
LLOYD'S MARITIME AND COMMERCIAL LAW QUARTERLY

CONTENTS

Case and comment

Compromising claims in fraud (<i>Maranello Rosso v Lohomij</i>)	537
The Hague-Visby time bar and discharge misdelivery (<i>FIMBank v KCH (The Giant Ace) (No 2)</i>)	542
Creditor funding agreements: what are the creditor's "best interests"?	
(<i>Lavrentiadis v Dextra</i>)	550
Tracing without fiduciaries: realism in the Australian Federal Court	
(<i>RnD v Roncane</i>)	559

Articles

Seaworthiness, negligent navigation and safer ships SIR NIGEL TEARE	566
Learning the lesson of <i>Lorentzen v Lydden</i> PROFESSOR ADRIAN BRIGGS KC	578
Maritime Autonomous Surface Ships (MASS) and the Salvage Convention 1989:	
Distinct operations requiring distinct treatment MAYANK SURI	594

Unjust enrichment review

Unjust enrichment scholarship in the courts: use and utility SIR ANDREW BAKER,	
ALICE HORN and SERENA LEE	624
Unjust enrichment in New Zealand PROFESSOR PETER WATTS KC	650
Unjust enrichment in South Africa PROFESSOR HELEN SCOTT and	
PROFESSOR DANIE VISSER	656
Unjust enrichment in USA PROFESSOR MARK GERGEN	670

Lloyd's Maritime and Commercial Law Quarterly

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Maritime Autonomous Surface Ship (MASS) and the Salvage Convention 1989: Distinct operations requiring distinct treatment

Mayank Suri*

This paper discusses the relationship between Maritime Autonomous Surface Ship (MASS) and articles of the International Convention on Salvage 1989. The premise of the paper is that crewless operations require distinct treatment under the law of salvage. This premise is tested with reference to existing case law and articles in the Salvage Convention. It is argued that, if the operations of MASS substantially reduce the likelihood of accidents and risks associated with shipping operations, the factors for determining salvage rewards need to be revisited. It is also debated whether the present policy considerations underlying the Salvage Convention are fit to continue to apply to MASS in light of the social-political-economic changes since 1989.

I. INTRODUCTION

In a Report in 2017, which preceded its Scoping Exercise in 2021, the International Maritime Organization (IMO) concluded that Maritime Autonomous Surface Ships (MASS) should be safe, secure and environmentally sound.¹ Thereafter, the IMO embarked on an exercise to develop the regulatory framework for MASS² on the

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The following abbreviations are used:

Berlingieri: F Berlingieri, *The Travaux Préparatoires of the 1989 Salvage Convention* (Comité Maritime International 2003);

DNV AS: 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>;

DPA: Designated Person Ashore;

MASS: Maritime Autonomous Surface Ship(s);

MRC: minimum risk condition;

RCC: remote-control centre;

Salvage Convention: International Convention on Salvage 1989;

Scoping Exercise: see *infra*, fn.1;

Shaw: H Shaw, *Independent Review into the Potential for Delays in the Contracting and Engagement of Salvage Services in Marine Casualties* (July 2022).

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) (the “Scoping Exercise”), para.3.1.

2. IMO, *Autonomous Shipping* <https://www.imo.org/en/MediaCentre/HotTopics/Pages/Autonomous-shipping.aspx>. Unless otherwise stated, a reference to MASS is reference to a Maritime Autonomous

understanding that some MASS will be entirely devoid of the onboard presence of seafarers.³ This has come at a time when technology-pursuing member states of the IMO are actively blaming human error for being a central cause in maritime accidents: for example, “Further enhancement of navigational safety can be achieved by limiting human errors as this accounts for the majority of marine accidents”⁴ and “Erroneous human behaviour has been identified as one of the prime factors causing or contributing to the incident in emergency situations and maritime accidents”.⁵ Japan has been actively testing large commercial ships operating on Autonomous Navigation Systems (ANS) through congested waters; in rough weather and sea conditions; for long distances (750 kilometres); and in what are traditionally known as risky parts of a shipping operation, such as berthing and unberthing.⁶ It has stated that “Practical implementation of fully autonomous navigation will improve the flow of goods, people, costs, and traffic, thereby creating greater convenience”.⁷ South Korea has stated that “the number of accidents is expected to be reduced significantly” when “MASS is operated widely”.⁸ China has stated that “the navigational control of MASS has fundamentally changed”, “the ship’s navigational model is transformed from seafarer-hardware systems to seafarer-autonomous systems-hardware system or further, to autonomous systems-hardware systems”.⁹ Russia and the United Arab Emirates have stated that a properly working MASS should be “exempted from continuous supervision and control by (even) a remote crew”.¹⁰ The United Kingdom has stated that MASS “are no longer just being developed as proof of concept but (are being) used for commercial purposes”.¹¹

Surface Ship without crew on board, ie, “Degree Four” of the level of autonomy recognised by the IMO. The context in which the references to MASS are being employed is the carriage of goods (of all sorts) in international trade.

3. 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.”

4. Israel and Poland, IMO, *Navigation, Communications and Search and Rescue* (MSC 98/INF.10, 4 April 2017), para.7.

5. Denmark et al, IMO, *Impact of new and advancing technologies to maritime transport and the regulatory framework* (MSC 98/22/7, 28 March 2017), para.10.

6. Japan, IMO, *Development of a Goal-Based Instrument for Maritime Autonomous Surface Ships (MASS), Draft provisions of navigational tasks/functions for the International Code of Safety for MASS* (MSC 106/5/1, 2 August 2022), para.3.

7. Japan, IMO, *Development of a Goal-Based Instrument for Maritime Autonomous Surface Ships (MASS), Results of demonstration tests of fully autonomous ship navigation on “MEGURI 2040”* (MSC 106/INF.4, 2 August 2022), para.3.

8. Republic of Korea, IMO, *Development of a Goal-Based Instrument for Maritime Autonomous Surface Ships (MASS), Considerations for accident response to fire and flooding accidents of maritime autonomous surface ships* (MSC 106/5/2, 30 August 2022), para.2.

9. China, IMO, *Development of a Goal-Based Instrument For Maritime Autonomous Surface Ships (MASS), Proposal for incorporation of risk assessment into MASS instrument* (MSC 106/5/3, 30 August 2022), para.7.

10. Russian Federation and the United Arab Emirates, IMO, *Development of a Goal-Based Instrument for Maritime Autonomous Surface Ships (MASS), Comments on document MSC 106/5/1* (MSC 106/5/4 13 September 2022), para.7.2.1.

11. The United Kingdom, IMO, *Development of a Goal-Based Instrument for Maritime Autonomous Surface Ships (MASS), United Kingdom developments on Maritime Autonomous Surface Ships: research, legislation and industry projects* (MSC 106/INF.6, 1 August 2022), para.2.

Canada and South Korea have called for the development of a “consistent legal framework” for the regulation of MASS across IMO instruments with an emphasis on the “liability and compensation” provisions in Conventions that are under the purview of the Legal Committee.¹² They also believe that it is “almost impractical to accommodate MASS within the current regulatory framework of IMO”.¹³ Unsurprisingly, a joint working group of three committees (Maritime Safety, Legal, and Facilitation) has been constituted at the IMO to “address common high-priority issues identified by the regulatory scoping exercises for the use of MASS”.¹⁴

This article will deal with the question of salvage of MASS because, regardless of the promise of their safety, it can be envisioned that these vessels may require rescuing. The article will continually point out how much the world has changed since the last international legal instrument on salvage. This is the article’s main premise, from which specific assertions are born: for example, the increased role of governmental coast guard agencies in salvage, decreasing its purely transactional nature; and the cognisance of environmental considerations that have resulted in calls for conscientious capitalism, increasingly pressuring the shipping industry to examine its environmental impact. The article will also underline that the significant change accompanying MASS makes factors considered in past judicial decisions unsuitable for determining salvage disputes. For example, a wholly crewless ship may become incapable of providing witness testimony, a factor which has been instrumental in establishing the factual context of a salvage operation. Foreshadowing all of the above is the promise that MASS will be exponentially safer than ships run through crewed navigation. The article will thus investigate whether the current international Convention on salvage is a prudent fit for MASS.

This article is structured in the following way. Part II comments upon the IMO’s Scoping Exercise for MASS in respect of applicability and suitability. Part III points out that traditional policies underlying salvage law are not a good fit for MASS. Part IV gives reasons why MASS salvage operations should be treated differently from conventional salvage operations. Part V discusses why MASS should be categorised as vessels and not as property. Part VI discusses the judicial interpretation of danger and its effect on salvage of MASS. Part VII is a deliberation on the contractual aspect of salvage and how it may be done for ships without crews. Likewise, Part VIII is a discussion on non-contractual salvage and what it means for MASS, with a view to highlighting the differences with crewed ships. Part IX discusses the current duties of a casualty’s interests in context of MASS and suggests further duties. Part X discusses issues in respect of the compensation regime. Part XI concludes with some suggestions in respect of the appropriate approach to international salvage law.

12. Canada and the Republic of Korea, IMO, *Work Programme, Proposal for a new output to develop a consistent legal framework for the regulation of Maritime Autonomous Surface Ships (MASS) across IMO instruments* (LEG 109/13/2, 10 January 2022) para.21.

13. *Ibid*, para.6.

14. The Chairs of the Maritime Safety, Legal and Facilitation Committees, IMO, *Work Programme, Proposal for the establishment of a joint MSC-LEG-FAL Working Group on MASS to consider common gaps and themes identified during the regulatory scoping exercises conducted by the three committees* (LEG 109/13/3, 14 January 2022), Annex, para.1.

II. THE SALVAGE CONVENTION AND THE IMO REGULATORY SCOPING EXERCISE

The applicability and suitability of the International Convention on Salvage 1989 (the Salvage Convention)¹⁵ for MASS was assessed in the Scoping Exercise. 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”.¹⁶ For the purposes of the Scoping Exercise, the Salvage Convention was initially reviewed by Finland with support and assistance from Comité Maritime International (CMI).¹⁷ The conclusion reached in this exercise was that the Salvage Convention does not need to be amended or replaced and that developing interpretations would be sufficient. As far as the applicability of the Salvage Convention goes, this conclusion seems to be, *prima facie*, correct because the Salvage Convention is very broadly worded so that it covers a wide range of subject matter. However, this conclusion, simpliciter, does not seem to clarify its suitability for MASS operations.

Additionally, the Scoping Exercise raised the question of involvement of remote operators, remote control centres/stations, providers of network or computer systems, or system developers) in the liability and compensation regime.¹⁸ It also stated that the introduction of new actors and technologies raised “policy questions regarding the apportionment of liability”. This would imply that suitability is a big question-mark, because presently the actors in the purview of the Convention are three—salvor, shipowner, and cargo interests—and to some marginal extent, governments.

One has to note that the IMO is not a decision-making body. It is a confluence of member states. It would, therefore, remain to be seen whether member states who fuelled the industrial revolution and benefit from salvage industry’s growth are sanguine about the information technology revolution.

III. POLICIES ON SALVAGE AND MASS

It is well known, in the majority of maritime jurisdictions, whether through the adoption of the Salvage Convention or through the application of the civil law of salvage (specifically, the doctrine of *negotiorum gestio*), that historic policies underlie the law of salvage.¹⁹ Even though it has become commonplace for states to intervene in salvage operations (for example, in the UK by the Secretary of State’s Representative), because of such policies, the relationship of the salvor and the salvee is governed by private law principles. In effect, while a state may benefit from salvage operations by the protection of marine life

15. International Convention on Salvage, 1989; adopted 28 April 1989; entered into force 14 July 1996. Currently adopted by countries flagging 62.07 per cent of the world tonnage.

16. Scoping Exercise, para.3.2.

17. Scoping Exercise, Appx 1.

18. In respect of all the Conventions under its purview.

19. FD Rose, “Restitution for the Rescuer” (1989) 9 OJLS 167, 171. See also Michael Howard, “CTL—Hit and Miss in the Supreme Court” [2020] LMCLQ 433, 438 (“In the days before powered vessels and modern communications, salvage of derelicts was more frequent, though it can still occur today”).

within its jurisdiction, it would not become a party to the commercial settlement with the salvor; the burden of that would still lie with the salvee, thus leaving the two to settle their disputes privately, even though elements of that relationship are heavily influenced by state actions.²⁰ This raises the question, if MASS operations are going to effect a “fundamental change” in shipping operations, and therefore in salvage operations, whether and to what extent the policies that underlie the present law will withstand that change.

It is worthwhile to mention that resource owning, seafarer providing, agrarian, exporting, Global South, states have only recently begun to be an active part of international policy-making after acknowledgement of their independent statehood.²¹ As one author puts it, the ship owning, consuming, Global North, states have created private law theory “in direct relation to the Global South, either in direct juxtaposition or at its expense”.²² This author suggests that pluralism, i.e. inclusion of those ideas of law which have been traditionally excluded, may give rise to different results from what has become a customary view of international law.²³ It is also trite that the risks and consequential rise in salaries of seafarers have restricted many traditional maritime nations (a symbiosis of person and machine) to become ship owning nations (machine), with the majority of the seafarers being provided from populated Asian states.²⁴ This fact combined with the promise of replacement of those seafarers through the employment of MASS will not receive easy acceptance from seafarer providing states. There is also a burgeoning emphasis on regulating Artificial Intelligence (AI) because its impact on workforce, specifically through lay-offs, is worrying. If that happens, then the unescapable conclusion for MASS is the reduction of shipowner's control.

Since the outcome of the Scoping Exercise is that it should be sufficient to accommodate the relationship of MASS with the Salvage Convention as a matter of interpretation, it would need to be seen what effect the present policies and provisions have on the relationship of the salvor with an owner of MASS. This should help assess the suitability of the Salvage Convention for MASS operations.

IV. WILL MASS SALVAGE OPERATIONS BE DIFFERENT?

1. Change in perspective: salvor to salvee

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. These acts may be a direct output of the software programme controlling MASS, for example in

20. *Ibid.*

21. This is unsurprising, since “Out of the 2,136,190 vessels globally, 1,726,903 fly a developing state flag”: see Argyro Kepesidi, *Maritime Autonomous Surface Ships: A critical “MASS” for legislative review*, Article No 97, UNCTAD Transport and Trade Facilitation Newsletter N°96 (13 December 2022).

22. Ralf Michaels, “Private Law Theory and the ‘Global Legal Community’” (2022) 23 German LJ 851, doi:10.1017/glj.2022.56.

23. *Ibid.*, 861.

24. Kepesidi (*supra*, fn.21).

terms of an emergency procedure, or through electronic commands sent over satellite communication systems from another location.²⁵ If the blame placed on human errors and the consequent faith in technology and machines is well placed, from the commencement of operations, salvage of MASS would be devoid of mistakes, at least from the salvee's perspective.

However, the definition of "salvage operation" focuses only on the actions of the salvor. The broad definition 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".²⁶ This definition was, arguably, drafted in light of the practice that the crew of a casualty would abandon the vessel, or not be in a position to help the salvors, or that the crew of the casualty would lose capacity to communicate with shore based rescue services.²⁷ Thus, the salvage master gained overall control of salvage operations, ie including the casualty ship. Therefore, the applicability of the definition to MASS would not have been an issue.

However, what if the MASS is able to do some of the acts which a crew would not or could not do in an accident response system, for example, releasing tow lines while a substantial part of the vessel is on fire. A crew may not think of suppressing a raging fire that seems life threatening, nor should they be required to; however, a MASS system, by virtue of being artificial, should not consider a threat to its structure as a reason not to suppress an onboard fire. Although the accident response system of MASS would be tied up with its perception of risk and indeed its capabilities, it can be argued that on several factors it may have better accident response than the crew of a ship.²⁸ Therefore, it seems that, while the definition of "salvage operations" does not create issues of applicability of the Salvage Convention to MASS, it does raise questions of suitability.

2. Passive acts: "any act or activity"

The words "any act or activity" could include passive acts of the salvor. Some judicial authorities have held that passive acts do constitute salvage operations, such as "comfort that its (a salvor's) presence provided the passengers and crew",²⁹ or even merely allowing use of vessel space (a helipad).³⁰ These decisions highlight that passive acts have reduced a risk perceived by onboard crew and passengers and were thus worthy of being considered as acts of salvage. Categorising some acts as "passive acts" is closely linked to the perception of risk held by those on board the salvee. With MASS, this perceived risk goes away, primarily because there is no one on board to be threatened by the situation leading to salvage. It would be a challenge to identify passive acts. A more suitable proposition is

25. Republic of Korea (*supra*, fn.8), Table 2.

26. Article 1(a).

27. See *infra*, fnn 214 and 215.

28. Republic of Korea (fn.8) Table 2.

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

30. *Sunglory Maritime Ltd v PHI Inc (The Aeolian Heritage)* (2016) 212 F Supp 3d 618 (ED Louisiana). See also FD Rose, "Passive salvage", in FD Rose, *Kennedy & Rose: Law of Salvage*, 10th edn (London, 2021), [5.035].

that a vessel in danger, and unable to extricate itself from the situation, may require help or aid.³¹

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.³²

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.³³ For example, start-up companies such as Spire Global are now using satellites to track ships that escape traditional vessel-tracking technologies and are providing services on a subscription-based model.³⁴ Although use of satellite communications is not new, their relevance to salvage operations was not considered during the drafting of the Salvage Convention.³⁵ This is surprising, since Inmarsat has been using its satellites to connect ships to shore for at least a decade prior to the conclusion of the Convention.³⁶ However, it seems clear that companies such as Spire Global and Inmarsat will play a much greater role in MASS operations in the future. However, as adverted above, a MASS may be able to respond to accidents with a higher threshold for injury, and consequently a lower perception of risk, than a human crew. This may be a result of some functions, such as radiocommunications, remaining unaffected longer than they would in a crew abandonment scenario. It may, therefore, be unsuitable to apply the present definition of salvage operations, which allows for passive acts to be claimed as salvage acts, to MASS operations.

3. Standardisation: effect on MASS salvage operations

Whether it is a mobile phone charging port or a MASS, standardisation is the latest friend of the environment.³⁷ In its broad benefits are reduction in waste, increased reuse and reduced production, such as of spare parts specific to a particular manufacturer's machines. Additionally, the IMO's three regulatory scoping exercises have been conducted because member state “delegations believed that IMO needed to ensure that

31. Rose (1989) 9 OJLS 167, 174.

32. Scoping Exercise, 5.5.

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

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

35. See *infra*, fnn 214, 215 and 216.

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

37. European Parliament, *Long-awaited common charger for mobile devices will be a reality in 2024* www.europarl.europa.eu/news/en/press-room/20220930IPR41928/long-awaited-common-charger-for-mobile-devices-will-be-a-reality-in-2024.

MASS designers, builders, owners and operators had access to a clear and consistent regulatory framework”.³⁸ Clearly, this pro-active regulatory intervention should have positive consequences for the environment.³⁹ The specific mention of “designers, builders, owners and operators” also signifies that there is a will to direct commercial developments towards standardisation. One form of standardisation could be that these vessels are allowed to run only on “battery-based electric propulsion systems”, instead of traditional fossil fuels.⁴⁰ Such a regulatory step would be similar to the EU’s mandating a “USB Type-C charging port” for all mobile devices.⁴¹

In addition, there could be standardisation of communication from MASS vessels. The IMO work in respect of ship-to-shore data exchange was already underway in relation to electronic business.⁴² The IMO’s Expert Group on Data Harmonisation (EGDH) has extended this work to “ship reporting systems”.⁴³ This data set comprises two relevant code lists: IMO0373, which covers reporting codes for a range of ship defects and limitations, from “Hull integrity, Manoeuvrability, Mooring, Cargo handling, Communication, Navigation, and Other”; and IMO0370, which covers reporting codes for a range of particulars about what is happening to the ship, from “Assistance, Incident, Miscellaneous, Other, Particulars, and Salvage”. It would be unsurprising if the need to follow the same reporting codes is mandated for MASS, vessels that would rely on constant shore communication for reporting or taking instructions.

Thus, it would seem that two propositions arise. First, if regulatory developments outpace or (if delayed) out-power commercial developments of MASS, then standardisation of design and communication would be attained. If that is the case, it would seem that the perception of “prejudicial consequences of danger at sea”⁴⁴ would be reduced to a substantial degree, not least because there are no humans on board at risk of mortality or injury. Another consequence of regulation-led standardisation may be to reduce the skill and effort of a salvor in dealing with novel challenges, if there are standard actions coded into the system of MASS to undertake during a salvage operation.⁴⁵ It may therefore be practical to consider the effect of standardisation on the traditional factors in assessing the success of a salvage operation.

38. IMO (*supra*, fn.3), para.2.2.

39. IMO (*supra*, fn.1).

40. Republic of Korea, IMO, *Development of a Goal-Based Instrument for Maritime Autonomous Surface Ships (MASS) Application of autonomous technology by onboard system at present* (MSC 106/INF 13, 30 August 2022), para.11.

41. European Parliament (*supra*, fn.37).

42. See generally IMO, *The IMO Compendium on Facilitation and Electronic Business*, www.imo.org/en/OurWork/Facilitation/Pages/IMOCompendium.aspx.

43. Expert Group on Data Harmonisation, IMO, *Review and Revision of the IMO Compendium on Facilitation and Electronic Business, including additional E-Business Solutions: New IMO Data Set On “Ship Reporting Systems (Resolution A.851(20))”* (FAL 46/6/4, 4 February 2022).

44. And thereby the generosity exercised while decreeing salvage rewards. See Rose (1989) 9 OJLS 167, 176.

45. Article 13(1)(b) and (e).

V. 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”.⁴⁶ However, the assumption appears to have been that MASS are, or at least could be, ships rather than property.⁴⁷ 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,⁴⁸ this comment suggests that the UK also considered 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”.⁴⁹ 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.⁵⁰ This may introduce some uncertainty in respect of salvage of cargo (ie, property) on board MASS that are also legally defined as property, because Art.6(2) provides only 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*”.⁵¹ This issue may be addressed by MASS owners by obtaining prior contractual authority from cargo owners to conclude salvage contracts. This 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.⁵² The same problem arises in respect of Art.19 of the Salvage Convention, which provides that “*services rendered notwithstanding the express 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.⁵³ 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 to cover MASS characterised as property.

46. Scoping Exercise, 5.6. For the definition of “vessel” in the Salvage Convention, see Art.1(b).

47. Scoping Exercise, para.2.1 (“MASS could include ships”).

48. See the definition of “Master” in the annex to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978.

49. Finland, First Step Initial Review for the Scoping Exercise (19 July 2022).

50. For the definition of “property” in the Salvage Convention, see Art.1(c).

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

52. Lloyd’s Open Form (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.

53. Emphasis added.

The better view is that MASS, particularly larger MASS carrying cargo, will fall within the Salvage Convention, Art.1(b) definition of “vessel”. Such MASS are clearly capable of navigation, ie making ordered movements on water.⁵⁴ 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.⁵⁵ The Salvage Convention definition of “vessel” is also unproblematic with respect to MASS because it does not mention the presence of humans on board.

VI. HOW WILL DANGER BE IDENTIFIED IN MASS SALVAGE OPERATIONS?

For crewed vessels, the apprehension of danger is proved through a mix of the crew’s testimony and documentary evidence. For MASS, the crew will be replaced by cameras and sensors. This Part first examines previous salvage cases where danger has been examined, so that we can identify illustrative indicators. It then compares these precedents with intrinsic and external indicators which may be used to identify danger in connection with MASS salvage operations.

1. Illustrative indicators

The “fear of something bad happening” has been held to be indicative of a situation of danger.⁵⁶ Danger is “exposure to harm, loss, pain or other negative result; a cause of peril; a menace”.⁵⁷ In the case of a helicopter making an emergency landing onboard the *Aeolian Heritage*,⁵⁸ the pilots’ perception that “something worse might happen” was indicative of danger.⁵⁹ Potential liability for environmental pollution,⁶⁰ parting of a tow line,⁶¹ fire in the cargo holds,⁶² fire in the engine room,⁶³ grounding,⁶⁴ parting of

54. *Michael v Musgrave (The Sea Eagle)* [2011] EWHC 1438 (Admlty); [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 2019* (London, 2020), [5.1.21].

55. Institute of Shipping and Trade Law, *Remote Controlled and Autonomous Shipping: UK Based Case Study* (2022), 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.

56. *The Aeolian Heritage* (2016) 212 F Supp 3d 618, 18.

57. B Gardner (ed), *Black’s Law Dictionary* (11th edn, Thomson Reuters 2019), 493.

58. *The Aeolian Heritage* (2016) 212 F Supp 3d 618, 25.

59. *Ibid*, 25.

60. *The Renos* [2019] UKSC 29; [2019] 2 Lloyd’s Rep 78; [2019] Bus LR 1584.

61. *Maridive VIII v Key Singapore (The Key Singapore)* [2004] EWHC 2227(Comm); [2005] 1 Lloyd’s Rep 91.

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

63. *The Mbashi* [2002] 2 Lloyd’s Rep 602 (SAF HC).

64. *The Ocean Crown* [2009] EWHC 3040 (Admlty); [2010] 1 Lloyd’s Rep 468; *The Altair* [2008] EWHC 612 (Comm); [2008] 2 Lloyd’s Rep 90; *The Kuzma Minin* [2019] EWHC 3557 (Admlty); [2020] 2 Lloyd’s Rep 617.

a stern mooring wire,⁶⁵ impeded manoeuvrability,⁶⁶ and immobilisation⁶⁷ 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*,⁶⁸ the Court had to make a distinction between “rescue towage services” and “towage services rendered to a vessel in physical danger”. Remarking that a stark categorisation was unreal,⁶⁹ the Court distinguished between a straightforward towage case in a calm sea, and a situation where an immobilised vessel may pose a risk to itself and other vessels, eg in a traffic zone, which would constitute a dangerous situation.⁷⁰ Therefore, where there are easily identifiable events that have the potential of causing harm, loss, injury or damage to MASS, or their owners, or others, a situation of danger will readily be identified by the courts.

2. Intrinsic indicators of danger

Identifying whether danger exists is an objective exercise, taking into consideration facts of each particular case.⁷¹ In the case of non-contractual salvage of MASS, there may have been no 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 whether there are intrinsic protocols in MASS that indicate danger:

“In some cases, events may force the ship or other parts of the autoremote 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).”⁷²

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.”⁷³

Thus, a last resort MRC is a state in which the MASS are trying to maintain their physical condition in which they pose the least risk to life, the environment and property,

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

66. *The Tramp* [2007] EWHC 31 (Admlty); [2007] 2 Lloyd’s Rep 363.

67. *The Voutakos* [2008] EWHC 1581 (Comm); [2008] 2 Lloyd’s Rep 516.

68. *Ibid*, [33].

69. See *ibid*, [16] (“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”).

70. *Ibid*.

71. *The Hamtun* [1999] 1 Lloyd’s Rep 883. The Court adopted the test found in FD Rose, *Kennedy’s Law of Salvage*, 5th edn (London, 1985), [303–304]; see also *Kennedy & Rose: Law of Salvage*, 10th edn (2021), [5.004].

72. 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>.

73. *Ibid*, 94.

but they will potentially be exposed to harm if they are unable to sustain this MRC indefinitely.⁷⁴ 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”.⁷⁵ However, as the “safety philosophy” of the last resort MRC showcases, this is a state in which the MASS cannot take any more decisions.⁷⁶

Because of the apprehension that comes with a change in circumstances, it may be hard to argue, at least in the early days of unproven safety robustness,⁷⁷ that MASS are not in danger if they are in a last resort MRC, even if they were programmed to minimise “risk to life, environment and property”.⁷⁸ By analogy, it is most probable that MASS, in a last resort MRC, are in a situation where “something worse might happen”⁷⁹ or, at the very least, that MASS are in an “unhappy predicament”.⁸⁰

3. Extrinsic indicators of danger

It has been suggested that MASS, or a MASS ecosystem,⁸¹ will share a common situational awareness with other ships and devices.⁸² It is foreseeable that the notification of “danger” will become easier in the context of MASS salvage. Futuristic ecosystem elements such as 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.⁸³ For example, the European Union’s EfficienSea 2 project in the Arctic and Baltic sea is providing instant connectivity to ships in those waters; this includes providing instant navigational warnings and notices to mariners, and reporting of search and rescue operations.⁸⁴ At a minimum, MASS will be able to connect to Global National Satellite Systems (GNSSs).⁸⁵ Arguably, owing to the connectivity and reporting mechanisms in place nowadays, there are several entities which become aware of a probable collision, grounding or other externally perceivable dangerous scenarios at the same time as the crews on affected conventional vessels.

74. The word “indecision” is used to refer to the last resort MRC’s decision trees: *ibid.*

75. *Ibid.*

76. “Decision Trees”, in M Murty & V Devi, *Pattern Recognition: An Algorithmic Approach* (Alphen an den Rijn, 2011), p.123.

77. 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).

78. DNV AS, 18.

79. *The Aeolian Heritage* (2016) 212 F Supp 3d 618 (*supra*, fn.29).

80. *The Tramp* [2007] EWHC 31 (Admlty); [2007] 2 Lloyd’s Rep 363, [25]—“unhappy predicament” being a term used to infer “danger” in the situation.

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

82. 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>.

83. Marikka Heikkilä, “Smart Fairways—Co-design of Future Fairways in Finland” (ICMASS 2022, Singapore, April 2022).

84. European Commission, “Grant Agreement Number 636329—Efficiensea 2” (Innovation and Networks Executive Agency 2015).

85. 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).

However, the legitimacy and accessibility of data from all these sources pose a challenge. This data has to be recorded by MASS systems and, ideally, transmitted in real time to shore-based RCCs. The data needs to be neutral, sufficient, precise and intelligible.⁸⁶ Voyage data recorders (VDRs) already serve this function. In *The Sakizaya Kalon*,⁸⁷ 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.”

The requirements mandated by DNV AS for MASS require the RCC to record at a minimum “operational status of key vessel functions including communication links”.⁸⁸ 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”.⁸⁹ Furthermore, it is prescribed that the voyage data recorder covers the RCC, in addition to the MASS.⁹⁰ This data should help a court to conduct an objective exercise in the determination of danger. In *The Hamtun*,⁹¹ the Court had to rely on hand drawings on hydrographic charts. “Sensor-data from multiple sensors like video-cameras, images, radar information, audio” should be able to provide a clear and precise picture of the situation.⁹² It would therefore seem that specific actions of MASS, seen in relation to other documented evidence, would help a court conclude on the element of danger.

VII. CONTRACTUAL SALVAGE: CAN MASS BE DEEMED TO “CONTRACT” FOR SALVAGE? IF NOT, THEN WHAT?

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”. Additionally, MASS may find themselves in a situation where RCC communications are lost or are disconnected.⁹³ Potential salvors may not be able readily to contact the RCC. Could MASS rely instead on a reciprocal MRC to allow for salvage operations to be undertaken?

86. See *The Hamtun* [1999] 1 Lloyd’s Rep 883, 885, 891.

87. *The Sakizaya Kalon v The Panamax Alexander* [2020] EWHC 2604 (Admlty); [2021] 2 Lloyd’s Rep 70, [6].

88. DNV AS, 88.

89. *Ibid.*

90. *Ibid.*, 102: 2.1.26 Voyage data recorder (VDR)—IMO MSC.333(90).

91. [1999] 1 Lloyd’s Rep 883, 883, 902.

92. DNV AS, 91: MASS will be transmitting these to RCCs.

93. Eg, abandonment by owners: *The Kuzma Minin* [2019] EWHC 3557 (Admlty); [2020] 2 Lloyd’s Rep 617.

1. The challenge: 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.⁹⁴ Article 6(2) of the Salvage Convention gives legal recognition to the 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. In practice, the exercise of the authority to contract for salvage has been undertaken by/from shipowners' and ship managers' offices for decades.⁹⁵ Receiving instructions from the shipowner is virtually instantaneous these days.⁹⁶ Salvors conduct their affairs from land,⁹⁷ where they become aware of a possible casualty from their monitoring devices in their shore-based offices,⁹⁸ or they are contacted directly by shipowners or other interested parties.⁹⁹ Thus, given enough time, the salvage of MASS can equally be negotiated through land based owners or their employees.¹⁰⁰

However, this may not be feasible in very urgent situations. In *The Altair*,¹⁰¹ the court warned against the dangers of haggling and delay, and encouraged certainty. This is why Art.6(2) of the Salvage Convention provides the master with authority to enter into salvage contracts.¹⁰² 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".¹⁰³

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.¹⁰⁴

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.¹⁰⁵ It follows that the question of authority to enter into salvage agreements should consider the

94. 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: On the new command at sea*, 2nd edn (London, 2022), 248.

95. Geoffrey Brice, "Salvage: Present and Future" [1984] LMCLQ 394, 400.

96. Howard Bennett, in H Bennett (ed), *Carver on Charterparties*, 2nd edn (London, 2021), [4.428]. Also see "Dutch Safety Board report challenges onboard authority" (*Nautilus International* 4 August 2022) <https://www.nautilusint.org/en/news-insight/telegraph/dutch-safety-board-report-challenges-onboard-authority/>.

97. Often signing the contract for salvage on land: see *The Altair* [2008] EWHC 612 (Comm); [2008] 2 Lloyd's Rep 90.

98. See Diccon Rogers' testimony in *The Kuzma Minin* [2019] EWHC 3557 (Admlty); [2020] 2 Lloyd's Rep 617.

99. Or by an interested party acting on behalf of the salvage property: see [2008] EWHC 612 (Comm); [2008] 2 Lloyd's Rep 90.

100. Similar to what happened in *The Altair* [2008] EWHC 612 (Comm); [2008] 2 Lloyd's Rep 90.

101. *Ibid.*

102. *Ibid.*

103. Berlingieri, 189.

104. *The Choko Star* [1990] 1 Lloyd's Rep 516.

105. Scoping Exercise; IMO, *Human Element Vision, Principles and Goals for the Organisation* (Cmd A 23/ Res.947, 26 February 2004).

multidimensional nature of shipping operations, keeping in mind the element of urgency of salvage operations.¹⁰⁶

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 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 consequences of their actions without the psychological, emotional and cognitive feedback which a master in a situation of danger would have.¹⁰⁷

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.¹⁰⁸ 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.

2. The clue: 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 spatial distance between two ships, or a ship and any other entity.¹⁰⁹ 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 it as a call for assistance. A specific action devised for MASS is:

"Call for assistance (tug): in addition to calling for assistance, the ship normally need to provide some means for other ships (typically tugs) to fasten tow, e.g. by extending towing lines."¹¹⁰

Where MASS autonomously execute emergency plans which are functionally equivalent to the decisions taken by master mariners or chief officers nowadays, their conduct should exemplify a call for assistance.¹¹¹

Additionally, it is commonplace for salvage contracts to be agreed over VHF.¹¹² The systems on board MASS will have the ability to communicate with external stakeholders, and this ability would include the ability of "communicating with other

106. Rose (1989) 9 OJLS 167, 174.

107. Cf the Court's remarks in *The Amoco Cadiz* [1984] 2 Lloyd's Rep 304, 335, where it criticises the company's "control" over the master's actions.

108. *The Hamtun* [1999] 1 Lloyd's Rep 883, 897 ("for there to be 'services at request', both offer and acceptance were required").

109. *The Aeolian Heritage* (2016) 212 F Supp 3d 618 (a helicopter recognised the "H" sign).

110. DNV AS, 94.

111. A Tettenborn, "Shipping: Product Liability goes High-Tech", in Baris Soyer and Andrew Tettenborn (eds), *New Technologies, Artificial Intelligence and Shipping law in the 21st Century* (London, 2019), p.116. Also see 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* (Abingdon, 2021), p.207.

112. *The Star Maria* [2002] EWHC 1423 (Admlty); [2003] 1 Lloyd's Rep 183.

vessels, VTS, tugs, pilot station, etc, using VHF transmitter on board the vessel; and transmit emergency messages from the vessel”.¹¹³ Courts have, unsurprisingly, used VHF records to assess whether a call for assistance was in the nature of salvage.¹¹⁴ It would not be surprising to see the same practice being continued for messages from MASS. It may even be easier to conduct this enquiry in the absence of an onboard master’s “persuasively influential” views.¹¹⁵

3. The alternative: 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”.¹¹⁶ It has been suggested by Professors 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.¹¹⁷ They suggest that an “Art.6.2bis” 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”. 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 and of onshore management of the MASS owner’s organisation.¹¹⁸

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.¹¹⁹ The DPA’s role is to prevent a situation leading to pollution, loss of property and loss of life. In addition, the DPA has direct access to the highest management levels of the ship-owning company.¹²⁰ The identification of the DPA as the person authorising MASS salvage would result in logistical efficiency because it will create a clear channel of communication with the salvor.¹²¹ Additionally, since the DPA is a well-established role

113. DNV AS, 92.

114. *The Mbashii* [2002] 2 Lloyd’s Rep 602; *The Tramp* [2007] EWHC 31 (Admlty); [2007] 2 Lloyd’s Rep 363.

115. See *The Tramp* [2007] EWHC 31 (Admlty); [2007] 2 Lloyd’s Rep 363, [19].

116. CMI, *First Step Initial Review for the Scoping Exercise* (undated).

117. Baris Soyer and Andrew Tettenborn, “Autonomous Ships and Private Law Issues”, in Baris Soyer and Andrew Tettenborn (eds), *Artificial Intelligence and Autonomous Shipping* (Oxford, 2021), 63–80.

118. Cartner (*supra*, fn.94), p.605 notes that this person should be “the connection among management, the registry state, the vessel and its contents and the voyage”.

119. The 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.

120. *Ibid.* In practice the DPA may already be the one exercising the authority to contract: Shaw, para 5.2.1.

121. This would be an ideal scenario: see the discussion in *The Altair* [2008] EWHC 612 (Comm); [2008] 2 Lloyd’s Rep 90.

in the industry,¹²² it would be a promising candidate to identify “the person responsible for managing the fully autonomous ship”.¹²³

Additionally, should a “MASS Code”¹²⁴ 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.¹²⁵

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. However, with the lack of an onboard master this proposition reintroduces challenges that the Convention was created to resolve. Second, and more controversially, MASS may be deemed to call for assistance when they execute functions coded into them to do so.¹²⁶ In either case, it does not seem likely that interpretations of the present articles would suffice.

VIII. NON-CONTRACTUAL SALVAGE OF MASS

While it can be envisioned that MASS owners contracting for salvage would have necessary contractual safeguards to protect their position, eg for tasking the salvor to record the salvage operation on video and audio device(s), such an understanding would not arise where the salvage operation is conducted by a volunteer. A volunteer salvor is someone who, without a pre-existing duty, contractual or otherwise, to provide salvage services, assists a vessel in danger.¹²⁷ A volunteer's assistance during a situation of “danger” gives rise to a salvage claim.¹²⁸ Similar to conventional shipping, in such cases the probability that a MASS owner would dispute a claim for salvage is higher than it would be in the case of salvage by agreement.

Alternatively, some events may take the assistance being provided to a vessel outside of the framework of a different pre-existing contract and give it the form of salvage. For instance, in *The Key Singapore*,¹²⁹ there was no contract for salvage, the claimants were towing the rig prior to the tow breaking apart under a towage agreement. The Court concluded that the breaking of the tow line caused a situation of danger and that the actions of the claimants post that situation were in the nature of salvage.

In situations of non-contractual salvage, it becomes important to assess the factual context of the services provided, because it is open to an owner to dispute that the services

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

123. Russian Federation et al (supra n 10), para 7.2.10.

124. IMO (supra n 2), para 6.2.

125. 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, Cmd LEG 109/13/2, 2022), para 4, 19; There are, already, calls for inclusion of salvage services in the DPA's role: Shaw, para 5.2.5.

126. G Vojković & M Milenković, “Autonomous ships and legal authorities of the ship master” (2020) 8 Case Studies on Transport Policy 333.

127. Rose (1989) 9 OJLS 167, 171.

128. *The Aeolian Heritage* (2016) 212 F Supp 3d 618. See also the comment on this case in R Force and M Davies, “US Maritime Law” [2017] IMCLY 199 §320.

129. [2004] EWHC 2227(Comm); [2005] 1 Lloyd's Rep 91 (supra n 60).

rendered were not in the nature of salvage. In such disputes, testimony of the on-board crew is compared with the salvor's version of the facts.¹³⁰ Naturally, these testimonies can be motivated to support a particular version and thus be inaccurate.¹³¹ Courts have been cautious in taking testimonies on face value. For instance, in *The Hamtun*,¹³² the court construed the arrival time of the salvage vessel at the site of the salvee, recorded in a Vessel Traffic Services (VTS) report, as the time of commencement of the operation and dismissed the opposing testimonies.

Although recorded evidence is favoured over oral evidence, testimonies can still be of some value in persuading a court of the correct facts. The lack of crew on board MASS would reduce the strength of a defence against a salvage claim. MASS owners can counter this by having sound and video recorders that record everything on or around MASS. "Machine evidence", rather than eyewitness testimonies, would be used extensively in evidentiary assessments of events leading to a salvage claim.¹³³ In such cases, it may be promising for MASS that machine recorded information is viewed as being more "neutral" than the testimony of a person.¹³⁴

A cautionary step against false claims of salvage would be to have audio and video recording equipment cover the entire structure of MASS and work even when the vessel has otherwise lost the ability to run its other functions.

IX. DUTIES OF MASS OWNERS

1. Introduction

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.¹³⁵ The first duty is that of full co-operation during the course of the salvage operations.¹³⁶ The second is to exercise due care to prevent and minimise damage to the environment.¹³⁷ The third is to take redelivery of the vessel at a place of safety on the reasonable request of the salvor.¹³⁸

130. *The Star Maria* [2002] EWHC 1423 (Admlty); [2003] 1 Lloyd's Rep 183; *The Tramp* [2007] EWHC 31 (Admlty); [2007] 2 Lloyd's Rep 363.

131. *The Hamtun* [1999] 1 Lloyd's Rep 883, 891 and 892.

132. [1999] 1 Lloyd's Rep 883.

133. For a broad discussion on "machine evidence", see S Gless, *AI in the Courtroom: A Comparative Analysis of Machine Evidence in Criminal Trials* 2020 (51)2 Georgetown J of International Law.

134. See the discussion on VDRs in *The Sakizaya Kalon v The Panamax Alexander* [2020] EWHC 2604 (Admlty); [2021] 2 Lloyd's Rep 70, [4–6].

135. These duties are of such a generic nature that they would apply with or without contractual/Convention stipulation; *Kennedy & Rose: Law of Salvage*, 10th edn (2021), [11.064].

136. Salvage Convention, Art.8(2)(a). An impecunious owner/operator may choose to abandon the ship: *Kennedy & Rose: Law of Salvage*, 10th edn (2021), [11.064]. 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.

137. Salvage Convention, Art.8(2)(b).

138. *Ibid.*, Art.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,¹³⁹ which simplifies matters for MASS.

The Scoping Exercise comment on Art.8(2) 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.

CMI's scepticism is justified, but the reference to programmers and manufacturers is problematic. 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 technology products or services (eg, incorrect algorithmic calculations or effects), they will sue the technology manufacturers/providers for breach of contract.¹⁴⁰ 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.¹⁴¹

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 should 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.¹⁴² 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 in 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 Art.8(2) duties of the shipowner's organisation.

2. 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 cooperation 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,¹⁴³ the wording of Art.8(2) is challenging

139. See further N 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, 218–253.

140. Similar to the attempt in *Marc Rich & Co AG v Bishop Rock Marine Co Ltd (The Nicholas H)* [1995] 2 Lloyd's Rep 299; [1996] AC 211.

141. Scoping Exercise, 5.5.

142. See Lord Mustill's speech in *The Nagasaki Spirit* [1997] 1 Lloyd's Rep 323; [1997] AC 455, concerning liability for environmental salvage under Art.14.

143. Since this should be designed into the MRCs: DNV AS, 29. See also F Collin, "Unmanned Ships and fault as the basis of shipowner's liability", in H Ringbom (et al) (eds), *Autonomous Ships and the Law* (Abingdon, 2021).

because these current standards are described and tested on the basis of human actions. As Røsæg has noted:¹⁴⁴

“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.”

Gaskell propounds the conventional test of the “reasonably prudent master”.¹⁴⁵ However, as Røsæg points out, the difficulty is in how one applies this test to autonomous systems. For example, in the case of the *Amoco Cadiz*, the crew started taking precautionary measures but stopped short of accepting external help.¹⁴⁶ The tanker operations manual of the owner of the *Amoco Cadiz* stated that, “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”.¹⁴⁷ 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.¹⁴⁸ 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 was reasonable. 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, because there is no guiding principle stated in Art.8(2) to help with such a coding exercise. The duties do not state what factors should influence a reasonable prudent master.¹⁴⁹

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. Satisfaction of the Art.8(2) duties will then be a question of what standards are agreed between MASS owners and salvors.¹⁵⁰

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.¹⁵¹ 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 on persons involved in their operation.

144. E Røsæg, “Diabolus ex machina: when an autonomous ship does the unexpected”, in H Ringbom et al (eds), *Autonomous Ships and the Law* (Abingdon, 2021), 134.

145. Gaskell (1991) 16 Tul Mar LJ 1.

146. *The Amoco Cadiz* [1984] 2 Lloyd’s Rep 304, 312 (“broadcast a VHF message ... advising ... that all ships should keep clear”, and “the not-under-command signals were hoisted”).

147. *Ibid*, 330, 335.

148. *Ibid*, 315.

149. The “psychological element” should have been considered in order to formulate the present duties: see Berlingieri, 236–237.

150. See the discussion on the DPA, *ante*, Part VII(3).

151. DNV AS, 18–19. Generally, the concentration of legal and academic attention towards “product liability”, in the case of autonomous ships, indicates the disputable nature of coding on breach.

3. Coding duties

MASS will act according to 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.¹⁵²

Thus, MASS operations 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 at 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.¹⁵³ The importance of the duty to arrange for salvage in a timely fashion was recognised at the time of drafting the Convention.¹⁵⁴ It was emphasised that the duration between the moment the danger arose and the moment salvage commenced was likely to have a significant impact on the steps taken to avoid damage to the environment.¹⁵⁵ While the exercise of this duty has been challenging, depending on the will of the person making that decision, with MASS it is foreseeable that the duty could be enforced by coding it in an appropriate MRC.

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 should be deemed to have called for assistance and authorise salvage operations if certain MRC 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.¹⁵⁶

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 cooperation *prima facie*. Additionally, if the coded actions of MASS, in a situation where a threat of damage to the environment exists, result in a call for assistance in a timely fashion, this would *prima facie* satisfy the duty to exercise due care to prevent or minimise damage to the environment.¹⁵⁷

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?¹⁵⁸ In the case of the

152. DNV AS, 48.

153. See the discussion of *The Amoco Cadiz*, ante, Part IX(2).

154. Berlingieri, 237.

155. *Ibid*, 241. This has not changed even today: Shaw, para.4.5.15.

156. R Veal and M Tsimplis, "The integration of unmanned ships into the lex maritima" [2017] LMCLQ 303, 318, 330. See also Shaw, para.2.11.3.

157. Berlingieri, 219.

158. This will not necessarily be disastrous, 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>.

Brillante Virtuoso,¹⁵⁹ it was held that, since “the vessel was not in a place of safety as she was a dead and disabled ship anchored in international waters, the original peril of piracy or vandalism or malicious mischief continued to operate”.¹⁶⁰ A “place of safety” is 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”.¹⁶¹ In situations where MASS regain their normal propulsion and navigational capabilities after the main salvage operations have concluded, it may be prudent to have them communicate directly to salvors that they 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 that might cause injury to the salvors, or damage their vessels or equipment. In such cases, though, redelivery would presumably need to take place in a safe port.¹⁶²

4. The DPA's duty

It would be logical if the Art.8(2) duties on the MASS owner were placed on or also on the DPA to provide all necessary information on notification of danger, and extend full co-operation to salvors.¹⁶³ 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 could be channelled via the DPA.¹⁶⁴ This would also be in line with the role of the DPA in the shipowner's organisation, and complement her existing duties and authority, as suggested above.¹⁶⁵

It is trite that the master and the crew are not entitled to salvage remuneration when they save or assist in saving their own ship, unless their efforts exceed their existing contractual 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.¹⁶⁶ To argue otherwise seems antithetical to the purpose of such an entity.¹⁶⁷ Logically, the DPA should be under a duty to convey data on the situation

159. [2015] EWHC 42 (Comm); [2015] 1 Lloyd's Rep 651; [2015] Lloyd's Rep IR 388.

160. *Ibid.*, [294].

161. *Ibid.*

162. *The Ocean Victory* [2017] UKSC 35; [2017] 1 Lloyd's Rep 521; [2017] Lloyd's Rep IR 291; [2017] 1 WLR 1793, [24].

163. “The importance of collaboration and the timely provision/exchange of accurate information on the ship and its cargo in a salvage is essential”: Shaw, para.2.11.6.

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

165. See *ante*, Part VII(3).

166. Unless Art.6 covers the DPA as well: see Soyer & Tettenborn (*supra*, fn.117).

167. See *ante*, Part VII(3).

leading up to the danger, along with all other helpful information and actions, so that considerations for salvage operations can incorporate this information.¹⁶⁸

X. EFFECT OF MASS OPERATIONS ON THE COMPENSATION REGIME

1. Introduction

On “questions of liability”, the Scoping Exercise commented as follows:¹⁶⁹

“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. ... it 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.”

As things presently stand, owners or their 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.¹⁷⁰ The owners of property on board the vessel are liable to provide compensation only for the salvage of their property.¹⁷¹ 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 has pointed 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.¹⁷² Gaskell notes that the compromises reached over what became Arts 13 and 14 of the Salvage Convention had both positive (clarificatory) and negative (fudging) results.¹⁷³ Furthermore, it must be recognised that, even after 33 years, the Salvage Convention has only been adopted by flag States covering 62.07 per cent of global tonnage, which reflects its relatively lukewarm reception.¹⁷⁴ Additionally, there is an ongoing debate whether the policy of environmental protection would fare better if delegated to state control.¹⁷⁵ It seems that the IMO has decided to address these concerns, given that the Scoping Exercise considered that “technical aspects and questions of

168. E.g., LOF 2020, cl F(ii) entitles the salvors to “all such information”.

169. Scoping Exercise, para.7.

170. Salvage Convention, Arts 13(2) and 14(1).

171. *Ibid.*, Art.13(2)—disregarding the indirect effect of Art.13(1)(b).

172. Brice [1990] LMCLQ 32, 43.

173. Gaskell (1991) 16 Tul Mar LJ 1, 49.

174. It therefore cannot be said to provide a global uniform solution. *Cf* International Regulations for Preventing Collisions at Sea 1972, which have been adopted by States covering 98.91 per cent of world tonnage.

175. Brice [1984] LMCLQ 394, 398.

liability” would be best addressed together.¹⁷⁶ This Part considers the effects of MASS operations on the existing compensation regime under the Salvage Convention.

2. Condition for salvage payment

For the shipowner, liability to pay arises out of the salvor’s rendering a useful result to the vessel, the property and the environment.¹⁷⁷ 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”.¹⁷⁸

Finland’s comment to the Scoping Exercise noted that “[t]his right concerns the entity performing salvage”.¹⁷⁹ The CMI commented that “[the provisions of the article] apply to MASS and do not prevent MASS operations and require no actions”.¹⁸⁰ 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 arguments of “self-interest/self-preservation” have failed to persuade courts that a person producing a useful result is not entitled to salvage.¹⁸¹ This is, indeed, recognised in Art.12.3 of the Salvage Convention. Additionally, in *The Sava Star*,¹⁸² for example, the Court ruled that services provided by the cargo owners that went beyond their contractual duties to the shipowner, 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.¹⁸³

This may raise novel disputes concerning new actors such as RCC operators, 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. They should also be mindful of passive acts being seen as useful results.¹⁸⁴ Defining what useful results mean in a particular situation may also help to limit the exposure to liability for MASS owners.¹⁸⁵

With MASS, novel safety mechanisms such as MRCs and redundancy¹⁸⁶ are going to be employed on board. Where salvors take manual control of MASS in danger,¹⁸⁷ they

176. Scoping Exercise, para.6.5.

177. Salvage Convention, Arts 13 and 14, which relate to two different heads of payment but liability to pay is of the shipowner.

178. On the synonymity of “useful” and “successful”, see Gaskell (1991) 16 Tul Mar LJ 1, 49.

179. Finland, *First Step Initial Review for the Scoping Exercise* (19 July 2022).

180. CMI, *First Step Initial Review for the Scoping Exercise* (undated).

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

182. *Ibid.*

183. *Ibid.*, 144.

184. See also the discussion *ante*, Part IV(2).

185. *Nanhai Rescue Bureau of The Ministry of Transport v Archangelos Investments ENE (The Archangelos Gabriel)* [2016] 7 CMCLR 1, 2.

186. DNV AS, 70. Also see, S Eriksen & M Lützen, “The impact of redundancy on reliability in machinery systems on unmanned ships” [2022] WMU J Marit Affairs.

187. For how, see Eriksen & Lützen, *ibid.*

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.¹⁸⁸ For instance, if a fire is detected on board MASS which damages the main electrical power supply system,¹⁸⁹ and the fire is contained by the salvors, who then begin to tow the vessel, the emergency power supply system¹⁹⁰ may activate. There may be other scenarios where functions of a particular MRC come to the aid of a salvor conducting a salvage operation. Such scenarios should have the effect of reducing the value of useful result and subsequent calculation for payment under the provisions of Art.13. Similar scenarios, likely with MASS salvage operations, can be hypothesised which raise a novel commercial question 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?¹⁹¹ It would be interesting to see then whether courts are willing to construe the time of commencement of salvage operations in favour of salvors.¹⁹² All of these scenarios result from the interplay of the term “useful result”, the definition of “salvage operation” and the criteria for payment under Art.13. It seems that the proposed capabilities of MASS have the potential of seriously undermining the traditional understanding of these concepts.

3. 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.¹⁹³ The impetus for this policy was to encourage salvors who acquired and maintained special equipment and personnel which was often used only in times of dire emergencies, so that they did not divert those resources to other uses, so as not to make them unavailable when needed.¹⁹⁴ However, this policy of encouragement needs some re-examination, given the speed with which new technology is being employed, which has made access to assistance much more affordable and prompt.¹⁹⁵ Arguably, salvors have also discovered alternate employment avenues 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*,¹⁹⁶ the salvage industry has managed to sustain itself.¹⁹⁷

188. See Eriksen & Lützen, *ibid*, 164.

189. DNV AS, 75.

190. *Ibid*.

191. As discussed in Solbian (*supra*, fn.158).

192. *Cf The Hamtun* [1999] 1 Lloyd's Rep 883.

193. Rose (1989) 9 OJLS 167, 175.

194. *The Nagasaki Spirit* [1995] 2 Lloyd's Rep 44, 59 (Clarke J).

195. An argument in *The Choko Star* [1990] 1 Lloyd's Rep 516, 519 shows that access to assistance is an argument used in disputing the reasonableness of selecting a particular salvor over others.

196. [1997] 1 Lloyd's Rep 323; [1997] AC 455.

197. As Professor 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.

Article 13(1) of the Salvage Convention provides that the reward to salvor(s) should be “fixed with a view to encouraging salvage operations”.¹⁹⁸ 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.¹⁹⁹ This novelty seems to be acknowledged in Finland’s comment in the Scoping Exercise, in relation to the criteria for fixing the reward in Art.13(1), which states:²⁰⁰ “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 has made no comments in this respect, other than agreeing that this article does not pose a problem of application to MASS. Before considering Finland’s comment in respect of the article, it would be helpful to see how the policy of encouragement features 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.

There is also 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.²⁰¹ Although the provision does not expressly state that only the factors stated therein should be considered, the use of the word “shall” in Art.13(1) may also imply the exhaustive nature of the stated criteria. This contradicts the view put forward by Finland in the Scoping Exercise that the list of factors is not exhaustive.

The Salvage Convention also does not 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 salvage reward depends on judicial discretion. For MASS owners, this may create 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 potentially consider the 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.²⁰² 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,

198. The word “reward” is used as an umbrella term which includes reimbursement, remuneration and reward: see Rose (1989) 9 OJLS 167, 200.

199. See “Automatic Operation (AO)” in DNV AS, 68. See also Scoping Exercise, para.5.12. The creation of a “MASS Code” points towards the distinct operations of these vessels compared with conventional ones.

200. Finland, *First Step Initial Review for the Scoping Exercise* (19 July 2022).

201. *China Ping An Property Insurance Co Ltd v Nanhai Rescue Bureau of The Ministry of Transport (The Taixin 1)* [2021] 2 CMCLR 6, 12; *The Kuzma Minin* [2019] EWHC 3557 (Admlty); [2020] 2 Lloyd’s Rep 617; and *The Mbashi* [2002] 2 Lloyd’s Rep 602.

202. Such fears are fairly common even now: Shaw, para 2.4.2.

in *The Voutakos*,²⁰³ 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.²⁰⁴ Similarly, in *The Ocean Crown*,²⁰⁵ 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.

4. Special compensation

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.²⁰⁶ This new principle is codified in Art.14.²⁰⁷ It states that salvors may receive special compensation on the basis of expenses 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.²⁰⁸ Article 14 was unsurprisingly born out of the growing need to tackle oil pollution.²⁰⁹ MASS developers have stated that MASS will run on electric batteries.²¹⁰ Batteries, such as the racks of lithium cells proposed to be used on MASS, should pose a much lower environmental risk than the fuel currently used by conventional vessels.²¹¹ Logically, these racks of batteries will not release pollutants into the sea in the way conventional bunkers do, and thus the requirement for common environmental salvage equipment such as oil booms will not arise in the context of MASS salvage operations.²¹² As Gaskell, points out, though, art 14(1) deals with salvage operations “in respect of a vessel”.²¹³ In this respect, it is pertinent to consider the Supreme Court’s ruling in *The Renos*:²¹⁴

203. [2008] EWHC 1581 (Comm); [2008] 2 Lloyd’s Rep 516.

204. This was similarly stated in *The Hamtun* [1999] 1 Lloyd’s Rep 883, 900 and *The Ocean Crown* [2009] EWHC 3040 (Admlty); [2010] 1 Lloyd’s Rep 468, [55].

205. *Ibid*, [44–45].

206. Article 14.

207. See the discussion on practical significance of Art.14 in Martin Davies, “Whatever Happened to the Salvage Convention 1989?” (2008) 39 JMLC 463, 480.

208. SCOPIC 2020, cl.14 (Pollution Prevention). See also *The Renos* [2019] UKSC 29; [2019] 2 Lloyd’s Rep 78; [2019] Bus LR 1584, [25], where the Court gives the example of “floating booms around (it) with a view to preventing or minimising environmental damage”.

209. As is well recognised, it was triggered by the oil pollution from the *Amoco Cadiz*: Berlingieri, 189.

210. X Feng et al, “On maritime electrification—electrification technologies, charging infrastructure and energy management strategies” (ICMASS 2022, Singapore, April 2022).

211. E.g., 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/>.

212. 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.

213. See Gaskell (1991) 16 Tul Mar LJ 1, 56 (“4 Cargo Raising”).

214. *The Renos* [2019] UKSC 29; [2019] 2 Lloyd’s Rep 78; [2019] Bus LR 1584, [21], [26]. However, this judgment has faced criticism in *Kennedy & Rose: Law of Salvage*, 10th edn (2021), [10.242], [10.243].

“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) 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.”

It seems anomalous for MASS owners, who have invested in technology that reduces human error to a substantial extent, and who operate bunker-free vessels, to claim environmental salvage cover from their P&I Clubs, which primarily cover liability in case those errors, or liabilities, arise. It also raises the question, what incentive is there for MASS owners to take P&I cover for environmental salvage, if their vessel does not pose such a threat, save that Art.14 makes them the first resort of liability.²¹⁵ 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.²¹⁶ This may also not sit well with 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.²¹⁷

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.²¹⁸ The “safety net” concept is necessary only if there is a significant potential threat to the environment. Where that is not the case, recourse is taken only to Art.13.

The “safety net” concept in Art.14 is a derogation from the purely commercial relationship of the shipowner and salvor, as it does not adhere, at least directly, to the doctrine of restitution under private law.²¹⁹ It can thus be said that it is in the nature of a “policy” set in the Salvage Convention.²²⁰ If the benefits of MASS for the environment are proven, as are being proposed, the application of this policy to MASS may not enjoy easy acceptance amongst MASS owners and their insurers.

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*,²²¹ 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 the environment, it is unlikely that MASS

215. Berlingieri, 321.

216. For concerns raised earlier: see Gaskell (1991) 16 Tul Mar LJ 1, 54.

217. *Ibid*, 53.

218. *The Nagasaki Spirit* [1997] 1 Lloyd's Rep 323; [1997] AC 455.

219. Rose (1989) 9 OJLS 167.

220. The preparatory material point to this conclusion: Berlingieri, 323.

221. [1997] 1 Lloyd's Rep 323; [1997] AC 455.

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 are to be promoted and encouraged. Arguably, the Scoping Exercise had this in mind when referring in its comment to “policy questions regarding the apportionment of liability”.²²²

XI. CONCLUSION

In a lecture in 1989, the renowned English salvage lawyer Geoffrey Brice QC mentioned the sea changes that had occurred to shipping between the two Salvage Convention years (1910 and 1989).²²³ Surprisingly, though, there are no references in the preparatory works of the Salvage Convention to common technologies that were already prevalent in 1989, such as “internet, satellite, technology, robot, Inmarsat, VDR, computer,^[224] or analytics”,²²⁵ even though parallel Conventions, such as the Convention on the International Maritime Satellite Organization 1979, clearly show that member states of the IMO were well aware of the 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.²²⁶ 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.²²⁷ It is hoped that this may produce a more holistic and comprehensive regulatory approach to MASS in future. However, given the grave concern for the environment and its close linkage to the policies underlying the Salvage Convention, it is surprising that the Marine Environment Protection Committee (MEPC) does not find a place in this group.

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 salvor, and compensation of the salvor, shows that their interpretation is informed by policy decisions aimed at furthering maritime commerce and safety. Therefore, the reform suggestions made are of a similar nature. Owing 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 being advocated. 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

222. Scoping Exercise, para.5.5.

223. Brice [1990] LMCLQ 32, 33.

224. Except as a sole mention as a non-polluting cargo: Berlingieri, 347.

225. *Ibid.*

226. For an analysis of the changing nature, and reasons, for IMO's work: see M Tsimplis, “Shipping and the Marine Environment in the 21st Century”, in M Clarke (ed), *Maritime Law Evolving* (Oxford, 2013), 113.

227. IMO, *Provisional agenda for the first session of the Joint MSC-LEG-FAL Working Group on MASS* (Cmd MASS-JWG 1/1, 7 June 2022).

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.²²⁸

228. It is telling that the UK disagreed with Finland's initial review and kept open the option of amending the Convention: see *ante*, Part V.