

LEGAL COMMITTEE
111th session
Agenda item 10

LEG 111/10/2
19 January 2024
Original: ENGLISH
Pre-session public release:

**MEASURES TO ADDRESS MARITIME AUTONOMOUS SURFACE SHIPS (MASS)
IN INSTRUMENTS UNDER THE PURVIEW OF THE LEGAL COMMITTEE**

**Summary of the research of the Comité Maritime International (CMI)
International Working Group (IWG) on MASS
in relation to liability issues**

Submitted by Comité Maritime International

SUMMARY

Executive summary: The submission includes a summary of the research by the CMI IWG MASS on the scope of liability for maritime torts in the MASS context and identifies legal issues that autonomous ships raise for maritime liability and considers potential strategies for their resolution.

*Strategic direction,
if applicable:* 2

Output: 2.10

Action to be taken: Paragraph 56

Related documents: LEG 107/8 and Corr.1

Introduction

1 Within the scope of its mandate and mission to promote international uniformity in maritime law, the Comité Maritime International (CMI) established an International Working Group on MASS (IWG/MASS) in 2017 to undertake ongoing in-depth study of the legal issues linked to MASS in support of LEG deliberations. The IWG/MASS submitted initial results of analysis of IMO instruments under the purview of the Legal Committee in LEG 107 (LEG 107/8; LEG 107/8/Corr.1).

2 The IWG/MASS commenced work on a working paper focused on liability in 2022 and considered an initial draft through correspondence and preliminary discussion at the CMI Montreal Colloquium from 14 to 16 June 2023. At that time, the IWG chair convened a focus group to further develop the working paper through virtual meetings, correspondence and input invited from IWG members. This new submission is the outcome of that process and discusses the scope of liability for maritime torts in the MASS context. The purpose of the submission is to identify legal issues that autonomous ships raise for maritime liability and to discuss potential strategies for their resolution. The submission does not take a position on what the policy outcome of the discussions should be.

MASS: a unique challenge?

3 The technology underpinning MASS is not the first instance of innovative technology being employed in ships and the maritime domain: ships, and the various component functions underpinning their operation, are becoming increasingly automated. This raises the question of whether MASS technology, and its potential malfunction, really requires any extensive reconsideration of the established legal and liability framework. It is suggested that MASS technology *is* distinct from prior technologies and *does* require such a review, for at least three reasons.

4 First there is the true level complexity of the MASS technology. Not only does understanding MASS technology present formidable challenges to existing regulators and technical experts, the prospect of advanced autonomous systems with self-learning capabilities is, it is suggested, not something the legal framework has yet had to address. Second, there is the level of deference that is expected to be afforded to the MASS technology. At least one of the main advantages of MASS is to reduce the need for human involvement in the functionality of ships, to reduce human error and exposure to danger at sea. It is true that ships today have, e.g. unmanned machinery spaces, but the prospect of a ship without *any* personnel on board and with limited or no remote human oversight whatsoever to address malfunction places a unique level of reliance on technology that requires fresh legal consideration. Third, the MASS technology will be expected to occupy a space in decision-making functionality in safety-critical aspects of a ship's operations, not least its navigation: this, of course, is an area which has previously been entrusted only to the most trained and experienced human actors for whom the ship's owner is generally responsible. In tandem, the above factors an unprecedented reduction in the apparent scope from human culpability in the operation of ships, which raises significant questions about the suitability of the current liability regime.

Context

5 Errors by masters and crew, including failure to meet their duties, may have two kinds of legal consequences. First, the master or crew member may be subject to (personal) administrative, criminal, or civil liability for the wrongful act. Second, the incident may result in liability for the shipowner* who, as an employer retains a vicarious liability for errors committed by persons who act on his/her behalf. The focus here is on the latter question, i.e. how the changing realities regarding MASS may be expected to affect the liability of the owner. This is the key question when it comes to whether compensation will be available for incidents caused by MASS.

6 It should be noted at the outset, however, that this matter is not harmonized internationally and that the legal regimes of different jurisdictions may entail significant variations on these points.

7 The existing IMO liability regimes cover only pollution damage (the CLC, Bunkers. HNS conventions, with related protocols), wreck removal (the Nairobi Convention) or death or injuries to passengers (the 1974 Athens Convention and its 2002 Protocol). These instruments establish a strict liability regime, whereby victims of the specified types of damage need not claim that there has been an error or negligence on behalf of the ship to have the right to be compensated (up to a specified maximum limit) under the conditions of the conventions. To the

* For reasons of convenience, the term "shipowner" is used here, not as a term denoting ownership, but referring to the entity carrying the liability of the operations involving the ship, i.e. usually the company in charge of the commercial operation of the ship. This may include entities, such as "reder", "armateur" in Scandinavian, German and French law, but may also refer to entities such as "operator", "managers" or (certain kinds of) charterers, as the case may be.

extent that (future) MASS cause damage covered by these conventions, it is assumed that the conventions will apply, i.e. that it does not matter for the purpose of the applicability of the convention whether the damage was caused by a MASS or a conventionally operated ship.

8 Another relevant international liability instrument in shipping is the 1910 Convention for the Unification of Certain Rules of Law with respect to Collisions between Vessels (hereinafter the 1910 Convention), which provides for a fault-based liability for collisions, i.e. that liability for the damage arising from the collision shall be distributed based on the fault of the vessels (rather than the individuals) involved in the collision.

9 If shipowners are found to be liable, they have a right to limit their liability under the rules of the LLMC Convention (1976, with applicable updates). The LLMC regime does not address questions of liability as such, but applies to a broad set of maritime claims, whatever the basis of liability. Exempted claims are mainly those covered by other liability regimes, such as pollution, salvage, or general average. The maximum limitation amount is based on the tonnage of the ship or, in the case of passenger ships, the number of passengers that the ship is authorized to carry. The rights of limitation under LLMC only extend to shipowners (defined as "the owner, charterer, manager and operator of a seagoing ship"), salvors and persons "for whose act, neglect or default the shipowner or salvor is responsible". Other persons, such as shipyards, classification societies or equipment manufacturers do not enjoy a similar right to limit their liability.

10 As far as contractual issues are concerned, the relationship between the carrier and cargo interests is regulated by the Hague-Visby Rules (and some variations to them in the Hamburg and Rotterdam Rules), but other contracts such as charterparties, or contracts between the owner and shipyards or equipment manufacturers are not harmonized at the international level, albeit that private organizations have developed standard contracts for specific purposes (e.g. BIMCO).

11 This submission deals with non-contractual (tort) liability that does not appear to be covered by existing IMO conventions. This covers any "normal" damage, economic or other damage, caused to ships or other third parties by a MASS, for example, through a collision, grounding, or stranding. These matters have not been assessed as part of the "Regulatory Scoping Exercise" undertaken by IMO, since that exercise only considered the effect of MASS on existing IMO conventions.

Legal setting

12 Absent an international liability regime providing otherwise, in most jurisdictions shipowners' liability is fault-based. Therefore, for liability to arise, it must be shown that fault or negligence by the owner has caused or contributed to the damage. It is normal for the claimant to prove such fault or negligence. However, the errors do not need to be committed by the owner personally; the owner will usually be vicariously liable for negligence by employees and persons working on the owner's behalf. For the claimant, the vicarious liability of the owner is essential, as the employees and other persons working on the owner's behalf generally do not have the financial resources to pay substantial compensation.

13 MASS developments may particularly affect two main issues in relation to liability: first, the extent to which faults or negligence by new entities, such as remote operators, equipment manufacturers, system designers, shipyards and software developers will be covered by the owner's vicarious liability; and second, how the concept of fault plays out in the absence of human conduct in a highly automated context.

14 The implications of MASS on liability are addressed below by discussing the scope of owners' vicarious liability in a MASS context (paragraphs 16 to 28). Product liability is briefly considered in paragraphs 29 to 32 and the nature of fault in paragraphs 33 to 38. Various regulatory options to address the identified issues and challenges are discussed in paragraphs 39 to 46, with some concluding remarks offered in paragraphs 47 to 55.

15 A starting point for the paper is that the introduction of MASS should avoid creating higher risks for third parties, i.e. victims of damage caused by incidents involving MASS should not be worse off than they would be in a similar incident involving conventionally operated ships. A second, related starting point is that a workable liability system should minimize the risk for third parties that (e.g. owing to an impossibility to meet the burden of proof) no one can be held liable for damage caused by MASS.

Scope of liability with respect to new entities

Extent of the owner's vicarious liability

16 MASS will bring about new players whose conduct will directly affect the operation of both MASS and other ships in their vicinity. Whether the scenario concerns remote operation or the (occasional) autonomous operation of ships, entities like suppliers of technology, system builders, software programmers, providers of communication infrastructure, as well as the usual naval architects, shipbuilders, class, and equipment providers, will in the future through MASS have a direct impact on how ships operate at sea.

17 The range of persons included within the shipowner's vicarious liability varies from one jurisdiction to another. The vicarious liability of shipowners often extends beyond a mere employment relationship, by encompassing faults of other entities who provide services to the ship. Often, however, this addition is coupled with the further condition that such services by other entities need to relate to matters for which the owner has some insight and/or control over the type of work or service provided.

18 The extent to which errors committed by such persons will trigger the vicarious liability of the shipowner also depends on contractual relationships and can be expected to vary from one jurisdiction to another, also depending on the type of error and how it has affected the operation of the ship.

19 Persons who are closely involved in the operation of ships such as (remote) crew members are more easily identified as falling within the vicarious liability of the owner, independently of contractual relationships between them. Conversely, the more remote the contribution of the person is from the actual operation of the ship (or the less control the shipowner has over the service provided), the more difficult it is to justify that the work performed by the person belongs to the sphere of liabilities for which the owner is liable.

20 If the fault is not within the liability sphere of the owner, the matter will not be governed by maritime law, but by general tort law in the jurisdiction concerned. This may have the consequence that it will be more challenging for claimants to identify the liable party, the error in question, the causal link between the error and the damage and the applicable legal framework. In addition, errors that have been committed a long time before the damage occurred may be inaccessible to claimants because of time bars in some jurisdictions.

21 On the other hand, as noted, claims outside the realm of the shipowner's liability would normally not be subject to limitation.

Remote operation

22 It follows from the broad principles outlined above that a person who operates a ship from a remote location (whether or not labelled a Master) could normally be expected to fall within the scope of the shipowner's liability. Hence, the shipowner would be vicariously liable for the negligent navigation of a ship by a remote operator. The location from which the task is performed is normally not considered to be a decisive factor in deciding whether the task is among those for which the owner is liable. A remote operator of a MASS may thus in most cases be expected to have a similar status as a conventional master or officer on watch with corresponding responsibilities. Indeed, it would be a major alteration of existing maritime law if responsibilities relating directly to the control and manoeuvring of ships could be contracted out to a third party, thereby cutting the link to the owner's vicarious liability.

23 That said, physically removing the control of the ship away from the ship clearly entails certain important new risks and liability implications for the owner. For example, operating the MASS remotely is entirely dependent on reliable communication technology, such as satellite communication systems: should the shipowner or the communication system provider bear the risk of interruptions or delays in communication? While it might seem desirable from a maritime law perspective, or for reasons of simplicity, that the shipowner remains liable for this risk too, that position is difficult to justify if liability is based on attribution of fault. In many instances of communication failure, it may have been impossible for the owner or crew members to foresee the failure or even to choose the system which is used for the purpose. Hence it may well be that the owner's liability on behalf of remote operators will be more limited than for traditional crew members, as some errors linked to the operation of the ship may be owing to circumstances that are beyond the control of both the remote operators and the owner.

Other service providers

24 Other key stakeholders, such as shipyards, equipment manufacturers, software developers, etc. have a less immediate impact on the operation of ships and will therefore, despite their crucial importance for the safe operation of MASS, normally be outside the sphere of persons whose actions, errors or negligence give rise to liability for owners. Claims against such parties may be brought in respect of damage caused by their defective product/service. In most jurisdictions such actions would be outside the realm of maritime law and, as was noted above, claims against such persons may involve important challenges in the form of difficulties to prove the wrongdoing, the causal links, and the required proximity (in substance as well as time) between the error and the consequences. Moreover, if liability is placed with these types of entities, it could leave the shipowner, who is the person using and benefitting from the technologies that these entities produce, supply, and install, without any liability.

25 In theory, the link between the services or tasks provided by such entities and the shipowner's liability could be strengthened by focusing on and emphasizing the shipowner's overall responsibility over the safety of the ship and, through that, his responsibility to carefully choose the service providers, shipyard and manufacturers, and to select reliable technological solutions, coupled with adequate prior testing and supervision as well as training opportunities for the crew. In this way the failure in the equipment or technology used on board the MASS could more easily be translated (also) into a fault or negligence by the owner.

26 However, placing a very high standard of care on the owner on such matters would not correspond to the legal system in many countries, for two main reasons. First, this type of responsibility, to test and control and verify technology installed on board, may be only remotely connected with the shipowners' core activities, for which he assumes vicarious liability. Second, high standards of care in this area would stretch the notion of negligence, as it could place unrealistic demands on what a shipowner is expected to know and control. More generally, without the availability of a realistic alternative course of action, the owner or those who work on his behalf, will normally not be considered to have acted negligently.

Fault by the MASS itself

27 In most jurisdictions the assumption is still that errors or negligence giving rise to liability are made by *humans*. However, there are also legal regimes, including those emanating from the *Code Napoleon*, that accept that *objects* can be "at fault" (although it is more commonly referred to as defective objects). Liability was initially thought to be based on presumed negligence of the owner of the building or object, but it is now accepted that the liability is based on the defectiveness of the building or object, and exists even if the owner was not, or could not even have been aware of, the defect. The question of whether a machine or system by itself can be at "fault" or commit torts may seem academic, since a machine cannot be sued or (more importantly) compensate victims. However, as already noted, the question of who is at fault is not the same as who is liable to pay compensation. It is thus thinkable in such jurisdictions that the error of the machine or the object will be considered as part of the owner's vicarious liability. The fact that an object (MASS) does not have legal personality (or a bank account) is thus not in itself a reason to reject the attribution of fault to it or its navigation system, if it is clear who will be financially liable for damage caused by such faults or defects.

28 It is notable in this respect that the 1910 Convention does not refer to fault of a human (master, crew member, pilot, etc.), but refers to fault "of the vessel". In some jurisdictions, hidden defects of the vessel are considered faults of the vessel for the purposes of the 1910 Convention.

Product liability

29 A separate question is whether claims for malfunctioning technology could be directed at the developers of that technology, in the form of a product liability. Product liability is in many jurisdictions strict, and claimants are therefore not expected to identify a particular fault or act of negligence by the technology developer. Claims in negligence will, however, be important potential avenues for compensation in circumstances where the prevailing strict liability regime finds no application.

30 Some product liability regimes focus on the defectiveness of the relevant product with reference to the level of safety the public is entitled to expect and in view of, for instance, the way the product is presented and the uses to which the product may reasonably be put. Some "strict" regimes allow limited defences for producers where the state of scientific knowledge is such that the relevant defect could not have been discovered: this has clear potential significance in the context of software and advanced autonomous technology. Regarding general negligence claims, the focus will likely be placed on the production process and whether appropriate degrees of care were exercised. This will inevitably be assessed in the light of the prevailing regulatory framework for the development and operation of the autonomous technology.

31 A commonality between most strict and fault-based product liability regimes is the need for a causal link between either fault or defectiveness, and the relevant loss. This will likely involve complex factual inquiries which fall to be made against the backdrop of the shipowner's well-established responsibilities for the safe management of vessels.

32 Any such shift in the general trajectory of liability away from shipowners (and their insurers) and onto technology producers would be a significant development, not least because technology producers are not in a category of entities generally entitled to limit their liability for maritime claims under global tonnage limitation regimes such as the LLMC Convention. In turn, this raises significant questions for the existing insurance framework for maritime liability.

Characterization of fault in a MASS context

33 The development towards MASS also raises more general issues of tort law, i.e. how fault should be characterized or defined in a new environment where the liable person has less control and means of exercising control over equipment failure and other causes of damage by MASS. It has already been noted that in most countries errors or negligence giving rise to liability are presumed to be caused by humans, e.g. in the format of a negligent breach of duty or, in a contractual setting, a want of due diligence. Under the 1910 convention, liability for collisions explicitly follows fault.

34 However, accidents can occur at sea without any fault on the part of an entity which may be the subject of legal action. This is the case in conventional shipping and these cases may be expected to rise with the development of MASS. If liability follows fault, in principle, the loss suffered should lie where it falls. This is essentially the case with doctrine such as "inevitable accident" under English law pursuant to which a defendant will escape liability if it is shown that the loss could not have been avoided by the exercise of reasonable care.

35 The issue presented by MASS is the very real prospect of all relevant actors being able to demonstrate the requisite level of skill and diligence (or the victim otherwise not being able to prove otherwise) and yet an accident and loss still results because of (for instance) some glitch or error in the autonomous navigation system or the communication system on which that system relies. Fault or negligence, as was noted above, normally presumes that the person should or at least could have realized that something was wrong and therefore should have acted differently.

36 Whether a human may be held responsible for faults by machines will often centre around the extent to which the human was expected to supervise or be "in charge of" the system in question, i.e. the autonomy level involved. Even highly sophisticated data systems that currently in reality operate ships, such as Dynamic Positioning, do not challenge the assumption that the human is in charge, as it is expected that the officer on watch at all times monitors the operation and intervenes where needed. This changes if humans are specifically authorized to leave supervision and control, and is only expected to return to active control if the system asks for it, or in case of alarms, etc.

37 The risks and questions related to negligence are likely to vary with the type of MASS operations. If there are humans on board, they might be able to – and be expected to – intervene when the system navigating the vessel is unable to cope. In this case, a key question is whether the humans were provided reasonable time and opportunities to familiarize themselves with the situation before being expected to intervene. If the vessel is remotely operated, the remote operators will clearly be expected to intervene, and may well be considered negligent if they fail to do so. Yet, their negligence may be reduced or removed if the vessel provides wrongful or incomplete situational awareness information to the remote operating centre (ROC) or if the communication link between the ship and the ROC is slow or broken. Even in the case of fully autonomous vessels, there will still be humans involved, but the link between the incident and the humans whose errors were at the origin of it may be very distant. The navigation algorithms may have been developed many years ago by a team of hundreds of developers, and the only "human in the loop" may be a shore-based emergency response team. In all these scenarios, proving fault or negligence of one of the humans involved may prove impossible, even if the MASS as such did not function as expected and certified.

38 It should also be noted that "full" autonomy, from a liability perspective, is not necessarily limited to futuristic hi-technology ships operating without any intervention by humans. For liability purposes, full autonomy simply means that the ship, when the error

happened, operated (and was authorized to operate) autonomously without human supervision. It may thus concern only very limited periods of time and is not dependent on whether there were crew members on board the ship. If the liability of MASS is different from conventional operation, the liability regime may thus change repeatedly during a single voyage, depending on the division of labour between the human and the machine at the critical moments in time.

Alternative strategies

39 When considering how to approach the new risk profile of MASS in terms of liability, the first, and easiest, solution would be to accept the *status quo*, i.e. the "do nothing" option. This would leave the challenges to accommodate MASS to the existing liability framework to national courts and regulators. In some jurisdictions, failures by MASS may be regarded as just another type of "technical failure" by ships and hence easier to accommodate in the existing liability framework. In other jurisdictions, where fault is closely linked to actions or omissions by humans, this will be more difficult and it may not, for example, be possible to claim compensation from the MASS side in a collision, and the losses would lie where they fall, with the owners of the other vessels or other third-party claimants.

40 At the other end of the spectrum, there is the possibility to introduce strict (faultless) liability for owners of MASS. If an incident occurs involving a MASS, the MASS is presumed to be at fault, subject to some pre-identified exceptions and defences. Strict liability on the shipowner thus significantly eases the burden placed on claimants, but also has some preventive potential, in that liability for the new technology is placed with the person who uses and benefits from the technology and has the best opportunities to optimize actions to avoid incidents. Strict liability regimes come in various forms. One variant represents a kind of "enterprise liability", in which the owner or operator of MASS is considered to have taken a calculated risk when introducing (and benefitting from) a new type of technology, which justifies strict liability. Other variants include liability for particularly hazardous activities or, even with respect to technical failure of devices prone to causing damage.

41 Strict liability, however, also raises questions of fairness. Why would the MASS in a collision with another ship be presumed to be at fault, simply because it is a MASS? If two ships behave in an identical manner, it is unfair if one of them (the MASS) is liable where the conventional ship is not. It is perfectly possible, for example, that the MASS keeps its course and speed as it should under the COLREGS, and that the collision is caused by the manned vessel suddenly turning in front of the MASS. While that example probably could be resolved by applying the habitual exemption for contributory negligence, strict liability does entail other issues of fairness. To avoid liability, the MASS shipowner would, for example, have to successfully rebut presumptions that may be difficult for him to prove, which an owner of a conventional ship will not have to deal with. This may also create an incentive for MASS operators to conceal that the ship operated in an autonomous mode at the time of the incident. It is not self-evident, therefore, that introducing a strict liability regime for MASS would be the best possible solution.

42 One way of addressing the difficulties for claimants to demonstrate fault in a fault-based liability system would be to redefine the traditional idea of fault itself as something other than demonstrable lack of care/due diligence, in the context of autonomous systems. This could be achieved by allowing for "anonymous" or "cumulative" culpa to count as errors by the owner, even without an identified single negligent person or act. While such constructions are supposedly accepted under the 1910 Convention, they do not remove the need for claimants to demonstrate that some form of negligence has occurred.

43 Another strategy, which may also be in line with the 1910 Convention, would be to presume fault in certain circumstances with a reversal or practical qualification of the burden of proof with respect to fault: requiring those best placed to assess the safety of the technology (shipowners and/or technology developers) to prove an absence of fault. Such defendants may be required to prove the specific cause or only to show reasonable care. Yet, this strategy, too, may prove only partially helpful for claimants, since it also leaves the option of no liable party open in cases where the owner can prove that the fault was committed by a person outside the sphere of his (vicarious) liability.

44 In addition to presumptions relating to fault, it is also possible to use presumptions with respect to the liable person: if the presumed liable person (shipowner) cannot demonstrate that another person (outside his vicarious liability) is responsible for the wrongdoings in question, liability will rest with the owner.

45 As was noted in paragraph 5.3.2, an alternative strategy to improve the prospect of compensation without departing from the notion of fault-based liability could be to raise the standard of care expected from the owner to the extent that (latent) technical errors by the MASS would amount to a failure of the owner to maintain the safety of the ship. The mere fact that an incident happens could be regarded as evidence of insufficient testing of MASS systems or insufficient training provided to the crew using it, wrongful choice of service providers, etc. hence maintaining a link to the owner's negligence. However, it was already noted that this strategy to avoid liability gaps may stretch the notion of negligence considerably, and that circumstances over which the owner has little information and control, and few means to acquire it, will normally extend beyond the level of care expected in a fault-based liability system. Moreover, the mere fact that an incident happens with a MASS does not in itself prove that the incident was due to a technical error.

46 Yet another approach departs from defects in the MASS itself or its technology systems as a basis for liability. In this variant, the incident itself triggers the owner's (fault-based) liability, and it could be applied with or without a link to the owner's own awareness of the matter. The concepts and criteria developed in product liability law could be instructive in this respect, even if it is unclear whether a ship as such could be considered a "product". A product is defective when it does not offer the safety a person is reasonably entitled to expect, taking all circumstances into account. In an analogy to this approach a MASS could be considered defective if it does not offer the safety the (maritime) world is reasonably entitled to expect from it, taking all circumstances into account. For MASS owners, the duty to provide a non-defective MASS could be a continuous one. Every time a MASS starts on a voyage, it must provide the safety that the maritime public is reasonably entitled to expect, e.g. by updating systems and replacing outdated technologies. A MASS that was safe five years ago may not be safe enough today anymore, and a MASS with all updates applied may be safe whereas the same MASS without the updates may be defective.

Conclusion

47 A shift towards MASS will affect several aspects of a ship's operation and liability for any losses. The people involved in operating ships are less likely to have control over the processes which control the navigation of them and will be specifically authorized not to be in charge of navigation in cases of "full autonomy". If casualties arise it may be difficult for claimants to trace those at fault, and any error may have occurred years before, giving rise to issues of time bar. Proving error or negligence may be demanding for third parties who have suffered loss caused by MASS. Such novel elements increase the risk that victims of incidents involving MASS may not be adequately (or at all) compensated.

48 New risks that may not be fully covered by the existing liability regime include, inter alia, the increased reliance on technology for the operation to work, the increased range of persons whose decisions will directly affect how ships are operated, and the increased handing of control from humans to machines.

49 The legal solutions to the various risks will vary from one state to another and there is hence a risk that liability linked to MASS will suffer from a significant lack of regulatory uniformity, which is challenging in a global industry.

50 There is no perfect solution available to resolve the identified issues. All available strategies discussed above, including the do-nothing option, involve some question marks relating to effective protection of third parties, fairness or practicality.

51 A fault-based liability regime involves important risks that victims of incidents involving MASS are left without compensation. This is due to, inter alia, the difficulties in establishing what has happened and the fact that a person linked to the MASS- shipowner has committed a fault.

52 Various regulatory techniques linked to the use of presumptions, proof rules and a broader understanding of culpability would serve to reduce such drawbacks but would not do away with the fundamental problems involved. For such mechanisms to work properly, it is still necessary to know what has happened and to what extent various persons involved contributed to the events.

53 Another approach could be to interpret "fault of the vessel" in the 1910 Convention as including a defective condition of the MASS itself and accept that an object such as a MASS can be "at fault" (defective). The defect of the ship could be linked to safety levels which the (maritime) world is reasonably entitled to expect from it, to be further established by regulatory guidelines.

54 A strict liability regime, coupled with the relevant and necessary exceptions, would in some respects appear to be the most clear-cut of the alternatives identified in this paper. In most states, however, such a solution would need to rely on regulatory intervention, preferably guided by IMO-coordination, and a related revision of the 1910 Convention. While being the "cleanest" option in terms of legal clarity, it also is the one that demands most regulatory intervention and policy effort by the Organization.

55 However, before any regulatory intervention on the topic of liability and MASS could be contemplated, several important regulatory questions need to be addressed. This includes the material scope of such an instrument. Regulating any type of MASS would fail to acknowledge that MASS represents a mode of operating ships rather than a category of ships. A ship with MASS capabilities that is operated in the lower (manually controlled) levels of autonomy by an onboard crew does not justify any alteration of the existing liability regime. Targeting, on the other hand, only MASS that operate in an autonomous or remote-controlled mode, would involve various questions of fairness in relation to conventional ships, as identified above. A more general liability instrument addressing technical failure on board ships, in turn, would expose a series of difficult definitions between technical and human errors and their inter-relationship. An even more general liability regime covering any type of third-party liability for ships may, on the other hand, be too ambitious an exercise and an initiative to embark on since such an effort has already been turned down by the Organization in 1997.

Action requested of the Committee

56 The Committee is invited to take note of the information provided above and take action, as appropriate.