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DEVELOPMENT OF IMO E-NAVIGATION STRATEGY AND REVIEW OF GMDSS

(Submitted by Nick Ashton, ETMSS Vice-Chairperson)

Summary and Purpose of Document

This document provides a short summary report on the activities of the International Maritime Organization in developing an eNavigation Strategy and consideration of a review of the Global Maritime Distress & Safety System (GMDSS)

ACTION PROPOSED

The Team is invited to note the information provided, and consider how WMO may most effectively engage with IMO in developing its eNavigation strategy and review of the Global Maritime Distress & Safety System (GMDSS).

- Appendix A: Development of an E-navigation Strategy Implementation Plan – Report of the IMO Correspondence Group.
- Appendix B: Draft Report of the Correspondence Group to the IMO sub-committee on Standards of Training and Watchkeeping (STW).
- Appendix C: Developing a Common Data Infrastructure for eNavigation – Information paper submitted to IMO NAV 56.

DISCUSSION

1. Background

- 1.1 The International Maritime Organization (IMO), at the meeting of its Maritime Safety Committee (MSC) in 2008 (MSC85) approved a "Strategy for the Development & Implementation of eNavigation", to be coordinated between its Radiocommunications and Search and Rescue (COMSAR), Safety of Navigation (NAV) & Standards of Training and Watchkeeping (STW) sub-committees.
- 1.2 At its 55th Session, in July 2009, the NAV sub-committee agreed to set up a Correspondence Group of interested parties to progress the development of the strategy.
- 1.3 At its 86th session, in June 2009, the Maritime Safety Committee approved a "scoping study" to assess the need for a review of the Global Maritime Distress and Safety System (GMDSS), taking into account the development of eNavigation. This work was assigned to the COMSAR sub-committee.
- 1.4 WMO engagement with the Correspondence Group has been informal to date; whilst it has been noted that "Maritime Safety Information" is a key element to be included in eNavigation, it has been less clear exactly what role "metocean" information might play in this.

2. Proposals for WMO Engagement with eNavigation for consideration by ETMSS

- 2.1 The latest Report from the IMO Correspondence Group (Appendix A) provides details of the "user needs" so far identified; the details shown in the Annexes to this document highlight where environmental information and domain awareness will be important to both shipboard and land-based users of eNavigation. Additionally, the Draft Report to STW (Appendix B) provides some further background and highlights some of the options that might be considered in progressing the strategy.
- 2.2 The paper at Appendix C was submitted to IMO by the Nautical Institute, and was welcomed and endorsed by the eNavigation Working Group at NAV 56. It can be seen that, in Para. 6 of this paper, WMO is highlighted for the work that it is currently undertaking in developing systems for the global exchange of data and information.
- 2.3 Given the requirements for environmental information already identified, alongside any review of the GMDSS, together with the specific acknowledgement of WMO's position in providing a global exchange of information, it is proposed that WMO ensures that sufficient resource is available to the Team to enable active engagement with IMO in the context of eNavigation.

Appendix A

Development of an E-navigation Strategy Implementation Plan – Report of the IMO Correspondence Group

Attached as separate document.

Appendix B

Draft Document on Report to STW 42 from the Correspondence Group on e-navigation.

1. Background

The Maritime Safety Committee at its 85th session approved the strategy for the development and implementation of e-navigation and described the vision, core objectives and benefits of e-navigation. A definition was given as:

"e-navigation is the harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance berth to berth navigation and related services for safety and security at sea and protection of the marine environment". (MSC 85/26/Add.1).

The Maritime Safety Committee then at its 86th session approved a proposal for a coordinated approach to the implementation of the e-navigation strategy. (MSC 86/23/4) The proposal outlines a joint plan of work for the NAV, COMSAR and STW Sub-Committees for the period 2009-2012.

Working groups for implementation of the e-navigation strategy have been established by the NAV and COMSAR Sub-Committees respectively. These working groups are being assisted by a Correspondence Group coordinated by Norway.

Currently 38 member states, 4 intergovernmental organizations and 11 non-governmental organizations participate in the work of the Correspondence Group.

Rising trends of marine accidents both in terms of numbers and costs are mainly associated with collisions and groundings. Sixty (60) percent of these accidents are reportedly caused by direct human failure. (MSC 85/26/Add.1). It may though sometimes be the case that failure can also be attributed to failure of the larger "system" within which mariners work.

2. Status of progress related to the Work Programme.

The Work Programme gives a coordinated approach to the implementation of the e-navigation strategy, and identifies 4 required steps:

- Step 1: Identification of user needs and their requirements,
- Step 2: Development of an overall conceptual, functional and technical architecture (which will need to be maintained), - particularly in terms of process description, data structures, information systems, communication technology and regulations.
- Step 3: A gap analysis, taking into account the human element throughout the process, focusing on technical, regulatory, operational and training aspects, recognizing that these aspects are inter-related and need to be considered in a coordinated manner.
- Step 4: Cost-benefit and risk analyses, addressing financial and economic aspects as well as assessing the impact on safety, security and the environment.

Recognizing that the development of an e-navigation strategy implementation plan would need a joint effort by the COMSAR, NAV and STW Sub-Committees, MSC 85 endorsed that the Chairmen along with the Secretaries of the COMSAR, NAV and STW Sub-Committees should jointly develop a coordinated approach to implement the e-navigation strategy. Within the framework established by the e-navigation strategy, all three Sub-Committees will follow the above four steps, as appropriate, and each from their own focus.

For the STW subcommittee it is important that the e-navigation strategy identifies training, competency, language skills, workload and motivation as essential. Alert management, information overload and ergonomics are the prominent concerns. These aspects of e-navigation will have to be taken into account in accordance with IMO's Human Element work. (MSC86/23/4).

STW 42 is required to answer questions related to further gap analysis, C/B- and risk analyses, focusing the gap analysis on training, identifying the minimum training requirements for the new and existing tools within e-navigation and then the gap between these and the minimum international standards. (NAV 56/8). Training of personnel is expensive, and may change the conclusion of a Formal Safety Assessment (FSA) and a C/B analysis on improved navigational safety. Therefore it would be advisable that delivery of equipment developed within the e-navigation concept should include equipment training. The cost of training will therefore be an important part of the quantification of costs for a C/B analysis. (NAV 56/8).

3. Terms of Reference for the Correspondence Group on e-navigation and STW 42.

Taking into account the Work Programme on e-navigation (MSC86/23/4) STW 42 (2011) is invited to address specific questions and issues raised by NAV and/or COMSAR. To this end the Correspondence Group on e-navigation submits this report to STW 42 raising specific questions and issues that should be addressed by the STW Sub-Committee.

4. The Human Element, Qualifications and Standardization.

The Human Element Analyzing Process (HEAP) is described in MSC/Circ.878/MEPC/Circ. It is essentially a checklist for issues to consider, in particular relating to the human element, organizational and training issues. The document can be used in a gap analysis as well as in a risk analysis.

In the broadest sense, e-navigation should support humans to manage information to ensure good situational awareness and facilitate consistently good decision-making. Looking at the challenges in the industry it is important to recognize opportunities offered by advancement in technology. Still it should be clear that the major challenge to embrace concerns the human element.

The importance of global maritime transport is well recognized, but there is also a growing sensitivity and awareness in many countries of the importance of the marine environment and the need to actively protect coastal waters. There is an increasing intolerance of adverse impacts on the marine environment caused by shipping, and in particular accidents that result in marine pollution. Thus there is a need to adopt appropriate strategies for monitoring and surveillance of shipping and its interface to a wide range of data information and reporting systems that support marine navigation. Many of these applications have direct relevance to the IMO e-navigation strategy.

Having recognized the user needs onboard and ashore on communication and search and rescue, the functions and description of system architecture have been identified. (NAV 56-WP.7) A

gap analysis will be conducted, followed by a cost-benefit analysis and a risk analysis. The gap analysis will be divided into four elements: technical, operational, regulatory and training.

Seafarer qualifications required should ideally mirror the extent of the enhanced technology and speed of its introduction, and define the different needs for training. This is part of the more general development of e-navigation which requires not only documentation of skills, but also of how seafarer qualifications are to be maintained and updated.

There may be a need for people to have different educational backgrounds onboard and ashore, but their ability to operate interactively is also important. Experience from working onboard may therefore be important to the relevant functions carried out on shore.

In this context there are important questions for the STW Sub-Committee to consider, such as the future training requirements for those on board and ashore and what they should be doing for safer navigation of ships.

It is expected that ships will become increasingly bigger and more complex, - and shipborne may be expected to have the qualifications and competency to meet these developments.

The Correspondence Group will have to address the future training requirements and qualifications needed to meet e-navigation. At the same time it is fundamental that a framework for harmonizing maritime information systems must be designed to facilitate the reduction of "single person errors/single unit errors", particularly onboard. This will require the system to reduce some of the basic errors in perception, communication and decision-making that can occur on board as well as ashore, and enhance team operations. ("Team" can mean teams onboard, ashore or joint teams between ship and shore). Key requirements in relation to the human/machine interface will include more effective means of analyzing and prioritizing information, - under both normal and abnormal conditions.

(The members of the Correspondence Group are welcome to give examples to this end.)

5. The Future Path of the Navigator: Two scenarios.

Having assessed the user needs, functions and system architecture of e-navigation, - and expecting the further development of technology and operational procedures, one may predict a variety of scenarios for the future personnel on board and for skills, competencies, qualifications and training needs. Two example scenarios may illustrate the wider spectrum of possible e-navigation related developments.

5.1. The navigating navigator

This is a scenario where the monitoring equipment is kept relatively traditional. The navigators' own skills will still be essential to the safe navigation of the ship, and the bridge team will be the main backup to the safe functioning of the ship. This will have to be reflected in the principles of the training and certificates required. There is, however, also a question of whether one should emphasize assessment of the de facto skills and competences, or alternatively if assessment should include a more formal documentation of having fulfilled authorized training programs.

5.2. The monitoring navigator

In this alternative scenario the data solutions and monitoring equipment are much more sophisticated. The navigator will have to rely heavily on data structure and the displays and there may be less emphasis on the skills and competencies of the navigator. The main task will be to monitor the

system displays and the indicators of the system's health or resilience. This scenario will include an even closer cooperation with organizations ashore to help secure a safe voyage from berth to berth. A consequence of this scenario is that the ambitions of the seafaring professional could be affected, and there would be implications for the development of the training, education and required competencies for seafarer certificates. It may also impact the recruitment of adequate instructors.

Does the Correspondence Group think this scenario might have an impact on future training needs?

6. Preliminary results of the GAP analysis

The NAV e-navigation Correspondence Group Coordinator sent an input to the Correspondence Group concerning the gap analysis on August 30, and has requested comments by 15 October.

Issues related to the STW Sub-Committee will be collected from the input and the comments, and will be included in the paper to STW 42- (25-28 January 2011). The deadline for submission to IMO of that paper is 22 October.

There may be further issues to consider like a greater level of system integration, the need to manage greater levels of data and information, greater co-ordination and decision making between ship and shore, use of Decision Support Systems (DSS), including ECDIS and INS, and securing the competence to alternate between work stations for a highly mobile work force.

7. Questions to STW 42.

Safe and efficient navigation will continue to rely on good decisions being made on an increasingly constant and reliable basis. Some decisions can be made with an increased dependence on technology but it will also important to include by design the capability for the human beings to make good decisions, especially in those areas where it is acknowledged that human beings are particularly adept and efficient.

In addition, whilst e-navigation is not to be technology-driven there will be a heavy reliance on technology. Similar to any existing system in operation, e-navigation system components will also have inherent reliability risks. Since any system cannot be entirely infallible its short comings and limitations must be understood by users and maritime training should be increasingly taking this into account.

It is relevant to ask the STW Sub-Committee the following questions:

- 1) Is it advisable to have a standard bridge layout for ships to facilitate the smooth familiarization of shipborne personnel when transferring from one ship to another?
- 2) Is there a need for an eventual revision of the principles of the present standards of training and certification, to meet the new challenges arising out of the implementation of e-navigation?
- 3) Which scenarios would be most suitable as a guideline for the future development of training and certification of shipborne personnel to meet the requirements of e-navigation?

Appendix C

Developing a Common Data Infrastructure for eNavigation – Information paper submitted to IMO NAV 56.

Attached as a separate document.