. *Journal of Maritime Law and Commerce*, 47:123-249.
- Consortium, X. 2017. Enable-s3 project. Available at: <http://www.enable-s3.eu/about-project/consortium/> [Consulted 28 February 2017].
- Deketelaere, P. 2017. The legal challenges of unmanned vessel. Master dissertation. Gent,

- Belgium: Universiteit Gent.
- Freestone, D., Barnes, R., and Ong, D. 2006. *The Law of the Sea: Progress and Prospects*. New York: Oxford University Press.
- Frohm, J., Lindstrom, V., Winroth, M., and Stahre, J. 2008. Levels of automation in manufacturing. *Ergonomia* Gauci GM (2016) Is it a vessel, a ship or a boat, is it just a craft, or is it merely a contrivance? *Journal of Maritime Law and Commerce*, 47:479-531.
- ILO . 2017. C164 - Health Protection and Medical Care (Seafarers) Convention, 1987 (No. 164). [Online] Available at: [http://www.ilo.org/dyn/normlex/en/f?p=NORML EXPUB:55:0:::55:P55\\_TYPE,P55\\_LANG,P55\\_DOCUMENT,P55\\_NODE:CON,en,C164/Document](http://www.ilo.org/dyn/normlex/en/f?p=NORML EXPUB:55:0:::55:P55_TYPE,P55_LANG,P55_DOCUMENT,P55_NODE:CON,en,C164/Document) [Accessed 14 September 2017].
- IMO. 2017. Maritime Safety Committee 98th session [online] Available at: [http://www.imo.org/en/MediaCentre/MeetingSummaries/ MSC/Pages/MSC-98th-session.aspx](http://www.imo.org/en/MediaCentre/MeetingSummaries/MSC/Pages/MSC-98th-session.aspx) [Accessed 1 July 2017].
- Lielbarde, S. 2017. Concept of seafarer before and after the Maritime Labour Convention 2016: comparative analysis of the legal effects of defining legal concepts in the shape of legal terminology. RGSL Research Paper [Online], 17. Available at: [http://www.rgsl.edu.lv/wcontent/uploads/2017/03/Lielbarde\\_final.pdf](http://www.rgsl.edu.lv/wcontent/uploads/2017/03/Lielbarde_final.pdf) [Accessed 14 September 2017].
- Meyer, B. 2016. NAVTOR to lead EU autonomous vessel project. Available at: <https://www.americanshipper.com/main/news/navtor-to-lead-eu-autonomous-vessel-project-65401.aspx> [Accessed March 2018].
- MUNIN. 2016. Research in maritime autonomous systems: Project results and technology potentials, MUNIN, 2016, 1.
- Rodiere, R., and Du Pontavice, E. 1997. *Droit maritime* (Vol. 11). France: Dalloz.
- Schoenbaum, T. 2001. *Admiralty and Maritime Law*. St Paul, USA: West Academic.
- Tanaka, Y. 2015. *The International Law of the Sea*, Cambridge, Cambridge University Press.
- Tetley, W. 2002. *International Maritime and Admiralty Law*, Cowansville, Editions Y. Blais.
- Kraska, J. 2010. The law of unmanned naval systems in war and peace. *The Journal of Ocean Technology*, 5(43): 51-52.
- Karlis, T. 2018. Maritime law issues related to the operation of unmanned autonomous cargo ships. *WMU Journal of Maritime Affairs*, 17(1): 119-128.
- Van Hooydonk, E. 2014. The law of unmanned merchant shipping- an exploration. *The Journal of International Maritime Law*, 20(3): 403-423.
- Veal, R. 2016. *Unmanned ships and navigation: the regulatory framework*, Genova, IUMI.
- Zabat, M., Stabile, N., Frascaroll, S., and Browand, F. 2011. *The Aerodynamic Performance of Platoons*, ISSN 1055-1425, archived from the original on 2011-07-19.
- Conventions:
- Athens Convention relating to the Carriage of Passengers and their Luggage by Sea, Athens, 13 December 1974.
- Convention on The Prevention of Marine Pollution by Dumping of Wastes and Other Matter, London, 19 December 1972 (hereafter: London Convention).
- Convention on the International Regulations for Preventing Collisions at Sea, London, 20 October 1972 (hereafter: COLREGs).
- Convention on the Unification of Certain Rules of Law with respect to Collisions between

- Vessels, Brussels, 23 September 1910.
- Convention on Limitation of Liability for Maritime Claims, London, 19 November 1976.
- International Convention for the Unification of Certain Rules of Law relating to Bills of Lading, Brussels, 25 August 1924 (hereafter: The Hague Rules).
- International Convention for the Prevention of Pollution from Ships, London, 2 November 1973 (hereafter: MARPOL).
- International Convention on Civil Liability for Oil Pollution Damage, Brussels, November 1969, as amended by the 1992 Protocol (hereafter: CLC Convention).
- International Convention on Salvage, London, 28 April 1989.
- International Convention on the Arrest of Ships, Geneva, 12 March 1999.
- Spanish Act on Maritime Navigation, 24 July 2014.
- United Nations Convention on the Law of the Sea, Montego Bay, 10 December 1982. (hereafter: UNCLOS)
- United Nations Convention on Conditions for Registration of Ships, Geneva, 7 February 1986.
- UN Convention on the Carriage of Goods by Sea, Hamburg, 31 March 1978 (hereafter: Hamburg Rules).
- UN Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea, Rotterdam, 23 September 2009 (hereafter: Rotterdam Rules).