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**COVER NOTE**

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| From: | Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director |
| date of receipt: | 26 January 2024 |
| To: | Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union |
| No. Cion doc.: | SWD(2024) 31 final |
| Subject: | COMMISSION STAFF WORKING DOCUMENT Union submission to the International Maritime Organization's 108th Maritime Safety Committee proposing a new output regarding the development of a transition scheme for the introduction of digital technology for Very High Frequency (VHF) voice communications |

Delegations will find attached document SWD(2024) 31 final.

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EUROPEAN
COMMISSION

Brussels, 26.1.2024
SWD(2024) 31 final

**COMMISSION STAFF WORKING DOCUMENT**

# Union submission to the International Maritime Organization's 108th Maritime Safety Committee proposing a new output regarding the development of a transition scheme for the introduction of digital technology for Very Hight Frequency (VHF) voice communications

**Union submission to the International Maritime Organization's 108th Maritime Safety Committee proposing a new output regarding the development of a transition scheme for the introduction of digital technology for Very High Frequency (VHF) voice communications**

## PURPOSE

This Staff Working Document contains a draft Union submission to the International Maritime Organization's (IMO) 108th Maritime Safety Committee (MSC 108). The IMO has scheduled MSC 108 from 15 to 24 May 2024.

The draft submission proposes the establishment of a new output on the development of a transition scheme for the introduction of digital technology for Very High Frequency (VHF) voice communications to guarantee the smooth introduction and the envisaged entry into force of amendments between 2035 and 2045.

## EU COMPETENCE

Navigation and radio-communication equipment are listed as items in Sections 4 and 5, respectively, of Commission Implementing Regulation (EU) 2023/1667[1]. The Implementing Regulation contains design, construction and performance requirements and testing standards for marine equipment. It is based on the empowerment of the Commission to indicate, through implementing acts, the design, construction and performance requirements as well as the testing standards for marine equipment falling within the scope of Directive 2014/90/EU on marine equipment[2], in accordance with Article 35(2) thereof. Current VHF radios do not support digital transmission, which means that the construction and performance requirements and testing standards for such equipment in future Implementing Regulations adopted in accordance with Article 35(2) of Directive 2014/90/EU on marine equipment will be substantially affected.

In light of all of the above, the present draft Union submission falls under EU exclusive competence, pursuant to article 3(2) TFEU as the new output on the development of a transition scheme for the introduction of digital technology for Very High Frequency (VHF) voice communications, once adopted, risks affecting or altering Union legislation, and in particular Commission Implementing Regulation (EU) 2023/1667.[3] This Staff Working Document is presented to establish an EU position on the matter and to transmit the document to the IMO prior to the required deadline of 13 February 2024.

[1] OJ L 215, 31.8.2023, p. 1

[2] OJ L 257, 28.8.2014, p. 146

[3] An EU position under Article 218(9) TFEU is to be established in due time should the IMO Maritime Safety Committee eventually be called upon to adopt an act having legal effects as regards the subject matter of the said draft Union submission. The concept of '*acts having legal effects*' includes acts that have legal effects by virtue of the rules of international law governing the body in question. It also includes instruments that do not have a binding effect under international law, but that are '*capable of decisively influencing the content of the legislation adopted by the EU legislature*' (Case C-399/12 Germany v Council (OIV), ECLI:EU:C:2014:2258, paragraphs 61-64). The present submission, however, does not produce legal effects and thus the procedure for Article 218(9) TFEU is not applied.

MARITIME SAFETY COMMITTEE
108th session
Agenda item 18

MSC 108/18/X
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# WORK PROGRAMME

## Proposal for a new output regarding the development of a transition scheme for the introduction of digital technology for Very High Frequency (VHF) voice communications

**Submitted by Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands (Kingdom of the), Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the European Commission, acting jointly in the interest of the European Union**

**SUMMARY**

| | |
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| *Executive summary:* | This document proposes a new output on the development of a transition scheme for the introduction of digital technology for Very High Frequency (VHF) voice communications to guarantee the smooth introduction and the envisaged entry into force of amendments between 2035 and 2045. |
| *Strategic direction, if applicable:* | 2 |
| *Output:* | Not applicable |
| *Action to be taken:* | Paragraph 35 |
| *Related documents:* | NCSR 9/12/6, NCSR 9/WP.5, NCSR 9/24, NCSR 10/12, NCSR 10/WP.5, NCSR 10/22, MSC 107/22, MSC.1/Circ.1460/Rev.4 and Circular Letter No.4791; Report ITU-R M.2530-0 |

## Introduction

1 This document, submitted in accordance with the provisions of the *Organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies* (MSC-MEPC.1/Circ.5/Rev.5), proposes a new output on the development of a transition scheme for the introduction of digital technology for Very High Frequency (VHF) voice communications.

## Background

2 Radiotelephony in the VHF maritime mobile frequency band is the most important voice communication system for the safety of navigation. Unfortunately, congestion in the VHF maritime mobile frequency band has become a serious problem for a number of Member States of the Organization and is continuing to grow. The availability of voice channels in the VHF maritime mobile frequency band has been reduced rapidly and

substantially, which increased congestion problems, in particular, as a consequence of the implementation of systems for the exchange of digital data.

3 In 2019, based on a proposal by a number of International Telecommunication Union (ITU) Member States, World Radiocommunication Conference 2019 (WRC-19) included in the preliminary agenda of WRC-27 a proposal to consider improving the utilization of the VHF maritime frequencies in Appendix 18 of the ITU Radio Regulations with a focus on digital technologies and spectrum-efficient systems. A final decision on the inclusion of the matter on the agenda of WRC-27 had to be taken at WRC-23.

4 In developing the 'IMO position on ITU's World Radiocommunication Conference 2023 agenda items concerning matters relating to Maritime Services' (IMO position on WRC-23), the 9th session of the Sub-Committee on Navigation, Communications and Search and Rescue (NCSR 9) considered document NCSR 9/12/6 (Austria et al.) proposing to take an informed decision with respect to the introduction of digital voice radiotelephony in the VHF maritime mobile band, having the potential to deal with the congestion on maritime VHF channels.

5 The IMO/ITU Experts Group developed the draft IMO position on WRC-23 on this matter (NCSR 10/12) which was finalised by NCSR 10 and approved at MSC 107 (MSC 107/20/Add.1, annex 36). The IMO position on WRC-23, includes, inter alia, the following:

.1 a transition scheme has to be developed to guarantee the smooth introduction of digital technology for voice communications and the envisaged entry into force of the amendments between 2035 and 2045; and

.2 VHF channels 06, 13, 16, 70, AIS 1 (AIS-SART) and AIS 2 (AIS-SART) used for GMDSS (based on SOLAS and the ITU Radio Regulations) and any other relevant channels could retain their current functionality. This is due to the operational and safety needs especially when navigating close to coastal waters or in-port areas, and considers the substantial number of non-SOLAS ships participating in the GMDSS.

6 In this context, NCSR 10 invited Member States and international organizations to submit proposals for a new output to MSC 108 in order to undertake the necessary work on digital voice in VHF radiotelephony (NCSR 10/22, paragraph 12.46).

*Consideration of the matter in ITU*

7 The ITU is the responsible body for the allocation and development of technical specifications for the use of radio spectrum. It is therefore that the shortage of voice channels in the VHF maritime mobile frequency band also needs to be addressed in ITU. It should be noted that a change of the current use of radio spectrum could only be concluded by a WRC which takes place every three to four years. ITU's Radiocommunication Sector (ITU-R) conducts studies, among others, to provide technical input to the WRC.

8 Between WRC-19 and WRC-23, ITU-R Working Party 5B (WP 5B), where many maritime stakeholders, including IMO Member States, the International Association of Lighthouse Authorities (IALA) and the International association for marine electronics companies (Comité International Radio-Maritime – CIRM) participate in the work, initiated initial studies on the issue of possible digitization of parts of the VHF maritime frequency band. WP 5B prepared a draft report, which was approved by ITU-R Study Group 5 (SG 5) in September 2023. The report has been published as Report ITU-R M.2530-0 - Digital voice communication in the VHF maritime frequency band.

9 ITU Member States considered the matter at WRC-23 and decided to include the consideration of improving the utilization of VHF maritime radiocommunication in the provisional agenda of WRC-31 (instead of WRC-27 as was initially planned for). A final decision on the inclusion of the matter on the agenda of WRC-31 will be taken at WRC-27.

10 WRC-23 (Resolution 363 (rev. WRC-23)) has invited ITU-R to study this matter. It is expected that ITU-R will commence these studies in its study cycle 2024-2027 in SG 5. Resolution 363 (rev. WRC-23) further invites relevant international organizations to participate actively in the studies by providing requirements and information that should be taken into account in ITU-R studies. Active participation and input from IMO in those ITU studies will be needed and it is, therefore, essential to urgently consider this matter thoroughly in IMO in order to safeguard the interest of shipping in the work of ITU towards WRC-27.

**IMO objectives**

11 The proposed introduction of digital technology for VHF voice communications would allow IMO, in co-operation with other international organizations, to respond proactively to the congestion in the VHF maritime mobile frequency band which, under certain circumstances, could lead to dangerous situations for ships navigating in busy shipping areas.

12 In conjunction with the responsibilities of the Committee, this proposal directly contributes to the implementation of Strategic Direction 2 ‘Integrate new and advancing technologies in the regulatory framework’, and is clearly within the scope of IMO's mission to promote safe, secure, environmentally sound, efficient and sustainable shipping through cooperation.

**Need**

13 As an example, the coasts of Belgium and the Netherlands, including the ports of Antwerp and Rotterdam are situated in a very busy limited geographical area and require a considerable number of VHF voice channels for everyday operational use, including communications in approaches to coastal waters, port operations, different Vessel Traffic Service (VTS) areas and locks operations, as well as for the traffic travelling through the Channel and along the North Sea coastline. A similar challenge to accommodate the high demand of VHF voice channels for operational use, by many stakeholders in a very limited geographical area, exists in other busy shipping areas around the world.

14 Due to shortage of VHF voice channels, Administrations have no other option than assigning the same channels to different stakeholders within each other’s radio range. In doing so, there is a considerable risk of causing confusion to personnel onboard ships and ashore when they are also listening to conversations not relevant to their own operation. This could lead to misunderstanding and/or miscommunication, and consequential dangerous situations, and constitutes a risk that needs to be addressed.

**Analysis of the issue**

15 The ITU World Radiocommunication Conferences in 2012, 2015 and 2019 adopted extensive changes to Appendix 18 of the Radio Regulations to identify channels for the introduction of exchange of digital data in the maritime domain, such as Digital selective calling (DSC), Automatic identification system (AIS), Application-specific messages (ASM) and, more recently, VHF data exchange system (VDES), as well as identification of channels for Satellite AIS and Autonomous maritime radio devices (AMRDs).

16 As a result of the identification of channels for exchange of digital data, the number of simplex channels in use for VHF voice communications has reduced. This was compensated by identifying channels for optional simplex use of what previously had been duplex channels. However, those revised frequencies and channelling arrangements did not provide for sufficient additional simplex channels for VHF voice communications and, as such, did not alleviate the problem of congestion and shortage of channels in the VHF maritime mobile frequency band in busy shipping areas around the world.

17 During initial consideration of this matter in IMO, it became evident that:

.1 analogue voice channels for VHF are heavily congested, and yet further reductions in the number of these channels are expected at future WRCs;

.2 in order to provide for additional VHF voice channels, introduction of digital technologies and spectrum-efficient systems should be considered;

.3 digital technology is already widely used in land mobile communication. It is an established technology with known technical properties. Digital technology has the potential to accommodate more voice communication channels in the same amount of radio frequency spectrum than the currently established analogue technology;

.4 digital voice communication might offer an improved functionality, for instance by including the capability of transmitting the location of the radio for the entire duration of the digital voice conversation, and/or allowing for a short message service (SMS) without the need to set up a digital or other voice call. However, these options would need careful consideration by the Organization in order to correspond with the seafarers needs;

.5 a transition scheme has to be developed to guarantee the smooth introduction of digital technology for voice communications;

.6 taking into account that certain channels could retain their current functionality and new functionalities could be introduced, it is of utmost importance to consider possible consequences to IMO's regulatory framework when digital technology for VHF voice communications would be introduced; and

.7 careful consideration should be given to the possible ramifications of this work and the time required for consideration and implementation, and an entry-into-force date between 2035 and 2045 could be realistic.

18 In order to assess all options and aspects, this issue should be given thorough and careful consideration by the Organization. Further, active participation and input to the work of ITU and possible other relevant international organisations is needed from IMO to:

.1 emphasize the operational needs for VHF voice communications for ships, in particular, for GMDSS and safety of navigation;

.2 contribute to studies on possible new functionalities to improve safety; and

.3 together with other stakeholders, achieve a transition scheme which will be acceptable to the maritime community.

**Analysis of implications**

19 Most equipment in use today, both on board ships and ashore, is not designed to be reprogrammed for digital use of voice communications. However, VHF radiocommunications equipment is currently updated, modified or replaced to accommodate exchange of digital data (MSC.1/Circ.1460/Rev.4 refers) to comply with the revised frequencies and channelling arrangements adopted by WRC-12, WRC-15 and WRC-19 (paragraphs 15 and 16 above refer). The move to digital modulation is evident and will continue into the future.

20 Introduction of digital technology for VHF voice communications between 2035 and 2045 would allow time for manufacturers to develop standards for, for instance, mixed-mode analogue-digital radios, or radios that accommodate software allowing reprogramming for digital voice communication capability. This type of equipment could be introduced over time when equipment is to be replaced, which would limit the financial implications for the shipping industry and Member States. In this context, it should be noted that the need to replace equipment would be dependent on the preferred transition scenario, and consequential transition scheme, to be developed. There are no additional financial implications for the IMO budget. Initial consideration of possible scenarios have been included in Section 10 of Report ITU-R M.2530-0 - Digital voice communication in the VHF maritime frequency band.

21 Therefore development and replacement of equipment, both on board ships and ashore, should form an integral part of the transition scheme. In this context, it might also be important to consider the feasibility that VHF channels used for GMDSS and any other relevant channels could permanently retain their current functionality in order to maintain the safety aspect throughout the transition from analogue to digital voice communications, as well as after the transition.

22 There are no administrative requirements expected to arise from this output, and the Checklist for Identifying Administrative Requirements, as set out in annex 1, has been completed on this basis.

23 The co-sponsors wish to note that the consequences of not undertaking the proposed work could result in:

.1 operational needs for VHF voice communications for ships not being fully taken into account in the work of ITU and other relevant international organisations;

.2 new functionalities being introduced without proper consideration by IMO; and

.3 a transition scheme that is unfavourable to the maritime community.

**Benefits**

24 A migration to digital voice communication in the maritime VHF band could improve the spectrum efficiency by virtually multiplying the number of available communication channels.

25 Availability of more channels for VHF voice communications will allow Administrations to assign different channels for operational use to individual stakeholders, as such maintaining a safe environment for voice communications.

26 In addition, digital voice communication could offer an improved functionality for the benefit of seafarers, Search and Rescue (SAR) organizations and Administrations.

**Industry standards / relevant international regulations**

27 Industry standards for digital technology for VHF voice communications have not been developed yet, however ETSI TR 103 784 outlines how an existing Land Mobile standard could be modified to suit the specific requirements of the maritime industry. Information on existing digital communication standards, established in other industry sectors, has been included in Report ITU-R M.2530-0 - Digital voice communication in the VHF maritime frequency band.

28 Appendix 18 to ITU's Radio Regulations contains the 'Table of transmitting frequencies in the VHF maritime mobile band'. It describes which frequencies and bandwidth are designated to which channel and defines the use of the channel (for instance 'distress, safety and calling', or 'digital only'). Administrations may designate and assign channels selected from and in accordance with Appendix 18.

29 According to the *Performance standards for shipborne VHF radio installations capable of voice communication and digital selective calling* (resolution MSC.511(105)), VHF radiocommunications equipment should be designated for operation on channels selected from and in accordance with Appendix 18 to the Radio Regulations.

**Output**

30 The Committee is invited to consider including a new output on "Development of a transition scheme for the introduction of digital technology for VHF voice communications" in the biennial agenda of the NCSR Sub-Committee with two sessions estimated to complete the item.

31 The output is to:

.1 consider different scenarios to introduce digital technologies and spectrum-efficient systems for VHF voice communications, taking into account the operational requirements, in particular, for GMDSS and safety of navigation, and the regulatory and operational consequences for each scenario;

.2 on the basis of the preferred scenario, and in cooperation with other international organisations, develop a transition scheme to guarantee the smooth introduction of digital technology for voice communications and the envisaged entry into force of amendments between 2035 and 2045; and

.3 provide input to studies in ITU between WRC-23 and WRC-27 from IMO's perspective in particular, to safeguard the interest of shipping.

32 The co-sponsors are proposing a new output, because the work required is much broader than only preparing input to ITU under the current annual output *Response to matters related to the ITU-R Study Groups and ITU World Radiocommunication Conference* under which this matter has been discussed until now. Currently, there is no output available to consider this matter thoroughly, with the necessary attention and control by the Organization.

**Human Element**

33 The human element has been sufficiently considered and addressed during the development of this proposal by providing the completed checklist, as set out in annex 2.

**Urgency**

34 The co-sponsors are aware that at MSC 107 the Chair of the Committee proposed to apply a moratorium on submissions of proposals for new outputs to MSC 108 in order to focus on the consideration of the workload of the Committee and sub-committees, and that the Committee agreed that only duly justified urgent proposals for new outputs should be submitted to MSC 108, subject to assessment by the Chair. In this respect, taking into account the meeting schedule of ITU and, in particular, that studies towards WRC-27 need to be finalized by ITU-R in 2026, the co-sponsors are of the view that there is an urgent need to start the work in IMO in 2025 to allow the NCSR Sub-Committee to complete the work in 2026. It is, therefore, proposed that a new output on "Development of a transition scheme for the introduction of digital technology for VHF voice communications" be included in the biennial agenda of the NCSR Sub-Committee for 2024-2025 and the provisional agenda for NCSR 12, with a target completion year of 2026.

**Action requested of the Committee**

35 The Committee is invited to consider this proposal and include the proposed new output in the biennial agenda of the NCSR Sub-Committee for 2024-2025 and the provisional agenda for NCSR 12.

## ANNEX 1

## CHECKLIST FOR IDENTIFYING ADMINISTRATIVE REQUIREMENTS

(MSC-MEPC.1/Circ.5/Rev.5, annex 6)

This checklist should be used when preparing the analysis of implications required in submissions of proposals for inclusion of outputs. For the purpose of this analysis, the term "administrative requirement" is defined in accordance with resolution A.1043(27), as an obligation arising from a mandatory IMO instrument to provide or retain information or data.

**Instructions:**

(A) If the answer to any of the questions below is **YES**, the Member State proposing an output should provide supporting details on whether the requirements are likely to involve start-up and/or ongoing costs. The Member State should also give a brief description of the requirement and, if possible, provide recommendations for further work, e.g. would it be possible to combine the activity with an existing requirement?

(B) If the proposal for the output does not contain such an activity, answer **NR** (Not required).

(C) For any administrative requirement, full consideration should be given to electronic means of fulfilling the requirement in order to alleviate administrative burdens.

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| 1. Notification and reporting?<br>Reporting certain events before or after the event has taken place, e.g. notification of voyage, statistical reporting for IMO Members | **NR** | Yes<br>□ Start-up<br>□ Ongoing |
| Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes) | | |
| 2. Record-keeping?<br>Keeping statutory documents up to date, e.g. records of accidents, records of cargo, records of inspections, records of education | **NR** | Yes<br>□ Start-up<br>□ Ongoing |
| Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes) | | |
| 3. Publication and documentation?<br>Producing documents for third parties, e.g. warning signs, registration displays, publication of results of testing | **NR** | Yes<br>□ Start-up<br>□ Ongoing |
| Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes) | | |
| 4. Permits or applications?<br>Applying for and maintaining permission to operate, e.g. certificates, classification society costs | **NR** | Yes<br>□ Start-up<br>□ Ongoing |
| Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes) | | |
| 5. Other identified requirements? | **NR** | Yes<br>□ Start-up<br>□ Ongoing |
| Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes) | | |

## ANNEX 2

## CHECKLIST FOR CONSIDERING AND ADDRESSING THE HUMAN ELEMENT

(MSC-MEPC.1/Circ.5/Rev.5, annex 5, appendix)

| | **1**<br>**Question** | **2**<br>**Yes/ No** | **3**<br>**IMO references** | **4**<br>**Considerations** | **5**<br>**Instructions** |
|---|---|---|---|---|---|
| ***Workload*** | | | *Other relevant references may be added*<br><br>*Strike out references that are not relevant* | *If answer to question is "yes" identify considerations. If answer is "no" make proper justification* | *Identify how human element considerations should be addressed in the output* |
| **1** | **Does the "output" affect workload?** | Yes | | See 1.1.1 | See 1.1.1 |
| **1.1** | **On board, especially in the already intensive phases of the voyage and port operations to:** | Yes | *Revised guidelines for the operational implementation of the International Safety Management (ISM) Code by Companies* (MSC-MEPC.7/Circ.8)<br><br>*Guidelines on fatigue* (MSC.1/Circ.1598)<br><br>*Principles of minimum safe manning* (resolution A.1047(27))<br><br>*Guidelines for the investigation of accidents where fatigue may have been an issue* (MSC/Circ.621) | See 1.1.1 | See 1.1.1 |
| **1.1.1** | Operations including navigation, cargo and | Yes | | A decrease of workload is envisaged during | A decrease of the workload should be the goal, also |

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| | engineering | | | navigation when only listening to voice communications relevant to the actual operation of the ship, unlike also having to listen to non-relevant conversations as currently might be the case.<br><br>During trials to test digitization of VHF radio in the Port of Rotterdam (Netherlands), it was noted that the absence of background noise in the digital modes made listening to radio transmissions significantly easier and less stressful.<br><br>The addition of GNSS data and transmitter identification with each transmission could also reduce the stress levels of the mariner as this information would clearly identify each transmission, even if the voice communication were garbled. | when considering the implementation of new functionalities. |
| **1.1.2** | Maintenance of the ships structure and its equipment | No | | | |

| | | | | | |
|---|---|---|---|---|---|
| **1.1.3** | Onboard administration in support of the ships' management systems | No | | | |
| **1.1.4** | Onboard administration related to regulation involving flag States, classification societies, port State and other bodies such as charterers and port authorities | No | | | |
| **1.1.5** | Increased workload or time pressure on personnel if involved in implementation of changes prior to the implementation date | No | | | |
| **1.2** | **Ashore, in a manner that would affect the ships operation to:** | | | | |
| **1.2.1** | Companies' administration | No | | | |
| **1.2.2** | Flag State, port State and classification societies administration such that certification and other processes are compromised or delayed | No | | | |
| | **1**<br>**Question** | **2**<br>**Yes/ No** | **3**<br>**IMO references** | **4**<br>**Considerations** | **5**<br>**Instructions** |
| ***Decision-making*** | | | *Other relevant references may be added*<br><br>*Strike out references that are not relevant* | *If answer to question is "yes" identify considerations. If answer is "no" make proper justification* | *Identify how human element considerations should be addressed in the output* |

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| **2** | **Does the "output" impact decision-making on board the ship?** | | | | |
| **2.1** | By confusion with existing requirements and regulations | No | | | |
| **2.2** | By changing responsibilities as laid out in the ISM Code | No | | | |
| **2.3** | By creating complexity in its implementation and/or in the safety management systems | No | | | |
| **2.4** | By requiring increased mental effort, such as the need to find, transform and analyse data or result in the need to make judgements based on incomplete information | No | | | |
| **2.5** | By limiting the time available to establish situational awareness, decide, communicate (possibly across time zones) or check | No | | | |
| **2.6** | By increasing reliance on judgement and administrative controls to manage major risks such as oil spills and collisions | No | | | |
| | **1 Question** | **2 Yes/ No** | **3 IMO references** | **4 Considerations** | **5 Instructions** |
| ***Living and working environment*** | | | *Other relevant references may be added*<br><br>*Strike out references that are not* | *If answer to question is "yes" identify considerations. If answer is "no" make proper* | *Identify how human element considerations should be addressed in the output* |

| | | | | | |
|---|---|---|---|---|---|
| | | | *relevant* | *justification* | |
| **3** | **Does the "output" affect the living and working environment?** | | *Guidelines on the basic elements of a shipboard occupational health and safety programme* (MSC-MEPC.2/Circ.3)<br><br>*Guidelines on fatigue* (MSC.1/Circ.1598) | | |
| **3.1** | By interfering with existing arrangements for abandonment, fire-fighting and other emergency plans or procedures | No | | | |
| **3.2** | By introducing new materials that could create an explosion, fire, environmental or occupational health risk | No | | | |
| **3.3** | By introducing new high energy sources such as high-voltage,<br>high pressure fluids | No | | | |
| **3.4** | By affecting access or egress and causing lack of ventilation in working spaces | No | | | |
| **3.5** | By affecting the habitability of accommodation spaces due to<br>noise, vibration, temperatures, dust and other contaminants | No | | | |

| | 1<br>Question | 2<br>Yes/ No | 3<br>IMO references | 4<br>Considerations | 5<br>Instructions |
|---|---|---|---|---|---|
| ***Operation and maintenance*** | | | *Other relevant references may be added*<br><br>*Strike out references that are not relevant* | *If answer to question is "yes" identify considerations. If answer is "no" make proper justification* | *Identify how human element considerations should be addressed in the output* |
| **4** | **Does the "output" affect the operation and maintenance of the ship, its structure or systems and equipment?** | | *Revised guidelines for the operational implementation of the International Safety Management (ISM) Code by Companies* (MSC-MEPC.7/Circ.8)<br><br>*Guidelines for bridge equipment and systems, their arrangement and integration (BES)* (SN.1/Circ.288)<br><br>*Principles of minimum safe manning* (resolution A.1047(27))<br>*Issues to be considered when introducing new technology on board ships* (MSC/Circ.1091)<br><br>*Guideline on software quality assurance and human-centred design for e-navigation* (MSC.1/Circ.1512)<br><br>*Guidelines for the standardization of user interface design for navigation equipment* (MSC.1/Circ.1609) | | |

| | 1<br>Question | 2<br>Yes/<br>No | 3<br>IMO references | 4<br>Considerations | 5<br>Instructions |
|---|---|---|---|---|---|
| **4.1** | By introducing equipment that<br>the user may find difficult to operate or maintain or may be unreliable | No | | | |
| **4.2** | By introducing new and/or novel technology, or technology that changes the role of the person | No | | | |
| **4.3** | By introducing requirements for new competencies and roles | No | | | |
| **4.4** | By overloading existing infrastructure such as power generation and ventilation systems | No | | | |
| **4.5** | By poor integration with existing systems and controls | No | | | |
| **4.6** | By introducing new and unfamiliar operations/procedures | No | | | |
| **4.7** | By introducing new and unfamiliar operating interfaces? | No | | | |
| **4.8** | By introducing risks to the ship during any modifications required prior to the implementation date of the output | No | | | |

| | 1<br>Question | 2<br>Yes/<br>No | 3<br>IMO references | 4<br>Considerations | 5<br>Instructions |
|---|---|---|---|---|---|
| ***Measures to address the human element*** | | | *Other relevant references may be added*<br><br>*Strike out references that are not relevant* | *If answer to question is "yes" identify considerations. If answer is "no" make proper justification* | *Identify how human element considerations should be addressed in the output* |
| **5** | **Does the "output" require changes to:** | | *Shipboard technical operating and maintenance manuals* (MSC.1/Circ.1253)<br><br>*Revised guidelines for the operational implementation of the International Safety Management (ISM) Code by Companies* (MSC-MEPC.7/Circ.8) | | |
| **5.1** | Training | No | | | |
| **5.2** | Practical skill development and competences | No | | | |
| **5.3** | Operating, management and/or maintenance procedures | No | | | |
| **5.4** | Information/manuals for operation and maintenance | No | | | |
| **5.5** | Spares outfit | No | | | |
| **5.6** | Occupational safety requirements including guarding and PPE | No | | | |
| **5.7** | Shore support | No | | | |