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INSURING REMOTELY OPERATED VESSELS: TEMPESTUOUS WATERS FOR HULL INSURERS?

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Insuring Remotely Operated Vessels: Tempestuous Waters for Hull Insurers?

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This paper examines the potential legal implications posed by Remotely Operated Vessels (ROVs) controlled by Remote Control Centres (RCCs) for hull and machinery insurance policies. It explores the insurability of RCC equipment together with the ROV under the same policy and analyses whether an analogy can always safely be drawn between RCC operators (whether acting as employees of the shipowner or independent third parties) and the master or crew of traditional ships. The paper concludes that a number of legal uncertainties and problems will need to be addressed before standard form hull and machinery (H&M) insurance terms that will be applicable to ROVs are revised.

Keywords: Marine insurance, hull and machinery, autonomous shipping, unmanned ships, remotely operated vessels, remote control centres.

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1 Introduction

Technological developments in shipping promise to give rise to the emergence of vessels equipped with features that will allow for remote control or autonomous operations. Autonomy, which is to be considered as a type of operation rather than a new type of ship,[1] will gradually be achieved. To this end, until full autonomy is in place, vessels will increasingly rely on being operated by control stations that are either based on land or on board other ships. Denominated as 'remote control centres'[2] (RCCs), they are a 'set of equipment and control units that are needed at the site or sites where safe and effective remote control and/or monitoring of Remotely Operated Vessel (ROV), or several ROVs, is conducted'.[3] The role of RCCs is anticipated not to be confined merely to the period before full autonomy is achieved. RCC operators are expected to intervene to undertake the direct control of the ship in situations where the autonomous navigation system fails or is not adequate to respond to critical circumstances arising during the ship's voyage.

While the percentage of vessels that will be remotely operated in the next twenty years is far from predictable, estimations are that the tasks required from port standby to manoeuvring as well as the commencement of passage at sea could be operated from shore by 2030.[4] As advances in automation gradually find their way into vessels, the roles allocated to seafarers on board will also inevitably alter and some of these will be performed by operators based ashore. The changes in shipping will accordingly necessitate rethinking of the scope of hull and machinery (H&M) insurance contracts with a view to assess to what extent the currently applicable rules are adequate to address issues arising from the deployment of ROVs. This paper seeks to examine, respectively: (1) whether ROVs could constitute 'ships' in the context of H&M insurance; (2) under what circumstances RCCs could qualify as 'equipment' of ROVs

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1 Luci Carey, 'Report on BIMCO Autonomous Ships Seminar', *NUS Centre for Maritime Law Report 19/01* 19 available at <https://law.nus.edu.sg/cml/pdfs/reports/CML-R1901.pdf> (accessed 18 September 2019).

2 Also referred to as 'base control station' in the Maritime UK – Maritime Autonomous Surface Ships Industry Code of Practice, November 2018 (Maritime UK Code of Practice) available at <https://www.maritimeuk.org/documents/305/MUK_COP_2018_V2_B8rlgDb.pdf> (accessed 17 October 2019).

3 Ibid 46.

4 Institute of Marine Engineering, *Science & Technology (IMarEST) Report* 'Autonomous Shipping — Putting the human back in the headlines II' available at < https://www.imarest.org/reports/1055-autonomous-shipping-putting-the-human-back-in-the-headlines-ii/file> (accessed 12 September 2019) 18, 20.

and be insurable along with them; (3) whether RCC-related perils could be regarded as 'maritime perils' and attract the application of the Marine Insurance Act 1906 (UK) (the MIA); and finally, (4) whether there could be room to argue that the acts of RCC operators should be insured or excluded as a separate peril under H&M insurance policies.

2 Are remotely controlled vessels 'ships' for the purposes of H&M insurance?

This paper does not seek to address the issue of whether or not a remotely controlled ship or a ship operating in fully autonomous mode would be considered as a 'ship' in the legal sense of the word. This issue has been very comprehensively and aptly analysed in several scholarly works.[5] Instead, this paper will attempt to identify the interrelation between the RCC and the ROV for the purposes of determining the subject-matter insured under H&M insurance policies.

H&M insurance traditionally covers loss of or damage to the 'vessel' or 'ship' and its equipment. The MIA contains several provisions referring to the term 'ship' without really providing a definition such as the one found in the Merchant Shipping Act 1995 (UK).[6] What the MIA does, however, is to state what the term 'ship' would include.[7] It reads as follows:

> The term 'ship' includes the hull, materials and outfit, stores and provisions for the officers and crew, and, in the case of vessels engaged in a special trade, the ordinary fittings requisite for the trade, and also, in the case of a steamship, the machinery, boilers, and coals and engine stores, if owned by the assured.

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5 For instance, see Robert Veal, Michael Tsimplis and Andrew Serdy, 'The Legal Status and Operation of Unmanned Maritime Vehicles' (2019) 50 Ocean Development and International Law 23-48, DOI: 10.1080/00908320.2018.1502500; Robert Veal and Michael Tsimplis, 'The Integration of Unmanned Ships into the *Lex Maritima*' [2017] LMCLQ 304–335; Eric van Hooydonk, 'The Law of Unmanned Merchant Shipping — An Exploration' (2014) 20 JIML 403-423.

6 Section 313(1)(c) of the Merchant Shipping Act 1995 (UK) provides that 'ship' includes every description of vessel used in navigation. See also the Senior Courts Act 1981 (UK), s 24: '"ship" includes any description of vessel used in navigation and (except in the definition of "port" in section 22(2) and in subsection (2)(c) of this section) includes, subject to section 2(3) of the Hovercraft Act 1968, a hovercraft'.

7 MIA, Schedule, Rules for Construction, r 15.

This description refers to two circumstances which would need to be taken into consideration when assessing what items may be encompassed within the term 'ship': the ordinary fittings required for the special trade in which the ship is involved; and the type of ship. Furthermore, the relevant rule contains a proviso that the items listed should be owned by the assured for them to be included within this term. It should be noted that the presence of crew is not a prerequisite for a craft to be termed a 'ship'; and whether a ship (with or without crew) is remotely operated will also not affect the qualification of the subject-matter as such.[8] The reference of 'stores and provisions for the officers and crew' in r 15 merely highlights that where insurance is taken on a 'ship', stores and provisions will also be included in the cover unless parties agree to the contrary.[9] This reference should not be stretched to mean that a craft may not qualify as a 'ship' for the purposes of a H&M insurance policy subject to the MIA unless it contains stores and provisions for the crew. Therefore, an unmanned vessel may be perfectly capable of qualifying as a 'ship' even though it contains no stores or provisions.

3 Insurability of RCCs on-board other ships along with ROVs

RCCs may either be fixed units or may be movable or portable.[10] They may therefore be built on land or placed on board other ships from where the RCC operators can command and control the ROV. This may occur particularly where a convoy of ROVs follows a mother ship in a particular geographical area that accommodates an RCC. Such an arrangement could give rise to the question of whether movable RCCs placed on board vessels other than the ROV operated by RCC personnel could qualify as an item insurable together with the ROV under the same policy. This could be particularly advantageous for certain geographical areas such as the Arctic or passages involving piracy risk and where the RCC and ROVs are owned by the same party. The navigational dependence of ROVs on the RCC, particularly in respect of some

8 See also the Maritime Unmanned Navigation through Intelligence in Networks (MUNIN), *D9.3 Quantitative Assessment*, available at <http://www.unmanned-ship.org/munin/wp-content/uploads/2015/10/MUNIN-D9-3-Quantitative-assessment-CML-final.pdf> (accessed 17 October 2019) pp 131-132 on this point.

9 See *Roddick v Indemnity Mutual Marine Insurance Co Ltd* [1895] 2 QB 380 where a policy on 'hull and machinery' was held not to include coals, provisions and stores.

10 Maritime UK Code of Practice (n 2) para 9.2.3.

degrees of autonomy, could connote that loss or damage sustained by the RCC could readily result in loss or damage to the ROV.

The answer to this question would also affect the indemnity to be paid under the policy for the loss to the subject-matter insured. Where the policy is valued, the valuation would dictate the indemnity to be paid where the subject-matter insured is lost or damaged. Where the policy is unvalued, the insurable value is the value of the ship at the commencement of the risk,[11] or arguably the difference in the value of the ship immediately before and after the loss where the Institute Clauses apply.[12] It would therefore be necessary to identify whether RCC equipment could be deemed to have been insured together with the ROV in determining what the indemnity to be paid under a H&M insurance policy includes, unless the policy contains an express provision in this regard.

3.1 Designation of the subject-matter

It has been said that r 15 of the MIA is unlikely to apply mandatorily to the current policy forms.[13] However, the rule serves as a tool for interpreting the modern policy clauses unless the clauses themselves provide that a different interpretation is to be adopted. H&M insurance is offered on standard terms in the London insurance market under the International Hull Clauses 2003, the Institute Time and Voyage Clauses – Hulls 1/10/83, and the Institute Time and Voyage Clauses – Hulls 1/11/95.[14] The clauses refer to two terms relevant for the purpose of identifying the insurable property under H&M contracts incorporating the clauses, namely 'vessel' and 'subject-matter insured'. While several provisions in the Institute Clauses mention 'vessel',[15] there are also references to 'subject-matter insured' in the Perils Clause[16] and in the Duty of the Assured Clause.[17] The

11 MIA, s 16(1).

12 *Continental Illinois National Bank & Trust Co of Chicago v Bathurst (The Captain Panagos DP)* [1985] 1 Lloyd's Rep 625; *Thor Navigation Inc v Ingosstrakh Insurance* [2005] Lloyd's Rep IR 490.

13 Jonathan Gilman, Claire Blanchard, Mark Templeman, Neil Hart, Philippa Hopkins, *Arnould's Law of Marine Insurance and Average* (19ed, Sweet & Maxwell 2018) para 10–03.

14 For the similarities and differences between these clauses, see N Geoffrey Hudson and Tim Madge, *Marine Insurance Clauses* (5th ed, Informa Law from Routledge 2012) Part III.

15 Eg Institute Time Clauses — Hulls 1/10/1983, cls 1, 2, 4, 7, 8, 9, 11, 12.

16 Ibid, cl 6.

17 Ibid, cl 13.

International Hull Clauses, in turn, follow the Institute Clauses in this regard.[18] Lloyd's Marine Policy (MAR (91) Form), which is incorporated into policy schedules, also contains references to both 'vessel' and 'subject matter insured' with no definition provided.[19] It is submitted that the term 'subject-matter insured' refers to the parts that do not belong to the vessel itself, yet are included in the marine adventure together with the vessel on its board, such as leased equipment[20] or parts taken off.[21] The 1983 and 1995 Hull Clauses do not include express references to such apparatus, which can, however, be separately incorporated into the policy upon the agreement of the parties. Where the insurance is either on 1983 or 1995 terms and the subject-matter is not comprehensively defined within the policy, which movables fall under the wording 'subject-matter insured' would need to be determined by reference to the interest intended by the assured to be insured.[22]

Remotely controlled vehicles and remote-control systems similar to ROVs and RCCs such as unmanned tethered or autonomous underwater vehicles (AUV) and unmanned[23] or remotely piloted aerial vehicles (RPAV)[24] have been in use for many years. Unmanned aircraft systems (UAS) represent the aircraft and its associated elements which are operated without a pilot on board and remotely piloted aircraft systems (RPAS) are comprised of remote piloted aircraft, its associated pilot station and any other elements.[25] The recent regulations enacted in the European Union on unmanned aircrafts also refer to an 'unmanned aircraft system' as a term which includes both the 'unmanned aircraft (UA)' and 'the equipment to control it

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18 See references to 'vessel' in, including but not limited to, cls 3, 4, 5, 7, 8, 10; 'subject-matter insured' in cl 2 (the Perils Clause), cl 9 (the Duty of the Assured Clause), cl 41 (the Additional Perils Clause) and cl 49 (the Recoveries Clause).

19 Contrast with the Institute Yacht Clauses 1/11/85, where 'vessel' is defined as 'the hull, machinery, boat(s), gear and equipment, such as would normally be sold with her if she changed hands'.

20 International Hull Clauses 2003, cl 3.

21 Ibid cl 4.

22 MIA, s 26(4) provides that in designating the subject-matter insured 'regard shall be had to any usage regulating the designation of the subject-matter insured'.

23 'Unmanned aerial vehicle' is defined by the International Civil Aviation Organization (ICAO) in its *Global Air Traffic Management Operational Concept*, ICAO Doc 9854, AN/458, First Edition (2005) available at <https://www.icao.int/Meetings/anconf12/Document%20Archive/9854_cons_en%5B1%5D.pdf> (accessed 17 October 2019) as 'a pilotless aircraft in the sense of Article 8 of the Convention on International Civil Aviation, which is flown without a pilot-in-command on-board and is either remotely and fully controlled from another place (ground, another aircraft, space) or programmed and fully autonomous'.

24 A subset of unmanned aircraft (ICAO Circular 328, AN/190, *Unmanned Aircraft Systems (UAS)* (2011) available at <https://www.icao.int/Meetings/UAS/Documents/Circular%20328_en.pdf> (accessed 17 October 2019) para 3.3) which is a piloted aircraft where the pilot is located either on ground, ship, space or on board yet another aircraft (ibid para 3.2).

25 Ibid p 8.

remotely'.[26] The latter is described as 'any instrument, equipment, mechanism, apparatus, appurtenance, software or accessory that is necessary for the safe operation of a UA other than a part and which is not carried on board that UA'.[27] A RPAS can be controlled from one of many pilot stations,[28] and many RPASs can be piloted from a single station[29] — a situation intrinsically similar to that which is expected to be put in place in respect of remotely controlled vessels.[30] It is noteworthy in this regard that some examples of insurance policies providing, amongst other things, hull cover on unmanned aerial vehicles[31] demonstrate that the remote control stations and any relevant equipment used therein are also insured together with the unmanned aerial vehicle itself.[32]

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[26] Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft, art 2(1); Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems, art 3(3). The former Regulation covers the operations of unmanned aircrafts including their remote pilots and the latter lays down rules on the design and manufacture of unmanned aircraft systems.

[27] Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 (n 26), art 3(2). However, the UK definition of 'small unmanned aircraft' does not refer to any control station: Air Navigation Order 2009, SI 2009/3015, s 255 provides that ' "Small unmanned aircraft" means any unmanned aircraft, other than a balloon or a kite, having a mass of not more than 20kg without its fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of its flight'.

[28] In which case, the aircraft must be piloted only by one of the remote pilot stations at a time: see *Global Air Traffic Management Operational Concept* (n 22) para 5.22.

[29] Ibid para 3.9.

[30] Remote pilot stations should not be confused with air traffic control stations: the latter monitor air traffic and control aircraft operations affecting air traffic; whereas the former establish the command and control link between the remotely piloted aircraft and the station and have direct responsibility for the navigation and safety of the aircraft. Moreover, air traffic control stations are typically located within a single State, whereas remote pilots and their stations navigating and controlling a RPAS may be located in different States.

[31] Such as UAV operator insurance that may also compensate the operator for third-party liability.

[32] See, for instance, the following definitions:
'Unmanned Aerial Vehicle ("UAV") means the unmanned aerial vehicle and system described in Item 5 of the Declarations or any other unmanned aerial vehicle and system qualifying under the provisions of the Special Insuring Agreements, and shall include support equipment, control stations, control links, flight termination systems and launch/recovery equipment. Also included in this definition are parts temporarily detached from the unmanned aerial vehicle and system for replacement until such time as replacement by a similar part has commenced; as well as tool and equipment which are specially designed for the unmanned aerial vehicle and system and which are ordinarily carried therein.'
'The word "UAV" wherever used in this Insurance, shall mean the Unmanned Aerial Vehicle described herein, and in addition to the airframe shall include power plants, propellers, rotors and appliances forming part of the Unmanned Aerial Vehicle at the inception of coverage hereunder, including parts detached and not replaced by other similar parts. This includes complete operating system, comprising airframe, payload, launch station and Ground Control Station.'

The particular case of remotely operated underwater vehicles used for research missions which are deployed from a 'mother vessel'[33] may give rise to the question of whether they can then be categorised as an item of equipment of the mother vessel, especially considering the mission duration and proximity between the mother ship and the autonomous underwater vehicle.[34] It is, however, unlikely that the ordinary H&M insurance policy of a mother ship would also cover the autonomous underwater vehicle, which would probably require a separate policy.[35]

Given its relatively small size, it is not surprising that the remotely operated underwater vehicle — and not the mother ship — is referred to as possibly constituting 'equipment' of the other. It is suggested that the opposite categorisation would be likely to occur in the context of ROVs and RCCs. Here, the relevant question would be whether RCCs (or RCC equipment) could constitute 'equipment' of ROVs.

3.2 RCC equipment: 'ordinary fittings requisite for the trade'?

According to the MIA, r 15, the term 'ship' includes the 'ordinary fittings requisite for the trade' for a ship engaged in a special trade, which would also be included in the insurable value of the ship.[36] Where the policy merely refers to 'vessel' or 'subject-matter insured' and fails to provide a more detailed account of what exactly is covered where a ROV is insured, it is suggested that r 15 should be employed to interpret the term 'vessel'.[37] Where, however, the interest insured under the policy is clearly expressed to be in respect of 'hull and machinery' only, the cover will be more limited compared to that of a policy covering a 'ship'.[38]

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33 Gwyn Griffiths, Nicholas W Millard and Roland Rogers, 'Logistics, Risks and Procedures Concerning Autonomous Underwater Vehicles' in Gwyn Griffiths (ed), *Technology and Applications of Autonomous Underwater Vehicles* (Taylor & Francis 2003) 279–293.

34 Veal, Tsimplis and Serdy (n 5) 30. See ibid p 32 as to whether unmanned underwater vehicles could be characterised as 'equipment' under the United Nations Convention on the Law of the Sea (UNCLOS).

35 ED Brown and NJJ Gaskell, *The Operation of Autonomous Underwater Vehicles, Volume II: Report on the Law* (Society for Underwater Technology 2000) 183.

36 MIA, s 16(1).

37 It is assumed for the purposes of this analysis that 'vessel' in the Institute Clauses and 'ship' in the MIA are interchangeable terms.

38 *Roddick v Indemnity Mutual Marine Insurance Co Ltd* [1895] 2 QB 380.

Annotation on r 15 of the MIA in the Digest[39] suggests that the rule was drafted by reference to nineteenth century treatises on marine insurance law.[40] The terms 'ship' and 'ordinary fittings requisite for the trade' should therefore be interpreted in the light of the relevant treatises and case law on which the rule was based. According to the works cited in the Digest, what is described as a 'ship' is not 'confined to the body or hull of the vessel, but extend[s] to her materials and outfit' and would include 'all the appurtenances, necessary, suitable, or usual, and that may be presumed to belong to a vessel of such description, *for the purposes of navigation*, on a voyage such as that described'.[41] Equipment necessary for the navigation of the ship for a particular voyage would accordingly be regarded as a component part and be insurable together with the ship itself. It was also provided in those works that outfits necessary to make the vessel seaworthy for the voyage insured, and permanent fittings necessary to adapt the ship to a particular trade (eg permanent grain ceilings for the grain trade) fall under the term 'ship'.[42]

Provided they are owned by the same shipowner, RCCs that are placed on board other vessels than the ROV being insured may arguably be insurable together with the ROV itself if they are employed to make the ship seaworthy and are considered necessary for the purposes of navigation. Two caveats may, however, arise in this context, namely that the RCC (as elaborated under this heading) is not affixed to the ROV but to another ship, and that RCCs

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39 *A Digest on the Law relating to Marine Insurance* (Stevens & Sons 1901), the work of Sir McKenzie Chalmers, the drafter of the MIA, annotated the Marine Insurance Bill which was later enacted as the Marine Insurance Act 1906. The relevant notes on the Bill's provisions are therefore reflective of the background against which the provisions were drafted: ibid p v: 'The large type propositions of this Digest are taken, with a few slight corrections, and with the necessary verbal alterations (such as the substitution of the indicative for the imperative), from the clauses of the Marine Insurance Bill, which was introduced in the House of Lords in 1894, 1895, 1896, and 1899'; ibid p ix: 'If the Bill passes this Digest may be useful as showing the foundations on which it was built up'. For an authority relying on the footnotes of the Digest see *Netherlands v Youell* [1998] CLC 44, 48 (Phillips LJ): 'In these circumstances, when dealing with a provision of the Act which has given rise to such difficulty, it seems to me legitimate to look at the existing law at the time that the Bill was drafted as an aid to interpretation of the Act. In that task one is assisted by the footnotes in the digest.'

40 The Digest provides at p 129 that the term 'ship' is used with the same meaning that it has in an ordinary policy, which at the time, was an SG policy which insured 'body, tackle, apparel, ordnance, munition, artillery, boat, and other furniture of and in the good ship or vessel'. The work also cites Charles McArthur, *A Practical Treatise on the Contract of Marine Insurance* (2nd ed, Stevens & Sons, 1890) p 67 as a source for the definition of the term 'ship'.

41 This was provided in Charles McArthur, *A Practical Treatise on the Contract of Marine Insurance* (1st ed, Stevens & Sons, 1885) p 93 citing Phillips, p 463. Emphasis added.

42 McArthur (n 41) pp 93-94

do not necessarily qualify as fittings requisite for a particular 'trade', but for a particular 'level of automation'. These issues will be examined below.

It was held in *New Liverpool v Ocean Accident*[43] that moorings used to permanently moor the vessel, when used for the trade of coal, could fall under the term 'ordinary fittings requisite for the trade' even though they were occasionally detached from the vessel.[44] It was also stated in *Hogarth v Walker*[45] that dunnage mats used for the proper carriage of cargo in the Black Sea grain trade, even if not affixed to the ship or used at the time when the loss occurred, were nevertheless 'fittings' of the vessel insured. It was further observed that they rendered the ship seaworthy for the carriage of cargo. These cases seem to support the view that fittings do not have to be affixed to the vessel insured to be considered within the insurable value or insured together with the vessel. This would be particularly relevant where the insurance policy incorporates the Institute Clauses Hulls 1983 or 1995, which provide no express clause as to fittings or equipment of the vessel insured.

However, the International Hull Clauses 2003 provide that the hull insurance covers 'loss of or damage to *equipment* or apparatus not owned by the assured, but *installed for use on the vessel* and for which the assured has assumed contractual liability, where such loss or damage is caused by a peril insured'[46] under the policy.[47] This would include equipment leased by the owner. Three conditions would need to be met for a claim for loss or damage to the leased equipment to succeed: that the equipment is installed on the vessel; that the assured has assumed contractual liability for the equipment in the absence of ownership; and that the loss or damage to the equipment is caused by a peril that is enumerated in the policy as an insured peril. It goes without saying that such equipment is included in the insured value of the vessel and the insurers are liable either for the contractual liability assumed by the

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43 *New Liverpool–Eastham Ferry & Hotel Co v Ocean Accident & Guarantee Corp Ltd* (1929) 34 Lloyd's Rep 421.

44 In this case, chain and anchors were bought together with the vessel and used for mooring the barge which was providing coal to other vessels whilst lying moored.

45 [1900] 2 QB 283.

46 Emphasis added.

47 International Hull Clauses, cl 3.1. It is also provided under the Nordic Marine Insurance Plan that any loss or damage to equipment or spare parts that the owner has leased will be covered by hull insurance and no necessity will arise for the owner to insure the parts it does not own but bears a risk of loss or damage (Nordic Marine Insurance Plan of 2013, Version 2019, cl 10-1 Commentary).

assured, or the reasonable cost of repair or replacement, whichever is the lesser.[48] The Clauses therefore require that for equipment to be insurable under a H&M insurance policy, one of the conditions is that it should be installed on the vessel insured. RCCs placed on board vessels other than the ROV insured would seem not to fulfil this condition.

The second issue mentioned above, ie, whether RCCs constitute a fitting requisite for a particular trade, would seem to require further elaboration. Case law where the wording 'ordinary fittings requisite for the trade' was interpreted discussed circumstances where the relevant furniture was used in the carriage of cargo.[49] RCCs are not established for such a purpose, but rather for ensuring that ROVs or fully autonomous vessels are properly navigated even though they are either uncrewed or operating with a reduced crew. In that sense, it may be difficult to argue that RCCs are requisite for a particular trade. One exception to this may perhaps present itself where the RCC is placed on board a mother ship that sails together with platooning ROVs carrying cargo in the Arctic or in piracy-prone areas.

In the light of the foregoing, where the subject-matter insured is not expressed in clear terms in H&M policies, there may be an argument that RCC equipment placed on board vessels other than the ROV insured could constitute part of the insured property. However, in the (unlikely) circumstance that it does, if RCC equipment is insured under the ROV's policy as well as under the mother ship's policy, this could amount to double insurance. Under the International Hull Clauses, the clause on parts taken off provides '[i]f at the time of loss or damage to the parts taken off the vessel, such parts are covered by any other insurance or would be so covered but for this Clause 4, then this insurance shall only be excess of such other insurance'.[50] This type of wording may serve as an example for addressing the issues that may arise out of any potential double insurance situations.

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48 Clause 3.2.

49 *Hogarth v Walker* [1900] 2 QB 283; *New Liverpool–Eastham Ferry & Hotel Co v Ocean Accident & Guarantee Corp Ltd* [1929] 34 Lloyd's Rep 421.

50 Clause 4.3.

4 RCC-related perils and H&M insurance contracts

ROVs will be subject to multiple risks, the occurrence of which may result in loss or damage to the vessel itself. These include, but are certainly not limited to, the following classes of risks:

i) Acts of RCC operators in carrying out their duties in relation to the ROV (amounting to negligence or incompetence or recklessness);
ii) Perils occurring at the RCC affecting the control of the vessel, such as fire, earthquake, flooding or cyber-attacks;
iii) Perils inherent to the automation technology involved, such as software deficiencies of the ROV or loss of connection between the ROV and the RCC (not arising from a cyber-attack);
iv) Traditional maritime perils such as perils of the seas, fire, piracy etc directly affecting the vessel.

A H&M insurance cover for ROVs could probably be sufficiently comprehensive only where all these eventualities are insured against, either being included in the main policy or being available as additional cover subject to the payment of an extra premium.[51] It is available to the parties to subject their insurance contract to the provisions of the MIA if they so agree. In the absence of such an express agreement, whether a contract is a marine insurance contract where it insures marine perils as well as perils mentioned above would have to be decided by reference to the MIA and relevant case law.

A contract of 'marine insurance' is a contract whereby the insurer undertakes to indemnify the assured against 'marine losses', which are expressed as 'losses incident to marine adventure'.[52] 'Marine adventure', in turn, is the subject of insurance where 'any ship goods or other moveables are exposed to maritime perils'.[53] A ship is an 'insurable property' under a H&M policy to which the MIA would apply provided that the policy covers marine losses, ie, losses arising where the ship is exposed to 'maritime perils'. Maritime perils are also defined

[51] An analogy can be drawn in this regard with unmanned aerial vehicles which are generally insured against property damage under all risks policies.
[52] MIA, s 1.
[53] MIA, s 3(2)(a).

as 'the perils consequent on, or incidental to, the navigation of the sea' such as barratry, perils of the sea, fire and captures, and include also 'any other perils, either of the like kind or which may be designated by the policy'.[54]

As discussed above,[55] it is highly likely that remotely operated vessels constitute 'ships' and that they would accordingly be covered against the traditional maritime perils under H&M insurance policies. An important question arises whether any peril designated by the parties and included in a marine insurance policy could fall within the term 'maritime perils' without being 'consequent on, or incidental to, the navigation of the sea'.[56] This was discussed by Mustill J in *The Captain Panagos DP*[57] where an insurance contract covering a mortgagee's interest was held to be a marine insurance contract. He clarified the difference between perils occurring *on* the sea and perils *of* the sea, and gave the example of the bursting of a ship's boiler, which is not a traditional risk that was covered under the SG Form, but is still a maritime peril, being incidental to the navigation of the sea.[58] According to Mustill J, 'it could scarcely be denied that the risk of such an event, taking place while the ship is on passage, can properly be characterized as "incidental to the navigation of the sea", and hence within the definition of marine perils'.[59] He further explained that the form of the policy did not have to reflect a traditional marine insurance policy, nor did the cover under the policy have to resemble the maritime perils enumerated in s 3(2) of the MIA. However, the inclusion of designated perils into a policy would not suffice to make it a marine insurance policy;[60] only perils 'consequent on or incidental to the navigation of the sea' could give the adventure the character of a marine adventure as described in the MIA, s 3(2).[61] He added that, to properly

54 MIA, s 3(2).

55 See Part 2 above.

56 Support for this view can be found in Francis Rose, *Marine Insurance: Law and Practice* (2nd ed, Informa Law from Routledge 2012) para 1.40 by reference to 'fire' being 'not necessarily of a marine nature'. The contrary view was expressed in respect of the equivalent provision of MIA, s 3(2) in the Marine Insurance Act, RSM 1987, c M40 (Canada) in *Pine Ridge Golf Club v Lombard General Insurance Co of Canada* 2003 MBQB 168, [2003] 11 WWR 48, [2003] 176 Man R (2d) 47 (Hanssen J) para 20: 'While a literal reading of the concluding words of ss. 5(3) of The Marine Insurance Act appears to permit any peril to be designated by the policy as a marine peril, this would be an absurd interpretation.'

57 *Continental Illinois National Bank & Trust Co of Chicago v Bathurst (The Captain Panagos DP)* [1985] 1 Lloyd's Rep 625.

58 Ibid 631.

59 Ibid.

60 Ibid.

61 Ibid.

characterise a contract as a marine insurance contract, the contract should cover, at least in the main, perils 'consequent on or incidental to the navigation of the sea'.[62]

It goes without saying that H&M insurance policies under which ROVs will be insured will provide cover against traditional maritime perils. They would, however, also need to insure the acts of RCC operators which could occasion loss or damage to the ROV. It was held in *Gibbs v Mercantile Mutual Ins (Austr) Ltd*[63] that the careless operation (or negligent navigation) of a marine craft in estuarine waters (and not seas) was a peril consequent on or incidental to the navigation of the sea which would attract the application of the MIA. It was observed in this case that the location of the accident — seas or estuarine waters — was irrelevant and that the nature of the insured risk mattered.[64] A policy would even be a marine policy where the vessel does not prosecute a voyage at sea but is kept on land.[65] Accordingly, regardless of where the loss occurs, a contract would be a marine insurance contract if a marine craft is negligently operated and if the contract covers, in the main, perils consequent on or incidental to the navigation of the sea. The acts of RCC operators could therefore qualify as a maritime peril and if they are insured under insurance contracts together with traditional maritime perils, the contract can properly be termed as one of marine insurance.

The rather controversial issue would be whether perils occurring at the RCC (particularly where it is built on land) such as fire, earthquake, or cyber-attacks or perils inherent to the automation technology which could potentially cause loss or damage to the ROV could properly be characterised as 'perils consequent on or incidental to the navigation of the sea'. In the likely event that they could not, attracting the application of the MIA could nevertheless be possible where the loss or damage to the ROV occurred due to 'land risks which may be

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62 Ibid.

63 [2003] HCA 39, (2003) 199 ALR 497. In this case negligent navigation in estuarine waters was held to be a peril incidental to the navigation of the sea.

64 See also *Leon v Casey* [1932] 2 KB 576 (CA) where the relevant policy covered goods on an adventure that included a journey by land from Cairo to Alexandria and then by steamship to Jaffa. The goods were insured, amongst other risks, against the risk of fire and were damaged during the land transit from Cairo to Alexandria. It was held by the Court of Appeal that whether the loss occurred on land or sea did not matter — the test was whether the policy was substantially one of marine insurance.

65 Gilman et al, *Arnould's Law of Marine Insurance and General Average* (n 13) para 1–09, citing *Countrywide Finance Ltd v State Insurance* [1993] 3 NZLR 745; *Gate v Sun Alliance Insurance Ltd* [1995] LRLR 385; *Vero Insurance NZ Ltd v Posa* (2009) 15 ANZ Insurance Cases 61–791 in support of this view and *Con-Stan Industries of Australia Pty Ltd v Norwich Winterthur Insurance (Australia) Ltd* (1986) 160 CLR 226 against.

incidental to any sea voyage'[66] or where the risks are considered 'risks analogous to a marine adventure'.[67]

5 Acts of RCC operators: new perils under H&M insurance policies?

5.1 Negligence of RCC operators

5.1.1 Analogy with 'negligence of the master, officers, crew'

An argument often advanced by proponents of autonomous and unmanned vessels is that the new technology is expected to contribute substantially to reducing human-related losses by eliminating the human element on board. As true as this may prove to be, the risks entailed in a sea voyage undertaken by an ROV (whether manned or unmanned) are not limited to the negligence of those on board. One of the risks that is anticipated to lead to loss or damage to the hull and machinery of ROVs, and against which insurance cover can be sought, is

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[66] MIA, s 2(1). The version of the section before the enactment of the Act read 'losses on inland waters or on any land risk which may be interposed in, or subsidiary or incidental to, any sea voyage': *Digest* (n 39) p 3 § 2(1). It is noteworthy that the contract that can be 'extended' to losses on any land risks incidental to any sea voyage must be a marine insurance contract: one that provides cover against maritime perils, ie, perils consequent on, or incidental to, the navigation of the sea. This can be achieved through the insertion of express provisions in the policy, as well as through usage of trade.

[67] MIA, s 2(2) provides: 'Where a ship in course of building, or the launch of a ship, or any adventure analogous to a marine adventure, is covered by a policy in the form of a marine policy, the provisions of this Act, in so far as applicable, shall apply thereto.' This provision connotes that even if a policy does not satisfy the criteria of a marine insurance contract, it can be considered as such where it is made in the form of a marine policy and where what is covered is 'an adventure' that is analogous to a marine adventure. Compare the Marine Insurance Act 1993, c 22 (Canada), s 6(1), which provides somewhat differently that a marine insurance contract insures 'losses that are incidental to a marine adventure or an adventure analogous to a marine adventure including losses arising from a land or air peril incidental to such adventure if they are provided for in the contract'. Examples of risks involved in an adventure analogous to a marine adventure can be found in the Institute Cargo Clauses (Air). See John Dunt, *Marine Cargo Insurance* (2nd ed, Informa Law from Routledge 2016) para 1.28; see also the Law Commission Consultation Paper No 201 and the Scottish Law Commission Discussion Paper No 152, *Insurance Contract Law: Post Contract Duties and Other Issues* (Law Commission Paper No 201) para 16.16 for the suggestion that air cargo insurance could be treated as marine insurance if an air journey is regarded to be analogous to a marine adventure. But see the *Report on the Review of the Marine Insurance Act 1909* of the Australian Law Reform Commission (ALRC) proposing that the MIA should be extended to include adventures solely confined to Australia's inland waters: ALRC 91, para 8–82. The English and Scottish Law Commissions had previously proposed two alternatives in respect of the subsection, being the repeal of s 2(2) in its entirety or the repeal of the words 'in the form of a marine policy' (Law Commission Paper No 201 para 16.24). This proposal was not implemented.

effectively the negligent acts of RCC operators in navigating the ship. The standard wordings covering H&M risks[68] were certainly not drafted at a time when the deployment of ROVs was so imminent. Therefore, undoubtedly, the list of insured perils under the standard forms contains no express reference to the negligence of RCC operators. What they do contain, however, is a clause providing that loss or damage to the subject-matter insured caused by the negligence of master, officers, crew or pilots is recoverable provided such loss or damage does not result from the privity of the assured, owners or managers.[69]

Where insurance policies do not contain a clause defining the terms 'master' or 'crew', or one that clarifies whether RCC operators qualify as such, reference would need to be made to the definitions of the relevant terms under the law governing the insurance contract. However they are denominated in particular contexts,[70] the question of whether they fall within these terms will require an analysis of these wordings and what they connote in law.[71] A number of scholarly works and policy documents have elaborated on a possible analogy between RCC operators and master or crew.[72] It is not the purpose of this paper to simply duplicate those works, but rather to highlight the legal problems that may arise in the hull insurance context. Certain P&I insurance policies on autonomous ships provide that 'crew' encompasses both those on board and at the RCC.[73] A similar approach was adopted in the Maritime UK Code of

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68 Institute Voyage Clauses – Hulls 1/10/1983; Institute Time Clauses – Hulls 1/10/1983; Institute Voyage Clauses – Hulls 1/11/95; Institute Time Clauses – Hulls 1/11/95; International Hull Clauses 2003.

69 Institute Voyage Clauses – Hulls 1/10/1983, cl 4.2.3; Institute Time Clauses – Hulls 1/10/1983, cl 6.2.3; Institute Voyage Clauses – Hulls 1/11/95, cl 4.2.2; Institute Time Clauses – Hulls 1/11/95, cl 6.2.2; International Hull Clauses 2003, cl 2.2.3. MIA, s 55(1)(a) provides, however, that the insurer 'is liable for any loss proximately caused by a peril insured against, even though the loss would not have happened but for the misconduct or negligence of the master or crew'.

70 See MUNIN *D8.8: Final Report: Shore Control Centre* available at <http://www.unmanned-ship.org/munin/wp-content/uploads/2015/09/MUNIN-D8-8-Final-Report-Shore-Control-Centre-CTH-final.pdf> (accessed 17 October 2019) 11, suggesting that RCC operators and the RCC supervisor will be at the RCC together with a RCC captain and engineer. In this context the supervisor would have the task of organising the operator's workload (ibid 10) and the RCC captain would be expected to be legally responsible for the activities of the vessels under the command of the RCC (ibid 11).

71 For instance, the Merchant Shipping Act 1995 (UK) defines 'master' as including 'every person (except a pilot) having command or charge of a ship'.

72 For a non-exhaustive account of these works, see Veal, Tsimplis and Serdy (n 5) 35–37; Luci Carey, 'All Hands Off Deck? The Legal Barriers to Autonomous Ships' (2017) 23 JIML 202, 210–214; Bernard Eder, Unmanned Vessels: Challenges Ahead' [2019] LMCLQ 47, 55; Van Hooydonk (n 5) 412; Summary of Responses to the Comité Maritime International (CMI) Questionnaire on Unmanned Ships 2–4; CMI Position Paper on Unmanned Ships 19, both available at <https://comitemaritime.org/work/unmanned-ships/> (accessed 17 October 2019).

73 See Shipowners Maritime Autonomous Vessel Liability Insurance Policy 2018/2019 available at <https://www.shipownersclub.com/media/2018/07/PUBS-A4-Maritime-Autonomous-Vessel-Liability-

Practice, where 'crew' was defined as 'a person employed or engaged in any capacity on-board a ship on the business of the ship or any person engaged in the direct control and operation of the ship from a remote location'.[74] There thus seems to be a tendency in the shipping industry and certain insurance circles to equate RCC operators with 'crew' in the traditional sense of the term, yet this approach could arguably give rise to hurdles where RCC operators do not act as servants of the shipowner (assured) in the same way that 'crew' would do. This paper suggests below that their functional equivalence is arguably not absolute and that the negligence of RCC operators may therefore have to be considered as a separate peril from that of the negligence of master or crew.

5.1.1.1 Functional equivalence and standard of care

The responsibilities that RCC operators will potentially have to undertake will effectively echo, to some extent, those of the master, chief engineer or the company operating the ship.[75] Primarily dealing with the command and control of the ROV, RCC operators will be expected to be responsible for, amongst other things, planning and executing the operation as well as the launch and recovery of the vehicle payload;[76] maintaining the ship at the shore and at sea;[77] arranging for inspections of the ROV;[78] and taking all necessary steps to prevent

Insurance-Policy-0618_FINAL.pdf> (accessed 17 October 2019). In this policy, 'crew' is defined as 'a person employed or engaged in any capacity on board a MAV [ie, marine autonomous vehicle] on the business of the MAV, or any person engaged in the direct control and operation of the MAV from a remote location whilst at that location'.

74 Maritime UK Code of Practice (n 2) 13. It is to be noted that the 'definitions' section of the Code of Practice includes the following statement: 'In this code the following definitions have been established for the sake of clarity. It is stressed that they carry no legal status and will need to be amended or removed as the International and UK regulatory organisations charged with the overall policies for MASS complete their phased work.'

75 As per the Merchant Shipping (International Safety Management (ISM) Code) Regulations 2014/1512 and the UK Merchant Shipping (Safety of Navigation) Regulations 2002 No 1473 (but see the initiative of the UK Maritime and Coastguard Agency on recasting these Regulations and the relevant Consultation Outcome Report available at <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/771182/Safety_of_Navigation_consultation_outcome_report.pdf> (accessed 17 October 2019). See also MUNIN, D7.2: Legal and Liability Analysis for Remote Controlled Vessels 18-19, available at <http://www.unmanned-ship.org/munin/wp-content/uploads/2013/11/MUNIN-D7-2-Legal-and-Liability-Analysis-for-Remote-Controlled-Vessels-UCC-final.pdf> (accessed 17 October 2019).

76 Maritime UK Code of Practice (n 2) 49.

77 In the latter case, together with the 'autonomous ship controller': see MUNIN, D7.2: Legal and Liability Analysis for Remote Controlled Vessels (n 75) 25.

78 Ibid 26.

collisions.[79] Despite these functional similarities, there will be circumstances where RCC operators will not act as the shipowner's servants or agents and will be entirely independent entities. It is also noteworthy that the master has a broader role that goes beyond the role potentially to be allocated to RCC operators. The impact of the foregoing on the analogy between RCC operators and master and crew is elaborated on below.

Negligence is not the duty to act carefully, but rather a duty requiring parties not to inflict damage carelessly,[80] the instance of which would also include the duty not to act carelessly.[81] The scope of duties of RCC operators and where these duties are enshrined, is accordingly of primary concern, as this will circumscribe the situations in which RCC operators will be required not to act carelessly. In establishing the standard of care of seafarers, instruments such as the ISM Code,[82] the STCW Convention,[83] and the COLREGs[84] will all be undoubtedly relevant. Additionally, industry instruments such as the Maritime UK Code of Practice may further qualify as standard-setting instruments. Although codes of practice are usually self-imposed and the courts may not accept them as evidence of the maximum standards applicable, they may nevertheless be considered by the courts as setting minimum standards.[85]

The test for establishing the standard of care is that of how a reasonably prudent person in a similar position would act.[86] Where the negligence of a master, crew or officers serving on board is at issue, the obvious benchmark for a 'reasonably prudent person' would be other masters or crew serving on board, and acting according to their perceptions as well as to

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79 Ibid 22.

80 *Overseas Tankship (UK) Ltd v Morts Dock & Engineering Co Ltd (The Wagon Mound)* [1961] AC 388, 425 (Viscount Simonds).

81 Michael A Jones, Anthony M Dugdale, Mark Simpson, *Clerk & Lindsell on Torts* (22nd ed, Sweet & Maxwell 2018), para 8–06.

82 The International Safety Management (ISM) Code aims to provide international standards for the safe management and operation of ships. The master, for instance, would be responsible of implementing the safety management system on board the vessel.

83 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended. See the CMI Position Paper on Unmanned Ships (n 72) 16 on the applicability of the Convention to remotely operated and fully autonomous ships.

84 Convention on the International Regulations for Preventing Collisions at Sea 1972 (COLREGs). See the CMI Position Paper on Unmanned Ships (n 72) 13–15 on the applicability of the Convention to remotely operated and fully autonomous ships; and also Carey (n 72) 207–211.

85 Brown and Gaskell (n 35) 147.

86 *Blyth* v *Birmingham Waterworks Co Ltd* (1856) 11 Ex 784, 4 WR 294.

information received from a variety of sources. However, RCC operators' acts (whether negligent or not) will much more heavily depend on the information transmitted through the ROV sensors which will directly dictate the course of action to be adopted. It is reported that one of the factors which is likely to cause adverse circumstances to the ship is the lack of 'perceived feelings' of the ship such as rolling, sensitivity of the ship, or sense of balance, upon which the master or crew on board would act.[87] Although this risk could arguably be mitigated (if not entirely avoided) through the use of the RCC simulator as human-machine interface allowing a 3D image of the environment, it has been suggested that visualisation would be unlikely to ensure situation awareness.[88] Moreover, it has been observed that the visual information received may cause information overload.[89] This could be a particular problem where one RCC operates several ships at the same time.[90]

In the event of a loss or corruption or distortion of the link between the RCC and the ROV, which would presumably be an occurrence beyond the operator's control, the RCC operator's act (or omission) may arguably not be regarded as negligent where the operator did not have any situational awareness or had distorted awareness due to technical deficiencies. It may even be suggested that the decisions and actions of the RCC operators affected by these circumstances would not amount to negligence, as their lack of situational awareness would taint the reasonable foreseeability of any harm that may occur or of the type of accident that actually occurs.[91] However, the 'agony of the moment' cases do not negate the duty of care,

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87 Y Man, M Lundh and T Porathe, 'Seeking Harmony in Shore-Based Unmanned Ship Handling: From the Perspective of Human Factors, What Is the Difference We Need to Focus on from Being Onboard to Onshore?' in Giuseppe di Bucchianico, Andrea Vallicelli, Neville A Stanton, Steven J Landry (eds), *Human Factors of Transportation — Social and Technological Evolution Across Maritime, Road, Rail, and Aviation Domains* (CRC Press 2017) 61, 67.

88 Ibid.

89 Ibid 68. It is noteworthy, however, that this may be alleviated to some extent where information is set to be transmitted more frequently in areas with heavy traffic than in open seas. Providing an adequate amount of data for human perception was seen to be achieved through the reduction of the frame-rate, the image resolution or efficient image compression in Bureau Veritas, Guidelines for Autonomous Shipping, December 2017, para 3.5.4, available at <https://www.bureauveritas.jp/news/pdf/641-NI_2017-12.pdf> (accessed 17 October 2019).

90 Mikael Wahlström, Jaakko Hakulinen, Hannu Karvonen, Iiro Lindborg, 'Human factors challenges in unmanned ship operations — insights from other domains', (2015) 3 Procedia Manufacturing 1038, 1040.

91 One of the three duty of care tests was established in *Caparo Industries plc v Dickman* [1990] 2 AC 605 where it was held that for a duty of care to exist, harm to the claimant must have been foreseen or been reasonably foreseeable, that there must be a requisite proximity between the claimant and defendant and that it must be fair, just and reasonable to impose a duty of care on the defendant. This test is the primary test in property damage cases. At the duty of care stage, the relevant question is whether some type of harm was reasonably foreseeable by the defendant, and at the breach stage, it is whether the type of

but recognise that the same standard of care is not expected of persons faced with emergency situations. What may therefore be expected of the RCC operators is that they would act 'in a way which is not unreasonable, taking into account the exigencies of their situation'.[92]

The above scenario is unlikely to happen in a case where a master is on board, is fully aware of the conditions of the environment and also benefits from perceived feelings regarding the state of the ship and the sea. In these circumstances it would be easier to establish negligence on the part of the master — an insured peril under H&M insurance policies — and the loss or damage would be covered provided it results from the master's negligent act or omission. However, if the loss of the link (or the loss of situational awareness) is not insured as a separate peril and the acts of RCC operators are considered to fall within the wording 'negligence of master, crew or officers', the clause may not be triggered given the lack of negligence on the part of the RCC operator.

It is also submitted that the test for the standard of care, ie the 'reasonably prudent person', would apply differently to RCC operators and masters. How a reasonably prudent master would act in a given circumstance may not always (or necessarily) be identical to how a reasonably prudent RCC operator would act in the same circumstance. Assessing the breach of the duty of care of RCC operators by reference to how a reasonably prudent master would act in that case could therefore create difficulties.

On balance, one could possibly argue that the negligence of RCC operators may fall under the 'negligence of the master, officers and crew' clause given that they will broadly be responsible for the control and command of the ROV. Equating those parties in all circumstances may, however, not produce useful results unless there is an absolute overlap between their roles and responsibilities.[93] Furthermore, what may constitute negligence by a master, may not

accident which actually occurred was reasonably foreseeable: see Rachael Mulheron, *Principles of Tort Law* (Cambridge University Press 2016) 50.

92 See *DAS International Ltd v Manley* [2002] EWCA Civ 1638 (Hale LJ).

93 Although some clarification with regard to the terms 'master', 'engineer', 'operator' and 'crew' was considered necessary, this was not seen as a significant barrier for insuring ROVs by Cefor, the Nordic Association of Marine Insurers: see <https://cefor.no/globalassets/documents/industrypolicy/news/mass---zooming-in-on-civil-liability-and-insurance---10-december-2018.pdf> (accessed 17 October 2019) para 3.5.2.

necessarily constitute negligence by a RCC operator and reference to a 'master' in applying the test of a 'reasonably prudent person' to a RCC operator could prove problematic. A stand-alone clause covering the losses caused by the negligence of RCC operators will arguably serve to address the foregoing difficulties.

5.1.1.2 The Trolley Problem

This well-known ethical problem highlights a difficult dilemma. There are two sets of rails. One set of rails has five people tied to it and the other has only one person tied to it. A runaway trolley is approaching to run over the five people but there is also someone standing next to a lever that controls a switch. That person has the option of diverting the trolley to run over the single person on the other set of rails. The ethical question is whether the person should let the trolley run over and kill five people, or should divert it to kill only one.[94] The implications of this dilemma in the context of autonomous vehicles have already been elaborated and some jurisdictions have considered whether software programmes can be designed to avoid this type of situation.[95]

Rather than the decisions that will need to be taken by autonomous systems, this paper focuses on the types of decisions that the RCC operators will be required to take and their potential implications for H&M insurance. Like autonomous systems, RCC operators will be faced with situations that will expose them to ethical dilemmas.[96] However, they will also need to manage non-ethical dilemmas.[97] As this paper solely focuses on losses giving rise to claims under H&M insurance policies, risks that may potentially result in the personal injury or death of crew or passengers and the types of dilemmas to which RCC operators may be

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94 This problem was introduced by Philippa Foot in 'The Problem of Abortion and the Doctrine of the Double Effect' (1967) 5 Oxford Review 5–15, reprinted in her book *Virtues and Vices* (Basil Blackwell 1978). It was further elaborated on in Judith Jarvis Thomson, 'The Trolley Problem' (1985) 94 Yale LJ 1395–1415.

95 The Ethics Commission in Germany published rules on automated and connected driving in June 2017 ('Bericht der Ethik-Kommission Automatisiertes und vernetztes Fahren'). For the English translation of the Rules, see <https://www.bmvi.de/SharedDocs/EN/publications/report-ethics-commission-automated-and-connected-driving.pdf?__blob=publicationFile> (accessed 17 October 2019). Rules 8 and 9 are particularly relevant to the dilemma.

96 Where they operate several passenger ships in the same area that are all in danger, or passenger ships and manned commercial ships at the same time.

97 For example, where they command multiple commercial cargo ships in the same area and the cargoes involved are at variable risks of loss.

exposed to in such situations will not be elaborated below.[98] Nevertheless, one cannot ignore the fact that when a passenger vessel and a commercial ship are operated at the same time, both being in danger of loss or damage to the hull and machinery, any risk of loss or damage recoverable under a H&M policy could also carry the risk of causing personal injury or death to the passengers or crew. The courses of action to be taken would therefore need to consider the human element.

A feature of RCC operators that promises to distinguish them from modern-time masters will indeed be the management of multiple interests at once, particularly where they will be operating several vessels at the same time in a given area.[99] Most certainly, managing several interests simultaneously is not alien to modern-time masters, who are required to ensure the safety of those on board (crew and passengers) as well as to serve the best interests of the shipowner, charterers and ship operators.[100] Nevertheless, masters' duties are limited to reconciling these interests in a single ship,[101] whereas RCC operators who are managing multiple vessels at the same time could be faced with significant conflict of interest situations. The examples that follow are provided to assist in the illustration of the likely divergences in the exercise of masters' and RCC operators' duties and in the standards of care to which they would be expected to adhere.

Example 1. The RCC operator commands two vessels in the same area, one being a commercial ship with crew on board and the other being a passenger vessel. Would the course of action to be taken by a 'reasonably prudent RCC operator' be to avoid any loss to the passenger vessel? A similar question may arise where two manned ships are operated, and it is inevitable that one of them will be damaged: which one to choose? When the same

98 Although one can readily contemplate the difficulty RCC operators may face in taking a course of action where there are passenger ships and crewed commercial ships or multiple passenger ships at risk in the same area. The question would accordingly boil down to the one in the trolley problem: should RCC operators take a course of action that is likely to cause harm to fewer people?

99 It is anticipated that a shore control centre operating 24/7 would require a minimum of 18 personnel and would need to operate multiple vessels to be profitable: see Carey, 'Report on BIMCO Autonomous Ships Seminar' (n 1) 4.

100 Dr John AC Cartner, Richard P Fiske and Tara L Leiter, *International Law of the Shipmaster* (1st ed, Informa Law from Routledge 2009) para 9.9.

101 Except if a situation occurs that would require life salvage at sea.

question is raised in respect of the masters of each of the ships, the obvious answer would be that a 'reasonably prudent master' would act to avoid any loss or damage to his/her own ship.

Example 2. The RCC operator commands two commercial cargo vessels, both being unmanned. The interests at stake are, amongst others, those of the shipowners of the two vessels, those of the cargo owners, of the environment, and of the ships operating around the two unmanned commercial vessels. In respect of matters of safety and pollution, the master has the 'overriding authority and responsibility to make decisions'[102] considering all the circumstances prevailing at the time and is required to act in a way that s/he considers to be in the best interests of the ship and the marine environment.[103] Where there are many interests that conflict, however, how would a 'reasonably prudent RCC operator' be expected to act? Rather than acting for the best interests of the shipowners or charterers, should the RCC operator act for the greater good to preserve the environment and to cause as little loss overall as possible? Or would not acting in the best interests of one of the parties lead to a breach of the RCC operator's duty of care?

These examples illustrate that the issue may not be so easily dealt with where RCC operators are in charge of several ships at the same time. The abovementioned situations may even call for an analogy with general average situations where the ships operated by the same RCC in the same area are taken to be involved in a common maritime adventure and the loss is incurred for the common safety.

It is further estimated that the presence of persons on board (as passengers or crew) is likely to affect the course of action that a 'reasonably prudent RCC operator' would be expected to take and will approximate their acts to those of vessel traffic controllers (VTCs) rather than to those of the masters. However, RCC operators will have a wider scope of duty compared to VTCs as they will have the primary responsibility for the operation of the vessels (like masters)

102 ISM Code, r 5.2.

103 Cartner et al, *International Law of the Shipmaster* (n 100) para 9.10.1.

which VTCs do not have. VTCs' actions may therefore be regarded as 'permissive' rather than 'obligatory',[104] whereby the end responsibility rests with the person commanding the vessel.

5.1.1.3 Causation

According to the MIA, unless the policy otherwise provides, any loss or damage that is remotely caused by the negligence of servants ('master and crew') is recoverable where the proximate cause is an insured peril.[105] Whether the policy context suggests different rules must therefore be assessed on a case by case basis. In the Institute Clauses and the International Hull Clauses, the loss should be proximately caused by the negligence of the master, crew, officers and pilots so as to be recoverable.[106] It is suggested that the risk of loss would be higher where the control of the ROV is transferred from a primary RCC operator to another operator or pilot where a network of RCCs operate at different locations,[107] or where the ROV is shut down or the level of control is changed by the operator inadvertently. Moreover, routine checks that the operators would be required to carry out may prove to be lengthier for an operator who oversees ships at different locations compared to an operator whose ships are within a single area,[108] and this could also increase the risk of loss by negligent behaviour.

English courts have so far been fairly cautious about deciding negligence to be the main or sole ground for allowing a claim.[109] Based on earlier case law on negligence as a proximate cause of the loss, the following observations may perhaps be made under three categories of cases.[110] Where no marine peril operates and the negligent handling of the ROV is the only

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104 See *New York Airways, Inc v United States* 283 F 2d 496 (2d Cir 1960), on the scope of duty of the air traffic controllers.

105 Section 55(2)(a).

106 See eg International Hull Clauses 01/11/03, cl 9; Institute Time Clauses – Hulls 1/10/83, cl 13.

107 Maritime UK Code of Practice (n 2) para 9.6.2.

108 Peter Barthelsson and Jacob Sagefjord, 'Autonomous Ships and the Operator's Role in a Shore Control Centre', Diploma Thesis in the Master Mariner Programme, Chalmer's University of Technology, Gothenburg, Sweden 2017, para 6.3, available at <http://publications.lib.chalmers.se/records/fulltext/250212/250212.pdf> (accessed on 19 October 2019). The latter case could arise, amongst other circumstances, where sailing in a particular geographical area, such as in the Arctic, which requires expert knowledge on the part of the RCC.

109 Gilman et al, *Arnould's Law of Marine Insurance and Average* (n 13) para 23–69.

110 See ibid for the classes of cases on negligent acts of masters, crew, officers and pilots.

evident cause of the damage to the ROV, the negligent handling will be the proximate cause of the loss.[111] This could particularly occur where the RCC operator fails to observe the steps to be followed in order to transfer the control of the ROV to another operator or pilot.

The second category of cases is where negligence occurs as a response to a casualty[112] and raises the question of whether it would break the chain of causation between the casualty (insured against under the policy) and the loss. The assured, its servants and agents are required to take reasonable measures to avert or minimise a loss recoverable under the policy. This duty would also be incumbent on RCC operators provided they fall under the term 'agent' for having been delegated the conduct of the marine adventure.[113] Instead of being interpreted to impose a sanction in the event of negligence, this duty was held to mean that any failure to act as such (amounting to negligence) would break the chain of causation between the insured peril and the loss and constitute an independent peril.[114] At this point, the question whether RCC operators can fall within the expression 'master, officers, crew or pilots' would determine the outcome of the claim: if affirmative, the negligence of RCC operators as an insured peril breaking the chain of causation would render the loss recoverable; otherwise, where the loss is caused by their negligence qualified as an 'uninsured peril' (if not specifically excluded under the policy) the policy would not respond.

The duty to sue and labour would arise following the occurrence of a peril insured against under the policy in order to avert or minimise a loss;[115] however, the existence of such a duty on the part of RCC operators may be doubtful under certain circumstances. The intrinsic reliance of the RCC on the sensors attached to the ROV to achieve situational awareness and act to minimise a loss may arguably prevent the duty from arising where the insured peril causes a loss to the sensors themselves. Moreover, loss of connection between the RCC and ROV beyond the control of the operator may also put in jeopardy any efforts to minimise the

111 *Baxendale v Fane* (1940) 66 Lloyd's Rep 174.

112 *Lind v Mitchell* (1928) 34 Comm Cas 81.

113 It was stated by Lord Phillips in *Netherlands v Youell* [1998] CLC 44, 55 that the duty of agents to sue and labour under s 78(4) arises in relation to a marine adventure because of the delegation of the conduct of the adventure to those parties.

114 *Netherlands v Youell* [1998] CLC 44; see also *Masefield AG v Amlin Corporate Member Ltd (The Bunga Melati Dua)* [2011] 1 CLC 97, 123.

115 *Netherlands v Youell* [1998] CLC 44; *Linelevel Ltd v Powszechny Zaklad Ubezpieczen SA (The Nore Challenger)* [2005] EWHC 421 (Comm).

loss and would presumably not even amount to negligence where the operator has no or distorted situational awareness due to technical deficiencies. At this point, it will be crucial to determine whether the risk causing the initial casualty such as loss of connection or any other technical failure resulting in poor situational awareness where the ship is outside the RCC line of sight[116] is otherwise insured against under the policy.[117] Other issues to be considered would be whether RCC operators would be taken to have discharged their duty to minimise loss where they transfer the control to another RCC[118] after being informed of the occurrence of the peril following which the connection is lost; or whether such duty would exist where there is a peril affecting the RCC such as a natural disaster or fire that substantially hinders the functions of RCC personnel.

The third category of cases is where negligence operates together with perils of the seas. Where a loss by ingress of water is brought about by the negligence of the crew, the proximate cause of the loss has long been considered to have been the perils of the seas.[119] These causes were both taken to be proximate causes of the loss in recent decisions.[120] It is

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116 Such as the failure of sensors.

117 The loss of the link (or connection) between ROV and RCC is a risk that should not be underestimated. In the context of drones, this risk is mitigated — at least in respect of some models — through built-in equipment ensuring the return of the drone to its point of origin. (See *R v Shah* [2017] ABPC 259 [21] (Canada) where loss of the link between a drone and its control centre was considered as a primary risk associated with drone operations.) In the maritime context, it is envisaged that the maintenance of a safe state ('minimum risk condition') could perhaps be achieved by imposing adequate rules governing the design of ROV, see DNV GL, Class Guideline — Autonomous and Remotely Operated Ships, September 2018, 21, available at <http://rules.dnvgl.com/docs/pdf/dnvgl/cg/2018-09/dnvgl-cg-0264.pdf> (accessed on 19 October 2019). In a similar vein, see also T Porathe, J Prison and Y Man, 'Situation Awareness in Remote Control Centers for Unmanned Ships' Proceedings of the Royal Institute of Naval Architects Conference, Human Factors in Ship Design & Operation, 26–27 February 2014, London, UK, para 1.2. It was also suggested in Bureau Veritas, Guidelines for Autonomous Shipping (n 89) para 2.4.4 that several options may be considered in case of loss of connection; namely the operator attempting to take over manual control, the ship slowing down to the next waypoint, the ship remaining at the location where the loss of connection occurred, and the ship sailing back to the previous waypoint. The Maritime UK Code of Practice (n 2) para 7.10.5 provides that in 'the event that the MASS experiences loss or compromise of Situational Awareness as well as loss of data-link, then Emergency Stop should be immediately initiated (making appropriate sound and visual signals when appropriate)'. However, this would not guarantee ultimate technical safety or the avoidance of any loss of connection.

118 Provided that the ROV is controlled by more than one RCC. Transfer of control is mentioned as a remote control centre hazard in DNV GL, Class Guideline — Autonomous and Remotely Operated Ships (n 117) 84.

119 *Trinder Anderson & Co v Thames and Mersey Marine Insurance Co* [1898] 2 QB 114.

120 *Versloot Dredging BV v HDI Gerling Industrie Versicherung AG (The DC Merwestone)* [2013] 2 Lloyd's Rep 131; see also *Venetico Marine SA v International General Insurance Co Ltd and Others (The Irene Em)* [2013] EWHC 3644 (Comm) [297] where it was stated that the question of whether negligence was a proximate cause would arise only where it is not otherwise caused by a perils of the seas and that on the facts of the case the negligence resulting in the grounding and the consequent damage was a proximate cause of the loss.

yet to be seen whether the same ratio will apply for losses contributed to by the acts of RCC operators.

5.1.2 Analogy with negligence of 'pilots'

Negligence of pilots is an insured peril under standard form H&M insurance contracts. Whether an RCC operator (based on land or on board another ship) could qualify as a 'pilot' is an issue that deserves further elaboration. The term 'pilot' found in the Clauses is intended to cover pilots who board vessels to take temporary control or command in certain geographical areas, most frequently in straits, near ports and in any other regions requiring specific knowledge of the area. Pilots may discharge their duties not merely on board vessels, but increasingly through remote means. Portable pilot units (or sensors) provide 'shore-based pilots' to remotely control any type of vessel of any size. It is suggested that ROVs will normally be controlled by RCC operators and may be navigated by 'area operators' (akin to pilots) in congested or coastal waters,[121] or that RCC operators may have a pilot licence for the operational areas.[122] Whichever scenario applies, an RCC operator's duties are expected to be far more comprehensive than those of pilots, and although the RCC operator may qualify as a pilot while discharging the duties of a pilot, in the rest of the circumstances the RCC operator would not necessarily be considered as such. For this reason, in the absence of any clause particularly covering losses caused by the negligence of RCC operators, these losses may arguably be recoverable under the wording 'negligence of pilot' where they are caused by the negligence of an RCC operator while discharging the duties of a pilot.

5.2 Incompetence of RCC operators

An RCC operator may act negligently without being incompetent, and act incompetently without this necessarily amounting to negligence. This distinction was enunciated by Willmer

[121] Barthelsson and Sagefjord (n 108) para 6.3.

[122] AAWA, 'Remote and Autonomous Ships — The Next Steps' (Rolls-Royce plc 2016) 12, available at <https://www.rolls-royce.com/~/media/Files/R/Rolls-Royce/documents/customers/marine/ship-intel/aawa-whitepaper-210616.pdf> (accessed 17 October 2019).

J in *The Landeer*:[123] 'Unhappily, the best qualified and most competent people are sometimes negligent.'[124] Incompetence and negligence are therefore distinct risks, and can both be separately causative of a loss giving rise to a claim under H&M insurance contracts. For insurance purposes it is absolutely crucial to distinguish between these two risks: while incompetence of the master and crew amounting to the unseaworthiness of the vessel would give rise to the twin consequences of breach of warranty (under voyage policies only)[125] and non-recoverability of the loss caused by incompetence, a H&M insurance policy on standard terms would respond to losses arising from the negligence of master, crew and other agents of the assured. In this regard, an important question arises whether the incompetence of RCC operators, where these do not operate as the servants of the shipowner, could amount to the unseaworthiness of the ROV insured.

Hull conditions respond to losses caused by the incompetence or error of judgement of persons[126] other than the master and crew, where an additional premium is paid and these perils are specifically covered by the insurers.[127] The Institute Additional Perils Clauses – Hulls[128] provide that 'loss of or damage to the Vessel caused by any accident or by negligence, incompetence or error of judgement of any person whatsoever' is recoverable subject to the payment of an additional premium.[129] The Additional Perils Clause in the International Hull Clauses contains similar wording[130] and the cover for incompetence and error of judgement

123 *Blackfriars Lighterage & Cartage Co Ltd v RL Hobbs (The Landeer)* [1955] 2 Lloyd's Rep 554. This was a marine case where the issue was whether the failure of a lighterman of considerable experience to exercise proper look-out caused the collision of the vessel.

124 Ibid 561.

125 Section 39(1). In time policies, there is no implied warranty that the ship shall be seaworthy; however, where the ship is sent to sea with the privity of the assured, the insurer is not liable for any loss caused by such unseaworthiness (s 39(5)). Hence, in this type of policy, the underlying question would be whether the incompetence of master or crew would in all circumstances amount to unseaworthiness, and if affirmative, whether the loss is caused by the failure to provide a seaworthy vessel.

126 Error of judgement here presumably refers to a non-negligent error of judgement. For the difference between negligent and non-negligent errors of judgement in the context of tort law, see *Whitehouse v Jordan* [1981] 1 WLR 246 (HL). It was further stated in *Henry v Thames Valley Police* [2010] EWCA Civ 5 [43] that any argument as to whether there was error of judgement must be avoided on the ground that in civil actions what matters is whether the defendant was negligent.

127 It is not clear whether the term 'any person whatsoever' would in principle encompass master, crew, officers and pilot. Gilman et al, *Arnould's Law of Marine Insurance and Average* (n 13) para 23–70 suggest that a cover of much wider scope compared to the negligence of master, crew, officers and pilots is provided under this clause.

128 For use with the Institute Time Clauses – Hulls 1/10/83, cl 294.

129 Clause 1.2.

130 Clause 41.1.3.

in both of these Clauses is subject to the proviso that the loss should not have resulted from a lack of due diligence by the assured, owners and managers. Clarifying whether RCC operators would qualify as master, crew or officers is therefore important for the purposes of incompetence: if affirmative, their incompetence would amount to unseaworthiness; if not, they could fall under the wording 'any person whatsoever' in the Additional Perils Clause and the loss caused by such incompetence would be recoverable where the additional cover is taken out.

Incompetence of the master and crew has been deliberated in a number of marine and non-marine cases.[131] In relation to a marine insurance policy, it was enunciated in *The Talisman*[132] that the test for competence was 'an objective one, directed to ascertaining what an ordinarily competent [fishing boat skipper] might reasonably be expected to do in the same circumstances'.[133] It is anticipated that RCC operators will be required to have an appropriate level of competence as would be currently expected from seafarers.[134] They will equally need to be trained to acquire general and mission-specific skills for the operation of ROVs, as well as be trained on the principles of autonomous systems and particularly on emergency contingencies such as loss of connection between the RCC and ROVs.[135] Lack of knowledge of how to proceed in case of a loss of connection or lack of adequate training on this issue could easily amount to incompetence.[136]

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131 See Roger White, 'The Human Factor in Unseaworthiness Claims' [1995] LMCLQ 221, 222–229 for an account of these cases discussed in the context of unseaworthiness. See also Konstantinos Bachxevanis, '"Crew Negligence" and "Crew Incompetence": Their Distinction and Its Consequence' (2010) 16 JIML 102–131.

132 *Steven v Scottish Boatowners Mutual Ins Assoc (The Talisman)* [1989] 1 Lloyd's Rep 535.

133 Ibid 539.

134 Maritime UK Code of Practice (n 2) para 11.7.1 recommends that the operators start with current seafarer skills and that trainings relevant to MASS technology should follow on from that. The Code provides at para 11.6.1 a list of possible certificates that the operators may need to acquire, such as RYA Certificates for powerboats at all appropriate levels and MGN 411 (M+F) – 'Training and Certification Requirements for the Crew of Fishing Vessels and their Applicability to Small Commercial Vessels and Large Yachts'.

135 Ibid p 56 Table 11.3; and para 11.6.2.

136 An analogy can be drawn here with the facts of *Manifest Shipping Co Ltd v. Uni-Polaris Insurance Co Ltd and Others (The Star Sea)* [2003] 1 AC 469. One of the issues was whether the master was incompetent for lacking basic knowledge on how to utilise a CO^2 fire extinguishing system where there was a constructive total loss of a ship due to an engine room fire. The insurers in this case had refused to accept the claim of the assured on the ground, amongst others, that the vessel was unseaworthy as per s 39(5) of the MIA. They contended that the master was incompetent and that the owners had been privy to such incompetence by turning a blind eye. The House of Lords held (at [1995] 1 Lloyd's Rep 651, 658) that the owners were not privy to the incompetence of the master, and endorsed the finding of Tuckey J that the

The required skills for RCC operators should be identified in accordance with the size and class of the vessel, the areas where operations will be conducted, as well as the nature of the cargo carried on board the ROVs that are being controlled.[137] The lack of knowledge about a particular vessel or its systems may amount to incompetence.[138] The possibility of RCC operators controlling several ships at once would call for the necessary competence of the operators to be adequate for each ship they operate and each voyage the ships prosecute. Moreover, the level of general competence required from RCC operators in terms of certification may differ between flag States and would therefore need to be dealt with at an international level, such as in the STCW Convention or a stand-alone instrument. This being the case, compliance with the requirements of certification in Conventions such as the STCW Convention[139] would not in all circumstances ensure competence, and it would gradually become more difficult to argue that non-compliance with certificate requirements does not constitute conclusive evidence of incompetence.[140]

Whether crew members are competent has been assessed in several instances by reference to their experience.[141] Although the issue of how RCC operators' competence will be assessed

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lack of knowledge of the fire-fighting equipment and the fact that the master had never taken fire-fighting training could be characterised as incompetence.

137 Maritime UK Code of Practice (n 2) para 11.4.1.

138 *Standard Oil Co of New York v The Clan Line Steamers (The Clan Gordon)* [1924] AC 100 where the master of a ship of peculiar construction acted inadequately in deballasting the ballast tanks due to a lack of knowledge on his part as to such peculiarity. The House of Lords accordingly held that the vessel was unseaworthy because of the master's incompetence. See also the decision in *Robin Hood Flour Mills Ltd v N M Paterson & Sons Ltd (The Farandoc)* [1967] 2 Lloyd's Rep 276, which was analysed in Bachxevanis (n 131) 109–110.

139 It should be noted that the application of the Convention to RCC operators is doubtful.

140 But see *Koninklijke Rotterdamsche Lloyd (NV) v Western Steamship Co Ltd (The Empire Jamaica)* [1956] 2 Lloyd's Rep 119 where there was a statutory requirement that the first and second mates should be certified, yet the second mate did not hold a certificate in the circumstances of the case. He negligently navigated the vessel which was consequently involved in a collision. On the ground that this was a tort case and the basis of liability was fault, it was held by the House of Lords that the lack of certificate was irrelevant (in that it was not causative of loss) as the second mate would not have navigated better had he held the certificate. He was therefore held to be generally competent despite the lack of certificate, yet was negligent. It should be noted that this case was decided before certification requirements were imposed under the ISM Code and the STCW Convention.

141 See the non-marine case *Brazier v Skipton Rock Co Ltd* (1962) 1 All ER 955 and the marine case *Blackfriars Lighterage & Cartage Co Ltd v RL Hobbs (The Landeer)* [1955] 2 Lloyd's Rep 554. Also see *Manifest Shipping Co Ltd v Uni-Polaris Insurance Co Ltd and Others (The Star Sea)* [2003] 1 AC 469, 517 (Lord Scott of Foscote): 'The master of the *Star Sea*, although recently appointed to the *Star Sea*, had been with the fleet for over 11 years and there was no evidence of any previous incompetence on his part. He had held a master's certificate since 1978.' See also *Marina Offshore v China Insurance Co (Singapore) Pte Ltd (The Marina Iris)* [2006] SGCA 28, [2007] 1 Lloyd's Rep 66 (marine insurance).

is yet to be clarified, it is to be expected that experience will constitute one of the benchmarks, together with qualifications for certain voyages[142] and knowledge in respect of certain vessels.[143] On this basis, it may be argued that:

i) Taking the necessary training and holding certificates to act as a seagoing ship's master may not necessarily satisfy the additional competence required from a RCC operator;

ii) RCC operators will be required to have experience in addition to the requisite training and certificates;

iii) Experience as a master will not necessarily suffice to qualify as a competent RCC operator.

In circumstances where RCC operators qualify as the servants of the owner, the insurers may rely on the implied breach of warranty of seaworthiness under voyage policies,[144] or may exclude any loss that results from such incompetence where the assured is privy to the incompetence.[145] Otherwise, where the assured has taken out additional cover for incompetence of 'any person whatsoever', the insurers will be required to indemnify the assured for any loss arising from the RCC operators' incompetence. In the absence of such additional cover and in the case where RCC operators are independent entities, their incompetence is unlikely to qualify as the incompetence of the servants of the owner and will accordingly not amount to unseaworthiness of the vessel. Such incompetence will accordingly be regarded as an uninsured peril if not specifically covered or excluded.

It is anticipated that RCC operators will increasingly find themselves in circumstances requiring them to deal effectively with information overload problems.[146] Particularly for RCC operators commanding multiple ships at a time, it may prove fairly challenging and time-consuming to differentiate between relevant and less relevant data, as well as to carry out

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142 *Marina Offshore v China Insurance Co (Singapore) Pte Ltd (The Marina Iris)* [2006] SGCA 28, [2007] 1 Lloyd's Rep 66 (marine insurance).

143 *Standard Oil Co of New York v Clan Line Steamers (The Clan Gordon)* [1924] AC 100, (1923) 17 LL L Rep 120. See also *Marina Offshore v China Insurance Co (Singapore) Pte Ltd (The Marina Iris)* [2006] SGCA 28, [2007] 1 Lloyd's Rep 66 [64] where it was stated that the crew's competence must be examined in the light of both the certification and actual seagoing experience.

144 MIA, s 39(1).

145 MIA, s 39(5).

146 Man et al (n 87) 68; Wahlström et al (n 90) 1040.

the analysis of relevant information to make accurate control decisions. Constant exposure to similar situations will be likely to result in operator fatigue, which may in turn qualify as a distinct source of incompetence.[147] In time policies, where the RCC operator's decision is tainted by his/her fatigue occurring after the ship sails and results in a loss, the insurer would be liable on the ground that the unseaworthiness of the ship occurred after the ship is sent to sea, and not before.[148]

The incompetence of RCC operators is also likely to give rise to intriguing causation problems, as it may not be easy to discern where incompetence is the proximate cause of a loss. In *The Marina Iris*[149] the issue was whether the loss was caused by perils of the seas or by the unseaworthiness of the vessel. Unseaworthiness was considered, amongst other grounds, by reference to the incompetence of the crew. The vessel had also been unstable, yet this was not contended by the insurers as a cause of unseaworthiness. There was evidence before the court in the first instance that the loss was caused by unseaworthiness especially with regard to stability and was only exacerbated by the incompetence of the crew.[150] There was no finding that the incompetence had operated as a proximate cause of the loss on its own. It is submitted that lack of experience or other incompetence of a RCC operator that acts as the servant of the owner that results in a collision of the ROV could qualify as a proximate cause of the loss in the absence of any other prevailing cause.

5.3 Misconduct of RCC operators

5.3.1 Barratry and misconduct not amounting to barratry

Hull insurance contracts traditionally cover 'barratry' of the master and crew, which is defined as a 'wrongful act willfully committed by the master or crew to the prejudice of the owner of

147 See White (n 131) 228 and Bachxevanis (n 131) 128–129 for the view that crew fatigue (or 'tiredness') may be considered as a form of incompetence.

148 See MIA, s 39(5) which provides that the insurer is not liable for any loss attributable to unseaworthiness where the ship is sent to sea in an unseaworthy state.

149 *Marina Offshore v China Insurance Co (Singapore) Pte Ltd (The Marina Iris)* [2006] SGCA 28, [2007] 1 Lloyd's Rep 66.

150 Ibid [65].

the vessel, or as the case may be, to the charterer'.[151] The SG Policy in use until the 1980s referred to this peril as 'barratry of the Master and Mariners',[152] whereas the International Hull Clauses 2003 as well as the Institute Time Clauses – Hulls 1/10/83 and the Institute Time Clauses – Hulls 1/11/95 provide for 'barratry of Master, Officers or Crew'.[153] Under all these instruments, where a loss of or damage to the vessel is caused by barratry, the insurers are required to indemnify the insured shipowner, provided that the shipowner is not privy to the act.[154] Earlier illustrations of this peril encompassed, amongst other things, chief engineers setting the vessel on fire while on board,[155] the deliberate sinking of a vessel by an engineer[156] and the master and crew using the vessel for smuggling for their own account as a result of which the vessel is seized.[157]

The MIA, s 55(2)(a) states that unless the policy otherwise provides, the insurer is liable for any loss proximately caused by an insured peril, even though the loss would not have happened but for the misconduct of the master or crew. Accordingly, unless the policy otherwise provides, the owner cannot recover where the loss is proximately caused by the misconduct of the master or crew not amounting to barratry. The owner can, however, recover where the misconduct of the master or crew is a remote cause, and not the proximate cause, provided that the proximate cause is an insured peril.

Whether any wilful misconduct by an RCC operator will amount to barratry will turn upon the relationship between the RCC operators and the shipowner. If they are an independent company such as a ship management company, if they have an interest in the ship insured and are co-insured with the shipowner under a composite insurance policy, their misconduct would not be an insured peril (MIA, s 55(1)(a)). Any loss or damage to the ROV that is caused by their misconduct could still be recoverable by the owners on the ground that under a

[151] MIA, First Schedule, Rules for Construction, R 11.
[152] MIA, First Schedule.
[153] Respectively, cls 2.2.5, 6.2.5, 6.2.4.
[154] This latter proviso was not expressed in the SG Policy.
[155] *Glencore Energy UK Ltd v Freeport Holdings Ltd (The Lady M)* [2017] EWHC 3348 (Comm).
[156] *The Michael* [1979] 1 Lloyd's Rep 55.
[157] *Lockyer v Offley* (1786) 1 TR 252.

composite policy, each assured has distinct contracts with the insurer and can recover despite the wilful misconduct of a co-assured.[158]

5.3.2 Recklessness

The standard form H&M conditions neither specifically covers nor excludes losses caused by the reckless behaviour of the assured or that of the master or crew. The MIA, s 55(2)(a), however, refers to the misconduct of the master or crew which encompasses instances of recklessness.[159] As per this subsection, the insurer would be liable for a loss proximately caused by an insured peril where the recklessness of the master or crew is a remote cause.

Monitoring several ships at a time by RCC operators is likely to cause several instances where their reckless behaviour would contribute to the occurrence of loss. For instance, an operator commanding a number of ships in the same area belonging to different shipowners may choose to act in a way that prevents the loss of a passenger vessel but causes a collision between two commercial vessels. The operator will accordingly be held to have acted recklessly in respect of the collision where this result was foreseen yet was not intended. Moreover, the trolley problem mentioned above[160] which is anticipated to occur particularly where RCC operators monitor several vessels in the same area is likely to increase instances of recklessness. Where RCC operators qualify as servants of the assured, their reckless behaviour could trigger the rule enshrined in the MIA, s 55(2)(a). The main problem arises where RCC operators do not act as servants of the owner but as an independent third party (eg an independent ship management company) providing services to them. In this circumstance, the recklessness of RCC operators would clearly not fall under the foregoing subsection. Whether any loss contributed to by their recklessness is recoverable would accordingly depend on whether they have an insurable interest in the ship and are co-insured under a composite policy together with the owner. If affirmative, the owner would still be

158 *General Accident Fire & Life Assurance Corp v Midland Bank* [1940] 2 KB 388; *Murphy v Murphy* [2004] Lloyd's Rep IR 744; but see *Direct Line v Khan* [2002] Lloyd's Rep IR 364.

159 *Forder v Great Western Railway Co* [1905] 2 KB 532.

160 See the discussion above in Part 5.1.1.2.

able to recover for a loss contributed to by the reckless acts of RCC operators under a composite policy.

6 Conclusion

ROVs, whether manned or unmanned, will need RCCs to operate safely and properly. The reliance on RCC equipment for the prosecution of a voyage will give rise to interesting questions as to the insurability of such equipment together with the ROV under the same policy, where the policy does not clearly provide that the equipment is excluded. Although the equipment will ordinarily be insured separately, there could be an argument that it is an ordinary fitting of the ROV requisite for the trade.

Moreover, the control of an ROV will constitute a primary duty of RCC operators, some of the tasks of which will also overlap with those of the master or crew. This, however, does not necessarily mean that an analogy can be drawn between RCC operators and master or crew in all circumstances. The application of the test of the standard of care to masters and RCC operators may result in different outcomes; and whereas the master is in principle required to observe only the interests of his/her ship, RCC operators commanding several ships at a time will probably be expected to act in a way to preserve several different interests at the same time.

In addition, the relationship between the RCC and the owner of the ROV insured will also play a role in identifying whether an analogy between RCC operators and master or crew is adequate. RCC operators are unlikely to fall under the wording ‘negligence of master, officer and crew’ if they do not act as the servants of the owner but as an independent third party.

The foregoing uncertainties and problems will need to be addressed before standard form H&M insurance terms that will be applicable to ROVs are revised.