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Development of guidance on the Standardized (or S) Mode of operation of navigation equipment

Submitted by Australia, the Republic of Korea, InterManager, The Nautical Institute (NI), International Association of Institutes of Navigation (IAIN), International Federation of Shipmasters' Associations (IFSMA), International Electrotechnical Commission (IEC) and Comité International Radio-Maritime (CIRM)

SUMMARY

Executive summary:	This document provides information on work undertaken by Australia, the Republic of Korea and some international organizations in 2015 for the development of guidance on the Standardized (or S) Mode of operation of navigation equipment
Strategic direction:	5.2
High-level action:	5.2.6
Output:	No related provisions
Action to be taken:	Paragraph 26
Related documents:	MSC 81/23/10; MSC 85/26/Add.1; MSC 94/21, MSC 94/18/8, MSC 94/18/10, MSC 95/22, MSC 95/19/8, MSC 95/19/12; NAV 58/14; NAV 59/INF.8; NCSR 1/9, NCSR 1/9/1 and NCSR 1/28

Introduction

1 This document outlines the work done in 2015 by Australia, the Republic of Korea, some international organizations and experts from IEC to develop the scope of an IMO guideline on the Standardized (or S) Mode of operation of navigation equipment. Work has also been undertaken to identify dependencies on other e-navigation-related work being progressed at IMO and other international organizations, including the International Hydrographic Organization (IHO).

2 It is envisaged that such IMO guidance will describe how best to achieve the level and degree of standardization necessary to address the user requirement for a greater degree of standardization in the use and operation of navigation systems than currently exists. The guidance will, in general, also address user needs as collected and assessed using Human Centred Design (HCD) principles.

3 This will provide benefits that include increased safety through better usability and decision support, as well as reduce effort needed to achieve equipment familiarization.

Background

4 Today, there are many different manufacturers of navigation equipment. Equipment displays, interfaces[1] and controls all differ. Mariners face the challenge of becoming quickly familiar with the wide variety of makes and models of navigation equipment available. Different equipment has the potential to cause confusion amongst mariners, reduce efficiency, degrade situational awareness, hinder good decision-making and jeopardize safety.

5 Mariners often experience a range of circumstances such as periods of high workload, emergencies, quick turnarounds (compounded sometimes with simultaneous crew change) and equipment faults/failures.

6 Safety and efficiency can be improved if seafarers are provided with a standardized, simple and effective interface for control and monitoring of navigational systems. Standardization is widely recognized as an effective countermeasure against increasing complexity and confusion and degrading situational awareness.

7 To address this issue, the International Federation of Shipmasters' Associations (IFSMA), supported by the Nautical Institute (NI), in a submission to NAV 54 (NAV 54/13/1 refers), proposed and described S-Mode.

8 MSC 95 approved a proposal (MSC 95/19/8, annex 1) for the development of guidelines on standardized modes of operation (S-mode) for navigation equipment. MSC 95 agreed to include, in the post-biennial agenda of the Committee, an output on *Guidelines on standardized modes of operation, S-mode*, with two sessions needed to complete the item, assigning the NCSR Sub-Committee as the coordinating organ. Development of guidance on the S-Mode of operation is one of the five planned output agreed by MSC 95 for e-navigation.

Introducing S-Mode

9 The notion of an S-Mode of operation has included that future navigation systems would have an S-Mode for display, control and monitoring. When activated (with a single button action, which is easily recognizable), the system would default to a standard display (e.g. north-up display, relative motion and true vectors) and present a standard user interface for key (pre-defined) tasks.

10 Australia and the Republic of Korea have held workshops on S-Mode during 2015. These workshops have involved Human Factors experts, maritime trainers, seafarers (including marine pilots), regulators, representatives from the marine electronics industry and others. These workshops have helped refine the scope of a future IMO guideline on S-Mode. They have identified that less focus could be placed on the idea of an independent mode, should another approach achieve the same goals.

[1] All attributes of an interactive system (software and hardware) that provide the information and controls necessary for the user to accomplish specific tasks with the interactive system ((ISO 9241-110).

11 A proposed description of the content or scope of the guideline on standardized modes of operation, S-Mode, is as follows:

> "*Guidance on the standardization of design for navigation and communication systems, encompassing displays, interfaces, and functionalities able to provide the bridge team and the pilot with timely access to essential information for the conduct of navigation throughout the voyage, from berth to berth.*"

12 However, it remains important that S-Mode should not limit a manufacturer's ability to innovate.

13 S-Mode may also incorporate provisions for the configuration of personal settings. These may be stored in the system. They will allow a user to rapidly customize the system to their preferred settings (e.g. overlay custom display features or give access to customized information).

Definition of S-Mode

14 In working towards a proposed definition of S-Mode, Australia and the Republic of Korea have considered key words and phrases drawn from existing IMO instruments and expert advice. These include:

> "standardization*, immediate access to essential information, consistency, intuitive use, human centred design, good practice, reduce equipment familiarization effort, 'style' guide, increasing safety by improving usability and facilitating effective decision making, navigation and communication systems, interface (equipment) design, different users same intuitive experience, consistent 'look and feel'.*"

15 This has led to a proposed description of S-Mode as provided in paragraph 11.

Scope of draft IMO guideline

16 Potential sections (structure) of the draft guideline on standardized modes of operation and display for navigational equipment (S-Mode) are:

.1 Introduction and 'scene setting' section – should include a discussion on navigation equipment, such as INS, ECDIS, ECS, Radar, GMDSS, AIS, GNSS receivers and multi PNT receivers and the echo sounder.

.2 State the intended 'concept of operations' for various navigational scenarios and manning levels on the bridge.

.3 A section based on consideration of navigation competencies taken from the STCW Convention and Code to generate a list of navigation tasks to be included.

.4 A description of the functions needed to support the above tasks.

.5 Details of the above functions.

.6 A list of essential information for the conduct of navigation (with reference to existing INS performance standards) and standardize access to navigation and communication interfaces in a continuous, clear, intuitive, non-repetitive, and unambiguous manner.

.7 A section on options for default user settings (e.g. head up, north up, scales, layers) to be stored and recalled (to take note of what was agreed at MSC 95).

17 The S-Mode guideline should be based on (and have strong links with) the *Guideline on Software Quality Assurance and Human-Centred Design for e-navigation* (MSC.1/Circ.1512). User involvement in the design and testing must be described in the process of developing S-Mode.

Links between S-Mode guidance and other e-Navigation work

18 Strong links and dependencies exist between the S-Mode guidance and the e-navigation outputs on "Additional modules to the Revised Performance Standards for Integrated Navigations Systems (INS) (resolution MSC.252(83) relating to the harmonization of bridge design and display of information" and *Guidelines for the harmonized display of information received via communications equipment*. These outputs are scheduled to be on the NCSR agenda in 2016/17 and the S-Mode guidance is scheduled for 2018/19. Therefore, it will be important to ensure the outcomes from the above outputs are developed keeping in mind the intention of the S-Mode guidance, to ensure all three outputs are aligned.

19 Further, IHO and IALA are progressing significant and relevant work on the development of product specifications, based on the IHO S-100 Geospatial Information Registry. Work on the display of navigational-related information is also being progressed. As S-Mode guidance is being developed, due account will be taken of these areas of ongoing work.

Links between S-Mode guidance and existing IMO instruments

20 The S-Mode should align with other existing IMO instruments. The following could be used to assist development of S-Mode guidance (or be affected by it):

.1 SOLAS regulation V/15;

.2 MSC.1/Circ.1512 on *Guideline on Software Quality Assurance and Human-Centred Design for e-navigation*;

.3 MSC.1/Circ.1503 on *ECDIS – Guidance for good practice*;

.4 MSC/Circ. 982 on *Guidelines on ergonomic criteria for bridge equipment and layout*;

.5 SN.1/Circ. 265 on *Guidelines on the application of SOLAS V/15 to INS, IBS and bridge design*;

.6 Resolution A.817(19) on *Performance standards for Electronic Chart Display and Information Systems (ECDIS)*;

.7 Resolution MSC.232(82) on *Revised performance standards for Electronic Chart Display and Information Systems (ECDIS)*;

.8 Resolution A.694(17) on *General requirements for shipborne radio equipment forming part of the Global Maritime Distress and Safety System (GMDSS) and for electronic navigational aids*;

.9 Resolution MSC.306(87) on *Revised performance standards for Enhanced Group Call (EGC) equipment*;

.10 Resolution MSC.191(79) on *Performance standards for the presentation of navigation-related information on shipborne navigational displays*;

.11 Resolution MSC.192(79) on *Revised performance standards for radar equipment*;

.12 SN.1/Circ.243/Rev.1 on *Amended guidelines for the presentation of navigation-related symbols, terms and abbreviations*;

.13 MSC/Circ.1091 on *Issues to be considered when introducing new technology on board ship*;

.14 Resolution MSC.252(83) on *Revised performance standards for Integrated Navigation Systems (INS)*; and

.15 Resolution MSC.302(87) on *Performance standards for Bridge Alert Management (BAM)*;

21 Other standards and guidance material, for example ISO and IEC standards and IACS Rec No. 95 for SOLAS regulation V/15, may be relevant to the development of S-Mode guidance.

22 A thorough document search and review to identify relevant IMO instruments and other standards and guidance material will be conducted.

Timing

23 MSC 95 (MSC 95/19/8) agreed to five new planned outputs to progress the IMO e-navigation Strategy Implementation Plan (SIP). The first listed output is *Guidelines on standardized modes of operation (S-mode)*, with completion planned for 2018/19.

24 MSC 95/19/12 provided amplifying information on the proposed scope of S-Mode guidance and how that work could be progressed. A further developed and refined road map is provided below.

Year	Tasks
2016	Agree on the scope of S-Mode and carry out a user needs evaluation (initial testbed design could also take place, given that some existing e-navigation user needs have been previously identified)
2017	Develop testbeds based on user assessments and commence simulation trials with a wide variety of seafarers and commence initial drafting of the guideline
2018	Continue simulation trials and drafting of the S-Mode guideline

Year	Tasks
2019	Complete drafting of the S-Mode guideline for the design of shipboard navigational equipment, along with notes for training (e.g. to develop model courses)

25 As mentioned in paragraph 18, there are strong links and dependencies between S-Mode guidance and the topics to be discussed under agenda items 6 and 9 (i.e. "Additional modules to the Revised Performance Standards for Integrated Navigations Systems (INS) (resolution MSC.252(83)) relating to the harmonization of bridge design and display of information", and *Guidelines for the harmonized display of navigation information received via communications equipment*).

Action requested of the Sub-Committee

26 The Sub-Committee is invited to note the information provided and decide as appropriate.