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COVER NOTE

From:	Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director
date of receipt:	29 July 2026
To:	Ms Thérèse BLANCHET, Secretary-General of the Council of the European Union
No. Cion doc.:	SWD(2026) 259 final
Subject:	COMMISSION STAFF WORKING DOCUMENT Union submission to the 111th session of the International Maritime Organization's Maritime Safety Committee proposing a new output to develop a recommendation on performance standards for AI systems embedded in navigational and communication equipment

Delegations will find attached document SWD(2026) 259 final.

Encl.: SWD(2026) 259 final

EUROPEAN
COMMISSION

Brussels, 29.7.2026
SWD(2026) 259 final

COMMISSION STAFF WORKING DOCUMENT

Union submission to the 111th session of the International Maritime Organization's Maritime Safety Committee proposing a new output to develop a recommendation on performance standards for AI systems embedded in navigational and communication equipment

Union submission to the 111th session of the International Maritime Organization's Maritime Safety Committee proposing a new output to develop a recommendation on performance standards for AI systems embedded in navigational and communication equipment

PURPOSE

This Staff Working Document contains a draft submission to the International Maritime Organization's (IMO) 111th Maritime Safety Committee (MSC 111). The IMO has scheduled MSC 111 from 13 to 22 May 2026.

The draft submission proposes a new output to develop standards for AI systems embedded in navigational and communication equipment.

There is an urgent need for the development of standards for AI systems performing a safety function in navigational and communication equipment. The deployment of AI-enabled systems in maritime operations requires the immediate establishment of a regulatory framework to ensure their safe and trustworthy use. Such a framework is essential to protect life, property, and the marine environment, while also preserving industry confidence, as preventable AI-related incidents could undermine the adoption of these technologies. Given the inherently global nature of maritime transport, harmonised action within the IMO is required to establish unified performance standards and to avoid regulatory fragmentation and operational constraints.

EU COMPETENCE

The EU Regulation 2024/1689[1] laying down harmonised rules on artificial intelligence (AI Act) sets safety requirements of high-risk AI systems. In accordance with Article 2 (2), Article 6(1) and Article 105 AI Act certain AI systems related to products covered by Directive 2014/90/EU are within the scope of the AI Act. Based on Article 105 AI Act, for such systems, the Commission shall take into account safety requirements for high-risk AI systems set out in Chapter III, Section 2 of the AI Act when carrying out its activities pursuant to paragraph 1 and when adopting technical specification and testing standards in accordance with paragraphs 2 and 3 of Article 8 of the Directive 2014/90/EU.

Navigation and radio-communication equipment is listed in sections 4 and 5, respectively of Commission Implementing Regulation (EU) 2025/1533[2]. 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[3], in accordance with Article 35(2) thereof.

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 development of performance standards for AI systems embedded in navigational and communication equipment, once finalised and adopted, risks affecting or altering Union legislation and in particular Directive 2014/90/EU and Regulation 2024/1689.[4] 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 10 February 2026.

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[1] OJ L, 2024/1689, 12.7.2024

[2] OJ L, 2025/1533

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

[4] 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
111th session
Agenda item 19

MSC 111/19/x
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WORK PROGRAMME

Proposal for a new output to develop a recommendation on performance standards for AI systems embedded in navigational and communication equipment

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

Executive summary:	This document proposes a new output to develop standards for AI systems embedded in navigational and communication equipment
Strategic direction, if applicable:	2 (in addition also 1, 4 and 6)
Output:	Not applicable
Action to be taken:	Paragraph 36
Related documents:	MSC-FAL.1/Circ.3/Rev.3

Introduction

1 This document is submitted in accordance with the relevant provisions of the draft revision of 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) (MSC 109/22, paragraph 19.14 and annex 26) on the submission of proposals for new outputs, and proposes a new output to develop recommendation on performance standards for AI systems embedded in navigational and communication equipment.

Background

2 Artificial intelligence (AI) systems are machine-based systems that operate with varying levels of autonomy and may adapt after deployment. They generate outputs – such as predictions, recommendations, or decisions – based on input data and can influence physical or virtual environments.

3 AI technologies are increasingly deployed across the maritime sector for a diversity of use-cases. Numerous AI applications support administrative, monitoring or optimization tasks that pose little to no risk to safety and security. At the same time, the growing integration of AI into navigational and communication equipment also means there is an increasing number of AI systems that are specifically used for safety-related purposes, for example, to

enhance situational awareness, support pollution prevention, and to improve overall vessel safety.[5]

4 In such cases, the AI system can affect the safe operation of ships and the protection of life at sea as well as marine environment. Consequently, any failure, inaccuracy, or unpredictable behaviour in these systems could pose a direct threat, potentially resulting in maritime casualties, loss of life, or environmental damage. This simultaneously increases liability risks for ship operators, undermining the uptake of AI technologies.

5 Mitigating the risks of such AI systems depends on a range of AI system specific factors, including the quality of datasets, the underlying model, the system's design and architecture as well as the conditions for correct and secure development and deployment of the AI system. These elements are not addressed in the existing IMO standards, which leads to regulatory uncertainty, inhibits innovation, and undermines confidence in AI-enabled marine equipment. Addressing this gap calls for standards for AI systems embedded in navigational and communication equipment.

IMO's Objectives

6 The development of performance standards for AI systems embedded in navigational and communication equipment supports core IMO objectives and mission to promote safe, secure and environmentally sound, efficient, and sustainable shipping through cooperation.

7 It is also fully aligned with the IMO Strategic Direction for 2024–2029, in particular:

- **Enhancing maritime safety and preventing casualties (Strategic Direction 1)** by ensuring that equipment relied upon for safety is robust, predictable and fit for purpose.
- **Integrating new and advancing technologies (Strategic Direction 2)** into IMO's regulatory framework in a manner that is safe, transparent and controlled.
- **Addressing the human element (Strategic Direction 4)**, ensuring that crew can interpret, oversee and appropriately intervene in AI-assisted systems.
- **Promoting uniform implementation of IMO instruments (Strategic Direction 6)** and avoiding a fragmented regulatory landscape as AI advances.

8 Establishing a globally harmonized safety standard for AI systems would reinforce the IMO's leadership in governing the rapid uptake of AI technologies within marine equipment. By providing developing the requested output, the IMO will enhance the capability of member states and industry to manage the unique complexities and emergent risks of AI, ensuring that the integration of machine intelligence augments – rather than compromises – the safety, security, and sustainability of maritime operations.

Need for the standards

9 As AI systems are increasingly handling safety critical tasks such as object classification, collision risk assessment, and distress signal processing, it functions as a core safety component within navigational and communication equipment.

10 The accompanying risks are in particular pertinent for AI systems based on machine learning techniques where outputs are often derived from statistical patterns rather than the deterministic 'if-then' logic of traditional software. Consequently, an AI system may

[5] For further examples see, e.g., Maritimes Crimes, The Role of AI in Maritime Safety and Security, 04.02.2025, available here: https://maritimescrimes.com/2025/02/04/the-role-of-ai-in-maritime-safety-and-security/#:~:text=liability%20and%20system%20validation%20remain,complex%20and%20require%20further%20regulation and Keren Raiten, Orca AI, Smart, Autonomous, Electric: Mapping the Maritime Ship Revolution, 17.03.2025, available here: Smart, Autonomous, Electric: Mapping the Future of Maritime Ships.

demonstrate high reliability in standard well-defined operational scenarios on which it has been trained but fail when encountering 'edge cases' that were not adequately represented in its training data, such as extreme weather conditions, sensor degradation, or novel vessel designs.

11 The inherent opacity and complexity of advanced AI systems, if not properly checked and mitigated (for example by human oversight measures), could present a critical safety challenge. An AI system that is not sufficiently trained or trained on biased or wrong data could result in wrong decisions, equally affecting safety. Moreover, the lack of transparency, if not constrained with necessary safeguards before it can be used, threatens to undermine the human-machine interface, potentially leading to automation bias where erroneous data is accepted without question, or conversely, causing the crew to disregard valid safety warnings due to a lack of trust.

12 Failures in the safety-critical AI systems pose direct threats to human health and life and carry significant environmental consequences, where flawed AI systems could lead to pollution incidents or hazardous material spills. Therefore, developing specific performance standards is necessary to ensure that AI systems acting as a safety component meets the relevant criteria to guarantee that its integration maintains or exceeds the safety level of traditional equipment.

13 Furthermore, the rapid uptake of AI requires a workforce capable of supervising complex safety components. Safe operation of AI systems depends on competent personnel trained to identify and respond to system anomalies. A coordinated international framework is therefore essential to steer the development of the skills and knowledge needed, ensuring that seafarers are fully empowered to manage the digital transition effectively.

14 In light of the above, there is an urgent need for the development of standards for AI systems performing a safety function in navigational and communication equipment. Without common rules, the maritime sector risks inconsistent safety and delayed deployment of potentially life-saving technologies.

Analysis of the issue

15 The existing regulations in the IMO frameworks such as SOLAS[6] and the ISM[7] do not provide a comprehensive and systematic framework to evaluate or mitigate the unique vulnerabilities associated with AI-based equipment. Furthermore, while IMO is in the process of establishing a framework for Maritime Autonomous Surface Ships,[8] this also will not provide sufficient procedures to assess the reliability, robustness, transparency, cybersecurity or human oversight of AI systems used within navigational and communication equipment.

16 Navigational and communication equipment refers to shipborne bridge and radio installations required under SOLAS Chapters IV and V that are relied upon for safe navigation, collision avoidance, grounding avoidance, and distress and safety communications. This includes, for example, radar/ARPA and related detection and tracking functions (including AI-enabled object classification or sensor fusion); Electronic Chart Display and Information Systems (ECDIS) and route planning/monitoring functions (including AI-enabled anti-grounding or route-deviation alerts); Automatic Identification Systems (including AI-driven traffic analysis or situation assessment); Integrated Navigation Systems (INS) or Integrated

[6] International Convention for the Safety of Life at Sea (SOLAS), 1974, available here: https://www.imo.org/en/about/conventions/pages/international-convention-for-the-safety-of-life-at-sea-(solas),-1974.aspx.
[7] The International Safety Management (ISM) Code, available here: https://www.imo.org/en/ourwork/humanelement/pages/ismcode.aspx.
[8] See here for further information: https://www.imo.org/en/mediacentre/hottopics/pages/autonomous-shipping.aspx.

Bridge Systems (IBS) incorporating AI-based decision support; and communications equipment such as GMDSS elements and related distress and safety functions (including AI-enabled alert processing or prioritization). The proposed standards would apply to AI systems embedded in such equipment to the extent those systems perform a safety function.

17 Lack of standards means that the industry does not have the technical benchmarks and validation methodologies to assess AI systems embedded in the navigational and communication equipment. As a result, market operators as well as administrations and conformity assessment bodies responsible for certifying navigational and communication equipment lack a suitable framework for verifying that these systems perform their safety functions reliability. Without the relevant standards, it is not feasible to demonstrate that this equipment meets the rigorous principles of safety of life at sea.

18 Consequently, **ship operators** face operational uncertainty and liability risks, as they lack assurance that the installed systems are compliant with SOLAS requirements or safe for integration into existing bridge workflows or other equipment.[9] **Conformity assessment** bodies are unable to validate AI-enabled equipment against an objective standard, compelling them to either decline certification requests or issue approvals based on different inconsistent criteria, thereby fragmenting the approach to safety.[10] **Administrations** lack a common basis for type-approval, enforcement, and oversight, rendering them unable to effectively monitor the safety of increasingly autonomous technologies entering their fleets.

19 Meanwhile, there are various regional and national initiatives exploring establishing requirements for AI systems covering navigational and communication equipment within their jurisdiction. Such disparate approaches threaten to fracture the global safety regime. Developing a centralized framework within the IMO would counter this risk, providing the necessary mechanism for nations to align their standards and work together effectively

20 Given the IMO's global mandate to regulate maritime operations, it is uniquely positioned to deliver the consistent, internationally agreed standards necessary for safe AI integration within marine equipment.

21 To ensure a balanced and risk-based approach, these standards should be limited only to AI systems that fulfil a safety function within marine equipment – that is, where the failure or malfunction of the AI system would endanger the health and safety of persons, property or the marine environment.

22 The risks of AI systems that perform safety functions in navigational and communication equipment arise from the way AI systems are developed, trained, updated, and operated, and from their potential to influence decisions or functions on board.

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[9] There are various reports on the legal risks hindering the shipowners' willingness to deploy advanced AI solutions. Notably, see Kim, D., Lee, C., Park, S., & Lim, S. (2022). Potential Liability Issues of AI-Based Embedded Software in Maritime Autonomous Surface Ships for Maritime Safety in the Korean Maritime Industry. *Journal of Marine Science and Engineering*, *10*(4), 498. https://doi.org/10.3390/jmse10040498. See also Fanshawe, J., Lloyd's Register, AI and Autonomy: Finding the Right Path through 16 Billion Options, 06.2023, available here: https://www.lr.org/en/knowledge/horizons/june-2023/ai-and-autonomy-finding-the-right-path-through-16-billion-options/ and IMA, AI and Autonomous Ships: Redefining Risk in Marine Insurance, 02.05.2025, available here: https://imacorp.com/wp-content/uploads/2025/04/AI-and-Autonomous-Ships_Thought-Leadership_042425.pdf.

[10] For example, for autonomous shipping technologies, the DNV in Norway has launched its own class notations to provide framework for safe development of these technologies, see here: https://www.dnv.com/news/2025/dnv-launches-class-notations-to-provide-framework-for-safe-development-of-autonomous-shipping-technologies/#:~:text=%E2%80%9CAutonomous%20shipping%2C%20in%20all%20its,%E2%80%9D.

23 To account for these factors, the standards should particularly address: risk management (ensuring that AI systems are subject to a structured risk-management process); data quality and governance (ensuring that the data used to develop and operate the AI system is appropriate, reliable, and managed in a controlled way); accuracy, robustness and cybersecurity (ensuring that AI systems perform reliably under normal and reasonably foreseeable conditions, with resilience to failures, errors, or malicious interference); human oversight and transparency (ensuring that human operators can understand the system's behaviour, monitor its operation, and intervene effectively when needed); traceability and documentation (ensuring that key events can be reconstructed and that sufficient information is available to assess the system's conformity with safety expectations).

24 Standardizing these requirements provides the objective basis needed for manufacturers to demonstrate compliance and for conformity assessment bodies and administrations to verify that AI-based systems operate safely.

25 In terms of implications, the proposed standards are not expected to impose significant additional costs on the maritime industry or create new administrative burdens for shipowners. The proposal does not mandate carriage of new equipment, rather, it establishes technical requirements for AI systems that manufacturers choose to integrate into navigational and communication equipment. Demonstrating conformity would accordingly be a matter for manufacturers, while shipowners benefit from higher reliability of AI-enabled equipment and reduced liability exposure. Administratively, the proposal operates within the existing framework: performance standards would be adopted by MSC resolution and applied through established type-approval mechanisms under SOLAS Chapter V regulation 18 and Chapter IV regulation 14, requiring no new instruments or reporting obligations. Capacity-building to develop technical expertise in evaluating AI-specific characteristics can be supported through existing IMO technical cooperation programmes and accompanying guidance materials.

Benefits from the proposal

26 The development of IMO standards for AI systems embedded in navigational and communication equipment as safety components would bring significant benefits:

- **Enhanced maritime safety**: AI components embedded in navigational and communication equipment, such as collision avoidance, grounding prevention, route monitoring, or distress alerting systems would meet minimum safety, reliability and transparency requirements.
- **Regulatory certainty**: Manufacturers, other economic operators and conformity assessment bodies would have clear criteria for assurance, enabling consistent approval and reducing market uncertainty.
- **Uniform implementation**: A harmonized IMO approach prevents fragmented national or regional requirements and ensures a globally level playing field.
- **Improved trust in AI:** Standards addressing risk management, robustness, data governance and human oversight builds the necessary trust among economic operators and users and drives a more widespread uptake of AI in maritime equipment.
- **Support for seafarers and the human element**: Improved transparency, logging and oversight functionalities help crew maintain situational awareness and control.
- **Facilitated innovation and competitiveness:** Clear standards encourage investment in safe and reliable AI technologies.

27 Furthermore, this output enables the IMO to proactively govern the digital transition rather than reacting to it, future-proofing the regulatory framework against rapid technological change. It provides the essential foundation for a maritime safety regime where human expertise is increasingly enhanced by machine intelligence.

Output

28 It is requested that the committee:

.1 approves a new work output to develop a recommendation on performance for AI systems embedded in navigational and communication equipment;
.2 approves the provisional roadmap set out in Annex 3;
.3 approves the formation of an Intersessional Correspondence Group to develop the recommendation; and
.4 approves the proposed Terms of Reference for a Correspondence Group.

Human element

29 The integration of AI into maritime navigational and communication equipment presumes a demanding application of the human element principles as outlined in IMO Resolution A.947(23).

30 As recognized in the above-referred resolution, the human element is a complex, multi-dimensional issue affecting maritime safety and security. This proposal frames the development of performance standards for AI embedded in navigational and communication equipment as a socio-technical task, not only a technical one. Accordingly, the standards should not only operationalise the technical safety performance characteristics of an AI system but also (i) respect and operationalise the views of seafarers, (ii) establish adequate safeguards so that a single human or organizational error does not by itself lead to an accident, and (iii) remain simple, clear and comprehensive for shipboard use while reflecting operational realities such as crew endurance and the need for effective communication.

31 Notably, it is imperative that safety performance standards include considerations related to human element to ensure that AI systems enhance, rather than obscure, the situational awareness of the ship's crew, acknowledging that the human operator remains central to safe ship operations. The autonomous and opaque nature of some AI systems require, among other things, transparency and user-centered approach, to avoid over-reliance or misinterpretation of AI-generated input.

32 The new output will embed human factors into the evaluation of algorithmic reliability, promote effective communication regarding system explainability, and strengthen the trust in the uptake of these systems. By embedding these human element principles into the performance standards, it can be ensured that the deployment of AI in maritime navigation and communication contributes positively to safety and the overarching goal of significantly reducing maritime casualties. Annex 2 of the proposal offers a checklist identifying key human element considerations.

Urgency, priority and target completion date

33 With AI-enabled systems already entering the market and operational fleets, there is an immediate necessity to establish a regulatory framework that ensures their trustworthy deployment. While the primary objective is to safeguard health, life, property, and the marine environment, this initiative is also strategically critical: the occurrence of preventable AI-related casualties would erode industry confidence, potentially stifling the uptake of these technologies.

34 Maritime transport is inherently global – national or regional measures cannot address the cross-border nature of ship operations and supply chains. To protect the common good of safe and secure shipping, harmonised IMO action is required. Without immediate action from the IMO to establish a unified performance standard, the maritime domain risks fracturing into a patchwork of conflicting requirements and regional operational limitations.

35 Based on the compelling need, the development of the IMO performance standards is proposed as a high-priority work and should be addressed as soon as feasible within the working arrangements of the Organization.

36 Considering the time frame for service delivery outlined above, it is then proposed that the work be undertaken in the 2027-2028 biennium.

37 The output is expected to be assigned to the Sub-Committee on Navigation, Communications and Search and Rescue. It is estimated to complete the work in two sessions of the NCSR Sub-Committee in 2027 and 2028, and to be submitted to MSC for consideration after its completion.

Action requested of the Committee

36 The Committee is invited to consider the proposals made in this document, particularly that contained in paragraph 28 and take action, as appropriate.

Annex 1

Checklist for Identifying Administrative Requirements

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.

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

Annex 2

Checklist for Considering the Human Element

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
Workload			*Other relevant references may be added* *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?**			In terms of the proposal's impact on workload, it is important to distinguish between the impact of uptake of AI and the impact of the proposed performance standards. While AI technology is likely to significantly affect workload, such effects arise from the technology itself, not from the performance standards proposed in the output.	
1.1	**On board, especially in the already intensive phases of the voyage and port operations to:**	**No**	*Revised guidelines for the operational implementation of the International Safety Management (ISM) Code by Companies* (MSC-MEPC.7/Circ.8) *Guidelines on fatigue* (MSC.1/Circ.1598)	See justification above. The proposed performance standards operate at the equipment type-approval stage. They are not expected to add to workload in operating or maintaining the equipment or in carrying out onboard administration procedures.	

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
			Principles of minimum safe manning (Resolution A.1047(27)) *Guidelines for the investigation of accidents where fatigue may have been an issue* (MSC/Circ.621)		
1.1.1	Operations including navigation, cargo and engineering	**No**			
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:**	**No**			
1.2.1	Companies' administration				
1.2.2	Flag State, port State and classification societies administration such that	Yes		Additional AI related criteria for approving navigational an	

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
	certification and other processes are compromised or delayed			d communication equipment may be added	

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
Decision-making			*Other relevant references may be added* *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*
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		The standards do not create implementation complexity. Rather, by requiring AI systems to provide transparent and explainable outputs, they enhance the ability of seafarers to make well-informed decisions.	
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		By requiring transparency, human oversight capability, and adequate user documentation, the standards would support the human operator and help to reduce the cognitive burden on seafarers who might otherwise need to interpret outputs from opaque or poorly documented AI systems.	
2.5	By limiting the time available to establish situational awareness, decide, communicate (possibly across time zones) or check	No		The standards are expected to enhance situational awareness by requiring AI systems to provide transparent, interpretable outputs	

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
				that support timely human decision-making.	
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* *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*
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) *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, 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 noise, vibration, temperatures, dust and other contaminants	No			

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
Operation and Maintenance			*Other relevant references may be added* *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) *Guidelines for bridge equipment and systems, their arrangement and integration (BES)* (SN.1/Circ.288) *Principles of minimum safe manning* (Resolution A.1047(27)) *Issues to be considered when introducing new technology on board ships* (MSC/Circ.1091) *Guideline on software quality assurance and human-centred design for e-navigation* (MSC.1/Circ.1512)		

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
			Guidelines for the standardization of user interface design for navigation equipment (MSC.1/Circ.1609)		
4.1	By introducing equipment that the user may find difficult to operate or maintain or may be unreliable	No		The standards do not introduce new equipment; they establish key requirements that help ensure AI-enabled equipment is dependable and comprehensible to the user.	
4.2	By introducing new and/or novel technology, or technology that changes the role of the person	No		See the consideration above.	
4.3	By introducing requirements for new competencies and roles	No		The performance standards are not expected to create new roles in operation and maintenance of the relevant equipment.	
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		The standards operate at the type-approval stage and do not prescribe shipboard operational or maintenance procedures.	
4.7	By introducing new and unfamiliar operating interfaces?	No			
4.8	By introducing risks to the ship during any modifications required	No			

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
	prior to the implementation date of the output				

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
Measures to address the human element			*Other relevant references may be added* *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) *Revised guidelines for the operational implementation of the International Safety Management (ISM) Code by Companies* (MSC-MEPC.7/Circ.8)		
5.1	Training	Yes		While the standards do not directly mandate training requirements, the transparency and human oversight provisions may inform future consideration of training and competency development to ensure seafarers can effectively interpret and oversee AI-enabled systems.	
5.2	Practical skill development and competences	Yes		See the consideration above.	
5.3	Operating, management and/or maintenance procedures	No			
5.4	Information/manuals for operation and maintenance	Yes		The standards may require manufacturers to provide documentation explaining AI system behaviour, limitations, and oversight, thereby improving the	

	1 Question	2 Yes/ No	3 IMO References	4 Considerations	5 Instructions
				quality and completeness of information available to operators.	
5.5	Spares outfit	No			
5.6	Occupational safety requirements including guarding and PPE	No			
5.7	Shore support	No			

Annex 3

Proposed Roadmap

The following timetable is being put forward as a possible roadmap for the approval of the recommendation on performance standards for ai systems embedded in navigational and communication equipment

Year	Committee & Activity	Outcome
2026	MSC 111: Output submission and approval, consideration of invitation to form an intersessional correspondence group Council, 137th session: Endorsement of new output Intersessional Correspondence Group: Online Workshop on [xxxxxxx] Report of the Correspondence Group submitted to NCSR 14	
2027	NCSR 14: Consideration of the Report of the Correspondence Group, additional paper submissions on the topic, establishment of a working group. NCSR 14 Working Group: Agreement on document structure, Chapters and associated goals. Begin work on functional requirements. Establish terms of reference for an intersessional correspondence and working group. Intersessional Correspondence Group: Development of functional requirements for outstanding chapters. Begin work on expected performances for functional requirements. Intersessional Working Group: Agreement on performance standards based on functional requirements. Preparation of a draft. Report of the Correspondence / Working Group submitted to NCSR 15	
2028	NCSR 15: Consideration of the Report of the Correspondence Group, additional paper submissions on the topic, establishment of a working group. NCSR 15: Working Group: Discussion on the draft recommendation on performance standards for AI systems embedded in navigational and communication equipment. Invite MSC to approve recommendation. Following MSC: Approval of recommendation.	

Annex 4

DRAFT TERMS OF REFERENCE FOR THE CORRESPONDENCE GROUP ON THE DEVELOPMENT OF A RECOMMENDATION ON PERFORMANCE STANDARDS FOR AI SYSTEMS EMBEDDED IN NAVIGATIONAL AND COMMUNICATION EQUIPMENT

The Correspondence Group, taking into account the comments and decisions made in plenary, and documents is instructed to:

1. develop a roadmap for the development of a recommendation on performance standards for AI systems embedded in navigational and communication equipment;
2. define the scope of the recommendation on performance standards for AI systems embedded in navigational and communication equipment;
3. organise and conduct Workshops on [XXX];
4. further develop the text of a recommendation on performance standards for AI systems embedded in navigational and communication equipment; and
5. submit a report for consideration at NCSR 14.