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MARITIME AUTONOMOUS SURFACE SHIPS (MASS) AND THE SALVAGE CONVENTION 1989

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Maritime Autonomous Surface Ships (MASS) and the Salvage Convention 1989

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This working paper discusses the impact of Maritime Autonomous Surface Ships (MASS) on aspects of the International Convention on Salvage 1989. In particular, it analyses the recently concluded scoping exercise of the Legal Committee of the International Maritime Organization on the subject of MASS and the Salvage Convention.

The paper highlights the divergent views of relevant stakeholders, argues that several developments relating to MASS require amendment of the Salvage Convention, and suggests that the current compensation regime may be a poor fit for MASS salvage. Finally, it argues that the conclusions of the Legal Committee in its Scoping Exercise will need to be revisited, owing to the changes that will arise from the introduction of MASS.

Keywords: Maritime Autonomous Surface Ships, salvage, international Conventions, law reform

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1 MASS and the Salvage Convention

In 2017, the International Maritime Organization (IMO) concluded that Maritime Autonomous Surface Ships (MASS) should be safe, secure, and environmentally sound.¹ The ultimate goal is that autonomous ships will remove seafarers altogether,² which should supposedly in turn result in fewer accidents and incidents caused by human error.³ However, there will inevitably be occasions where MASS will still require external help, which brings to the fore the issue of maritime salvage, as well as the applicability of the International Convention on Salvage 1989 (the Salvage Convention) to salvage operations involving MASS.⁴

The applicability and suitability of the Salvage Convention in the context of MASS was recently assessed in a Scoping Exercise on MASS conducted by the Legal Committee International Maritime Organization (IMO) (the Scoping Exercise).⁵ The objective of the Scoping Exercise was to ‘assess the degree to which the existing regulatory framework under its purview might be affected in order to address MASS operations’.⁶

¹ IMO, *Report of the Maritime Safety Committee on its Ninety-Eighth Session* (MSC 98/23, 28 June 2017) para 20.1. See also IMO, *Outcome of The Regulatory Scoping Exercise and Gap Analysis of Conventions emanating from the Legal Committee with respect to Maritime Autonomous Surface Ships (MASS)* (LEG.1/Circ.11, 15 December 2021) para 3.1 (the Scoping Exercise).

² IMO, *Outcome of the Regulatory Scoping Exercise for the use of Maritime Autonomous Surface Ships (MASS)* (MSC.1/Circ.1638, 3 June 2021): ‘Degree Three: Remotely controlled ship without seafarers on board. The ship is controlled and operated from another location. There are no seafarers on board. Degree Four: Fully autonomous ship. The operating system of the ship is able to make decisions and determine actions by itself.’

³ IMO, *Navigation, Communications and Search and Rescue* (MSC 98/INF.10, 04 April 2017) para 7. See also IMO, *Impact of New and Advancing Technologies to Maritime Transport and the Regulatory Framework* (MSC 98/22/7, 28 March 2017) para 10.

⁴ International Convention on Salvage 1989, Adopted: 28 April 1989; Entered into force: 14 July 1996.

⁵ Scoping Exercise (n 1).

⁶ *Ibid* para 3.2.

It follows that the objective of the Scoping Exercise should have been to conduct a qualitative evaluation of the effect, or influence, of MASS operations, on the existing Conventions. However, the conclusions that the Scoping Exercise reached rather seem to suggest that the Legal Committee of the IMO conducted an exercise to the opposite effect – that is, of assessing how MASS operations should be developed in order to fit into the framework of the existing Conventions. This is evident, for example, from the document submitted by Finland⁷ to the Scoping Exercise in respect of the review of the Salvage Convention.⁸ It identifies the following ‘potential gap and theme’: ‘[6].5 Degree 4: ...the role of the master needs to be clarified as in the case of degree 3’.⁹ The document also provides the following opinion in respect of the ‘most appropriate way’ to deal with the issue of clarifying the role of the master:

[7].4 Degree 4: I. ... As for the Salvage Convention, the most appropriate way of addressing the issue might be interpretations, if the issue of a master is dealt with in a separate instrument. One Member State was of the opinion that, at this stage, it is too early to determine whether the option of amending the Convention could be excluded.¹⁰

⁷ Finland was the Member State which prepared the initial review, supported by the Comité Maritime International (CMI). See Scoping Exercise (n 1) para 11.

⁸ IMO, *Regulatory Scoping Exercise and Gap Analysis of Conventions Emanating from the Legal Committee with respect to Maritime Autonomous Surface Ships (MASS)* (LEG 107/8/11, 10 January 2020) (the Finland document). The results of the initial review were reviewed by Australia, the Republic of Korea, and the UK.

⁹ *Ibid* para 6.

¹⁰ *Ibid* para 7.

Evidently, the Scoping Exercise took the ‘potential gap/theme’ identified in the Finland document and used it as a reason for recommending the development of IMO interpretations to address gaps in the existing Salvage Convention.¹¹

This approach, which focuses on merely plugging existing gaps, rather than developing the existing Salvage Convention framework to accommodate future developments in MASS, seems not to have been informed by a firm understanding of MASS operations.¹² Additionally, the Scoping Exercise seems to have ignored the significant proviso in the Finland document: ‘if the issue of a master is dealt with in a separate instrument’. The Scoping Exercise should arguably at least have assessed the issue of a separate MASS instrument by giving an opinion on this issue. The replacement of the words ‘separate instrument’ in the Finland document with ‘all instruments in coordination with all responsible committees’ in the final Scoping Exercise report further fudges the issue.

However, the Scoping Exercise does usefully identify some common potential gaps, including ‘the role and responsibility of the master’, ‘the role and responsibility of the remote operator’, ‘questions of liability’, and ‘definitions/terminology of MASS’.

Keeping the above in mind, this paper will analyse the changes that crewless MASS may bring about to salvage operations, in line with the objective of the Scoping Exercise and the

¹¹ Scoping Exercise (n1) Annex, p 38. On IMO interpretations/unified interpretations, see eg <<https://iacs.org.uk/publications/unified-interpretations/>>.

¹² Some reasons for this are suggested by H Ringbom, ‘Developments, Challenges, and Prospects at the IMO’ in H Ringbom et al (eds), *Autonomous Ships and the Law* (Routledge 2021) 56.

potential gaps identified by it and will comment on the application of the Salvage Convention to those operations.¹³

2 Will MASS salvage operations be different?

The obvious fundamental change with crewless MASS will be the lack of any humans on board. Mechanical acts, rather than human actions, will therefore play a larger role in MASS salvage. For example, any tow lines from MASS will have to be released mechanically and would have to be controlled through automation. This might require software developments or other assistance requiring satellite communications. However, this is not a difference which should fundamentally change the nature of MASS salvage operations.

The broad definition of ‘salvage operations’ in the Salvage Convention comprises ‘any act or activity undertaken to assist a vessel or any other property in danger in navigable waters or in any other waters whatsoever’.¹⁴ This definition contains two significant elements: first, the focus is on the actions of the salvor; second, the nature of the salvor’s act must be that of assistance. For the most part, the definition does not create problems of applicability to MASS salvage operations. The second element of the definition, however, needs to be interpreted in light of the particular nature of MASS. The element of danger will be discussed later.¹⁵

¹³ For a case study exploring the topic of salvage of MASS, see M Suri and K Wrobel, ‘Identifying Factors Affecting Salvage Rewards of Crewless Vessels — Lessons from a Case Study’ (2022) 21 WMU Journal of Maritime Affairs 275.

¹⁴ Article 1(a).

¹⁵ See Part 4 below.

Assistance may be either active or passive, such as ‘comfort that its presence provided the passengers and crew’,¹⁶ or even merely allowing the use of vessel space.¹⁷ The proposition that MASS in danger, and unable to extricate themselves from that situation, may require help or aid, is uncontroversial.¹⁸ A more challenging question is what acts can encompass ‘assistance’, particularly passive assistance, in the context of MASS salvage. For example, can a satellite services provider, watching and reporting MASS that have lost their datalinks to remote-control centres (RCCs), claim that it has provided acts of assistance in the nature of salvage? The Scoping Exercise notes that questions of salvage liability may now need to consider ‘new actors, e.g. ... providers of network or computer systems’, but this is not particularly helpful in clarifying whether novel acts of assistance for MASS salvage might come within the ambit of art 1(a) of the Salvage Convention.¹⁹

In this regard, it is important to note the more recent entry of non-traditional players into the maritime industry which may wish to claim payment for their assistance.²⁰ For example, start-up companies like Spire Global are now using satellites to track ships that escape traditional vessel-tracking technologies and providing services on a subscription-based model.²¹ This is nothing new, of course. Inmarsat has been using its satellites to connect ships to shore for many decades.²² It seems clear that such companies will play a much

¹⁶ *Dorothy J v City of New York* 749 F Supp 2d 50 (ED NY 2010).

¹⁷ *Sunglory Maritime Ltd v Phi Inc* 212 F Supp 3d 618 (ED La 2016). See also F Rose, *Kennedy & Rose: Law of Salvage* (10th edn, Sweet & Maxwell 2021) para 5-035.

¹⁸ FD Rose, ‘Restitution for the Rescuer’ [1989] 9 OJLS 167, 174.

¹⁹ Scoping Exercise (n 1) para 5.5.

²⁰ Including land-based operations: see Institute of Shipping and Trade Law, *Remote Controlled and Autonomous Shipping: UK Based Case Study* (2022).

²¹ S Hartley, *The Fuzzy and the Techie* (Portfolio 2018) 64; see also Spire Maritime <<https://spire.com/maritime/>>.

²² Established by the Convention on the International Maritime Satellite Organization (Inmarsat) 1976. See <<https://www.inmarsat.com/en/solutions-services/maritime/focus-on/merchant.html>>.

greater role in MASS operations in the future. The exact nature of the legal relationships between MASS owners and such technology service providers will of course primarily depend on the terms of the contracts entered into between them. Where providers like Spire or Inmarsat render services beyond their contractual obligations in the nature of assistance to MASS in danger, it does not seem too farfetched to argue that this might come within the definition of passive salvage, in that it will provide comfort and informational assistance on the location and health of MASS.

3 Are MASS vessels or property?

The Scoping Exercise concludes generally – that is, in relation to all the Conventions under its purview – that ‘it may need to be clarified that MASS (in particular, those at degrees 3 and 4) fall within the various definitions of ship’.²³ However, the assumption appears to have been that MASS are, or at least could be, ships rather than property.²⁴ This is a necessary implication of the Scoping Exercise’s conclusion that the role of the master needed to be resolved. Although the UK remarked, in its comment on Finland’s initial review, that ‘article 6 [of the Salvage Convention] covers both master or owner who are authorised to conclude contracts “on behalf of the owner of the property”’, the UK disagreed with Finland that this article needed any amendment or clarification. Since only a vessel is commanded by a master,²⁵ this comment suggests that the UK also considered

²³ Scoping Exercise (n1) para 5.6. For the definition of ‘vessel’ in the Salvage Convention, see art 1(b).

²⁴ Ibid para 2.1: ‘MASS could include ships’.

²⁵ See eg the definition of ‘master’ in the Annex to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978.

MASS to be vessels. Finland commented on art 6(2) of the Convention that ‘paragraph 2 does not prevent MASS operations, because it’s the owner’s prerogative to conclude contracts’.²⁶ Under art 6(2), this can only mean the owner of a vessel.

If MASS are not to be regarded as vessels for the purpose of salvage, by necessary implication, they will then constitute ‘any other property’ under art 1(a) of the Convention.²⁷ This may introduce some uncertainty in respect of salvage of cargo (ie property) on board MASS also legally defined as property, because art 6(2) only provides that the ‘master or the owner *of the vessel* shall have the authority to conclude such contracts on behalf of the owner of the property on board the vessel’.²⁸ This issue might need to be addressed by MASS owners obtaining prior contractual authorities from cargo owners in order to avoid any doubts, which would be unfortunate, as art 6(2) of the Salvage Convention was designed to avoid the need for this, and to avoid arguments and delays over cargo salvage.

Additionally, art 8(2) of the Salvage Convention provides that the vessel interests (the owner and the master of the vessel) or the property interest (the property, ie cargo owner) owe distinct duties to the salvor. This provision was clearly designed to draw a distinction between the duties of vessel and property interests, making it more awkward to apply it to MASS characterised as property.²⁹ The same problem arises in respect of art 19 of the Salvage Convention, which provides that ‘services rendered notwithstanding the express

²⁶ Comments of Finland on the initial review for the Scoping Exercise.

²⁷ See art 1(c) Salvage Convention.

²⁸ Emphasis added. Cf *The Altair* [2008] 2 Lloyd’s Rep 90, 92.

²⁹ The LOF refers to the vessel and all things on it as ‘the property’: Box 2. But an LOF is almost invariably signed by the master or owner of a vessel.

and reasonable prohibition of the owner or master *of the vessel* ... shall not give rise to payment under this Convention', which leaves the position of the MASS owner unclear if a property characterisation is adopted.³⁰ The further reference in art 19 to the 'owner of any other property in danger which is not and has not been on board the vessel' also would not seem intended to cover MASS characterised as property.

However, the better view is that MASS, particularly larger MASS carrying cargo, will fall within the art 1(b) Salvage Convention definition of 'vessels'. Such MASS are clearly capable of navigation, ie making ordered movements on water.³¹ Larger commercial MASS will have the structure, functions, and ability to navigate like a conventional ship, and will be designed to carry cargo on board.³² The Salvage Convention definition of 'vessel' is also unproblematic with respect to MASS because it does not mention the presence of humans on board.

4 How will danger be identified in MASS salvage operations?

As highlighted in Part 2 above, salvage operations must be rendered to a vessel in 'danger'. For crewed vessels, the apprehension of danger is proved through a mix of eyewitness

³⁰ Emphasis added.

³¹ *Michael v Musgrove* [2012] 2 Lloyd's Rep 37. See also Paul Dean and Henry Clack, 'Autonomous Shipping and Maritime Law' in Baris Soyer and Andrew Tettenborn (eds), *New Technologies, Artificial Intelligence and Shipping Law in the 21st Century* (Informa 2019) para 5.1.21.

³² *Remote Controlled and Autonomous Shipping* (n 25) 16: 'there can be no serious doubt that this includes a MASS'. See also P Dean, 'Autonomous Ships: Known Knowns and Known Unknowns' (January 2022) <<https://www.hfw.com/Autonomous-Ships-Known-Knowns-and-Known-Unknowns-Jan-2022>>; G Brice, 'The New Salvage Convention: Green Seas and Grey Areas' [1990] LMCLQ 32, 41.

testimony and documentary evidence. For MASS, eyewitnesses will be replaced by cameras and sensors on the MASS. This is not an exponential change, but it still merits discussion. This Part first examines previous salvage cases where danger has been identified to identify illustrative indicators, then compares these precedents with intrinsic and external indicators which may be used to identify danger in connection with MASS salvage operations.

4.1 Illustrative indicators

The ‘fear of something bad happening’ has been held to be indicative of a situation of danger.³³ Potential liability for environmental pollution,³⁴ parting of a tow line,³⁵ fire in the cargo holds,³⁶ fire in the engine room,³⁷ grounding,³⁸ parting of a stern mooring wire,³⁹ impeded manoeuvrability,⁴⁰ and immobilisation,⁴¹ have all been construed as situations of danger.

Whether the salvee was in a situation of ‘danger’ is often disputed in salvage cases, and the spatial or temporal indicators of ‘danger’ can be hard to identify. For this reason, in *The Voutakos*, the Court had to make a distinction between ‘rescue towage services’ and ‘towage services rendered to a vessel in physical danger’.⁴² Remarking that a stark

³³ *Sunglory* (n 17).

³⁴ *The MV Renos* [2019] 2 Lloyd’s Rep 78.

³⁵ *Maridive VIII v Key Singapore* (2005) 1 Lloyd’s Rep 91.

³⁶ *The Sava Star* [1995] 2 Lloyd’s Rep 134.

³⁷ *The Mbashi* (2002) 2 Lloyd’s Rep 602.

³⁸ *The Ocean Crown* [2010] 1 Lloyd’s Rep 468; *The Altair* (n 28); *The Kuzma Minin* [2020] 2 Lloyd’s Rep 617.

³⁹ *The Hamtun* [1999] 1 Lloyd’s Rep 883.

⁴⁰ *The Tramp* [2007] 2 Lloyd’s Rep 363.

⁴¹ *The Voutakos* [2008] 2 Lloyd’s Rep 516.

⁴² *Ibid* 523.

categorisation was unreal,⁴³ the Court distinguished between a straightforward towage case in a calm sea, and a situation where a immobilised vessel may pose a risk to itself and other vessels, eg in a traffic zone, which would constitute a dangerous situation.⁴⁴ Therefore, where there are easily identifiable events that have the potential of causing harm, loss, injury or damage to MASS, or their owners, a situation of danger will readily be identified by the courts.

4.2 Intrinsic indicators of danger

Identifying whether danger exists is an objective exercise, taking into consideration each particular case.⁴⁵ In the case of non-contractual salvage of MASS, there may not have been any communication between the volunteer salvor and the relevant autonomous ship, and no testimony from anyone on board. It is important, then, to understand the ways in which danger to MASS may be inferred from the relevant context, and if there are intrinsic protocols in MASS that indicate danger:

In some cases, events may force the ship or other parts of the autoremotely infrastructure out of its normal operation. In such an event, it is essential that the relevant response is defined, and that the ship is put in a state that poses the least risk to life, environment and property.

These states are called minimum risk conditions (MRCs).⁴⁶

⁴³ Ibid: 'The circumstances in which a pure risk of immobilisation elides into one of some sensible degree of physical danger is not capable of any precise identification'.

⁴⁴ Ibid.

⁴⁵ *The Hamtun* (n 39). The Court adopted the test in *F Rose, Kennedy's Law of Salvage* (5th edn, Sweet & Maxwell 1985); see also *Rose* (n 17) para 5-004.

⁴⁶ DNV AS, Class Guideline: Autonomous and Remotely Operated Ships (DNV-CG-0264, September 2021) 19 <<https://rules.dnv.com/docs/pdf/DNV/CG/2021-09/DNV-CG-0264.pdf>>.

These MRCs range from ‘normal operations’ to ‘last resort’. A potential last resort MRC is identified as:

Drop (emergency) anchor: may be used if the water-depth is within a suitable range. If used as a ‘last resort MRC’, the anchoring system will typically need an independent power supply. [This is] maybe one of the more extreme MRCs, and requires that suitable beaching zones have been identified up front. This MRC may typically be used when energy reserves are about to become depleted.⁴⁷

Thus, a last resort MRC is a state in which MASS are trying to maintain their physical condition in which they pose the least possible risk to life, environment, and property, but they will potentially be exposed to harm if unable to sustain this MRC indefinitely.⁴⁸ In this state, MASS may or may not be in need of external help because they would be dealing with the situation by ‘high performance of ... machinery’.⁴⁹ However, in accordance with the ‘safety philosophy’ of the last resort MRC, this is a state in which the MASS is coded not to take any more decisions.⁵⁰

Because of the apprehension that comes with a change in circumstances, it may be difficult to argue, at least in the early days of unproven safety robustness,⁵¹ that MASS are not in

⁴⁷ Ibid 94.

⁴⁸ The word ‘indecision’ is used to refer to the last resort MRC’s decision trees: *ibid*.

⁴⁹ *Ibid*.

⁵⁰ ‘Decision Trees’ in M Murty and V Devi, *Pattern Recognition: An Algorithmic Approach* (Springer 2011) 123.

⁵¹ For justification of this assumption, see H Nordahl et al, ‘Autonomous Ship Concept Evaluation – Quantification of Competitiveness and Societal Impact’ (ICMASS 2022, Singapore, April 2022).

danger if they are in a last resort MRC, even if they were programmed to minimise ‘risk to life, environment and property’.⁵² By analogy, it is most probable that MASS, in a last resort MRC, are in a situation where ‘something worse might happen’,⁵³ or, at the very least, that MASS are in an ‘unhappy predicament’.⁵⁴

4.3 Extrinsic indicators of danger

It has been suggested that MASS, or MASS ecosystems,⁵⁵ will share a common situational awareness with other ships and devices.⁵⁶ It is thus foreseeable that the notification of ‘danger’ will become easier in the context of MASS salvage. Futuristic ecosystem elements like smart fairways, where not only vessels, but also buoys and Vessel Traffic Services (VTSs) are connected via the Internet of Things (IoT), are going to become a part of the maritime scene.⁵⁷ For example, the European Union’s EfficienSea 2 project in the Arctic and Baltic Seas currently provides instant connectivity to ships in those waters, including instant navigation warnings and notices to mariners, and reporting of search and rescue operations.⁵⁸ At a minimum, MASS will have sensors and technology to connect to Global National Satellite Systems (GNSSs).⁵⁹ Arguably, due to the connectivity and reporting

⁵² DNV AS (n 46).

⁵³ *Sunglory* (n 17).

⁵⁴ *The Tramp* (n 40).

⁵⁵ Eg several MASS vessels operating in an area with continuous information exchange among them and other IoT devices.

⁵⁶ J Huffmeier, “‘PREParE SHIPS’ for Automated Ship Passages by Modern Decision Support Tools by Exchanging Future Positions’ [2020] IOP Conference Series: Materials Science and Engineering <<https://iopscience.iop.org/article/10.1088/1757-899X/929/1/012001/pdf>>.

⁵⁷ Marikka Heikkilä, ‘Smart Fairways – Co-design of Future Fairways in Finland’ (ICMASS 2022, Singapore, April 2022).

⁵⁸ European Commission, ‘Grant Agreement Number 636329 - Efficiensea 2’ (Innovation and Networks Executive Agency 2015) <<https://efficiensea2.org/wp-content/uploads/2018/09/Grant-Agreement-636329-EfficienSea-2-signed-2.pdf>>.

⁵⁹ S Krause et al, ‘Development of an Advanced, Efficient and Green Intermodal System with Autonomous Inland and Short Sea Shipping – AEGIS’ (ICMASS 2022, Singapore, April 2022).

mechanisms in place nowadays, there are several entities who become aware of a probable collision, grounding, or other externally perceivable dangerous scenarios at the same time as the crews on the affected conventional vessels.

However, the legitimacy and accessibility of this data is essential when it has to be used as evidence in court. This data should be recorded or documented by MASS systems and, ideally, transmitted in real time to shore-based RCCs. The data needs to be neutral, sufficient, precise, and intelligible.⁶⁰ Voyage data recorders (VDRs) already serve this function. In *The Sakizaya Kalon*, the Court noted:

The shape of a collision action in the Admiralty Court is now very different from what it was before the advent of VDRs. In the past a trial was required to establish the navigation of each vessel. There was often little common ground save that there had been a collision. The reliability of the evidence of the master or officer of the watch had to be assessed... This has all been changed by the advent of VDRs.⁶¹

The requirements mandated by DNV AS for MASS require RCCs to record at a minimum 'operational status of key vessel functions including communication links'.⁶² The general duty is that of 'data logging', which provides that 'in order to support failure and incident analysis ... , data related to key vessel functions should be electronically logged and stored. The information should be available to personnel in an RCC'.⁶³ Furthermore, it is prescribed

⁶⁰ See *The Hamtun* (n 39) 885, 891.

⁶¹ *The Sakizaya Kalon* [2021] 2 Lloyd's Rep 70, 72.

⁶² DNV AS (n 46) 88.

⁶³ *Ibid.*

that the voyage data recorder covers the RCC, in addition to the MASS.⁶⁴ This data would help a court to conduct an objective exercise in the determination of danger. In the *Hamtun*, the Court had to rely on hand drawings on hydrographic charts.⁶⁵ If a court were in future to be provided with ‘sensor-data from multiple sensors like video-cameras, images, radar-information, audio’ etc, that will make its task much easier.⁶⁶

5 Can MASS be deemed to ‘contract’ for salvage?

The Scoping Exercise suggests that the master’s authority to contract for salvage in art 6(2) of the Salvage Convention can be transferred to MASS remote operators. The CMI notes, however, that ‘this provision does not work for fully autonomous ships without shore-based support’. Although MASS should be connected to RCCs at all times, they may find themselves in a situation where RCC communications are lost or are disconnected.⁶⁷ Potential salvors may not then be able readily to contact the RCC. Could MASS rely instead on a reciprocal MRC to allow for salvage operations to be undertaken?

⁶⁴ Ibid 102, ‘2.1.26 Voyage data recorder (VDR) – IMO MSC.333(90)’.

⁶⁵ *The Hamtun* (n 39) 883, 902.

⁶⁶ MASS will be transmitting this sort of data to RCCs: DNV AS (n 46) 91.

⁶⁷ Eg abandonment by owners: *The Kuzma Minin* (n 38).

5.1 Authority and the lack of a master

Traditionally, the master has acted as the agent of the shipowner and cargo interests when accepting the offer of assistance from a salvor.⁶⁸ Article 6(2) of the Salvage Convention gives legal recognition to this authority of the master to contract for salvage. The lack of a master on board, or on call via the RCC, will mean that such authority cannot be exercised by the master by giving oral or written instructions to the salvor. In practice, however, the exercise of the authority to contract for salvage has been undertaken by/from shipowners' and ship managers' offices for decades.⁶⁹ Receiving instructions from the shipowner is virtually instantaneous these days.⁷⁰ Salvors conduct their affairs from land,⁷¹ where they will either become aware of a possible casualty from their monitoring devices in their shore-based offices,⁷² or will be contacted directly by shipowners or other interested parties. Thus, given enough time, the salvage of MASS can equally be negotiated through land-based owners or their employees.

However, this may not be feasible in very urgent situations. In *The Altair*, the Court warned against the dangers of haggling and delay and encouraged certainty.⁷³ This is why art 6(2) of the Salvage Convention provides the master with undisputed authority to enter into

⁶⁸ N Gaskell, 'The Enactment of the 1989 Salvage Convention in English Law: Policy Issues' [1990] LMCLQ 352. See also generally John AC Cartner, *Cartner on the International Law of the Shipmaster* (2nd edn, Informa 2022) 248.

⁶⁹ Geoffrey Brice, 'Salvage: Present and Future' [1984] LMCLQ 394, 400.

⁷⁰ Howard Bennett et al (eds), *Carver on Charterparties* (Sweet & Maxwell 2021) 377. See also 'Dutch Safety Board Report Challenges Onboard Authority' (*Nautilus International* 04 August 2022) <<https://www.nautilusint.org/en/news-insight/telegraph/dutch-safety-board-report-challenges-onboard-authority/>>.

⁷¹ Often signing the salvage agreement on land: see *The Altair* (n 28).

⁷² See Diccon Rogers' testimony in *The Kuzma Minin* (n 38).

⁷³ *Ibid.*

salvage contracts.⁷⁴ The CMI report to IMO at the time of drafting of the Convention further pointed out that providing this authority to the master ‘improves the salvor’s position’ and ‘is expected to increase the element of encouragement’.⁷⁵

Prior to art 6(2) of the Salvage Convention, the master had to demonstrate that s/he was an ‘agent of necessity’ to contract for salvage: in other words, that it was necessary to take assistance; it was not reasonably practicable to communicate with the cargo owners, or to obtain their instructions; that s/he acted bona fide in the interests of the cargo; and that it was reasonable to enter into the particular contract.⁷⁶

In addition to the master, the Scoping Exercise has, for both relevant degrees of autonomy (three and four), made the specific point that salvage involves a spectrum of human activities performed by ships’ crews, shore-based management, regulatory bodies, recognised organisations, shipyards, legislators, and other relevant parties.⁷⁷ It follows that the question of authority to enter into salvage agreements should consider the multi-dimensional nature of shipping operations, keeping in mind the element of urgency of salvage operations.⁷⁸

In the case of MASS, the human operators, as the master’s substitutes, are based in RCCs, which will invariably be distant from the vessel, as well as the situation of danger. Even if

⁷⁴ Ibid.

⁷⁵ F Berlingieri, *The Travaux Préparatoires of the 1989 Salvage Convention* (Comité Maritime International 2003) 189.

⁷⁶ *The Choko Star* [1990] 1 Lloyd’s Rep 516.

⁷⁷ Scoping Exercise (n 1); IMO, *Human Element Vision, Principles and Goals for the Organization* (A 23/Res.947, 26 February 2004).

⁷⁸ Rose (n 18) 174.

they have the authority to enter into salvage contracts, it is unlikely that they will perceive danger the way an onboard master would. They will have to consider the safety and the commercial consequences of their actions without having as precise a picture of the situation as an onboard master.

A possible alternative where the RCC operator cannot exercise authority, or where the situation is too urgent to do so, is to provide MASS with a reciprocal MRC to 'accept' salvage. For MASS to be deemed to accept salvage services via such an MRC, the legal concept of agency would have to be satisfied, as well as the requirements for the formation of a salvage agreement.⁷⁹ It is unlikely that an IMO interpretation of art 6(2) that extends the existing master's authority to pre-programmed authority via the MRC would be successful. Such a change would probably require a provision to that effect in a standalone MASS instrument, or an amendment to art 6(2) of the Salvage Convention.

5.2 Ways in which MASS can call for assistance

Communication through audio and visual aids and conduct is a necessary part of shipping operations because there is almost always distance between two ships, or a ship and any other entity. If MASS can release tow lines and make audio and visual signals to vessels in their vicinity, there is no reason why those vessels should not, in appropriate circumstances, interpret this conduct as a call for assistance. A specific action devised for MASS is:

⁷⁹ *The Hamtun* (n 39) 897: 'for there to be "services at request" both offer and acceptance were required'.

Call for assistance (tug): in addition to calling for assistance, the ship normally needs to provide some means for other ships (typically tugs) to fasten tow, e.g. by extending towing lines.⁸⁰

Where MASS autonomously execute emergency plans which are functionally equivalent to the decisions taken by master mariners or chief officers nowadays, their conduct alone may be sufficient to authorise salvage.⁸¹

It is commonplace for salvage contracts to be agreed over VHF.⁸² MASS systems will also have the ability to communicate with external stakeholders, including 'other vessels, VTS, tugs, pilot stations, etc'.⁸³

5.3 Designated Person Ashore

Both the Scoping Exercise and the CMI note that art 6(2) of the Salvage Convention will require clarification if the authority to conclude salvage agreements is going to be transferred to an onshore person. CMI goes further and states that 'if new persons are provided with the authority to conclude contracts for salvage operations, this paragraph needs to be amended'.

⁸⁰ DNV AS (n 46) 94.

⁸¹ A Tettenborn, 'Shipping: Product Liability goes High-Tech' in Soyer and Tettenborn (n 31) 116. See also Grant Hunter, 'Standard Contracts for the MASS(es) – Charterparties and Other Agreements for Autonomous Ships' in B Soyer and A Tettenborn (eds), *Ship Operations: New Risks, Liabilities and Technologies in the Maritime Sector* (Routledge 2021) 207.

⁸² *The Star Maria* [2003] 1 Lloyd's Rep 183.

⁸³ *The Mbash* (n 37) 92.

It has been suggested by Soyer and Tettenborn that two more agents should be given authority: the natural person in charge of the vessel; and the agency who controls the vessel on the owner's authority.⁸⁴ They suggest that an 'art 6.2 bis' be added to state that 'references to the master in Article 6.2 shall include any person to whom the operational control of the vessel may from time to time have been delegated'.

However, if an onshore person has to be identified for the purpose of delegating authority to conclude salvage contracts, this should ideally be a role which is functionally similar to the master's and shipowner's roles vis-à-vis a conventional ship: ie, they should have a sound understanding of ship operations, as well as onshore management of the MASS owner's organisation.⁸⁵

The Preamble to the Salvage Convention provides that the purpose of salvage is safety of vessels and property, and protection of environment. This closely matches the responsibility, and the authority, of the Designated Person Ashore (DPA) to monitor the safety and pollution prevention aspects of the operation of the ship under the ISM Code.⁸⁶ The DPA's role is to prevent a situation leading to pollution, loss of property, and life. In addition, the DPA has direct access to the highest management levels of the shipowning company.⁸⁷ The identification of the DPA as the person authorising MASS salvage would

⁸⁴ B Soyer and A Tettenborn, 'Autonomous Ships and Private Law Issues' in B Soyer and A Tettenborn (eds), *Artificial Intelligence and Autonomous Shipping* (Hart 2021).

⁸⁵ Cartner (n 68) 605 notes that this person should be 'the connection among management, the registry state, the vessel and its contents and the voyage'.

⁸⁶ International Safety Management Code 1993, art 4. See also the discussion in L Carey, 'All Hands Off Deck: Legal Barriers to Autonomous Shipping' (2017) 23 JIML 202–219.

⁸⁷ Ibid; In practice the DPA may already be exercising the authority to contract: H Shaw, *Independent Review into the Potential for Delays in the Contracting and Engagement of Salvage Services in Marine Casualties* (July 2022) para 5.2.1.

result in logistical efficiency because it will create a clear channel of communication with the salvor.⁸⁸ The DPA is a well-established role in the industry.⁸⁹ Additionally, should a 'MASS Code'⁹⁰ incorporate the traditional structures of the mandatory ISM Code, vesting the DPA with authority to conclude MASS salvage agreements would seem to align with the demands of a consistent, easily implementable legal framework.⁹¹

In essence, there would seem to be two main possibilities: first, MASS owners or their employees (the DPA, specifically) or agents, will be able to contract for salvage as they currently do. Second, and more controversially, MASS may be deemed to call for assistance when they execute functions coded into them to do so.⁹² Furthermore, MASS are capable of autonomously determining their actions, and communicating with external stakeholders.

6 Non-contractual salvage of MASS

Contractual salvage has been discussed above. Where salvage operations are undertaken in the absence of a salvage agreement, the salvor is acting as a volunteer. A volunteer is someone who, without a pre-existing duty, contractual or otherwise, to provide salvage services, assists a vessel in danger.⁹³ Cases of non-contractual salvage often give rise to

⁸⁸ *The Altair* (n 28).

⁸⁹ Alan E Branch and Michael Robarts, *Branch's Elements of Shipping* (9th edn, Routledge 2014) 458.

⁹⁰ IMO (n 2) para 6.2.

⁹¹ IMO, *Proposal for a New Output to Develop a Consistent Legal Framework for the Regulation of Maritime Autonomous Surface Ships (MASS) across IMO instruments* (Work Programme, LEG 109/13/2, 2022) paras 4, 19; There are, already, calls for inclusion of salvage services in the DPA's role: Shaw (n 87) para 5.2.5.

⁹² G Vojković and M Milenković, 'Autonomous Ships and Legal Authorities of the Ship Master' (2020) 8 *Case Studies on Transport Policy* 333.

⁹³ Rose (n 18) 171.

disputes about whether the services rendered were in the nature of salvage. Such arguments have traditionally depended on testimony of the crew on board, something which would be lacking with MASS.

It follows that the factual context and the salvor's conduct, rather than eyewitness testimonies from the master and crew of the salvaged vessel, will have to be assessed by the court as objective evidence of whether the events constituted a salvage operation.

7 Duties of masters and owners

Article 8(2) of the Salvage Convention provides for the duties that masters, shipowners, and property owners owe to salvors in the context of salvage operations.⁹⁴ The first duty is that of full co-operation during the course of the salvage operations.⁹⁵ The second is to exercise due care to prevent and minimise damage to the environment.⁹⁶ The third is to take redelivery of the vessel at a place of safety on the reasonable request of the salvor.⁹⁷

⁹⁴ These duties are of such a generic nature that they would apply with or without contractual/Convention stipulation: Rose (n 17) para 11-064.

⁹⁵ Article 8(2)(a). An impecunious owner/operator may choose to abandon the ship: Rose *ibid*. However, the right or ability to abandon is severely curtailed in most jurisdictions, owing to stronger regulatory controls, as is underscored by the language of art 11.

⁹⁶ Article 8(2)(b).

⁹⁷ Article 8(2)(c).

The three duties set out in art 8(2) do not directly arise from the crewing or conduct of the stricken vessel,⁹⁸ which simplifies matters for MASS. The Scoping Exercise commented as follows on art 8(2):

Article does not prevent use of MASS, because both the owner and the master have duties according to this article. However, it needs to be clarified who is the master and who might have the right to act on behalf of the owner.

By contrast, the CMI view is less sanguine:

Under the assumption that a vessel is not controlled from onshore facility nor anybody onboard, the applicability of this paragraph needs to be considered. There is also a possibility for a role of some other entities (programmer, manufacturer) to come into play, so further clarification/amendment is needed. In addition, references to 'due care' and 'reasonably required/requested' seem to fit uneasily for fully automated operations.

The Scoping Exercise comment shifts the burden of performance onto new entities, but seemingly onto a substitute for the master within the shipowner's organisation. In addition to adopting a more sceptical approach, the CMI comment seems to suggest that new external entities, such as programmers and manufacturers, may have legal duties imposed upon them. It is suggested that CMI's scepticism is justified, but that the reference to programmers and manufacturers is more problematic.

⁹⁸ See further NJJ Gaskell, 'The 1989 Salvage Convention and the Lloyd's Open Form (LOF) Salvage Agreement 1990' (1991) 16 Tul Mar LJ 1. Nothing related to the characteristics or operations of ships featured in the preparatory materials: see Berlingieri (n 75).

The need for MASS salvage may arise from navigational errors, passage planning errors, weather prediction errors, other shore-based errors, or external factors (such as the acts of other ships). Where MASS owners suffer loss or damage caused by malfunctioning maritime products or services (eg, incorrect algorithmic calculations or effects), they will sue the technology manufacturers/providers for breach of contract.⁹⁹ Nonetheless, channelling of liability to the shipowner is a theme of most maritime Conventions. It therefore comes as no surprise that in relation to all the Conventions under its purview, the Scoping Exercise recommends that the existing strict liability of shipowners in the liability and compensation regimes should be maintained for MASS owners.¹⁰⁰

It is appropriate that liability should continue to be imposed on shipowners, who are in control of MASS at the relevant time, are able to bear the financial expense of liability, and who have contractual remedies against those involved in providing the technology and design of MASS. There seems to be little benefit in extending the mutual duties of the salvage relationship to new entities.¹⁰¹ It is also unlikely that duties can be imposed on new entities by developing interpretations to the current art 8(2), which specifically identifies by whom those duties are to be borne. Given the general conclusions reached by the Scoping Exercise, it is likely that there will be little appetite for imposing novel duties on programmers/manufacturers. Therefore, the discussion below will focus on the issue of the art 8(2) duties of the shipowner's organisation.

⁹⁹ *The Nicholas H* (1995) 2 Lloyd's Rep 299.

¹⁰⁰ Scoping Exercise (n 1) para 5.5.

¹⁰¹ See Lord Mustill's speech in *The Nagasaki Spirit* [1997] 1 Lloyd's Rep 323 concerning liability for environmental salvage under art 14.

7.1 Current duties and standards of performance

The current duties under art 8(2) of the Salvage Convention are combined with standards of performance. Article 8(2)(a) requires that co-operation should be ‘full’; art 8(2)(b) requires exercise of ‘due care’; and art 8(2)(c) requires ‘reasonable’ acceptance of redelivery. Notwithstanding the argument that MASS could, if properly coded, better satisfy these standards than conventional vessels,¹⁰² the wording of art 8(2) is challenging because these current standards are described and tested on the basis of human actions. As Røsæg has noted:

Machines resolve navigational problems by means of methodologies differently from human methodologies, and in ways that we cannot easily comprehend. Liability law must adjust to this or automation will lead to a change in the balance between players in the shipping industry and those who suffer adverse consequences from it.¹⁰³

Gaskell propounds the conventional test of the ‘reasonably prudent master’.¹⁰⁴ However, as Røsæg points out, the difficulty is how one applies this test to autonomous systems. For example, in the case of the *Amoco Cadiz*, the crew ‘broadcast a VHF message ... advising ... that all ships should keep clear’, and ‘the not-under-command signals were hoisted’.¹⁰⁵ However, the tanker operations manual of the owner of the *Amoco Cadiz* stated that

¹⁰² Since this will be designed into the MRCs: DNV AS (n 46). See also F Collin, ‘Unmanned Ships and Fault as the Basis of Shipowner’s liability’ in Ringbom (n 12).

¹⁰³ E Røsæg, ‘Diabolus ex Machina: When an Autonomous Ship Does the Unexpected’ in Ringbom (n 12) 134.

¹⁰⁴ Gaskell (n 98).

¹⁰⁵ *The Amoco Cadiz* [1984] 2 Lloyd’s Rep 304, 312.

‘before accepting assistance from a non-company vessel, the Master shall, if practicable, advise the Marine Manager of the terms of the agreement to assist, i.e. whether salvage or towage’.¹⁰⁶ As it turned out, the master did not accept repeated calls for salvage assistance, and instead asked the salvors to contact the owner’s shore office.¹⁰⁷ Thus, the master of the *Amoco Cadiz* took into account the dangers at hand, the salvors’ offer, and the rules of his employer, in coming to a conclusion about what action to take. It seems unlikely that MASS could be coded to weigh up the nuances and complexities of such situations to meet the test of a reasonably prudent master.

This is unlikely to be an issue where communications are established between salvors and MASS owners, or where MASS owners are in remote control of some functions of their vessels. The satisfaction of the art 8(2) duties will then be a question of what is agreed between MASS owners and salvors.¹⁰⁸

However, where communications are not, or cannot be, established, the situation becomes more difficult to analyse, since it is the acts of MASS and not humans which have to be assessed. What is clear is that MASS can and will be coded to take certain measures in light of certain events.¹⁰⁹ The acts of MASS arising from that coding may possibly then be viewed as a proxy for satisfaction of the master’s or owner’s duties. However, as discussed, the standards of performance set out in art 8(2) are human-centric. What is therefore offered, by way of suggestion, are further duties more appropriate to MASS.

¹⁰⁶ Ibid 330, 335.

¹⁰⁷ Ibid 315.

¹⁰⁸ See the discussion on the DPA in Part 5.3 above.

¹⁰⁹ DNV AS (n 46).

7.2 Coding duties

MASS will be acting based on predetermined codes, ie algorithms determining actions based on data and logic which have been pre-programmed into them. Over time, through machine learning, codes will determine actions that MASS will take in particular situations.¹¹⁰

Thus, the operations of MASS will rely on predefined datasets, or updates which have been previously verified and validated. However, seen in the current context of human decisions, the performance of these duties falls to be judged on the moment when the relevant decisions are taken. These will necessarily be contemporaneous with salvage operations. Therefore, it is suggested that owners must ensure that MASS are properly coded and updated so that they can execute the functions required to meet art 8(2) duties at the time of salvage.

By providing automatic steps to be taken in a state of danger, coding may even address some concerns raised at the time of drafting of the Salvage Convention about leaving such decisions to the discretion of a master placed in a dangerous situation.¹¹¹ The importance of the duty to arrange for salvage in a timely fashion was recognised by the drafters.¹¹² They emphasised that the length of the period between the moment the danger arose and

¹¹⁰ Ibid 48.

¹¹¹ See the discussion above of *The Amoco Cadiz* (n 105).

¹¹² Berlingieri (n 75) 237.

the moment salvage commenced was likely to have a significant impact on steps taken to avoid damage to the environment.¹¹³

Imposing a duty on owners that MASS are coded to call for assistance in a timely fashion will equally support and facilitate the earlier suggestion that MASS could, or should, be deemed to have called for assistance and authorised salvage operations if certain MCR criteria have been met. This may also help to satisfy the high threshold of social acceptance which is being demanded of MASS – technical performance above and beyond the standard currently required of conventional ships may assist the smooth integration of MASS into the existing maritime ecosystem.¹¹⁴

It seems likely that MASS which call for assistance in a timely fashion, and which provide salvors with the means to save them (eg by throwing out tow lines), will be seen as satisfying the art 8(2) duty of full co-operation. Additionally, if the coded actions of MASS, in a situation where a threat of damage to environment exist, result in a call for assistance in a timely fashion, this would seemingly also satisfy the duty to exercise due care to prevent or minimise damage to the environment.

¹¹³ Ibid 241. This has not changed: see Shaw (n 87).

¹¹⁴ R Veal and M Tsimplis, 'The Integration of Unmanned Ships into the Lex Maritima' [2017] LMCLQ 303, 318, 330: 'Disappointingly there has been less evidence of stakeholders working together with a common goal of reducing, or minimising the risk to life, the vessel, its cargo and the marine environment.' See also Shaw (n 87) para 2.11.3.

The duty to take redelivery in a reasonable fashion is perhaps more problematic. What will happen if MASS have lost their satellite links to their owners?¹¹⁵ In the case of the *Brilliant* *Virtuoso*, it was held that ‘the vessel was not in a place of safety as she was a dead and disabled ship anchored in international waters, [and] the original peril of piracy or vandalism or malicious mischief continued to operate’.¹¹⁶ A ‘place of safety’ is obviously a conceptual construct connected to the danger faced by the vessel. Thus, extricating MASS out of ‘the grip of the original peril (danger)’, involves taking them to a ‘place of safety’.¹¹⁷ In situations where MASS regain their normal propulsion and navigational capabilities after the salvage operations have concluded, coding an MCR may be possible to communicate directly to salvors that MASS are in a place of safety, so as to give salvors the option to disconnect the tow line (or other equipment) and consider the vessel ‘redelivered’.

In situations where salvors can communicate with MASS owners, this duty will be easy to satisfy. In situations where MASS need to be moved to a place where the owners can take physical delivery, such as in situations of loss of propulsion, coding should ensure that MASS do not act autonomously in a way which might cause injury to the salvors, or damage to their vessels or equipment. In such cases, though, redelivery would presumably need to take place in a safe port.¹¹⁸ It has been held that:

¹¹⁵ This will not necessarily be fatal, given MASS precoding. At least one case of an autonomous ship successfully completing its voyage even though it had lost its satellite link has been reported: Solbian, ‘*Mahi 2* is the First Autonomous Vessel to Cross the Atlantic’ (Marine Business World, 20 March 2022) <<https://www.marinebusinessworld.com/news/247212/Mahi-2-first-autonomous-vessel-to-cross-Atlantic>>.

¹¹⁶ *The Brilliant Virtuoso* [2015] Lloyd's Rep IR 388.

¹¹⁷ *Ibid.*

¹¹⁸ *The Ocean Victory* [2017] Lloyd's Rep IR 291, 298.

a port will not be safe unless, in the relevant period of time, the particular ship can reach it, use it and return from it without, in the absence of some abnormal occurrence, being exposed to danger which cannot be avoided by good navigation and seamanship.¹¹⁹

This may cause novel issues for MASS because not all ports may be equipped, or willing, to allow them entry, at least in the early days of MASS operations.¹²⁰

7.3 The DPA's duty

It would be logical, then, to place the art 8(2) duties on the MASS owner, and/or the DPA to provide all necessary information on notification of danger, and extend full co-operation to salvors.¹²¹ That would seemingly solve the issue highlighted in the CMI comment above, regarding the role of the 'programmer/manufacturer', as information flowing to and from the salvors would be channelled via the DPA.¹²² This would also be in line with the role of the DPA in the shipowner's organization, and complement its existing duties and authority, as suggested above.¹²³

It is trite that the master and the crew are not entitled to salvage remuneration when they save or assist in saving their ship, unless their efforts exceed their existing contractual

¹¹⁹ Ibid.

¹²⁰ Although some ports have shown active interest in MASS development: Maritime and Port Authority of Singapore, *Flag, Coastal and Port Authorities from Eight Countries Come Together to Encourage Development of Maritime Autonomous Surface Ships*, 4 August 2020 <https://www.sgpc.gov.sg/media_releases/mpa/press_release/P-20200804-1>.

¹²¹ 'The importance of collaboration and the timely provision/exchange of accurate information on the ship and its cargo in a salvage is essential': Shaw (n 87) para 2.11.6.

¹²² On the basis that the owner/DPA are better placed to receive that information from the programmer/manufacturer.

¹²³ See Part 5.3.

duties and obligations. The same principle should extend to DPAs, regardless of whether the DPA is an employee of the shipowner or an independent contractor forming part of an outsourced RCC.¹²⁴ To argue otherwise seems antithetical to the purpose of such an entity.¹²⁵ Logically, the DPA should be under a duty to convey data on the situation leading up to the danger, along with all other helpful information and actions, so that considerations for salvage operations can incorporate this information.¹²⁶ The imposition of such a duty on DPAs would enhance the safety assurance of MASS salvage operations.

8 Effect of MASS operations on the compensation regime

On 'questions of liability', the Scoping Exercise commented as follows:

New technologies relating to MASS will introduce new actors, e.g. remote operators, remote control centres/stations, providers of network or computer systems, or system developers. In this regard, the RSE indicates that it may be necessary to decide whether and how these actors should be involved in the liability and compensation regime. ... [I]t was also felt that the introduction of new actors and technologies raised policy questions regarding the apportionment of liability under the LEG conventions, which may have to be addressed in the future.¹²⁷

¹²⁴ Unless art 6 covers the DPA as well: see Soyer (n 84).

¹²⁵ See Part 5.3.

¹²⁶ Clause F(ii) of LOF 2020 entitles the salvors to 'all such information'.

¹²⁷ Scoping Exercise (n 1) para 7.

As things presently stand, owners (in reality, usually the relevant insurers) are liable to provide compensation where their vessels have been rescued due to the salvors' actions, or where environmental harm has been minimised or avoided.¹²⁸ The owners of property on board the vessel are only liable to provide compensation for the salvage of their property.¹²⁹ It is unclear how, in this very closely related set of parties, 'new actors' would be accommodated by developing interpretations. It is also unclear what the Scoping Exercise meant by 'policy questions regarding the apportionment of liability'.

Arguably, one has to look at these questions in light of some of the issues of scope which already affect the Salvage Convention. As Brice points out, rather than broadly covering anti-pollution measures unconnected with salvage operations, special compensation under art 14 was narrowed down to cover only salvage operations and significant environmental harm.¹³⁰ Gaskell notes that the compromises reached over what became arts 13 and 14 of the Salvage Convention had both positive (clarificatory) and negative results (fudging).¹³¹ Furthermore, it must be recognised that, even after 33 years, the Salvage Convention has only been adopted by flag States covering 62.07% of global tonnage, which reflects its relatively lukewarm reception.¹³² Additionally, there is an ongoing debate whether the policy of environmental protection would fare better if delegated to State control.¹³³ Given that the Scoping Exercise considered that 'technical aspects and questions of liability' would be best addressed together,¹³⁴ this Part considers

¹²⁸ Articles 13(2) and 14(1).

¹²⁹ Article 13(2), disregarding the indirect effect of 13(1)(b).

¹³⁰ Brice (n 32) 43.

¹³¹ Gaskell (n 98) 49.

¹³² It therefore cannot be said to provide a global uniform solution. Cf the International Regulations for Preventing Collisions at Sea 1960, which is adopted by States covering 98.91% of world tonnage.

¹³³ Brice (n 69) 398.

¹³⁴ Scoping Exercise (n 1) part 6.5.

the effects of MASS operations on the existing compensation regime under the Salvage Convention.

8.1 Condition for salvage payment

For the shipowner, liability to pay arises out of the salvor rendering a useful result to the vessel, property, and the environment. The principle is enshrined in art 12(1) of the Salvage Convention, which states that '[s]alvage operations which have had a useful result give right to a reward'.¹³⁵

Finland's comment to the Scoping Exercise noted that '[t]his right concerns the entity performing salvage'. The CMI commented that '[the provisions of the article] apply to MASS and do not prevent MASS operations and require no actions'. Although art 12(1) of the Convention seems broad enough to apply to MASS salvage, and the views of the two organisations support that view, it will nonetheless be useful to consider the interplay between a 'useful result' and MASS salvage operations.

The focus on a useful result as the foundation for salvage liability has meant that any arguments of 'self-interest/self-preservation' have failed to persuade courts that a person producing a useful result is not entitled to salvage.¹³⁶ This is, indeed, recognised in art 12.3 of the Salvage Convention. In *The Sava Star*, for example, the Court ruled that services provided by the cargo owners that went beyond their contractual duties to the shipowner,

¹³⁵ On the synonymy of 'useful' and 'successful', see Gaskell (n 98) 49.

¹³⁶ *The Sava Star* (n 36).

and which had a useful result in the salvage of the ship, entitled them to a salvage reward. The Court concluded that 'public policy' supported such a conclusion.¹³⁷

This may raise novel disputes from RCCs, who may attempt to claim salvage compensation for any 'extra-contractual' actions undertaken during salvage operations. As a result, MASS owners would be wise to consider this possibility carefully and incorporate appropriate salvage provisions into their contracts with RCCs.

With MASS, novel safety mechanisms, such as MRCs and redundancy,¹³⁸ are going to be employed on board. In this regard, DNV AS notes that:

... to compensate for alternative manual ways to cope with unexpected and abnormal events on conventional ships, such automation functions should be redundant or augmented by independent automatic safety systems. As an example, a power management system on a conventional vessel is in general not provided with redundant control. Upon failure of the automatic control, the state of the electrical power system will remain unchanged and manual control by qualified crew on board will be possible. To compensate for manual control, the power management function should be redundant for vessels where the power system is designed for automatic operation.¹³⁹

¹³⁷ Ibid 144.

¹³⁸ DNV AS (n 46) 70. See also S Eriksen and M Lützen, 'The Impact of Redundancy on Reliability in Machinery Systems on Unmanned Ships' (2022) 21 WMU Journal of Maritime Affairs 161.

¹³⁹ DNV AS (n 46) 68.

Where salvors takes manual control of MASS in danger,¹⁴⁰ they will have to prove that it was their actions in taking control, rather than the redundant onboard systems, which gave rise to a useful result.¹⁴¹ For example, if a fire is detected on board an autonomous vessel which damages the main electrical power supply system,¹⁴² and the fire is contained by the salvors who then begin to tow the vessel, the emergency power supply system¹⁴³ may activate. In this scenario, salvors may be reluctant to release the tow line for the vessel to use its own power to navigate, since that could, on a balance of probability, be seen as an end of the salvage operation and reduce the time expended for salvage under art 13(1)(f).¹⁴⁴ The use of redundant emergency systems also raises novel commercial questions for salvors – will it still make economic sense to go to the aid of MASS if they may restart themselves soon after the immediate peril has been successfully averted?¹⁴⁵

8.2 Effect of the policy of encouraging salvage operations

Historically, a policy of encouraging salvors, especially professional salvors, has become synonymous with the application of the law of maritime salvage.¹⁴⁶ The impetus for this policy was to encourage salvors who acquired and maintained special equipment and personnel which was often only used in the times of dire emergencies, so that they did not divert those resources to other uses, so as to not make them unavailable when needed.¹⁴⁷

¹⁴⁰ Ibid.

¹⁴¹ See Eriksen and Lützen (n 138) 164.

¹⁴² DNV AS (n 46) 75.

¹⁴³ Ibid.

¹⁴⁴ However, the contract may stipulate exactly which services the salvors are engaged for: see *Nanhai Rescue Bureau of the Ministry of Transport v Archangelos Investments ENE* [2016] 7 CMCLR 1.

¹⁴⁵ Solbian (n 115).

¹⁴⁶ Rose (n 18) 175.

¹⁴⁷ *The Nagasaki Spirit* [1995] 2 Lloyd's Rep 44, 59.

However, this policy of encouragement arguably needs some re-examination, given the speed with which new technology is being employed, which has made access to assistance much more affordable and prompter,¹⁴⁸ while discovering alternate employment opportunities for salvage equipment and personnel so as to reduce dependency on salvage operations as their sole source of income. Despite observations that ‘running costs have been difficult for the traditional salvage concerns to sustain’, and arguments that ‘unless the “fair rate” includes an element of profit there will be no incentive to encourage salvors to prevent damage to the environment’, made in 1997 in *The Nagasaki Spirit*, the salvage industry has managed to sustain itself.¹⁴⁹

Article 13(1) of the Salvage Convention provides that the reward to salvor(s) should be ‘fixed with a view to encouraging salvage operations’.¹⁵⁰ MASS will be novel/special types of ship in the context of salvage operations because, as highlighted above, they will have the ability to restore their functions without human intervention.¹⁵¹ This novelty seems to be acknowledged in Finland’s comment in the Scoping Exercise, which states: ‘Some of the criteria might not apply to autonomous vessels.’ However, the comment goes on to state that ‘the article does not need to be amended, because the list is not exhaustive’. The CMI made no comments in this respect, other than agreeing that this article does not pose a

¹⁴⁸ See *The Choko Star* (n 76) 519: access to assistance is an argument used in disputing the reasonableness of selecting a particular salvor over others.

¹⁴⁹ As Girvin points out, the initial ‘overreaction’ from salvors died out very soon after the House of Lords decision: S Girvin, ‘Special Compensation under the Salvage Convention 1989: A Fair Rate?’ (*The Nagasaki Spirit*) [1997] LMCLQ 321.

¹⁵⁰ ‘Reward’ is used as an umbrella term which includes reimbursement, remuneration, and reward: see FD Rose (n 18) 200.

¹⁵¹ See ‘Automatic Operation (AO)’ in DNV AS (n 46) 68. See also the Scoping Exercise (n 1) para 5.12: the novelty of MASS may be recognised through a new ‘MASS Code’.

problem of application to MASS. Before considering Finland's comment, it may be helpful to discuss briefly how the policy of encouraging salvage operations has featured in judicial decisions.

The policy broadly seems to be applied in two different ways, adopting a more liberal or a more conservative approach. The more liberal approach is one which treats the words 'with a view to encouraging salvage operations', appearing in the general words of art 13, as applying to each or some of the factors (a-j) mentioned in the article. The more conservative approach prefers instead to determine an award on the basis of those factors alone, and then add an encouraging 'uplift' to the award after the event.

There is a view that the policy of encouragement may not be applied to factors which are not listed in art 13(1). Cases from China, the UK, and South Africa seem to have treated the list as exhaustive, ie by calculating the salvage award on the basis of only those listed factors.¹⁵² The use of the word 'shall' in art 13(1) may also imply the exhaustive nature of the stated criteria (although the provision does not expressly state that only those factors may be considered). This may contradict the view put forward by Finland in the Scoping Exercise that the list of factors is not exhaustive.

The Salvage Convention does not expressly state that a policy of moderation should be applied where the salvaged fund is substantial. Thus, while encouragement of salvage is mandatory, whether on a more liberal or conservative approach, moderation in fixing the

¹⁵² *China Ping An Property Insurance Co Ltd v Nanhai Rescue Bureau of the Ministry of Transport* [2021] 2 CMCLR 6, 12; *The Kuzma Minin* (n 38); *The Mbashhi* (n 37).

salvage award depends on judicial discretion. For MASS owners, this may bring about a conundrum. Given the cost of advanced technologies, MASS will be more expensive than their similarly sized, conventional counterparts. This will in turn increase the size of the salvaged fund based on the value of MASS. Thus, MASS owners may consider the potential nature and effect of art 13 of the Salvage Convention to be unjust and conclude that the potential financial consequences of salvage operations are going to be discouragingly out of proportion.¹⁵³ However, there are signs that some courts have applied, or referred to, some form of moderating principle, which may serve as a helpful guide. So, for example, in *The Voutakos*, it was stated that the policy of encouragement should be applied in moderation, bearing in mind the fact that a high reward may discourage shipowners from hiring salvors in future.¹⁵⁴ Similarly, in *The Ocean Crown*, it was held that the services rendered, rather than the value of the salvaged fund, must have a stronger bearing on the quantum of the salvage reward.¹⁵⁵

8.3 The problem of special compensation

With the Salvage Convention, the historic, strict principle of 'no cure – no pay' has given way to a more conscientious principle of 'if not the ship, then the environment' to pay salvors for preventing damage to the environment.¹⁵⁶ This new principle is codified in art 14.¹⁵⁷ It states that salvors may receive special compensation on the basis of expenses

¹⁵³ Such fears are fairly common even now: Shaw (n 87).

¹⁵⁴ Similarly stated in *The Hamtun* (n 39) and *The Ocean Crown* (n 38).

¹⁵⁵ *The Ocean Crown* (n 38).

¹⁵⁶ Art 14.

¹⁵⁷ For the practical significance of art 14, see Martin Davies, 'Whatever Happened to the Salvage Convention 1989?' (2008) 39 JML&C 463, 480.

incurred in preventing or minimising damage to the environment (as defined in art 1(d) of the Convention), even if they have failed to save the vessel and/or property.

Traditionally, oil pollution has been seen as the main threat to the marine environment.¹⁵⁸ Article 14 was unsurprisingly born out of the growing need to tackle oil pollution.¹⁵⁹ MASS developers have stated that MASS will run on electric batteries.¹⁶⁰ Batteries, such as the racks of lithium ion cells proposed to be used on MASS, should pose a much lower environmental risk than the fuel currently used by conventional vessels.¹⁶¹ Logically, these racks of batteries will not release pollution into the sea the way conventional bunkers do, and thus the requirement for common environmental salvage equipment like oil booms will not arise in the context of MAS salvage operations.¹⁶² As Gaskell points out, art 14(1) deals with salvage operations ‘in respect of a vessel’.¹⁶³ In this respect, it is pertinent to consider the Court’s ruling in *The MV Renos*:

Article 14(1) entitles the salvors to ‘special compensation’ from the shipowner equivalent to the expenses incurred in performing the duty under article 8(1)(b). The Convention regime was not initially as successful in its object as had been hoped, mainly because article 14(1)

¹⁵⁸ See cl 14, ‘Pollution Prevention’, SCOPIC 2020. See also *The MV Renos* (n 34) 87: ‘floating booms around [it] with a view to preventing or minimising environmental damage’.

¹⁵⁹ As is well recognised, art 14 was triggered by the oil pollution incident involving the *Amoco Cadiz*: Berlingieri (n 75).

¹⁶⁰ X Feng et al, ‘On Maritime Electrification – Electrification Technologies, Charging Infrastructure and Energy Management Strategies’ (ICMASS 2022, Singapore, April 2022).

¹⁶¹ Eg Leclanché, ‘Yara Birkeland, World’s First 100% Electric and Autonomous E-container Ship, Fully Powered by a Leclanché Battery System, Prepares for Commercial Operation’ (8 December 2021) <<https://www.leclanche.com/yara-birkeland-worlds-first-100-electric-and-autonomous-e-container-ship-fully-powered-by-a-leclanche-battery-system-prepares-for-commercial-operation/>>.

¹⁶² On racks of batteries, see Leclanché, ‘E-marine’ <<https://www.leclanche.com/solutions/e-transport-solutions/e-marine/>>. This leaves aside possible issues of future carriage of oil as cargo by battery-powered MASS.

¹⁶³ See Gaskell (n 98) 56.

did not provide for a profit element in respect of salvage services provided to safeguard the environment. ... The classic division of risks between hull insurers and P&I insurers assigns environmental liabilities and associated sue and labour charges to P&I insurers, a state of affairs which is reflected in clause 15 of the SCOPIC clause.¹⁶⁴

It arguably seems anomalous for MASS owners, which have reduced human errors to a substantial extent, and which are operating bunker-free vessels, to claim environmental salvage cover from their P&I Clubs, which primarily cover liability in case those errors, or liabilities, arise.¹⁶⁵ It also raises the question of what incentive is there for MASS owners to take P&I cover for environmental salvage, if their vessels do not pose such a threat, save that art 14 makes them the first resort of liability.¹⁶⁶ This may arguably lead to a situation where the benefits of MASS are undermined to accommodate the current special compensation regime in art 14 of the Salvage Convention, which in turn could lead to an unrealistic calculation of risks by P&I Clubs, and an undue financial burden on MASS owners, especially those from developing countries.¹⁶⁷ This may also not sit well with the P&I Clubs who agreed to underwrite the 'safety net' in art 14 in the liability allocation compromise reached during the drafting of the Convention.¹⁶⁸

Where MASS salvage is concerned, art 14 of the Salvage Convention seems to lose its value proposition, ie that salvors must be incentivised to protect the environment where the award under art 13 would not be sufficient to provide that incentive.¹⁶⁹ The 'safety net'

¹⁶⁴ *The MV Renos* (n 34).

¹⁶⁵ But see Rose (n 17) paras 10-242, 10-243.

¹⁶⁶ Berlingieri (n 75) 321.

¹⁶⁷ Gaskell (n 98) 54.

¹⁶⁸ *Ibid* 53.

¹⁶⁹ *The Nagasaki Spirit* (n 101).

concept is necessary only if there is a significant potential threat to the environment. Where that is not the case, recourse will, and should, be made only to art 13.

The 'safety net' concept in art 14 of the Salvage Convention is a derogation from the purely commercial relationship of the shipowner and salvor as it does not, at least directly, adhere to the doctrine of restitution under private law.¹⁷⁰ It can thus be said that it is in the nature of a 'policy' set in the Salvage Convention.¹⁷¹ If the benefits of MASS for the environment are proven, as has proposed, the continuing application of this policy to MASS may not enjoy easy acceptance amongst MASS owners.

The determination of the period during which special compensation is to be calculated may also be an issue in respect of MASS salvage operations. In *The Nagasaki Spirit*, the salvors successfully argued that the whole of the period that salvage operations continue should be considered, and not merely the period during which the environmental threat existed. This is pertinent to MASS salvage operations as well. On the assumption that MASS are safer, cleaner, and non-threatening to environment, it is unlikely that MASS owners (and their P&I Clubs) would be willing to pay special compensation against a longer period of operations. A more equitable solution that rebalances or recalibrates the interests of salvor and salvee may be required if adoption of the enhanced safety aspects of MASS is to be promoted and encouraged. Arguably, the Scoping Exercise had this in mind when referring to 'policy questions regarding the apportionment of liability' in its comment.

¹⁷⁰ Rose (n 18).

¹⁷¹ Indeed, a reading of the preparatory material points to this conclusion: Berlingieri (n 75) 323.

9 Concluding comments

In a lecture in 1989, the renowned English salvage lawyer, Geoffrey Brice, mentioned the sea changes that had occurred to shipping between the two Salvage Convention years (1910 and 1989).¹⁷² Despite this, there are no references in the preparatory works of the Salvage Convention of common technologies that were already prevalent in 1989, such as ‘internet, satellite, technology, robot, Inmarsat, VDR, computer,¹⁷³ or analytics’,¹⁷⁴ even though parallel Conventions, like the Convention on the International Maritime Satellite Organisation 1979, clearly show that the IMO was well aware of these technological advancements. This is possibly indicative of the tradition of the strictly distinct and independent approaches taken to legal, technical, safety, and environmental issues at the IMO at the time.¹⁷⁵ However, in a derogation from the norm, in the case of MASS, the IMO has constituted a joint working group (JWG) of three Committees: Maritime Safety, Legal, and Facilitation.¹⁷⁶ It is hoped that this may produce a more holistic and comprehensive regulatory approach to MASS in future.

This paper has attempted to highlight the issues in respect of some of the rules of the Salvage Convention which may arise due to peculiarities of MASS operations. Additionally, the analysis of the definition of vessel, authority of the master, duties of the salvaged

¹⁷² Brice (n 32) 33.

¹⁷³ Except for a single mention as an example of non-polluting cargo: Berlingieri (n 75) 347.

¹⁷⁴ Ibid.

¹⁷⁵ For an analysis of the changing nature, and reasons, for IMO’s work: M Tsimplis, ‘Shipping and the Marine Environment in the 21st Century’ in M Clarke (ed), *Maritime Law Evolving* (Hart 2013) 113.

¹⁷⁶ IMO, *Provisional Agenda for the First Session of the Joint MSC-LEG-FAL Working Group on MASS* (MASS-JWG 1/1, 7 June 2022). It is not clear why the Marine Environment Protection Committee has not been included in the JWG.

interests, and compensation of the salvor, shows that their interpretation are informed by policy decisions aimed at furthering maritime commerce and safety. Therefore, the reform suggestions made are of a similar nature. Due to technological advancements in shipping operations, and the wide acceptance of their promised benefits to global trade, there is a cross-sectoral interest in the governance of autonomous technologies. Leaving this governance to the private sector alone is not an option. This is, arguably, the primary reason why the IMO is undertaking a more thorough, integrated cross-committee approach to regulating MASS developments.

There is a need to revisit the current public and private law rights and duties in the salvage context in the light of MASS developments. Such a review should be informed by a much clearer and more concrete idea of how MASS and related commercial organisations will operate in future. It seems highly unlikely that simply developing IMO interpretations to fit MASS into the existing framework of the Salvage Convention will prove to be a particularly effective or well-received solution.¹⁷⁷

¹⁷⁷ It is telling that the UK disagreed with Finland's initial review and kept open the option of amending the Convention: see n 12 above.