SUMMARY OF RESPONSES TO THE CMI QUESTIONNAIRE ON UNMANNED SHIPS

In March 2017 the CMI Working Group on Unmanned Ships circulated a questionnaire among the Member Associations of the CMI. The questionnaire forms part of a regulatory scopic exercise undertaken by the Working Group with the aim to identify the nature and extent of potential obstacles in the current international legal framework to the introduction of (wholly or partly) unmanned ships.

In the questionnaire the national Maritime Law Associations (MLAs) are asked to elaborate on the extent to which the national understanding and application of a selection of international rules of and principles would or could accommodate an application to unmanned operations. The majority of questions (headings 3 through to 5) concern IMO conventions but the questionnaire also contains questions relating to UNCLOS (heading 2) and questions on issues of definition (heading 1) and liability (heading 6).

In line with the aim of the Working Group at this stage, to identify potential problem areas, the questionnaire in particular does not aim at finding legislative solutions. To the extent that the responses to the questionnaire contain comments in this direction, they have not been included in the below summary. The responses can be found in full on the CMI homepage: <http://www.comitemaritime.org/Maritime-Law-for-Unmanned-Craft/0,27153,115332,00.html>.

As at 13 February 2018 the Working Group has received responses from the Argentinian (Arg), Brazilian (Bra), British (Bri), Canadian (Can), Chinese (Chi), Croatian (Cro), Danish (Dan), Dutch (Dut), Finnish (Fin), French (Fre) German (Ger), Irish (Iri), Italian (Ita), Japanese (Jap), Maltese (Mal), Panamanian (Pan), Singaporean (Sin), Spanish (Spa) and US (US) MLAs.

CMI and the International Working Group are grateful to these 19 MLAs for having taken the time to answer the Questionnaire, the result of which is presented in the following overview.

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| 1. **NATIONAL LAW** |
| * 1. **Would a “cargo ship” in excess of 500 grt, without a master or crew onboard, which is either**      1. **controlled remotely by radio communication?**      2. **controlled autonomously by, inter alia, a computerised collision avoidance system, without any human supervision**   **constitute a “ship” under your national merchant shipping law?** |
| Answer:  17 MLAs (Maritime Law Associations) answer that an unmanned ship would (Arg, Can, Dut, Iri, Ita, Jap, Mal, Sin, US) or most likely would (Bra, Bri, Chi, Den, Fin, Fre, Ger, Spa) constitute a ship under their national law. The Panamanian MLA states that although the definition of ship under Panamanian national law is broad enough to include unmanned ships, it is ultimately up to the Administration to decide what a ship is. The Croatian MLA states that an unmanned ship would not be seaworthy. This answer does not seem to preclude that an unmanned ship would be a ship per definition under Croatian law. |
| * 1. **Would an unmanned “ship” face difficulty under your national law in registering as such on account of its unmanned orientation?** |
| Answer:  13 MLAs answer directly or indirectly that manning is no express criterion for registration (Bri, Can, Chi, Den, Dut, Fin, Fre, Ger, Iri, Ita, Jap, US). Five MLAs expressly state that an unmanned ship would not be able to register on account of its unmanned orientation (Arg, Bra, Cro, Mal, Spa). The Singaporean MLA answers that there is no regulation in place.  Four MLAs emphasize that an unmanned ship may still not be able to register due to current technical classification rules (Chi, Den) and rules implying that an on-board crew is required (Ita, Pan).  Comment:  The variety in the answers partly seems to be due to whether the question has been understood to aim at whether there is an express rule requiring manning in order to register (no MLA has answered expressly that there is) or whether other rules, indirectly requiring manning, such as rules on seaworthiness would effectively prevent a ship from registering. The answers of the national MLAs further depend on the extent to which the national rules on registration are linked to public rules on maritime safety. The US MLA, for example, states that the manning status or manner of operation of a ship is not a question raised with respect to the qualification of registry under the US flag. This can be contrasted with the statement of the Argentinian MLA stating that in order to register a ship in the Argentine Register, regulatory requirements regarding constriction and seaworthiness must be fulfilled. |
| * 1. **Under your national law, is there a mechanism through which, e.g. a Government Secretary may declare a “structure” to be a “ship” when otherwise it would not constitute such under the ordinary rules?** |
| Answer:  14 MLAs answer that there is no such mechanism under their national law (Arg, Bra, Can, Chi, Cro, Den, Fin, Ger, Iri, Ita, Jap, Sing, Spa, US). Three MLAs (Bri, Dut, Pan) answer that their law does contain such mechanisms. The French MLA answers that the authority responsible for flag control has the power to accept derogations from certain technical provisions. It does not necessarily follow from this answer that this would also include the power to declare a structure a ship, which per its definition would otherwise not be a ship. The Maltese MLA does not provide an express answer but refers to the wide definition of ship under Maltese law seemingly implying that there would be no need for such mechanism in relation to unmanned ships. |
| * 1. **Under your national merchant shipping law, could either of the following constitute the unmanned ship’s “master”**       1. **The chief on-shore remote-controller**      2. **The chief pre-programmer of an autonomous ship**      3. **Another 'designated' person who is responsible on paper, but is not immediately involved with the operation of the ship.** |
| Answer:  Eleven MLAs answer that their national laws contain a definition of master (Arg, Bra, Bri, Can, Chi, Cro, Dut, Fre, Pan, Sin, US). Three of these MLAs state that the master is defined as a person on board the ship (Bra, Chi, Cro). Out of the eight MLAs whose national law contain no reference to presence on board, six MLAs state that they consider or do not exclude that the remote controller could constitute the master (Bri, Can, Fre, Pan, Sin, US). Three MLAs state that while the definition as such does not preclude that a remote controller could constitute the master, provisions of national and international law presupposing that the master is present on board would render amendments to these rules necessary (Arg, Can, Dut). Nine MLAs quote the national definition of the master and it is noted that all definitions define the master with reference to the person being in command of the ship in these or similar words (Arg, Bra, Bri, Can, Chi, Dut, Fre, Sin, US).  Among the eight MLAs of jurisdictions not providing for a definition of master (or where no reference has been made in the answer), seven MLAs answer with reference to rules of national and international law presupposing that the master is on board the ship that without amendment the remote controller could not or most likely could not be the master (Fin, Ger, Iri, Ita, Jap, Mal, Spa). In particular the requirements for a minimum safe manning is emphasised by four of these MLAs as an obstruction to treat shore based personnel as master or crew (Can, Ger, Mal, Spa). The Danish MLA states that it is highly uncertain whether an on-shore person could be deemed the master under Danish law.  All 19 MLAs unanimously answer that neither the chief pre-programmer of an autonomous ship nor another designated person not immediately involved in the operation of the ship could constitute the master.  Comment:  The variety in the answers partly seems to be due to whether the answer has been given in respect of the general possibility to accommodate a remote controller under the traditional understanding of master, or in respect of the ability of the remote controller to discharge the master's obligation. It is clear that an answer based on the latter approach in most cases will lead to the conclusion that the remote controller cannot without more constitute the master. The MLAs of jurisdictions whose national law provide for a definition of master, for this reason, are more inclined to conclude that the remote controller could constitute the master, given that where the remote controller is in charge of the ship, he would fall under this definition. |
| * 1. **Could other remote-controllers constitute the “crew” for the purposes of your national merchant shipping laws?** |
| Answer:  Ten MLAs answer that their national laws contain a definition of crew (or seamen) (Bra, Bri, Chi, Cro, Den, Dut, Fin, Fre, Sin, US). Nine of these MLAs state that the definition expressly requires on board presence (all but Bra). Eight conclude that the definition could not comprise shore based individuals (Bra, Bri, Chi, Cro, Dut, Fre, Sin, US). Two MLAs do not exclude that persons working on shore may be “seamen” despite the reference to on board presence (Den, Fin): The Danish MLA states that if an unmanned ship is a ship per definition, a person employed on that ship may be considered a crewmember, although de facto not being on board the ship. The Finnish MLA equally states that the definition does not rule out a broader interpretation under which the crew performs its tasks from elsewhere and that focus should be on the functions performed.  Among the nine MLAs of jurisdictions not providing for a definition of crew or seamen (or where no reference has been made in the answer), six MLAs answer with reference to rules of national and international law requiring various functions to be carried out on board the ship, including but limited to the rules on minimum safe manning as set out above under 1.4, that remote controllers could not constitute crew (Can, Ger, Ita, Jap, Mal, Spa). Three MLAs do not exclude that depending on the purpose of the specific rule or regulation, a shore based controller may constitute crew (Arg, Dut, Pan).  Several MLAs recognise the need to view the answer in light of the functions performed or more specifically, the purpose of the various rules at issue. The Dutch MLA for example states: “Depending on the purpose of the specific rule or regulation about crew (for example social security, safety, training, living circumstances etc.) the answer may differ whether remote controllers constitute the “crew”.”  Comment:  Similar considerations arise as set out under 1.4 above with regard to answers given in respect of the general possibility to accommodate shore based individuals under the traditional understanding of seafarers or crew, or in respect of the ability of such individuals to discharge the crew's obligations. |
| 1. **UNITED NATIONS CONVENTION ON THE LAW OF THE SEA, 1982 (UNCLOS)** |
| * 1. **Do you foresee any problems in treating unmanned ships as “vessels” or “ships” under the Law of the Sea in your jurisdiction (i.e. that such ships would be subject to the same rights and duties such as freedom of navigation, rights of passage, rights of coastal and port states to intervene and duties of flag states) in the same way as corresponding manned ships are treated?** |
| Answer:  Among the seven answers focusing on *whether* unmanned ships would be subject to UNCLOS and thus subject to the same rights and duties, five MLAs answer that they would, given their capacity as ships and/or ships under national and international law (Dut, Fin, Fre, Ger, Pan). The Italian MLA states that possible problems will depend on the inherent (in)adequacy of UNCLOS to deal with the matter and possible inconsistencies with the definition of ship to be found in Italian law. The Maltese MLA states that it foresees problems in the treatment of unmanned ships by Malta because of the absence of legislation on a national and international level and that it is a moot point whether Malta will acknowledge and accept that the rights and obligations of manned ships under UNCLOS extend to unmanned ships.  The US MLA states that although the USA has not ratified UNCLOS, since under US law “ship” is defined without regard to manning, unmanned ships are probably subject to the same rights and obligations under the Law of the Sea. National US law for example uses the same definition for innocent passage as UNCLOS.  Among the answers focusing on potential problems arising once one accepts that unmanned ships fall under the scope of UNCLOS and thus, are subject to the same rights and duties as manned ships, a large proportion concern safety aspects. Four MLAs point to the potential problem of the port state not being in a position to satisfy itself as to the safety credentials of a ship in the traditional way by way of assessing the master and crew and the requisite on-board certification (Arg, Bra, Bri, Den). The British MLA adds that a lack of personnel on board means there are no persons on board to arrest in the event of defaults. The Canadian MLA points out that if unmanned cargo ships were felt to represent a pollution risk or a safety risk, Canadian domestic law in theory denies right of passage to those ships. The Japanese MLA states that several provisions in national law presuppose that a master is on board foreign ships. The Croatian MLA states that each jurisdiction allowing an unmanned ship to enter their waters should first ensure the technical capability of being able to assume command of an unmanned ship in case anything goes wrong. The German MLA states that security related issues may pose a problem and that unmanned ships are likely to be subject to more frequent coastal state inspections. The Argentinian MLA states that some of its members consider that an unmanned nuclear ship would not be included under Art. 23 of UNCLOS. This statement seems to suggest that an unmanned nuclear ship would not enjoy the right to innocent passage. The Singaporean MLA raises the issue of identification of the relevant personnel in respect of communication or decision making.  Two MLAs highlight the potential problem of establishing a genuine link to such ships (Bra, Den). The Spanish MLA seem to imply that an unmanned ship would not be eligible to fly the Spanish flag.  Among remaining types of issues mentioned, the Danish MLA raises concerns in respect of liability for damages and insurance. The Singaporean MLA states that it is unclear how national pilotage requirements and regulations wold apply to such ship. |
| * 1. **Paragraphs (3) and (4) of UNCLOS Article 94 include a number of obligations on flag states with respect to the manning of such ships. Do you think that it is possible to resolve potential inconsistencies between these provisions and the operation of unmanned ships without a crew on board through measures at IMO (under paragraph (5) of the same Article) or do you think other measures are necessary to ensure consistency with UNCLOS. If so, what measures?** |
| Answer:  Eleven MLAs state that they consider or tend to consider potential inconsistencies to be resolved through measures at IMO level (Arg, Bri, Chi, Den, Dut, Fin, Ger, Jap, Mal, Pan, Spa). Two MLAs consider that UNCLOS would require amendment in order to allow unmanned ships (Fre, Iri).The US MLA states that USA has not ratified UNCLOS. Five MLAs do not take a position (Bra, Can, Cro, Sin, Ita).  Three MLAs reaching the conclusion that measures at IMO level would suffice emphasise in particular the aim of Art. 94, which is to ensure safety of navigation (Arg, Bri, Ger). Three others emphasise the character of UNCLOS as a framework convention, leaving the further details to be worked out by IMO (Chi, Fin, Spa).  Among the MLAs that do not take a position on the question three MLAs consider the wording to exclude unmanned operations but are hesitant to exclude that a teleological interpretation could not lead to another conclusion (Bra, Can, Ita).  The French MLA states that whereas it considers amendments necessary these would be limited in scope. For example instead of mentioning the captain, officer and crew, a general reference could be made to the ship. |
| 1. **IMO CONVENTIONS – THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA (SOLAS) 1974 (AS AMENDED)** |
| * 1. **Does your national law implementing the safe manning requirement in Regulation 14 of Chapter V of SOLAS require at least a small number of on board personnel or does the relevant authority have the discretion to allow unmanned operation if satisfied as to its safety?** |
| Answer:  Eight MLAs answer that under the current national law the relevant authority does not seem to have discretion to allow unmanned operations (Arg, Bra, Can, Chi, Cro, Den, Ita, Mal, Spa, US). The remaining eleven MLAs do not rule out that the authority would have discretion to allow unmanned operations (Bri, Dut, Fin, Fre, Ger, Iri, Jap, Pan, Sin).  The MLAs that answer that the authority may have such discretion founds this position on the lack of a requirement for an express number of personnel required on board (Bri, Dut, Fin, Fre, Ger) or on a mechanism under the national law allowing the shipowner to apply with the authority for exceptions (Iri, Jap, Sin).  Comment:  It is noted that the answers are given with a particularly high degree of uncertainty. The majority of MLAs stating that it *may* be possible for the authority to allow unmanned operations do so with hesitation. |
| * 1. **Regulation 15 of SOLAS Chapter V concerns principles relating to bridge design. It requires decisions on bridge design to be taken with the aim of, inter alia, “facilitating the tasks to be performed by the bridge team and the pilot in making full appraisal of the situation…”. In the contest of a remote controlled unmanned ship, could this requirement be satisfied by an equivalent shore-based facility with a visual and aural stream of the ship’s vicinity?** |
| Answer:  Eight MLAs answer the question in the affirmative (Arg, Bra, Chi, Dut, Fin, Ger, Jap, Pan)  Nine in the negative (Bri, Can, Cro, Den, Iri, Ita, Mal, Spa, US). Two MLAs do not give an (express or implied) answer (Fre, Sin).  Among the MLAs answering the question in the affirmative, five emphasise the functionality of such shore bridge as decisive for the issue of whether such a bridge would satisfy the requirement (Bra, Chi, Ger, Jap, Dut). The Finnish MLA bases its conclusion on the fact that flag states have a large discretion in matters relating to ship design. It also emphasises, however, that unmanned ships may still need a bridge on board if people can be expected to board and operate the ship at times.  Among the MLAs answering the question in the negative, three MLAs state that in their view also unmanned ships will be required to have an on-board bridge (Can, Ita, US). The British MLA states that while it is clear that the bridge in the context of SOLAS only refers to an on-board bridge, SOLAS Chapter V Reg 3(2) grants the relevant maritime authority the ability to prescribe exceptions from and equivalence to the Chapter V regulations to the extent such provisions are unreasonable or unnecessary. The Danish MLA states that the Danish Maritime Authority recently issued a report concluding that the provision would have to be amended in order for unmanned ships to use an electronic and/or a remote bridge facility. The Spanish MLA states that as long as the master must be on board on the bridge, so must the bridge.  The French MLA states that it considers the question more technical than legal. This, if anything, may indicate that the French MLA does not see a legal obstacle towards such interpretation |
| * 1. **As interpreted under national law, could an unmanned ship, failing to proceed with all speed to the assistance of persons in distress at sea as required by Regulation 33 of SOLAS Chapter V, successfully invoke the lack of an on-board crew as the reason for omitting to do so (provided that the ship undertook other measures such as relaying distress signals etc.)?** |
| Answer:  The majority of MLAs state that whereas the mere fact that the ship is unmanned does not discharge the master from providing whatever assistance the ship is capable of, the fact that the ship in unmanned may de facto limit the scope of the duty since it would be limited to what is inter alia technically possible (Bri, Can, Den, Dut, Fin, Fre, Ger, Ita, Sin, Spa, US). Four MLAs similarly state that the master could not invoke the lack of crew to escape liability but do not go into details on the possible limited extent of the capability of an unmanned ship to render assistance (Arg, Cro, Iri, Pan). The Maltese MLA states that the lack of crew on board presumably could be invoked to excuse and unmanned ship from failing to provide assistance to persons in distress. The statements made in relation to this answer, however, indicate that such excuse could not be *successfully* invoked to escape liability. Rather the incapability of an unmanned ship to adhere with the requirements to render assistance could preclude such ship from flying the Malta Flag the Maltese MLA concludes. Three MLAs do not give an (express or implied) answer (Bra, Chi, Jap).  Three MLAs point out that as the obligation is channelled to the master the rule is only relevant to unmanned ships to the extent that the ship can be considered to have a “master” (Bra, Bri, Jap). The Danish MLA assumes that a shore based remote controller would be treated as master for the purpose of the rule.  Various MLAs point out that an unmanned ship may be able to assist in serving as a platform (Fin), staying on the windward side to offer protection, relay VHF communication (Ger), marking the location, provide shelter for those abandoning the distressed ship or provide video images (US). The US MLA states that the only assistance that could not be rendered would be to put aboard damage control equipment or assist persons in leaving the distressed ship. The French MLA states that a ship which is not technically able to render assistance should not be allowed to sail given the importance of the principle.  Comment:  It is noted that there is a common understanding that the master (to the extent there is one) of an unmanned ship would not be relieved from the duty to render assistance. There is further a common understanding that the extent of this duty will be defined by the actual capability of theship to render assistance, and that effectively this may reduce the duty in certain aspects (but possibly increase it in other aspects depending on the technical capabilities). However, the answers indicate a discrepancy when it comes to the minimum extent of the duty. While some answers seem to suggest that it would suffice for the ship to sail to the distress location and send electronic signals, others seem to suggest that the ship inter alia must be capable of taking distressed persons on-board. |
| 1. **THE INTERNATIONAL REGULATIONS FOR PREVENTING OF COLLISIONS AT SEA, 1972 (COLREGS)** |
| * 1. **Would the operation of an unmanned “ship” without any on board personnel, per se, be contrary to the duty / principle of “good seamanship” under the COLREGS, as interpreted nationally, regardless of the safety credentials of the remote control system?** |
| Answer:    11 MLAs state that unmanned operation should not necessarily be considered contrary to good seamanship (Arg, Bri, Can, Chi, Den, Dut, Fin, Ger, Ita, Jap, Pan). The Spanish MLA states that it is possible that the operation of an unmanned ship would be held contrary to the principle of good seamanship. Two MLAs state that such operation would be contrary to the standards of goods seamanship (Cro, Mal). Four MLAs do not take a position (Bra, Iri, Fre, Sin, US).  Eight MLAs emphasise the requirement that unmanned ship must be at least as safe as ships operated by a qualified crew (Arg, Bri, Can, Chi, Dut, Ger, Jap, Pan).  Two MLAs state that the notion of good seamanship in their view constitutes an open norm that is primarily aimed at the navigational conduct of the ship (Dut, Ger).  The Finnish MLA states that the good seamanship requirement in Rule 8 (a) COLREGS would apply by analogy to any action to avoid collision taken by a shore-based crew. The Danish MLA points out that the relevant criteria under Rule 2 COLREGS is who is operating the ship and not from where. The French MLA similarly states that unmanned ships may be in a position to adhere to the principle as there will still be human intervention, albeit from shore. The Italian MLA states that according to Italian case law the ordinary practise of seamanship requires the master, officers and crew to manage and oversee the marine adventure to the best of their ability, which should in theory, be possible also for a shore-based crew.  Two MLAs state that unmanned ships do not fall either under COLREGS or the national law incorporating the Regulations due to the way in which the Regulations were drafted with manned ships in mind (Bra, Spa).  The Croatian MLA states that according to Croatian law, an unmanned ship would be unseaworthy. The Maltese MLA reaches its conclusion that such ship would per se be contrary to the principle of good seamanship based on the traditional understanding of the principle and in lack of guidance on the subject. The Irish MLA states that questions of good seamanship are treated by Irish courts as questions of facts. The Singaporean MLA does not answer the question in relation to a remote controlled ship. The US MLA states that there seems to be no case law on the matter. |
| * 1. **Would the autonomous operation of a “ship”, without any on-board personnel or any human supervision, be contrary to the duty / principle of “good seamanship”, under the COLREGS, as interpreted nationally, regardless of the safety credentials of the autonomous control system?** |
| Answer:  Six MLAs state that autonomous operation without any human involvement should not per se be considered contrary to good seamanship (Arg, Can, Chi, Dut, Ger, Jap, Pan). Two MLAs state that such operation is probably inconsistent with the standards of good seamanship (Bri, Spa). Four MLAs state that such operation would be contrary to the standards of goods seamanship (Cro, Fre, Ita, Mal). Five MLAs do not take a position (Bra, Den, Fin, Iri, Sin, US).  In order to avoid repetition, reference is made to the remarks by the national MLAs in relation to both questions as set out under 4.1. The following additional remarks have been made only in relation to question 4.2:  The British MLA emphasises that many English cases hold that overreliance on heading or track control systems without keeping a proper lookout is contrary to good seamanship. By analogy, complete deference to autonomous navigation technology seems at odds with the standards set out in Rule 2(b), requiring a value judgement of which the current technology would not be capable. The Singaporean MLA similarly states that good seamanship may require the seaman to take action in response to unexpected or unforeseen circumstances which an autonomous system may not be programmed to do. The Finnish MLA refers to the Rule 2(a) COLREGS requiring precaution by the ordinary practise of seamen or by the special circumstances of the case and concludes that it will be more difficult to programme the ordinary practise of seamen than the algorithms needed to secure compliance with the remaining rules of COLREGS.  The French MLA states that the principle of good seamanship cannot be adhered to in circumstances where there is a lack of human intervention. Instead, one would have to introduce a corresponding standard for fully autonomous ships. The Italian MLA states that according to the understanding of the ordinary practise of seamen required under Italian law (see 4.1) a fully autonomous ship could not adhere to the principle.    The Danish MLA does not answer the question whether the operation of a wholly unmanned and unsupervised ship would be in breach of the principle.  Comment:  It is noted that whereas some MLAs consider the principle of good seamanship to require human intervention in the decision making loop, others consider the principle to be aimed at the navigational conduct of the ship. The apprehension is linked to the difference in approach as to whether under question 4.2 an autonomous ship would be in breach of the principle of good seamanship. |
| * 1. **As interpreted under national law, could the COLREG Rule 5 requirement to maintain a “proper lookout” be satisfied by camera and aural censoring equipment fixed to the ship transmitting the ship’s vicinity to those “navigating” the ship from the shore?** |
| Answer:  Six MLAs state that the requirement to maintain a proper lookout could or could probably be satisfied by transmission of data to a shore-based crew (Arg, Dut, Fin, Fre, Jap, Pan). Two MLAs state that it is unknown but likely (Bri, Can). Two MLAs state that it is possible that the requirement would be satisfied by such transmission (Spa, US). Three MLAs state that the requirement could not be satisfied by transmission to a shore-based individual (Iri, Ita, Mal). Six MLAs do not take a position (Bra, Chi, Cro, Den, Ger, Sin).  Eight MLAs emphasise the requirement that the system must be able to provide shore-based personnel with at least the same situational awareness as when present on board (Arg, Bri, Can, Dut, Fin, Fre, Ger, Jap). Two MLAs emphasize in addition that further factors such as the robustness and reliability of the system would have to be taken into the consideration as to whether the system would be equally safe (Dut, Ger).  The Spanish MLA emphasises that the Rule requires proper lookout to be maintained “by sight and hearing as well as by all available means”. If the courts would consider the cameras and aural equipment to be no more than “all available means” the prerequisite for by sight and hearing would still need to be fulfilled by human presence on board.  The Canadian MLA states that while there is no case law in relation to an unmanned ship, the prerequisites set out in Canadian case law in relation to manned operations could be met remotely.  Two MLAs base their conclusion that it is likely that such transmission would satisfy the requirement on the fact that there is no requirement in the Rule that specifically calls for these tasks to be carried out by an on-board crew member (Bri, Can). Two MLAs state that lookout by sight and hearing can per definition still be maintained if a technical mean is used (cf. for example a pair of binoculars) (Can, Ger).  In contrast the Irish MLA states that the fact that the Rule expressly requires that every ship shall at all times maintain a proper lookout by sight excludes that the lookout be maintained by transmission of data.  The Maltese MLA states that the convention presupposes on-board personnel. The Italian MLA states that the lack of a human presence on board a ship, especially in situations where additional or reinforced lookout is required makes it difficult to argue that a proper lookout can be maintained without anyone on board. The interpretation of the rule read together with Section A-VIII/2 Part 4 STCW by the Italian courts is still strictly tied to the concept of a human performing the duty on board. The Singaporean MLA similarly points to how COLREGS were not drafted with unmanned ships in mind. The traditional understanding of maintaining a proper lookout under COLREGS therefore requires that a watchman be placed on lookout duty in accordance with Section A-VIII/2, Part 4 STCW.  The German MLA emphasises that the term “lookout” is often used interchangeably for the person maintaining the “lookout” and “lookout” as a task performed by that person. This ought to be due to how the provision is often read together with Section A-VIII/2 Rule 4-1 STCW clearly referring to a physical person. A ship seems more likely to be in breach of the Rule if the former meaning is adopted whereas arguably the term “lookout” as an activity can be maintained from a distance.  The Chinese MLA states that “all other means” should include camera and aural censoring equipment attached to the ship but does not expressly state whether this would allow the lookout to be maintained exclusively from shore. The Brazilian MLA states that unmanned ships do not fall under either COLREGS or the national law incorporating the Regulations since the Regulations were drafted with manned ships in mind. The Croatian MLA states that according to Croatian law, an unmanned ship would be unseaworthy. The Danish MLA does not answer the question in relation to a remote controlled (but fully autonomous) ships. |
| * 1. **Would a ship navigating without an on-board crew constitute a “vessel not under command” for the purposes of COLREGS Rule 3(f), read together with COLREGS Rule 18, as interpreted under your national law?** |
| Answer:  16 MLAs state that a ship navigating without an on-board crew would not or probably would not constitute a ship under command (Arg, Bra, Bri, Can, Cro, Den, Dut, Fin, Fre, Ger, Iri, Ita Jap, Pan, Sin, Spa, US). The Dutch MLA states that it would not necessarily be such ship. Two MLAsdo not take a position (Chi, Mal).    Six MLAs emphasise that such ship would indeed be under command, albeit remote (Arg, Bra, Fin, Ita, Jap, US). Nine MLAs state that such ship would neither be “unable to manoeuvre” or the lack of crew an “exceptional circumstance” as required by the definition of a vessel not under command in Rule 3(f) COLREGS (Can, Cro, Dut, Fre, Ger, Iri, Ita, Sin, Spa). The Chinese MLA does not take a positon but equally emphasises that the suggested interpretation would require that the lack of an on-board crew qualified as an exceptional circumstance. The Maltese MLA states that whereas if the ship is able to manoeuvre as required by COLREGS, the fact that it does not have an on-board crew does not automatically make it a “vessel not under command”, consideration has to be taken to the fact that at the time the convention was drafted unmanned vessels were not contemplated. Two MLAs point out that the Rule does not apply where a ship has voluntarily surrendered its ability to sail or steer (Spa, US). The Danish MLA states that based on the meaning and purpose of Rule 18 such ship would be a power driven ship underway and under command.  Three MLAs point out that the answer does not mean that an unmanned ship that has lost satellite coverage or the like would be covered by the Rule (Bri, Ger, Ita).  The Finnish MLA points out that in either case, the suggested interpretation would not solve the problem in relation to two unmanned ships. |
| 1. **THE INTERNATIONAL CONVENTION ON STANDARDS OF TRAINING CERTIFICATION AND WARCHKEEPING, 1978 (STCW CONVENTION)** |
| * 1. **The STCW Convention purports to apply to “seafarers serving on board seagoing ships”. Would it therefore find no application to a remotely controlled unmanned ship?** |
| Answer:  Three MLAs (Fin, Pan, US) assume that the STCW convention would likely apply to shore-based personnel as well (with the necessary interpretations and adaptations) in circumstances where there was no new specific legislation. The Singaporean MLA states that the application depends on whether a new definition for “seafarers” will be created and whether shore-based personnel would be deemed as “serving on board”. Four MLAs state that the wording of Art III STCW suggests that the convention would not apply to a remotely controlled ships (Bri, Chi, Dut, Ger). Nine MLAs consider that STCW would not apply to a remotely controlled ships (Arg, Bra, Can, Fre, Iri, Ita, Jap, Mal, Spa). Two MLAs do not take a position (Cro, Den).  The British MLA states that regardless of whether STCW would apply to unmanned operations or not, it is clear that certain provisions on training and competence would not apply to shore-based controllers and other personnel. The Maltese MLA goes one step further in stating that it would not be viable to apply the STCW, or for that part the Maritime Labour Convention, to shore-based personnel as they drafted with manned operations in mind.  The Japanese MLA states that although the convention does not find application to a remotely controlled unmanned ship, certain rules requiring watchkeeping officers to be present may nevertheless arguably be interpreted to render an unmanned ship in breach of STCW and to that extent are applicable to unmanned ships. |
| * 1. **As interpreted under national law, can the STCW requirement that the watchkeeping officers are physically present on the bridge and engine control room according to Part 4 of Section A-VIII/2 be satisfied where the ship is remotely controlled? Is the situation different with respect to ships with a significantly reduced manning (bearing in mind that the scope of the convention only applies to seafarers on board seagoing ships)?** |
| Answer:  The US MLA states that the requirement would probably be fulfilled in relation to an unmanned ship. The Argentinian MLA does not exclude that the rule can be interpreted to allow a remote watch. The Singaporean MLA states that the application depends on whether a new definition for “seafarers” will be created and whether the shore-based personnel would be deemed as “serving on board”. The Chinese MLA states that watchkeeping by a remote controller may violate the requirement as enacted in national law. The Dutch MLA states that the requirement could probably not be fulfilled where the ship is remotely controlled. 10 MLAs state that the requirement could not be fulfilled in the case of a fully unmanned ship (Bra, Cro, Den. Fin, Ger, Iri, Ita, Jap, Mal, Spa). Four MLAs do not take a position (Bri Can, Fre, Pan).  The Argentinian MLA states that it does not follow from the rule that the watch must be with the on-board crew.  The British MLA states that the answer depends on whether the duty is construed as a duty for seafarers as defined per Art. III STCW to be present on the bridge or as a duty for the ship to maintain watchkeeping officers on the bridge. Only in the latter case could there be a violation as in the former case there would be no seafarers upon whom to impose the duty.  The US MLA states that the requirement would probably be fulfilled in relation to a significantly reduced crew. Four MLAs do not exclude that the requirement could be fulfilled (at least partially) with a significantly reduced crew (Bra, Fin, Ger, Spa). Again, the Singaporean MLA states that the application depends on whether a new definition for “seafarers” will be created and whether the shore-based personnel would be deemed as “serving on board”. Two MLAs state that the requirement could not be fulfilled in the case of a significantly reduced crew (Iri, Mal). 11 MLAs do not answer the question as to whether the requirement could be satisfied with a significantly reduced manning (Arg, Bri, Can, Chi, Cro, Den, Dut, Fre, Ita, Jap, Pan).  The Finnish MLA points out that whereas in relation to an unmanned ship it may be possible to argue that the STCW is not applicable as per Art. III so that there is no breach of Part 4 of Section A-VIII/2, accordingly, in relation to significantly reduced crew this argument is not available.  Two MLAs emphasise that the maximum working hours and minimum rest hours according to the Maritime Labour Convention and the respective national law would have to be complied with (Ger, Spa). The German MLA points out in addition that the present rules of STCW require watchkeeping around the clock.  The Dutch MLA points out that Dutch law contains an exemption clause which can be used to waive this requirement in relation to a significantly reduced manning.  The Italian MLA points out that in fact the position of a shore-based remote controller is not very different from that of an officer of the watch navigating the ship with a significantly reduced crew or in poor visibility as in all those cases he must rely on technology. If in addition, the command post on shore can be laid out similarly to the bridge then unmanned navigation seems not so different from modern manned navigation. |
| 1. **LIABILITY** |
| * 1. **Suppose a “ship” was navigating autonomously i.e. through an entirely computerised navigation / collision avoidance system and the system malfunctions and this malfunction is the sole cause of collision damage – broadly, how might liability be apportioned between shipowner and the manufacturers of the autonomous system under your national law?** |
| Answer:  Two MLAs state that if the event occurred today, it is not excluded that the national courts would incur a strict liability or at least shift the burden of proof for the shipowner to prove non-causation in order to avoid liability gaps resulting from the new way of operating ships (Den, Fin). 10 MLAs state that under national collision liability the ship would be liable vis-á-vis a third party to the extent it was at fault (Bri, Can, Chi, Cro, Dut, Fre, Ger, Ita, Mal, Spa). Three MLAs state that the ship would be held liable because of how the damage was caused by its activity (Arg, Bra, Iri). It follows, however, from the answers of these MLAs under 6.2 that these legal systems would also require fault on part of the ship. Four MLAs do not take a position (Jap, Pan, Sin, US).  Four MLAs point out that the third party may in addition have a direct cause of action against the software manufacturer (Bri, Ger, Iri, Ita). Three of these MLAs suggest that such liability would not require proof of negligence but would also on the other hand only be available for loss of life or personal injury or damage to private (but not commercial) property (Bri, Ger, Ita).  Four MLAs emphasise that the question of liability will be highly dependent on facts (Bri, Jap, Spa, US).  The Dutch MLA states that the Dutch Supreme court has held that there is a fault of the ship in the sense of Art. 3 of the 1910 Brussels Convention “where there is the realisation of a special danger to persons or things that was created by a ship not meeting the requirements that one could make under the given circumstances”. Based on this decision the MLA concludes that the ship in the present example would be at fault.  The Finnish MLA states that the shipowner has vicarious liability for a broad range of “helpers” but it is unclear whether it would extend to equipment and system manufacturers. The Argentinian MLA states that the duty to provide a seaworthy ship is non-delegable under Argentinian law.  The Italian MLA states that it is unclear whether the shipowner could be held liable under the given situation as under the present collision avoidance rules it is not possible to identify owner's liability for system malfunction.  The Maltese MLA, referring to general tort law, states that liability would be apportioned between shipowner and manufacturer according to the respective degree of fault but that where fault cannot be apportioned, they would be held jointly and severally liable. The Panamanian MLA equally states that liability would be apportioned on the basis of the relative comparative causative negligence of the manufacturer and the shipowner but that they would be held jointly and severally liable vis-á-vis the victims of the collision.  The Singaporean MLA states that in absence of law governing the regulation of unmanned or autonomous ships, the apportionment would be governed by tort law.  Comment:  It should be noted that some MLAs have read fault into the question and others not. Nevertheless, it is clear from the answers that most jurisdictions adopt a fault base collision liability. Some add that the manufacturer could be held liable under rules of product liability, which, however, will primarily be available in relation to personal injury. The question does not contain sufficient information to allow the MLAs to elaborate further (in a uniform manner) on national law on e.g. vicarious liability or burden of proof rules, which may or may not make the shipowner liable in a specific situation. Further, the information set out above is limited to information dealing with the shipowner’s liability towards an external third party and not internally in relation to the manufacturer. The wide spectra of additional information submitted by the MLAs but not set out above can be found in the responses of the respective MLAs available on the CMI homepage. |
| * 1. **Arts. 3 and 4 of the 1910 Collision Convention provide for liability in cases of fault. As interpreted under your national law, does the fact that the non-liability situations listed in Art. 2 are not conversely linked to no-fault, leave room for the introduction of a no-fault (i.e. strict) liability (for e.g. unmanned ships) at a national level?** |
| Answer:  Eight MLAs state that the there is no room under the 1910 Collision Convention for an introduction of a no-fault liability at national level (Bri, Dut, Fin, Fre, Ger, Ita, Pan, Spa). Two MLAs do not answer the question expressly but state that according to the national understanding of Art. 2, the provision is indeed linked to no-fault (Arg, Chi). Two MLAs answer that their jurisdictions are not state parties to the convention (Sin, US). The Canadian MLA states that the national legislator would have power to impose in national law strict liability on unmanned ships. It is unclear if this answer is linked to a foregoing statement that it is unclear to which extent the convention remains part of Canadian law. Six MLAs do not take a position (Bra, Cro, Den, Iri, Jap, Mal).  The Chinese MLA refers to the rule in Chinese law enacting Rule 2 of the Collision Convention, setting out explicitly that neither party shall be liable by force majeure or *other causes not attributable to the fault of either party* or if the cause is left in doubt.  The French MLA states that the Supreme Court has established on numerous occasions that it is necessary to prove fault of the ship in order to successfully claim against it.  The Canadian MLA states that it is unclear to what extent he 1910 Collision Convention remains part of Canadian law.  Two MLAs state that the national legislator concluded in drafting the current law that Art. 2 does not add anything to the legal position following already from Art. 3 and 4 of the convention (Ger, Spa).  The Italian MLA states that the ship would be liable only in the case of an intentional or negligent act of the person to whom the obligation to pay compensation for liability in tort is assigned expect for where the latter is able to prove unforeseeable circumstances or force majeure events able to interrupt the causal link.  The Finnish MLA states that there is no uncertainty about fault-based liability under the treaty but that the international and national collision rules sill leave some room for the courts to adopt a broad understanding of fault (such as including anonymous and cumulative culpa), the persons whose fault would be attributable to the ship and the adjustment of the level of proof required. The Danish MLA similarly states that the legislator could introduce evidentiary rules such as a rebuttable presumption that an unmanned ship is liable unless it proves that the collision would have been unavoidable even if the ship had been operated under traditional command.  The Spanish MLA in contrast, states that under Spanish law, consistent with the 1910 Collision Convention, there is no presumption of fault, which consequently has to be proven by the Claimant.  The Japanese MLA states that to the extent that the unmanned ship constitutes a “vessel” for the purpose of the 1910 Collision Convention it is questionable whether a contracting state can introduce no-fault (i.e. strict) liability (for e.g. unmanned ships) at a national level. |