



MEANAGREENMAURA

# UNMANNED VESSELS SERIES: ISSUE I

## 01 DEFINITIONS AND UNCLOS

### A NEW GENERATION OF VESSELS

An unmanned vessel is defined as being capable “of self-propelled and controlled movement on the water, in the absence of any personnel on board”[1].

Traditionally, the master and crew of a vessel have been given a crucial role in ensuring the safety of maritime adventures. Unmanned vessels present a significant deviation from the long-standing mode of operation, and it is therefore expected that such a transition requires commercial and regulatory preparedness.

But are we there yet? The answer would appear to be no - the international community still has a long way to go to prepare for the winds of change already blowing in its direction.

Revolutionary advancements in communications technology, artificial intelligence and the use of robotics, render unmanned vessels with autonomous systems, the future of the maritime industry. The exponential development of these disruptive technologies calls for a review of the existing international regulatory framework and an evaluation of its adequacy to cover unmanned operations.

This Series of articles will endeavour to assess how regulatory preparedness can be achieved, in order to accommodate the integration of unmanned vessels in commercial operations. The analysis will consider the applicability of governing international conventions to unmanned vessels, the ability of unmanned vessels to comply with the provisions of the conventions and how the level of autonomy impacts the position.

Remarkably, the autonomous shipping market is predicted to be worth \$134.90 billion by 2030 [2]. Some of the projects being currently developed around the world appear to support such predictions. Yara and Kongsberg have teamed up to create Yara Birkeland, which is the world’s first fully electric, zero emission container vessel [3]. Currently, it is remotely operated but is expected to commence fully autonomous transport operations by 2020. Similarly, ReVolt by DNV GL is an unmanned, zero emission, short sea vessel that is fully battery powered and autonomous [4]. It is expected to save \$34million in its estimated 30 year life span. The efforts undertaken by Rolls Royce should also be acknowledged, with the AAWA (Advanced Autonomous Waterborne Applications Initiative) outlining specification and design ideas for the next generation of vessels [5].

### Defining the autonomous vessel

While unmanned ships are evidently becoming a reality, the international regulatory framework under the auspices of the IMO, is not yet prepared for the introduction of these vessels into commercial operations. One fundamental issue, that needs to be addressed as a starting point, is the lack of an international consensus on the definition of an autonomous ship. The IMO has defined Maritime Autonomous Surface Ship (MASS) as “a ship

which, to a varying degree, can operate independently of human interaction"[6]. This definition was produced for the purposes of the regulatory scoping exercise undertaken by the IMO to address autonomous shipping, and as such, does not represent an international consensus on the matter, nor does it constitute legal authority.

Another layer of complexity is added when one considers the different potential levels of autonomy that vessels can operate at. The IMO's MSC 99 classification[7] recognises four degrees of autonomy for vessels. The first one is the smart-ship, with some automated processes but with seafarers on board to operate and control the vessel. The vessels falling within the second degree are remotely controlled from another location but seafarers are still on board. The third degree consists of vessels that are remotely controlled from another location and have no crew on board. Lastly, the fourth degree concerns the fully autonomous ship, which is "able to make decisions and determine actions by itself"[8] and which operates, of course, without seafarers on board. Lloyd's Register (LR), on the other hand, divides autonomy levels in 6 categories, from AL 1 which represents fully manual operation, to AL 6, fully autonomous and unsupervised operation [9]. Similarly, in the UK Code of Practice for MASS [10], level of control is categorized from 0 (Manned) to 5 (Autonomous), forming 6 levels as well.

The existence of these different classification systems for autonomy make it increasingly difficult to achieve regulatory preparedness and uniformity in light of technological advancements. This stresses the importance of drafting a preliminary definition to be agreed by key players of the shipping industry and members of the IMO. In this way, each state can act accordingly in reviewing their national laws and commercial players can envisage the future more accurately. Such a definition needs to be broad enough to incorporate all foreseeable levels of autonomy of an unmanned vessel.

The challenges with the international regulations, as further analysed in this Series, are mainly in respect to unmanned ships, with the autonomous systems of manned vessels not posing such an obstacle in compliance. Automated processes and autonomous systems

have been developed and used for years on manned vessels, being embraced within the current framework and without posing a problem for regulations. It would therefore be sound for a universal definition to focus only on unmanned vessels and their respective autonomy scale, which must be uniform across all states and organisations, if the industry is to achieve harmonisation.

In this light, since it is a vessel's unmanned orientation that poses a problem, there is no need to look at the lower levels of autonomy that involve seafarers on board. For current purposes, we will follow a more simplistic classification of autonomy levels, into two distinct categories of unmanned vessels: remotely operated and autonomous. The former involve a shore-based remote controller who controls the vessel with the help of sensors and cameras. In turn, autonomous vessels can either be supervised by a shore-based remote controller, or can be fully autonomous, with no supervision. From the standpoint of legal compliance, the twofold distinction is the most relevant. It is vital, however, to recognise early on, that autonomy is a continuum and vessels might operate at different degrees of autonomy during one voyage, or consist of systems that are imbalanced in terms of their individual autonomy.

Having established the central distinction to be used in the subsequent analysis, the Unmanned Vessels Series will examine whether and how unmanned vessels, either remotely-controlled or autonomous, fit into the existing legal framework. It is quite apparent that unmanned vessels will face obstacles in falling within the scope of, or complying with, a regulatory framework that presupposes the presence of a crew on board.

Some key international conventions will be considered in turn, starting with UNCLOS in this Issue.

## UNCLOS

The 1982 UN Convention on the Law of the Sea (UNCLOS) [11] enjoys almost universal application as it is accepted that it represents customary law. It lays down navigational rights and duties, as well as states' rights and obligations in relation to ships flying their flag.



The foundational question to be asked is whether unmanned vessels are considered 'ships' or 'vessels' within the meaning of the Convention. This will determine their legal status, and in turn whether they are subject to the rights and obligations provided by international maritime law.

The matter is rather problematic, since there is no internationally accepted definition of 'ship' or 'vessel'. UNCLOS uses both terms interchangeably, but without defining either. One could look to other international instruments in an attempt to define these terms, but this seems futile, since the definitions they provide are tailored and specific to the subject matter of each specialized convention. Such definitions would be inconsistent and highlight the need for a common understanding of what constitutes a ship, at an international level. Overall, and to the benefit of unmanned technologies, international regulations do not contain an express requirement of manning in their definitions of 'ship'. At the definition level, at least, it seems that unmanned vessels are not excluded from the scope of the conventions.

In the absence of an international consensus, a coherent argument is that UNCLOS regulates how states deal with their vessels, but allows the question of what constitutes a ship to be determined by national laws. This is supported by Article 91 which provides that "Every State shall fix the conditions for the grant of its nationality to ships, for the registration of ships in its territory, and for the right to fly its flag"[12]. At a national level, the definition of a ship is mostly unconnected to manning requirements. Under English law, the term ship "includes every description of vessel used in navigation"[13], and even though navigation is undefined and it is unclear whether manning is its prerequisite, it is expected that unmanned vessels will satisfy the definition.

Assuming that unmanned vessels are 'ships' within the meaning of UNCLOS, they will be subject to the same obligations that apply to manned vessels and their flag states. The duties of the flag state are outlined in Article 94, effectively leaving such measures to the discretion of each state, by referring to an abstract set of "generally accepted international regulations, procedures and practices"[14] that

the measures must conform to. In this way, UNCLOS preserves its relevance in times of shifting practices in the maritime industry.

The discretion given by UNCLOS to each state could have a problematic effect when it comes to the navigational rights of unmanned ships. A ship is subject to the laws of her flag state, based on her nationality, but also to the laws of coastal or port states, according to her physical location at any given point. Potentially, this could have the consequence of an unmanned vessel constituting a ship under the flag state's law, but not under the law of the coastal or port state.

The flag state's jurisdiction applies at all times, irrespective of the vessel's location, whereas the parallel jurisdiction of coastal or port states increases with the proximity of the vessel to its shores. As follows, if the vessel is present in the ports or internal waters, the coastal state has broad jurisdiction over her and a wide discretion when it comes to entry conditions for foreign ships, by virtue of Article 25 UNCLOS. Theoretically, a coastal or port state could decline access to its ports or internal waters by unmanned vessels, as long as the refusal is reasonable, non-discriminatory and proportional. Further limiting the coastal state's right, Article 300 provides that states "shall exercise the rights, jurisdiction and freedoms recognised in this Convention in a manner which would not constitute an abuse of right"[15].

When the vessel is passing through a state's territorial sea, their rights and jurisdiction are more limited. By virtue of a well-established principle of the law of the sea, all ships have a right of 'innocent passage' through territorial waters of other states. Passage is deemed innocent "so long as it is not prejudicial to the peace, good order or security of the coastal State"[16]. Since passage of an unmanned ship would not be more prejudicial than that of a manned one, it seems that unmanned vessels will be mostly protected in territorial waters and allowed to pass through, as long as their activities do not fall within Article 19(2) UNCLOS.

Jurisdictional issues are complex and have the potential to hinder the growth of unmanned shipping. It should be highlighted, however, that the possibility for such technological advances



was not contemplated when drafting UNCLOS. Therefore, if unmanned vessels become in fact commonplace, their navigational rights should, in consequence, be equal to those enjoyed by conventional manned ships.

Apart from the provisions regarding jurisdiction, UNCLOS contains other provisions that could be deemed problematic when applied to unmanned vessels. Article 98 outlines the duty of the master to render assistance, which inherently presumes the existence of the master on board. Since this duty is also incorporated in SOLAS, it will be discussed further in Issue II, under said convention.

Article 94(4)(b) provides that each ship must be "in the charge of a master and officers who possess appropriate qualifications... and that the crew" must be "appropriate in qualification and numbers"[17]. At this point, the distinction between the two categories of unmanned vessels becomes relevant, as we ask whether it is possible for an unmanned ship to have a master.

Remotely operated ones can arguably meet the requirements of art.94(4)(b) by drawing a parallel between the shore-based operator and the traditional master. It is much harder, however, to utilise a similar analogy for autonomous vessels. Even if their operations are supervised by a person onshore, the role of said person cannot be equated to that of the master, since navigation is pre-programmed and autonomous, and human judgment is replaced by algorithmic collision avoidance systems. In addition, even in cases where the supervising officer has the ability to command control and is therefore more akin to a master, equating their respective roles so as to comply with article 94, would possibly be frowned upon as a superfluous interpretation per analogiam.

The lack of a master and crew on board the vessel is the main challenge towards compliance with the legal framework, since many of the conventions were drafted presuming the presence of master and crew. As with other conventions as well, this does not mean that UNCLOS will operate to exclude unmanned vessels from its ambit, nor does it mean that this must have been the intention of the law makers. Simply, the possibility of such advanced technology was not yet contemplated at the

time of drafting. As such, the existing legal provisions should first be clarified by the relevant international body, before one reaches the conclusion that unmanned vessels would be in breach of them. ■

## References

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- [11] United Nations Convention on the Law of the Sea, 1982
- [12] UNCLOS, Article 91(1)
- [13] Merchant Shipping Act 1995, Section 313(1)
- [14] UNCLOS, Article 94(5)
- [15] UNCLOS, Article 300
- [16] UNCLOS, Article 19(1)
- [17] UNCLOS, Article 94(4)(b)

