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INFORMATION

From:	General Secretariat of the Council
To:	Working Party on Shipping
Subject:	Preparation of IMO/MSC 110 (London, 18 - 27 June 2025) - Draft submission by Germany - DEVELOPMENT OF A GOAL-BASED INSTRUMENT FOR MARITIME AUTONOMOUS SURFACE SHIPS - Proposed Amendments to chapter 15 (Human Element) of the MASS Code

Delegations will find attached a draft submission by <u>Germany</u>, in view of the 110th session of the IMO Maritime Safety Committee (agenda item 5).

Germany invites other Member States to take note of/support this document.



Maritime Safety Committee 110th session Agenda item 5 MSC 110/5/XX 11 March 2025 Original: ENGLISH Pre-session public release: ⊠

DEVELOPMENT OF A GOAL-BASED INSTRUMENT FOR MARITIME AUTONOMOUS SURFACE SHIPS

Proposed Amendments to chapter 15 (Human Element) of the MASS Code Submitted by Germany, International Federation of Shipmasters' Associations (IFSMA), International Transport Federation (ITF), Nautical Institute, Netherlands (Kingdom of the), Spain and the United Kingdom

	SUMMARY
Executive summary:	This document proposes a new a draft text and restructuring of chapter 15, Human Element, of the draft MASS Code, to be used as the base text to be further developed in the MASS Working Group. Proposed amendments to the existing draft include setting out a revised goal and principles to take into account developments and decisions made during the MASS Working and Correspondence Groups which subsequently impact the chapter's purpose. In addition, the [United Kingdom/Co-sponsor or sponsor or sponsor or proposes a human element checklist review to be undertaken of all identified chapters of the non-mandatory MASS Code to ensure the relevant chapters address the applicable human element provisions.
Strategic direction, if applicable:	2
Output:	2.23
Action to be taken:	Paragraph 18
Related documents:	MSC 109/WP.8. and MSC 110/ <u>5/</u> XX

Introduction

1 This document is submitted in accordance with MSC-MEPC.1/Circ.5/Rev.5 on Organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies, taking into account resolution A.1174(33) on the Application of the Strategic Plan of the Organization.

2 The Maritime Safety Committee (MSC), at its 105th session, established the intersessional MASS Correspondence Group (CG) for the development of the draft MASS Code, and at its 106th session, the Committee agreed to allocate this work to participating Member States and observer organizations under the CG. MSC 107 agreed to continue the review of the draft MASS Code, based on document MSC 107/WP.9, in the CG.

3 Chapters of the draft MASS Code were developed in detail during this time by several volunteering Member States_and Non-governmental Organizations (NGO) of consultative status, as was reported in document MSC 108/4. Directly prior to MSC 108, a further review of the draft MASS Code was performed, which was reflected in MSC 108/J/5.

4. MSC, at its 108th session, re-established the MASS CG to finalize eight chapters of the MASS Code that had been developed further than others, one being the Human Element chapter.

Human Element chapter

5 The Human Element chapter has had significant development at both MSC 108 and the preceding and subsequent meetings and related CGs. This work has involved collaboration and numerous feedback rounds between Member States to develop an effective and useful Human Element chapter. The [UK/Co-Sponsors] would like to express the sincere thanks to all for the expertise and efforts towards this vital chapter.

6. However, despite the efforts and considerable time spent on the chapter, it has not yet been finalized and the [UK/Co-Sponsors] believe key issues remain open regarding its scope and purpose in relation to the rest of the Code and other IMO Instruments. It is the [UK/Co-sponsors] view that the chapter needs to reflect the developments made in other chapters, considering its inevitable-connection to the rest of the Code, including its intended scope, content and structure.has developed ahead of initial conversations and requires reconsideration regarding its intended scope, content and structure.

7. The [UK/Co-Sponsors] have developed Annex 1, using the most recent version of the Human Element chapter from the MASS CG and the draft MASS Code (MSC 109/WP.8.), to propose a restructuring of chapter 15, with a focus on Manning and Training. Its objective is to take into account the work undertaken by the MSC-MASS WG and CG on chapter 15 and progress on the MASS Code as a whole.

8. The human element is an underpinning factor that has been considered holistically in the MASS Code. For example, noting the most recent deliberations in the MASS CG, it has been agreed to relocate the applicable provisions and requirements related to Human-Centred Design and Human Machine Interaction to chapter 9, to address the human element effectively in the context of system design.

9. Further at MSC 109 it was agreed <u>that</u> matters related to the labour and social issues of remote operators were under the remit of the International Labour Organization. The <u>FUK/Co-Sponsors</u> believe that, taking into consideration these clarifications and other developments in the MASS Code, it is now possible to provide a clear goal and refocus for chapter 15 to address the remaining gaps – those being Training and Manning, and ensuring that MASS are appropriately manned by trained, competent and experienced personnel. <u>with appropriate system support to those personnel</u>.

10. Annex 1 sets out a proposed revised draft of chapter 15 to be used as the base text.

11. Annex 2 provides a comprehensive mapping of the proposed WK/Co-Sponsor chapter to explain how it makes use of the text in the current version of chapter 15 in the MASS Code from the MASS CG.

Human Element checklist

12. The <u>__UK/</u>Co-Sponsors__note the considerable work on the human element but the previous efforts to address the human element in a singular chapter had presented difficulties

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and potential gaps or duplication in the Code.-However, since the restructuring of the Code at MASS-ISWG 3, and specific paragraphs within chapters at MSC 109, the Code now approaches the human element in a holistic way. This holistic approach mirrors the development of other IMO instruments and Codes, which have applied the IMO approved and recommended human element checklist to ensure the human element is considered throughout.

13. The [UK/Co-Sponsors] therefore propose a review of the draft MASS Code using the human element checklist (-MSC-MEPC.1-Circ.5-Rev.3, Annex 5) is re-undertaken, noting that this exercise was conducted for an earlier draft of the MASS Code. The purpose of this review would be to support a holistic and systematic approach to the human element, ensuring it has been considered throughout the MASS Code. The human element checklist provides an effective method for identifying possible gaps, and supports good practice before approving or adopting amendments to mandatory and non-mandatory IMO instruments as set out in -MSQ-MEPC.1-Circ.5-Rev.3, Annex 5.

Possibility of a master of a MASS being responsible for multiple vessels

14. At the second MASS-Joint Working Group (MASS-JWG), the Group set out:

"the possibility of the master of a MASS being responsible for multiple MASS at the same time and supported the view in principle" but concluded that a "detailed discussion on the circumstances where a master of a MASS could be responsible for several MASS was needed, and thus agreed that it was for the relevant Committee(s) to further consider what those conditions are" (MASS-JWG 2/WP.1., paragraph 16 & 17).

At MSC 107, the MASS Working Group and Committee concurred with the agreement (MSC 107/20, paragraph 5.22.2.13).

15. To date, the Group has focused on the development of the draft MASS Code and has not yet held detailed discussions on this principle, nor considered the condition(s) and circumstances required to permit a master of a MASS to be responsible for multiple MASS at the same time. This is critical when defining the role and responsibility of the Master during routine and emergency duties.

16. The [UK/Co-sponsors] raise this point, noting there are no provisions in the draft Code that address the principle to date, and believe that in alignment with the MASS-JWG2 and MSC 107 outputs, a discussion amongst the Group should be undertaken prior to considering the proposal for MASS.

17. [Therefore] Tthe [UK/Co-Sponsors] suggest that the non-mandatory Code, as currently drafted, maintains current requirements and safe manning principles to ensure that a MASS is operated at a level of safety that is expected of a conventionally operated ship. Any work, research or developments in relation to the possibility of the Master being responsible for multiple MASS_should be undertaken following the non-mandatory MASS Code, hould be undertaken_during the Experience Building Phase. The [UK/Co-Sponsors] believe this to be the appropriate time to explore this principle and for it to be considered further by the Group and Committee(s). This will ensure priority is given to the continued development and finalization of chapter 15 and the non-mandatory MASS Code.

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Action requested of the Committee

18. The <u>UKCo-Sponsors</u> proposes that the Committee considers the proposals highlighted above in reference to chapter 15 for the further development of the Code. Specifically, it is suggested that:

- .1 Annex 1 is used as the base text for chapter 15 of the MASS Code to be further developed and finalized in the Working Group (Paragraph 10);
- .2 the Group undertake a review of identified chapters of the MASS Code using the IMO human element checklist (MSC-MEPC.7/Circ.1/Rev.XX) to identify relevant locations for the human element in the Code, if not already addressed (Paragraph 12 and 13); and
- .3 Separate to the actions set out in (18.1 and 18.2), invite the <u>CommitteeGroup</u> to discuss the output from the MASS-JWG2 (MASS-JWG 2/WP.1, paragraph 16 & 17) and MSC 107 (MSC 107/20, 5.22.2.13) and consider paragraphs 16 & 17 set out in this proposal.

Action requested of the Committee

19. The Committee is invited to note the information provided and consider the proposals in paragraph 18 and take action, as appropriate.

Annex 1

Proposed revised base text for chapter 15

Chapter 15 Manning and Training

15.1 The purpose of this chapter is to ensure that [MASS/ship], to which this Code applies, are appropriately manned and operated by trained, competent and experienced personnel.

15.2 To ensure all MASS are manned safely as outlined in 5.7 [Survey and Certification, MSMD] the following principles should be followed:

15.2.1 The applicable international instruments, regulations and principles of safe manning should be adhered to when structuring manning levels, including any ROC(s).

15.2.2 The minimum level of safe manning should ensure that the minimum number of any seafarers [and/or] any Remote Operators_are sufficient to ensure the safety [and security] of life at sea, security_and the protection of the marine environment.

15.2.3 The minimum level of safe manning should ensure that the number of any seafarers or any Remote Operators is sufficien as well as <u>to</u>t to ensure an effective response to emergency situations and failures of systems.

15.2.34 The roles, responsibilities, and duties of all personnel as outlined in the Safe Manning Document, should be clearly identified, and defined and allocated.

15.2.<u>45</u> The Safe Manning Document shall should define whether a particular capacity is to be fulfilled by a seafarer serving on board the [MASS/vessel's], or by a Remote Operator.

15.2.56 Clear lines of authority and responsibility between any Remote Operators and seafarers on board a [MASS/vessel] should be established to ensure the safety [and security] of personnel and operations.

15.2.67 All personnel defined by the Safe Manning Document <u>shall_should_be</u> competent and capable of performing their function(s) at the appropriate level(s) of responsibility, regardless of the [MASS/<u>ship'svessel's</u>] mode of operation.

15.2.78 [The capacity [/role] of any seafarers or any Remote Operators [/persons] persons to safely operate the ship in any mode of operation must be determined by their qualification to perform the necessary functions for the level(s) of responsibility, as set out in the STCW Convention and Code 1978, as amended.

15.2.8 The minimum level of safe manning should take into account the impacts of fatigue on all personnel defined within the Safe Manning Document. MSC.1/Circ.1598 Guidelines on Fatigue.¹

15.2.<u>989</u> The minimum level of safe manning, <u>shall-should</u> provide for sufficient hours of rest, taking into account applicable <u>requirements</u>, <u>the provisions</u> set out in the STCW Convention and Code 1978, as amended, and <u>the provisions</u> set out in the IMO's principles of safe manning.

¹ MSC.1/Circ.1598 Guidelines on Fatigue

15.2.104 Regardless of the mode of operation, the Master of the MASS is responsible for the safe operation of the MASS aAt all times., the safe operation of a MASS is the responsibility of the Master regardless of the mode of operation.

15.2.12 The Master responsible for a MASS may be located physically onboard or at a ROC.

15.2.1<u>2</u>³ If there is a crew or persons on board <u>a [MASS/vessel], a the</u> Master should be physically present on board to ensure the safety of personnel and operations.

[15.2.1] where seafarers and other persons are onboard, the Master may discharge their <u>duties</u> <u>tasks</u>, <u>and/or</u> <u>duties</u> and <u>responsibilities</u> from a ROC that is certified in accordance with this Code.]

15.2.134 Multiple Masters may be operationally responsible for a MASS on a single voyage, subject to the Administration's approval of the proposed minimum levels of safe manning.

15.2.145 Only one master should be responsible for a MASS at any given time.

15.2.1565 Should a Master remotely change command team take over responsibility for the [MASS/vessel], sufficient time, resources, and procedures should be provided to ensure they are fully familiar with the ship and any ROC before assuming responsibility for the MASS.

15.2.1<u>6</u>⁷⁶ An emergency plan should be [provided/in place] at any ROC and, if applicable, on the vessel, that identifies the role and responsibilities of any Remote Operator(s) or seafarers on board the [MASS/vessel].

15.2.1<u>7</u>87 When determining minimum levels of safe manning,–_consideration must should be given to the capabilities and limitations of systems that enable connectivity between any ROC and the ship, including potential degradation of connectivity.

15.3 Where the levels of sSafe mManning are totto be met by the inclusion of Remote Operator(s)-roles and responsibilities set out in a Safe Manning Document are to be met by the inclusion of any Remote Operator(s):

15.3.1 They shall should be qualified and competent to a level not less than what is required under the STCW Convention and Code (1978), as amended to undertake their assigned tasks, duties and responsibilities from a ROC, that is certified in accordance with this Code.

[15.3.2 Consideration should be given to applicable <u>social and</u> labour <u>regulationsregulatory frameworks</u> required by the Administration.] The application should fully recognize the importance of seamless operational interactions between the [MASS/vessel] and the ROC and ensure the safe, secure and environmentally sound operations of the [MASS/vessel].]

15.3.3 The manning structure should not result in a Remote Operator validating the safety of a task or operation which has been determined by the Administration to bete be of a nature which required it to be carried out on board.

15.3.4 Remote Operators shall not be assigned any task, duty or responsibility, which_T due to the characteristics of a ROC or the ship, cannot be discharged <u>safely and effectively</u> from the ROC.

15.3.5 Where Remote Operator(s) are performing watchkeeping duties, there must be a sufficient number of Remote_Operators that meet the appropriate training and certification requirements to cover all watches, that are intended to be performed at a ROC.

15.3.6 Where a Remote Operator undertakes watchkeeping duties, sufficient time, resources, and procedures should be provided to ensure they are fully familiar with the ship and any ROC before assuming responsibility for a watch.

15.3.7 Consideration should be given to the duties of Remote Operators during emergencies, including their physical absence from the vessel and any degradation of connectivity.

15.3.8 The human-machine interface should be considered to ensure that any Remote Operator(s) are not <u>overburdened</u> by <u>the an [excessive/unsafe]</u> number of systems and interfaces.

15.4 All personnel comprising the Safe Manning Document should be suitably experienced and have completed training appropriate to their level of responsibility.

15.4.1 Should levels of safe manning include any Remote Operator(s) or any seafarers on board the [MASS/vessel], they should all be knowledgeable of the type and purpose of documentation associated with remote operations, including but not limited to such as operational manuals, failure modes and certification.

15.5 Where there are seafarers on board a [MASS /vessel] they must have completed training to attain the abilitiescompetencies that are appropriate to the capacity to be filled and so that their duties and responsibility can be taken up, including:

15.5.1 <u>Seafarers serving on board a [MASS/vessel]</u> must, at a minimum, be qualified as required by the STCW Convention and Code (1978), as amended.

15.5.2 Where the MASS operation includes the use of a ROC certified in accordance with this <u>Ceode</u>, training and drills for emergencies and failures of systems should be conducted between onboard seafarers and <u>any</u> Remote Operators.

15.6 Any Remote Operator(s) at any level of responsibility, should have completed training to attain the abilities competencies that are appropriate to the capacity to be filled and so that their duties and responsibility can be taken up, including:

15.6.1 Remote Operators performing watchkeeping duties are at a minimum qualified as set out in the STCW Convention and Code (1978), as amended, as if they were seafarers serving on board a seagoing ship.

15.6.2 The capacity of any Remote Operator(s) is determined by their qualification to perform necessary functions for the level(s) of responsibility, as set out in the STCW Convention and Code 1978, as amended.

15.6.3 Remote Operators undertaking duties for [MASS/vessel] should receive training in remote operations, including having demonstrated knowledge, understanding, proficiency and experience in the remote operation of a [MASS/vessel].

15.6.4 Training in remote operations should enable a Remote Operator to understand the operation of the ROC and [MASS'/vessel's] system and its associated components.

15.6.5 Knowledge, understanding, proficiency and experience gained through undertaking training in remote operations, should enable Remote Operators to operate the vessel safely <u>[and securely]</u>, with due regard for safety <u>[and security]</u> of life at sea and protection of the marine environment.

15.6.6 Training in remote operations should be delivered as additional training to the qualifications and experience set out in the STCW Convention and Code (1978), as amended.

15.6.7 Any training in remote operations should include the demonstration and evaluation of competence, that is additional to the competence set out for the management, operational and support levels of responsibility, set out in the STCW Convention and Code (1978), as amended.

15.6.8 Remote Operators, on being assigned to a ship, must be trained, certified and familiarised with their specific duties and with all ROC and ship arrangements, installations, equipment, procedures, <u>documentation and</u> ship characteristics that are relevant to their routine or emergency duties.

15.6.9 Training or drills required of ships must be extended to any ROC(s) and Remote Operator(s) undertaking duties for that ship, including any specialised training required to safely remotely operate a MASS remotely and respond to emergencies.

15.7 The provisions on working language set out in SOLAS V/14.3 shall should apply to [any MASS to which this code applies] and shall should extend to any ROC(s), Remote Operator(s) and third parties.

15.8 The provisions set out in SOLAS V/14.4 shall-should apply to any MASS, to which this code applies and extends to any ROC(s), Remote Operator(s) and third parties.

15.9 The company responsible for managing a MASS should issue a crew list that includes any Remote Operator(s) and seafarers on board the [MASS/vessel], ensuring compliance with the minimum Safe Manning Document. This list should be provided to any ROC and, if applicable, to the [MASS/vessel].





Annex 2

Table of proposed changes

			Annex 2	
		Table	of proposed changes	
Previous Paragraph	Previous Text	Proposed Paragraph	Proposed Text	Rationale
Chapter 15	Chapter 15 Human Element	Title	Chapter 15 Manning and Training	Following the MSC 109 MASS WG and MASS CG, if certain human element sections are relocated to other more appropriate chapters, and the proposals in Annex 1 are agreed, the remaining provisions no longer address the human element. It is proposed that this chapter is renamed to address the remaining points - Manning and Training. This aligns with other goal-based instruments that detail high-level manning and training requirements, such as the Polar Code.
15.1	The goal of this chapter is to ensure that Human Element issues involving the crew on board the ship or operational personnel in a Remote Operations Centre (ROC) are effectively addressed.	15.1	The purpose of this chapter is to ensure that [MASS/ship], to which this Code applies, are appropriately manned and operated by trained, competent and experienced personnel.	Amended to reflect the remaining provisions in the chapter, which regard Manning & Training, also removing the need for 15.1.1, 15.1.2 and 15.1.3. Manning and Training mirrors the goal- based standards in the Polar Code.
15.4	Manning/crewing	15.2	To ensure all MASS are manned safely as outlined in 5.7 [Survey and Certification, MSMD] the following principles should be followed:	Section 15.4 Manning/Crewing, including paragraphs 15.4.1, 15.4.2, 15.4.3 and 15.4.4 from the MASS CG Human Element chapter. They have been moved and slightly amended. The term "minimum Safe Manning Document" should be promulgated throughout the Code where manning is

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			concerned. This would align with the terminology set out in SOLAS V/14. The link to ConOps was removed and now aligns with chapter 5.7. The principles of Safe Manning and Minimum Safe Manning Document (MSMD) furnished according to IMO resolution A.1047(27) as amended, and to the satisfaction of the Administration – not according to a ConOps.
			Based on the discussion of the CG, the references to "Operational" have been removed for clarity.
	15.2.1	The applicable international instruments, regulations and principles of safe manning should be adhered to when structuring manning levels, including any ROC(s).	This point reflects and addresses 15.4.2 in the MASS CG Human Element chapter, but it has been moved with amended wording for clarity and to address ROCs.
			This proposal mirrors the previous suggestion but is concise and does not list all documents that may or may not apply or be considered in principle.
	15.2.2	The minimum level of safe manning should ensure that the minimum number of any seafarers or any Remote Operators are sufficient to ensure the safety of life at sea, security, the protection of the marine environment. as well as to ensure an	This point reflects and addresses 15.4.2.3 and 15.4.2 in the MASS CG Human Element chapter, it has been moved with amended wording to reflect any potential hybrid manning arrangements. This would mirror SOLAS V-14.

			effective response to emergency situations and failures of systems.	The provision ensures that any safe manning arrangements are sufficient.
		15.2.3	The roles, responsibilities, and duties of all personnel as outlined in the Safe Manning Document, should be clearly identified, defined and allocated.	This point reflects and addresses 15.4.2 in the MASS CG Human Element chapter, moved with amended wording. This would mirror SOLAS V- 14.
15.4.1	Administration should issue a minimum safe manning document which describes a manning structure that encompasses both the ship and the ROC(s). Taking into account the information provided in 15.4.2 and 15.4.3, the Administration should issue Minimum Safe Manning Documents (MSMD) in accordance with Chapter 5 of the Code and Resolution A1047(27).	15.2.4	The Safe Manning Document should define whether a particular capacity is to be fulfilled by a seafarer serving on board, or by a Remote Operator.	Added to address the capacities between seafarers on board and remote operators, to supplement chapter 5 of the Code (Certificate and Survey), and to highlight a gap in the Safe Manning Document. It is proposed to be reflected in chapter 5 and 15 to help clarify for end users. The requirement to issue a minimum safe manning document already exists. The proposed provision concentrates the requirement to clearly set out the capacities of any remote operators or seafarers serving onboard the ship.
15.2.6	[Crew onboard should have overriding authority over any remote operators with respect to the safety of persons onboard and operations.]	15.2.5	Clear lines of authority and responsibility between any Remote Operators and seafarers on board should be established to ensure the safety [and security] of personnel and operations.	Moved with amended wording, including the change from "crew" to "Remote Operators and seafarers on board". Proposed inclusion of "responsibility". This amendment proposes to focus on the clear lines of authority/ responsibility, in alignment with ISM principles. Rather

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				than authority being confused between any remote operators or persons on board. This, in combination with the provisions set out in 15.3.3 should be sufficient to ensure safety of personnel whilst not compromising the authority or responsibility of the Master. This clarifies the requirement and reduces any confusion caused by "authority" set out in the original text.
Proposed Gap – but relates to: 15.4 15.3.10 15.3.11	Proposed Gap	15.2.6	All personnel defined by the Safe Manning Document should be competent and capable of performing their function(s) at the appropriate level(s) of responsibility, regardless of the [MASS/ship's] mode of operation.	We have proposed this point to address level(s) of responsibility. The UK/Co- sponsors believe(s) this paragraph should remain in chapter 15 of the Code, rather than in chapter 5 (Certificate and Survey). This provision is set out to ensure that the personnel required for the safe operation of the vessel (seafarers and remote operators) are competent and capable of performing their function, irrespective of the Mode of Operation. This ensures that any human in the loop is adequately trained and experienced, so that they are able to intervene, as required.
Proposed Gap /	Proposed Gap/Clarification	15.2.7	[The role] of any seafarers or any Remote Operators [/persons] to safely operate the ship in any mode	This point has been proposed to add clarity to point 15.4 in the MASS CG Human Element chapter and ensure any

			Page s
Clarification regarding: 15.4 15.4.2 15.3.3	15.3.3 The Remote Operator of a MASS should have competency and experience as an officer qualified in accordance with appropriate STCW requirements.	of operation must be determined by their qualification to perform the necessary functions for the level(s) of responsibility, as set out in the STCW Convention and Code 1978, as amended.	remote operator is appropriately qualified. This ensures that the application of STCW is maintained for seafarers on board. However, this clarification ensures that functions identified in STCW are not just limited to "officers". For example, should a navigational
			 watch rating require training in remote operations, it is not in alignment with the provisions of STCW for them to be qualified to an "officer's" level. Furthermore, it is important that a remote operator is not just trained to an "officer's" level. The remote operator should hold the qualifications that enable them to execute the functions set out in the level of responsibility in the STCW Convention and Code, as amended.
			This reinforces the STCW Convention and Code's application for on-board seafarers. However, this also sets out that this is maintained for remote operators, to avoid the establishment of a two-tier system, between a remote operator and seafarer's level(s) of responsibility.

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Proposed Gap regarding: (15.4)	Proposed Gap (15.4)	15.2.8	The minimum level of safe manning should take into account the impacts of fatigue on all personnel defined within the Safe Manning Document.	Added to address a gap and take into account current provisions and standards while wider work is ongoing. Adds clarity to 15.4 in the current MASS CG Human Element Chapter.
Proposed Gap	Proposed Gap	15.2.9	The minimum level of safe manning, should provide for sufficient hours of rest, taking into account applicable requirements, the provisions set out in the STCW Convention and Code 1978, as amended, and the provisions set out in the IMO's principles of safe manning.	 Fatigue is a key point not addressed and should be considered in the SMD. The impact of fatigue on remote operators and any watchkeeping arrangements should be considered in any watchkeeping schedules. It is proposed to add clarity to 15.4 in the current MASS CG Human Element Chapter.
15.2.2	Safe operation of a MASS is, at all times, the responsibility of the designated Master regardless of the mode of operation, and they hold ultimate responsibility and authority over any operational decisions within a clear chain of command.	15.2.10	Regardless of the mode of operation, the Master of the MASS is responsible for the safe operation of the MASS at all times.	Moved and simplified for clarity.
15.2.3	The Master who is responsible for a MASS may be onboard the ship or at a ROC but should have the means to intervene when necessary.	15.2.11	The Master responsible for a MASS may be located physically onboard or at a ROC.	Moved and proposed amendments for clarity.
15.2.4	[If there is a crew or persons on board, a Master should be on board	15.2.12	If there is a crew or persons on board the Master should be physically present on board to ensure the safety of personnel and operations.	Propose this is included and moved to 15.2.13 in the proposed new draft and square brackets removed, to follow after the other agreed principles for clarity.

	as well, to ensure the safety of personnel and operations.]			
Proposed Clarification	Proposed clarification	15.2.11bis	[Except where seafarers and other persons are onboard, the Master may discharge their duties from a ROC that is certified in accordance with this Code.]	Proposed alternative wording for 15.2.12 and 15.2.13. The alternative wording in 15.2.12bis has been proposed as a potential solution to provide clarity to 15.2.12 and 13. We have therefore kept 15.2.12bis in square brackets pending a discussion in the WG to determine the preference.
15.2.5	Several Masters could be responsible for a MASS on a single voyage, while only one Master should be responsible at any given time.	15.2.13	Multiple Masters may be operationally responsible for a MASS on a single voyage, subject to the Administration's approval of the proposed minimum levels of safe manning.	Moved with an added emphasis on safe manning. This is an already agreed principle however it is proposed to add clarity and ensure the change of command should follow principle to enable familiarisation for any combination such as ROC-ROC, ROC to MASS or MASS to ROC etc.
15.2.5	Several Masters could be responsible for a MASS on a single voyage, while only one Master should be responsible at any given time.	15.2.14	Only one master should be responsible for a MASS at any given time.	This was already an agreed principle, set out in the original text of 15.2.13, but has been separated for clarity alongside 15.2.14.
15.2.5 / Proposed gap	Several Masters could be responsible for a MASS on a single voyage, while only one Master should be responsible at any given time.	15.2.15	Should a Master remotely change command and take over responsibility for the [MASS/vessel], sufficient time, resources, and procedures should be provided to ensure they are fully familiar with the	Added to provide clarity on 15.2.5 and on sufficient resources being allocated to the Master when handing over/ taking command of a vessel remotely. Amended with the inclusion of ROC.

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			ship and any ROC before assuming responsibility for the MASS.	
15.2.7	To ensure the safety and security of crew or any other persons onboard, a clear contingency/emergency plan should be in place and an onboard responsible person should be designated along with clearly defined responsibilities and authority.	15.2.16	An emergency plan should be provided/in place at any ROC and, if applicable, on the vessel, that identifies the role and responsibilities of any Remote Operator(s) or seafarers on board.	Separated to clarify the need for an emergency plan for any ROC and vessel, as applicable. This ensures the provision is sufficient to address emergency response. Furthermore, the emergency plan is not the document for setting out authority and responsibilities. This is provided for in the SMD. "If applicable" is proposed to address alternative manning arrangements for MASS. For example, an unmanned MASS.
Proposed Gap / clarification (15.4)	Proposed Gap/ clarification (15.4)	15.2.17	When determining minimum levels of safe manning, consideration should be given to the capabilities and limitations of systems that enable connectivity between any ROC and the ship, including potential degradation of connectivity.	Added to emphasise the principle of safe manning in the context of MASS. When determining safe manning, there must be consideration for a degraded state(s) of connectivity. Assessments of safe manning documents must ensure that remote operators are not performing safety-critical duties, if the vessel is in a condition of degraded connectivity.
Proposed clarification (15.4)	Proposed / clarification (15.4)	15.3	Where the levels of safe manning are to be met by the inclusion of Remote Operator(s).	This section has been proposed to specifically address the roles and

				responsibilities of remote operator(s) in manning, to provide clarity.
Proposed Gap (15.4)	Proposed Gap	15.3.1	They should be qualified and competent to a level not less than what is required under the STCW Convention and Code (1978), as amended to undertake their assigned tasks, duties and responsibilities from a ROC, that is certified in accordance with this Code.	This section has been proposed to address the tasks, duties and responsibilities specific to working from a ROC, to provide clarity.
Proposed Gap (15.4)	Proposed Gap	15.3.2	[Consideration should be given to applicable social and labour regulatory frameworks required by the Administration.]	Noting the decision at MSC 109 for the Code to not address Labour and Social issues until ILO have taken appropriate action, we have proposed this point to ensure consideration for future amendments and to reflect the national legislation of Administrations. We have left in square brackets for the group to discuss a preference to include or not.
15.2.6	Crew onboard should have overriding authority over any remote operators with respect to the safety of persons onboard and operations.	15.3.3	The manning structure should not result in a Remote Operator validating the safety of a task or operation which has been determined by the Administration to be required to be carried out on board	This has been re-located under the section addressing safe manning levels being met from a ROC The proposal clarifies the provisions set out in the original text of 15.2.7. Rather than a blanket approach of authority being overridden based on a location, the provisions set out that the manning structure between a ROC and vessel should not result in a remote operator validating the safety of specific task that

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				due to its nature, is unsafe for a remote operator to perform. For example, verifying the safety for an enclosed space working/rescue operation. This would be addressed during the assessment of the minimum Safe Manning Document Application, where a nuanced approach can be taken by the Administration, rather than a blanket approach applied across all types of MASS operations.
Proposed Gap / clarification (regarding 15.2.6)	Proposed Gap/ 15.2.6 Crew onboard should have overriding authority over any remote operators with respect to the safety of persons onboard and operations.	15.3.4	Remote Operators shall not be assigned any task, duty or responsibility, which due to the characteristics of a ROC or the ship, cannot be discharged from the ROC.	Added to distinguish the manning structure to the capabilities of a ROC or MASS. This point is suggested in the absence of standardised type-rating or performance standard for a ROC or automated/autonomous systems implemented on a MASS. Therefore, it is proposed to be an obligation upon the Administration to assess any proposed minimum levels of safe manning, including the roles and functions of personnel when performing safety-critical tasks. It is important to delineate between 15.3.3 and 15.3.4 for the purpose of the non-mandatory Code and to address the

				provisions set out in 15.2.7 in a nuanced
Proposed Gap, regarding 15.4	Proposed Gap regarding 15.4	15.3.5	Where Remote Operator(s) are performing watchkeeping duties, there must be a sufficient number of Remote Operators that meet the appropriate training and certification requirements to cover all watches, that are intended to be performed at a ROC.	Added to address the gap and ensure SMD for RO covers watchkeeping adequately.
Proposed clarification regarding 15.3	Proposed clarification regarding 15.3	15.3.6	Where a Remote Operator undertakes watchkeeping duties, sufficient time, resources, and procedures should be provided to ensure they are fully familiar with the ship and any ROC before assuming responsibility for a watch.	Proposed to address and ensure familiarisation of RO for watch keeping duties.
15.4 Proposed addition	15.4 Proposed addition	15.3.7	Consideration must be given to the duties of Remote Operators during emergencies, including their physical absence from the vessel and any degradation of connectivity.	Proposed to include to address and consider Remote Operations element during emergencies, in line with SOLAS V-14. 15.4 has been re-allocated throughout the proposal set out in Annex 1. This is an additional consideration (gap) to consider when establishing safe manning arrangements.
15.4.3	When determining the safe manning level, and with reference to guidance issued by the organisation i.e. the principles of safe manning the	15.3.8	The human-machine interface must be considered to ensure that any Remote Operator(s) are not overburdened by the number of systems and interfaces.	Consideration towards the human- machine interface has moved under 15.3 in the proposed new draft, with an emphasis on the manning structure and remote operator(s) roles and responsibilities.

	following should be taken into account: .2 optimal working conditions, configurations and ergonomics for all Human-Machine interfaces for the expected tasks to be performed by the human operator;			This is important to ensure that when determining RO safe manning levels in a ROC, HMI is taken into consideration. This is already considered for vessels incorporating seafarers serving onboard into their minimum level of safe manning. To note the standards or 'principles' of HMI would still be addressed under Chapter 9 (System Design). The remaining elements of 15.4.3 have been address elsewhere within the proposal set out in Annex 1
15.3	Supplementary Competencies, Training and Familiarization	15.4	All personnel comprising the Safe Manning Document should be suitably experienced and have completed training appropriate to their level of responsibility.	As discussed in previous MASS WG, the MASS Code is to set out high-level training requirements and for the appropriate sub-committee to review and provide detail on these requirements. As such, it is proposed that the requirement to complete training is
				maintained in the body of the text, as set out in 15.4 -15.5 until detailed provisions are set out by the appropriate sub- group.
				seafarers and remote operators does not need delineation in the Chapter and can be maintained as set out in Annex 1, 15.3 -15.6

				The requirement for seafarers to complete training and familiarisation of vessel-specific systems is already set out in STCW Regulation I/14. The onboard training and familiarisation of seafarers serving on board a MASS would come under this requirement.
15.3.11	[Administrations should consider clearly evidenced remote operational experience as sea time equivalency for those working within a ROC for the revalidation of [Certificate of Competency/MASS Operator Endorsement] where appropriate.]	N/A	N/A	Propose deletion of 15.3.12. This is a mechanism already provided for within the STCW Convention and Code. It does not need clarification within the MASS Code, as it is up to the Administration to determine whether an acceptable alternative occupation satisfies their conditions for CoC revalidation. "MASS Operator" is not an agreed term
				so may not be appropriate. The requirement for an endorsement has not been agreed, nor the mechanism by which an endorsement may be issued. The current provisions of STCW are sufficient to remove 15.3.12.
Proposed Clarification	Proposed Clarification	15.4.1	Should levels of safe manning include any Remote Operator(s) or any seafarers on board the [MASS/vessel], they should all be knowledgeable of the type and purpose of documentation associated	It is proposed to move this section to follow after manning and is slightly amended. This gap applies to all personnel.

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			operational manuals, failure modes and certification.	
Proposed Clarification	Proposed Clarification	15.5	Where there are seafarers on board a [MASS /vessel] they must have completed training to attain the competencies that are appropriate to the capacity to be filled and so that their duties and responsibility can be taken up, including:	This section is proposed to provide clarity that, as agreed in previous MASS JWG and WG, STCW qualifications must apply to any seafarers serving on board.
15.3.3	Seafarers on board MASS should be familiar with the operation of the autonomous or automated systems, for which the seafarers are responsible, installed on the MASS.	15.5.1	Seafarers must, at a minimum, be qualified as required by the STCW Convention and Code (1978), as amended.	This point is proposed to add clarity and emphasize the agreed STCW training and qualification requirements for seafarers on MASS. However, we do not believe this is a gap, and as the Group agreed, seafarers on board a MASS will be classed "seafarers" and therefore they will be required to meet the relevant STCW requirements.
Proposed Gap	Proposed Gap	15.5.2	Where the MASS operation includes the use of a ROC certified in accordance with this Code, training and drills for emergencies and failures of systems should be conducted between onboard seafarers and Remote Operators.	Proposed to address the point that seafarers should be trained and undertake drills for MASS-ROC interactions which may not be covered under existing training/drill requirements. It also addresses the need for training and drills between seafarers and any remote operators to be coordinated so that a comprehensive response to emergencies and failures of systems can be implemented.

15.3.10	Remote Operators should be competent in areas including, but not limited to: .1 knowledge of the autonomous or automated systems on board MASS and of RCC in association with situational awareness, collision avoidance, and auto tracking of the intended route, cybersecurity, propulsion plant etc.; .2 demonstration of the roles and responsibilities of RCO including role allocation between the autonomous or automated system and seafarers on board; .3 knowledge of the ODD of the autonomous or automated systems of the MASS .4 ability to apply the risk assessment on any operation of the MASS; and .5 managerial skills against the considerable risks while using the autonomous or automated systems (especially, the dangers of over- reliance on automated systems)	15.6	Any Remote Operator(s) at any level of responsibility, should have completed training to attain the competencies that are appropriate to the capacity to be filled and so that their duties and responsibility can be taken up, including:	This section is proposed to address remote operator Training. Section 15.3.11 has been separated and amended under section 15.6 in the proposed new draft. Amendments include utilising wording from STCW as a common basis for remote operators, as appropriate Reinforces that the STCW qualifications for each identified level of responsibility should be maintained.
Proposed Gap	Proposed Gap	15.6.1	Remote Operators performing watchkeeping duties are at a minimum qualified as set out in the	Proposed to address watch keeping duties for ROs in line with current requirements.

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			STCW Convention and Code (1978), as amended, as if they were seafarers serving on board a seagoing ship.	C
15.3.2	The Remote Operator of a MASS should have competency and experience as an officer qualified in accordance with appropriate STCW requirements.	15.6.2	The capacity of any Remote Operator(s) is determined by their qualification to perform necessary functions for the level(s) of responsibility, as set out in the STCW Convention and Code 1978, as amended.	The point is proposed to cover principles previously addressed in 15.3.3 of the MASS CG Human Element chapter. The re-wording aims to clarify and emphasis the remote operator's role and responsibility is maintained and aligned with the qualification structures of STCW.
15.3.10	Remote Operators should be competent in areas including, but not limited to:	15.6.3	Remote Operators should receive training in remote operations, including having demonstrated knowledge, understanding, proficiency and experience in the remote operation of a [MASS/vessel].	This point mirrors the previous wording but with slight amendment to clarify and follow STCW wording. The requirement of the remote operator should be to receive training.
15.3.7	The Remote Operator should be familiar with the ODD of the MASS systems properly.	15.6.4	Training in remote operations should enable a Remote Operator to understand the operation of the ROC and [MASS'/vessel's] system and its associated components.	This point mirrors the previous wording but with slight amendments to clarify and follow STCW wording. Rather than the non-mandatory Code specifying specific competency and other requirements to be fulfilled in Remote Operator training, high level provisions should be maintained. A similar approach to the provisions of Chapter 12 of the Polar Code could be considered and adopted. This is

mirrored in the proposal set out in Annex 1. During the EBP it may be possible to propose generic training requirements in alignment with the roadmap of the MASS Code. Administrations may require specific training in remote operations that may not be capture by prescriptive requirements set out in a non-mandatory code. In addition, depending on the type of MASS operation, Remote Operators may undertake different types of training. This may form the basis of a generic training and certification framework for Remote Operators moving forward. This point mirrors the previous wording 15.3.8 15.6.5 The Remote Operator should be Knowledge, understanding, familiar with the means by which they proficiency and experience gained but with slight amendments to clarify can takeover control of the MASS through undertaking training in and follow STCW wording. functions from the system without remote operations, should enable Remote Operators to operate the This proposal ensures that the delay. vessel safely [and securely], with due provisions in 15.3.9 would be covered, regard for safety [and security] of life whilst ensuring that training remote at sea and protection of the marine operations can apply to a wider scope environment. (in addition, see rationale for 15.6.4). Noting that the Principles of the Code 15.3.1 15.6.6 Training in remote operations should This point mirrors the previous wording ensure the base IMO instruments are be delivered as additional training to but with slight amendments. maintained, this section provides the qualifications and experience set principles for supplementary out in the STCW Convention and This clarifies that a Remote Operator Code (1978), as amended. competencies, and corresponding should complete training in remote

	training and familiarization provisions required when operating a MASS to fully demonstrate the roles and responsibilities including role allocation between the autonomous or automated system and for seafarers and operators on both the ship and ROC(s).]			operations. In lieu of an IMO standard of Remote Operator competence (KUPs), the provision is sufficient as a high-level requirement for the non-mandatory code, as instructed. Specific provisions on competence and training are to be addressed following finalisation of the non-mandatory MASS Code.
15.3.2	The Remote Operator of a MASS should have competency and experience as an officer qualified in accordance with appropriate STCW requirements.	15.6.7	Any training in remote operations should include the demonstration and evaluation of competence, that is additional to the competence set out for the management, operational and support levels of responsibility, set out in the STCW Convention and Code (1978), as amended.	STCW certification indicates a level of competence has been met. This is set out in 15.2.8 and 15.6.1 of Annex 1. This re-worded provision sets out that during the delivery of Remote Operator training, any competence to be demonstrated and assessed should be additional to the provisions of STCW. I.e. there should be no interference with the existing structures, model courses or competency tables. This is the same as the principles of training for polar navigation, Dynamic Positioning or oil and gas endorsements. The competence is additional to the core maritime Certificate of Competency.
Proposed Gap/ clarification regarding 15.3	Proposed Gap / clarification regarding 15.3	15.6.8	Remote Operators, on being assigned to a ship, must be trained, certified and familiarised with their specific duties and with all ROC and ship arrangements, installations, equipment, procedures,	This point is proposed to ensure remote operators are trained, certified and familiarised with the MASS they may operate. It mirrors the previous wording but with slight amendments to clarify and mirror STCW wording.

			documentation and ship characteristics that are relevant to their routine or emergency duties.	
Proposed Gap regarding 15.3	Proposed Gap regarding 15.3	15.6.9	Training or drills required of ships must be extended to any ROC(s) and Remote Operator(s) undertaking duties for that ship, including any specialised training required to safely operate a MASS remotely and respond to emergencies.	This point is proposed to ensure remote operators undertake training and drills with the MASS they may operate.
Proposed gap regarding 15.4	Proposed gap regarding 15.4	15.7	The provisions on working language set out in SOLAS V/14.3 should apply to [any MASS to which this code applies] and should extend to any ROC(s), Remote Operator(s) and third parties.	This point is proposed to address the requirements under SOLAS V/14.3 for ROC/ROs. Third parties are addressed to cover ROC-ROC, MASS-ROC & MASS-MASS interactions and others such as per the definition in the Code. This ensures that the safe working practices established on ships, extends between any onboard seafarers and
		15.8	The provisions set out in SOLAS V/14.4 should apply to any MASS, to which this code applies and extends to any ROC(s), Remote Operator(s) and third parties.	Kemote Operators. This point is proposed to address the requirements under SOLAS V/14.4 for ROC/ROs. Third parties are addressed to cover ROC-ROC, MASS-ROC & MASS-MASS interactions and others such as per the definition in the Code. This ensures that the safe working practices established on ships, extends

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				between any onboard seafarers and Remote Operators
15.4.4	The Company responsible for management of a MASS operation should issue a crew list that encompasses both the MASS ship and the ROC personnel and respects the minimum safe manning certificate.	15.9	The company responsible for managing a MASS should issue a crew list that includes any Remote Operator(s) and seafarers, ensuring compliance with the minimum Safe Manning Document. This list should be provided to any ROC and, if applicable, to the [MASS/vessel].	Moved and amended to include compliance with the minimum Safe Manning Document. A crew list should be issued to both any ROC and to the vessel, should the vessel be manned. This mirrors the requirement for conventional vessels being extended to the ROC.