CMI QUESTIONNAIRE ON UNMANNED SHIPS

BELGIUM

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?

Yes. Belgian maritime law knows several different definitions of the concept of 'ship', but none of those seem to require the presence of a crew on board for something to be considered a 'ship'.

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

No. The Ship Registration Act of 21 December 1990 defines a 'ship' as 'any floating structure, with or without its own motive power, with or without water displacement, used or capable of being used as a means of transport in, over or under water, including installations that are not permanently connected to the shore or to the bottom[1]. A crew, on board or on the shore, is not required.

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?

No. Art. 1, § 2 of the 1990 Ship Registration Act gives the Government the option to *exclude* certain (types of) ships from the scope of application, but there is currently no converse provision that would allow the Government to *include* non-ships.
The current Maritime Law Reform Project, however, does introduce the possibility for the Government to declare certain structures to be 'ships' for the purposes of the Maritime Law Code.

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[1] Art. 1, § 1, 1° Wet 21 december 1990 betreffende de registratie van zeeschepen: "*elk drijvend tuig, met of zonder eigen beweegkracht, met of zonder waterverplaatsing, gebruikt of geschikt om te worden gebruikt als middel van verkeer in, over of onder water, met inbegrip van de niet blijvend aan de wal of aan de bodem verbonden installaties*".

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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

Art. 1.1° of the Act of 5 June 1972 on the safety of vessels defines the 'master' as any person charged with the control of a vessel or actually in control of a vessel, and any person who replaces him[2].
Although it is clear from other provisions of the 1972 Act that the legislator assumed that the master would be on board of the vessel, the definition as such does not contain such requirement and could (in principle) encompass an on-shore controller. In the current state of the legislation, however, such on-shore controller would need to hold all qualifications and certifications that are required for sea-going masters.

The 'Maritime Act', i.e. Book 2 of the Commercial Code, does not define the 'master', but does still have an obligation for the master of the vessel to be personally present on board the vessel when entering or leaving ports, tidal ports or rivers (Art. 64).

1.4.2. The chief pre-programmer of an autonomous ship

The 'chief pre-programmer' is understood to be the person who inputs the route details (place of destination, routing options, etc.) into the autonomous ship's systems.

As indicated above, the 'master' is any person charged with the control of a vessel or actually in control of a vessel. If the tasks and duties of the 'chief pre-programmer' are limited to inputting data before the start of the voyage, it would be hard to see him as in control of the vessel during the voyage.

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

Again, the 1972 Act defines the 'master' as the person who is charged with the control or who is actually in control of the vessel. Being in control and being responsible are, of course, different concepts. A person who would only be responsible on paper, without being in control or at least charged with the control, would not be a master within the meaning of the 1972 Act.

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[2] Wet 5 juni 1972 op de veiligheid van de vaartuigen, Art. 1:
"*Voor de toepassing van deze wet wordt verstaan onder :*
1° " kapitein " : ieder die belast is met de leiding van een vaartuig of deze leiding in feite neemt, alsmede ieder die hem vervangt;"

In addition, the tendency should be resisted to appoint a 'master' for an autonomous vessel, simply to have a scapegoat to hold liable should things go wrong. In the current day and age, there are sufficient possibilities to hold the owner and/or operator of an autonomous vessel liable, without the need for an individual (the master) to be put in the line of fire.

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

Art. 90 of the Royal Decree of 20 July 1973 (as amended) on the inspection of ocean shipping provides that every ship that flies the Belgian flag must be sufficiently and efficiently crewed taking into account the requirements of safety and protection of the marine environment. In order to obtain a certificate of seaworthiness, the ship owner must prepare a crewing plan, indicating the minimum safe manning level for the ship. This plan is then submitted for approval to the Belgian Maritime Inspectorate (Art. 91).

The 1973 Royal Decree (and the Act of 5 June 1972 on which it is based) were clearly written with an on-board crew in mind. Nevertheless, there is no express requirement for the crew to be on board. At least in theory, therefore, the Maritime Inspectorate *could* approve a crewing plan that only provides for remote, on-shore controllers, if it was satisfied that these controllers can adequately ensure the safety of the ship and the protection of the marine environment.

In a Circular of 1 August 2014, the Maritime Inspectorate has indicated that the minimum safe manning level is to be determined taking into account factors such as the size and type of ship, the construction and equipment of the ship, the method of maintenance used, the cargo to be carried, the frequency of port calls, length and nature of voyages to be undertaken, and the trading area(s), waters and operations in which the ship is involved. If these are the relevant factors, (smaller) unmanned test vessels that only operate in a restricted area, carrying harmless cargo, could indeed be authorized.

In that same Circular, however, the Maritime Inspectorate also indicated that the following principles should be observed in determining the minimum safe manning of a ship:

a) Capability to:

- *a.1. Maintain safe navigational, engineering and radio watches in accordance with regulation VIII/2 of the 1978 STCW Convention, as amended, and also maintain general surveillance of the ship;*
- *a.2. Moor and unmoor the ship safely;*
- *a.3. Manage the safety functions of the ship when employed in a stationary or near stationary mode at sea and/or at port;*

a.4. Perform operations, as appropriate, for the prevention of damage to the marine environment;
a.5. Maintain the safety arrangements and the cleanliness of all accessible spaces to minimize the risk of fire;
a.6. Provide for medical care on board ship;
a.7. Ensure safe carriage of cargo during transit; and
a.8. Inspect and maintain, as appropriate, the structural integrity of the ship,
a.9. operate in accordance with the approved Ship's Security Plan.

b) Ability to:
b.1. Operate all watertight closing arrangements and maintain !hem in effective condition, and also deploy a competent damage control party;
b.2. Operate all onboard firefighting and emergency equipment and lifesaving appliances, carry out such maintenance of this equipment as is required to be done at sea, and muster and disembark all persons on board; and
b.3. Operate the main propulsion and auxiliary machinery and maintain them in a safe condition to enable the ship to overcome the foreseeable perils of the voyage.

Some of those principles are no longer relevant for unmanned vessels (if there is no crew, there is no need to provide medical care, for example), others will have to be taken care of by the remote or automated systems (such as the capability to safely navigate), but some of these principles will be very hard to realize through remote controllers: how would a remote controller be able, for example, to deploy a competent damage control party to a vessel in the middle of the ocean within a useful timeframe?

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.

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?

Art. 94.(4).(b) UNCLOS provides that the crew should be appropriate in qualification and numbers for the type, size, machinery and equipment of the ship. Furthermore, it is clear that Art. 94 and similar provisions were included because, at the time, the presence of a crew on board was the only possible way to ensure maritime safety – Art. 94 was not written to provide job security for seamen.
Unmanned ships are difficult to reconcile with the text of Art. 94 UNCLOS, but not with the purpose or intention of Art. 94 UNCLOS – provided, of course, that it can be shown that an unmanned ship is at least as safe as a manned ship.
Amending Art. 94 to make it clear that, under the right circumstances, it is not required to have a crew physically on board would have the benefit of clarity, but amending conventions is a difficult and time-consuming process. In practice, generally accepted regulations or practices (Art. 94.(5)) could be an interim (or permanent) solution.

3. <u>IMO Conventions</u> – 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?

The SOLAS manning requirements are implemented through the Act of 5 June 1972 (as amended) and the Royal Decree of 20 July 1973 (as amended). The Act and Decree do not expressly require a (minimum) number of crew members. In principle, therefore, the Belgian Maritime Inspectorate could allow unmanned operation if it is satisfied that such operation provides sufficient safety guarantees.

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?

Regulation 15 essentially concerns the *design* of equipment. A remote control room for a ship (like remote control rooms in chemical or nuclear plants) should equally be designed in such way as to be the most operator-friendly.

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.)?

There is no Belgian case law or literature on this issue. Where Regulation 33 imposes a duty to provide assistance, though, that must mean 'useful' assistance: there is no point in requiring a ship (manned or unmanned) to proceed to the location of an incident if it cannot usefully assist in the rescue or salvage operations.
If a ship is allowed to sail without a crew, and is then unable to provide meaningful assistance because there is no crew on board, it would seem there is no liability for not providing something that the ship is unable to provide.

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?

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?

Combined answer 4.1 and 4.2:
Good seamanship is a means to an end: it is one of the techniques that are used to avoid collisions and to increase the safety of shipping in general. If a remotely controlled ship or an autonomous ship can navigate as safely (or possibly even safer) than a manned ship, then the goal of the COLREGS is accomplished.

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 is no (published) Belgian case law on what exactly constitutes a 'proper lookout'. Here again, the proper lookout is a means to an end: there should be a lookout because that is a technique that has been shown to reduce the number of collisions and to increase maritime safety. If more modern (and possibly more performant) techniques than the human eye and binoculars become available, the

real question is whether these new techniques are at least as good as a human physically on board of the vessel.

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?

There is no (published) Belgian case law on this issue. It does not seem desirable, however, to consider a remotely operated or autonomous ship as a "vessel not under command".

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?

In a literal interpretation, the STCW Convention would not apply to onshore remote controllers. On the other hand, however, the STCW was introduced to solve problems and to increase the safety of shipping. In that light, several of the substantive rules of the STCW Convention could also be sensibly applied to onshore controllers. It is clear, for instance, that such controllers should have appropriate training. Also, just like the crews on board of manned vessels (and air traffic controllers, lorry drivers, etc.) are limited in the number of consecutive hours they can work, it would probably make sense to limit the number of consecutive working hours for onshore 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)?

There is no (published) Belgian case law or literature on this issue. The STCW does not explicitly provide, however, that the bridge or engine control room has to be located on the ship itself (although obviously that was the implicit understanding of the authors of the Convention). The requirement could be satisfied, therefore, if the remote control room on shore is considered to be the 'bridge' of the ship.

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?

Under Belgian law, if a ship does not comply with the COLREGS, it is generally presumed – as an inference of fact, not of law – that the ship was at fault. Defects or malfunctioning of the ships systems (steering, propulsion, etc.) are generally not considered a valid defence.

In all likelihood, the same would apply to IT/autonomous systems. As against the parties suffering damage as a result of the collision, the owner of the autonomous ship would therefore be fully liable and would not be able to invoke the malfunctioning of the IT system as a defence – unless such malfunctioning would amount to force majeure.

Once the owner of the autonomous ship has compensated the damaged parties, he may of course have a recourse action against the manufacturer of the IT system.

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 (i.e. strict) liability (for e.g. unmanned ships) at a national level?

There is only limited Belgian case law on collisions in general, and no (published) case law or literature on this specific issue. Given that the claimant in a collision case has the burden of proving fault of the other vessel, and that his claim will be dismissed if he does not carry that burden, there would seem to be little room for a strict liability.