

CMI QUESTIONNAIRE ON UNMANNED SHIPS

1. National law

1.1. Would a "cargo ship" in excess of 500 grt, without a master or crew onboard, which is either

1.1.1. controlled remotely by radio communication?

1.1.2. controlled autonomously by, inter alia, a computerised collision avoidance system, without any human supervision constitute a "ship" under your national merchant shipping law?

There is no single definition of a 'ship' in Finnish law, the definitions are contextual and vary between different aspects of maritime law. Generally speaking, definitions focus on the function and attributes of ships, not on issues related to their crew, manning or mode of operation.

For example, under section 2(14) Act on the Technical Safety and Safe Operation of Ships a ship is defined as including "every description of water craft used or capable of being used as a means of transport on water", while under section 2(14) of the Act on Environmental Protection in Maritime Transport (1672/2009) 'ship' is defined as "any sea-going vessel or craft and includes hydrofoil boats, air-cushion vehicles, submersibles, and floating craft, as well as fixed or floating platforms"

There is no indication in Finnish maritime law that a ship that otherwise meets the criteria would lose its characterization as a ship if its manning were changed, automatized or removed.

1.2. Would an unmanned "ship" face difficulty under your national law in registering as such on account of its unmanned orientation?

No, the relevant parts of section 1(1) of the Register of Ships Act (1993/512) provides that it covers Finnish ships with a length of 15 m and upwards, and engaged in merchant shipping. Section 2 of the same Act provides that "Finnish ships which are engaged in merchant shipping but fall short of the length specified in section 1 may, at the owner's request, be entered in the Register of Ships, provided they have a length of not less than 10 m." Section 1(2) further clarifies that pontoons and other mobile platforms and structures shall be considered equivalent to ships.

1.3. 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?

Generally, there is no such mechanism, but special laws may allow government to extend the application of certain acts. For example, section 7 of the Register of Ships Act provides for a possibility for provisional registration of ships where a special cause exists.

1.4. Under your national merchant shipping law, could either of the following constitute the unmanned ship's "master"

1.4.1. The chief on-shore remote-controller

1.4.2. The chief pre-programmer of an autonomous ship

1.4.3. Another 'designated' person who is responsible on paper, but is not immediately involved with the operation of the ship

There is no clear answer to this question in Finnish law. Chapter 6 of the Maritime Code (1994/674) requires each ship to have a master and includes a variety of responsibilities for the master. The main part of these responsibilities can be performed remotely, or by shore-based staff, even if this is not specifically foreseen in the Act. The scenario given in para. 1.4.1 is therefore clearly least problematic out of the three. However, even this one may face difficulties, for example with respect to the prohibition by the master to be away from the ship in case of danger. (Chapter 6, section 6 of the Maritime Code).

A programmer who is not involved in the operation of the ship will not meet the requirements of chapter 6, e.g. in relation to communications, search and rescue or ensuring the interests of the cargo owner. The programmer will probably also fail the requirements of training provided for in act 1687/2009.

A 'designated' master is a moot point. Such a person may resolve the needs linked to having a responsible person, but that solution would not address the operational responsibilities of the master, as required in Chapter 6.

To clarify this issue, the Finnish Maritime Code probably needs to be amended before the concept of Master can be extended along these lines. This is particularly so for options 1.4.2 and 1.4.3.

1.5. Could other remote-controllers constitute the "crew" for the purposes of your national merchant shipping laws?

Under section 2(8) of the Act on Ships' Crews and the Safety Management of Ships (1687/2009) crew is defined as meaning "means all persons serving on board". However, this does not rule out a broader interpretation under which the crew performs its tasks from elsewhere. As long as the crew's tasks are laid down in the form of functions to be performed (which is generally the case) and these functions can be performed remotely, there is no obstacle to such an understanding. Regulatory intervention is needed only in the relatively few cases where the crew is specifically required to be on board (see e.g. on watchkeeping below).

It may also be noted that the Act on the Registering of Ship's Crew (1360/2006) similarly applies to the registering of persons working on board Finnish ships and specifically does not extend to persons who work "on board a ship only when it is in port" or "on board a ship performing inspection, servicing, piloting or other comparable tasks, when the work is purely temporary." (Section 2)

The flag state authorities in Finland have also taken the view that any person working on board a Finnish ship for the shipowner shall be entered in to that ship's crew list, regardless of their duties on board. The statement "for the shipowner" does not require that the person in question is employed by the shipowner.

2. United Nations Convention on the Law of the Sea, 1982 (UNCLOS)

2.1. 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?

No. Counter-question: what rules would govern these ships if UNCLOS would not?

2.2. 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?

It follows from UNCLOS Article 94 that the more detailed requirements are to be laid down by the IMO or other competent international organization. This holds true for unmanned ships too. Apart from the textual support for this in Article 94, the argument that the UNCLOS rules out a development supported by IMO (that was not even foreseen when UNCLOS was drafted) is not in line with the general nature of UNCLOS as a framework convention.

3. IMO Conventions —The International Convention for the Safety of Life at Sea (SOLAS) 1974 (as amended)

3.1. 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?

Finnish legislation, notably sections 5 and 6 of the Act on Ships' Crews and the Safety Management of Ships (1687/2009) follows SOLAS and the related IMO Resolution on principles of safe manning (A.1047(27)). The main national principle on safe manning is laid down in section 5(1-2) of the Act:

Every ship shall be manned in such a manner that the ship, crew, passengers, cargo, other property or the environment are not needlessly put at risk.

The ship's complement and the competence of the crew shall be such as to enable the proper performance of all on-board watchkeeping, safety- and security-related duties and duties related to marine pollution prevention."

It does not, accordingly, strictly require anybody to be on board, as long as all functions can be met. Finnish legislation currently includes no general minimum numbers of crew members on board different types of ships, which means that each manning applications are dealt with individually. The procedure for establishing safe manning involves consultation of several parties, including trade unions.

3.2. 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 context 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?

Apart from the general duty to comply with SOLAS and mandatory codes related thereto, which is laid down in section 6 of the Act on the Technical Safety and Safe Operation of Ships (1686/2009), there is no specific mention of this in Finnish legislation, but in view of the large discretion of the flag state authority in matters related to ship design, including under SOLAS chapter V, the answer is probably positive. The matter supposedly depends on the factual circumstances. If bridges are going to be continuously unmanned it would serve no purpose to design bridges for manned conditions. Conversely, a requirement to design a bridge for occasional use of a (temporary) crew would seem entirely reasonable.

3.3. 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.)?

The requirement (which also features in UNCLOS Article 98) is implemented in sections 11-12 of chapter 6 of the Finnish Maritime Code. This rule is similar to that of SOLAS V/33 and applies to any ship, including unmanned ships.

The relevant sections oblige the master of a ship to render all possible and necessary assistance to persons in distress and to take measures to assist and eliminate danger to maritime traffic that has come to his knowledge. However, the obligations only apply as far as the actions can be taken without causing serious danger to the own ship, crew or other persons on board. In case the ship has been involved in a collision, the master is similarly required to assist the other ship and the persons on board any required assistance to save them from danger, as far as this can be achieved without putting the own ship's and crew's safety in serious danger (chapter 8 section 5 of the maritime code).

The qualification of the duty by reference to "all possible measures" or "everything within his power" will reduce the extent of the master's obligations on an unmanned ship, as the available options will be fewer. However, the absence of a crew does not do away with the duty to provide assistance to the extent necessary. An unmanned ship might very well, for example, serve as a platform to rescue people from the sea and bring them to shore. Measures to allow ships to perform such functions remotely will need to be considered.

4. The International Regulations for Preventing of Collisions at Sea, 1972 (COLREGS)

4.1. 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?

No, the good seamanship requirement in Rule 8(a) would apply analogically to any action to avoid collisions that are taken by shore-based crew.

4.2. 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?

This is a considerably more difficult matter, as it is unclear how this requirement, and the principle laid down in Rule 2(a) that nothing in the COLREGs exonerates from the consequences of any "neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case", can be implemented on fully automated (autonomous) ships. The ordinary practice of seamen or good seamanship is obviously more difficult to pre-programme than the algorithms needed for securing compliance with the rest of the COLREGs.

Very cautious algorithms and a low threshold for alerting the attention of shore-based crew seem to be ingredients for resolving this matter, unless the COLREGs are amended to deal with the issue more specifically.

4.3. 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?

There are no available national interpretations of this matter to date, but the positive stance adopted by the Finnish government on the development towards autonomous shipping in principle suggests that this is possible. If so, the key factors here would not be the principle as such, but the performance of the systems replacing the human lookout, including redundancy requirements etc. To the extent that such equipment provide better situational awareness than the human lookout, there would be no immediate obstacle for such an interpretation.

In terms of precedents, a less dramatic development already took place in the context of covered bridges and the rule in SOLAS Regulation V/21 on the equipment required to replace the human ear.

4.4. Would a ship navigating without an on-board crew constitute a "vessel not under command" for the purposes of COLREG Rule 3(f), read together with COLREG Rule 18, as interpreted under your national law?

No interpretations are available under Finnish law, but the proposed interpretation is unlikely to prevail. First, it is not factually correct that such a ship is not under command. Second, such an interpretation would be counterproductive with respect to the ambition to integrate unmanned ships with ordinarily manned ships. Third, it would not resolve the problem in case of a situation involving two unmanned ships. Finally, it may be questioned as a matter of principle whether the introduction of new technologies to operate ships should be linked to operational advantages (right of

way) that would essentially leave the responsibility to avoid collisions to all the other ships.

5. The International Convention on Standards of Training Certification and Watchkeeping, 1978 (STCW Convention)

5.1. 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?

A similar wording is used in Act Finnish legislation, notably section 15 of the Act on Ships' Crews and the Safety Management of Ships (1687/2009), as far as competence requirements is concerned. It may thus technically be argued that shore-based crews are not concerned. However, shore-based crews clearly need competence requirements too and it is likely that STCW will be applied for those categories as well (together with additional requirements that apply for the shore-based element), at least until another legal regime has been created for shore-based ship controllers.

5.2. As interpreted under national law, can the STCW requirement that the watchkeeping officers are physically present on the bridge and engine room 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)?

The watchkeeping rules probably represent the current IMO provisions that most directly challenge unmanned ship operations. Under Finnish law, the physical presence requirement are not established by law but clearly laid down in the implementing rules adopted by the national administration (e.g. TRAFI Regulation 16654/2011). Some sort of exemption to this requirement would seem necessary, if it is not changed. Yet, STCW does not allow for exemptions to this part. A possibility could be to use the procedure for temporary trials under STCW Regulation I/13, which is quite complex.

From an operational point of view, the bridge and engine room control rooms on an unmanned ship should be understood as the place where those functions are performed on shore, but the wording does not seem to allow for that interpretation.

For ships with a very small on-board crew, the main difference is that it is not even technically possible to argue that the STCW does not apply. On the other hand, even with a small crew, it may be easier to meet these requirements, if interpreted liberally.

6. Liability

6.1. 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?

Broadly speaking, the Finnish legal system places the responsibility for damage arising from the operation of the ship on the 'laivanisäntä/redare' (ship owner or

operator). Liability is fault-based, unless otherwise is stated; statutory strict liability is essentially limited to pollution and other environmental damage, under international, EU and national environmental law. The ship owner/operator assumes vicarious liability for the faults of a broad range of helpers, including crew members, but even persons who have no formal link to the ship. It is unclear, however, whether equipment and system manufacturers could be brought in under this vicarious liability. The shipowner's liability is limited based on the LLMC 1996 provisions.

Finnish case law has not, unlike the situation in e.g. Norway, been inclined to accept a strict liability that is not regulated in statutes, e.g. for technical failures or hazardous activities. On the other hand, there are examples, mainly outside the field of maritime law, where cumulative and anonymous culpa have been accepted as triggering liability.

The focus on human shortcomings accordingly remains solid in Finnish liability law and represents a challenge for fully autonomous operations. It is not easy to predict how Finnish courts would decide in the above scenario, but it is possible that in order to avoid liability gaps resulting from the new way of operating ships, courts would be more inclined to accept strict liability or at least shift the burden of proof towards the ship side. It is possible that increased automation will necessitate a review of the foundations for liability, not only in the maritime context, but more generally in both criminal and civil law.

6.2. 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

As a starting point the treaty applies and there is no uncertainty about its fault-based liability, which is also incorporated in chapter 8 of the Finnish Maritime Code (with a minor adjustment for joint responsibility in case of personal injury). Yet the international and national collision rules still leave some room for courts to adopt a broad understanding of fault (such as including anonymous and cumulative culpa), the range of persons covered by the 'ship' side and to make adjustments to the level of proof required.