e-Navigation – Outcome of IMO NAV57

Submitted by IHB

SUMMARY

Executive Summary: This document provides the extract of the NAV57 report concerning
e-navigation

Action to be taken: 2

Related documents: NAV57/15

1.   Attached to this document is an extract from the IMO NAV57 report to the IMO
Maritime Safety Committee on progress with e-navigation.

2.   The Sub-Committee is invited to note the information provided and take any action it
considers appropriate.

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.3   the proposed changes to the definition of parameter 13 to "requiring
assistance" were not supported because its use would probably not lead to
the provision of the required assistance as there would be limited
monitoring for the parameter. It should be noted that the GMDSS provided
facilities to indicate the need for assistance.

5.17   The Sub-Committee invited the Committee to extend the target completion year for
the planned output "Radiocommunication ITU-R Study Group matters" to 2013.

6   DEVELOPMENT OF AN E-NAVIGATION STRATEGY IMPLEMENTATION PLAN

6.1   The Sub-Committee recalled that MSC 86 had instructed NAV 55 to:

.1   consider future spectrum requirements with respect to e-navigation and
advise COMSAR 14 accordingly; and

.2   taking into account the user needs and current work on e-navigation,
provide advice on the correct generic term to replace the terms "Decca"
and "Loran" to STW 41.

6.2   The Sub-Committee recalled further that NAV 55 had noted the preliminary detailed
shipboard user needs, and agreed to establish a correspondence group to further progress
the work intersessionally.

6.3   The Sub-Committee recalled also that COMSAR 14 agreed that the conceptual
e-navigation architecture (Figure 2 of document COMSAR 14/12) was a good basis for
further development by the Correspondence Group and endorsed the proposed methodology
for carrying out the initial gap analysis. It further noted the proposed methodologies for
cost-benefit analysis and risk analysis.

6.4   The Sub-Committee also recalled that NAV 56 had finalized the user needs and the
initial system architecture, and completed an initial gap analysis, initial cost benefit and risk
analysis, taking into account the recommendations of COMSAR 14.

6.5   The Sub-Committee noted that MSC 88, noting the progress made in the development
of an e-navigation strategy implementation plan, had endorsed the Sub-Committee's action
in inviting the Joint IMO/ITU Expert Group on Maritime Radiocommunication Matters, at its
September 2010 meeting, to consider the further use of the 500 kHz band to support
e-navigation; and noted that the group had decided to follow the text in the draft (CPM) report
in supporting an exclusive primary allocation to the maritime mobile service in the
band 495-505 kHz in all three regions and a co-primary allocation in the band 510-525 kHz in
Region 2. The expert group had a detailed debate on the need for making a statement that
the existing maritime mobile primary allocation in the band 415 kHz-526.5 kHz should be
maintained. This was to fulfil the possible requirement in future for the promulgation of
additional security-related information, the implementation of e-navigation and the
implementation of the revised elements and procedures of the GMDSS. MSC 88 had also
instructed the Secretariat to convey this outcome to the Chairman of the e-navigation
correspondence group re-established by NAV 56.

6.6   The Sub-Committee noted also that STW 42, considering an interim report of the
e-navigation Correspondence Group, had underlined that the navigator's own skills would
remain essential for the safe navigation of the ship, and the bridge team would be the main
backup for the safe functioning of the ship. STW 42 noted that it would not be advisable to
be totally reliant on systems where the navigator only monitored the system displays and the

indicators of the system's normal functionality or resilience. In this context, NAV 54 had recognized that the increasing use of electronic navigational equipment might play a greater role in improving the safety of navigation in the future.

6.7   The Sub-Committee noted further that COMSAR 15 had agreed that IHO's S-100 data model should be used as a baseline for creating a framework for data access and information services under the scope of SOLAS; and also that IMO, in consultation with other organizations, should consider the establishment of a Harmonization Group on creating a framework for data access and information services under the scope of SOLAS, based on the example of the IMO/IHO Harmonization Group on ECDIS as well as the draft Terms of Reference for the IMO/IHO Harmonization Group on Data Modelling (HGDM) (COMSAR 15/WP.6/Rev.1, annex 1). Like STW 42, COMSAR 15 had noted and agreed that the navigator's traditional skills would remain essential for the safe navigation of the ship. The view was also expressed that this should not be an either/or scenario, but consideration needed to be given to the development from a purely navigating navigator toward a somewhat more monitoring navigator and that it would not compromise the skills of the navigator. COMSAR 15 had noted that COMSAR 14 and NAV 56 had identified and adopted the user needs with regard to the e-navigation concept of the Maritime Service Portfolios (MSP). COMSAR 15 had considered the template modified by the Republic of Korea based on document NAV 56/INF.10, for identifying practical e-navigation solutions based on operational, technical, regulatory and training aspects on a developed example of a gap analysis. It had been agreed that the e-navigation Correspondence Group should develop practical e-navigation solutions for other identified gaps, taking into account the human element. COMSAR 15 had agreed that e-navigation could provide the necessary data/information for SAR purposes and keep SAR within the scope of the e-navigation concept. COMSAR 15 had also agreed that SOLAS regulation IV/15.8 relating to transmitting and receiving general radio communications to and from shore-based radio systems or networks subject to SOLAS regulation IV/15.8 was of direct relevance to the e-navigation concept. COMSAR 15 had further noted and endorsed that there was a need for resilience in the overall system. Navigation and communications equipment should be able to reliably indicate that they were functioning correctly. If redundancy was used to provide resilience, the system should be able to transfer automatically to an alternative source, with appropriate indication being given to the user. In addition, information concerning the authenticity of the data was needed including its source.

6.8   The Chairman recalled the Secretary-General's opening remarks underlining the importance of making progress in the development of an e-navigation strategy implementation plan, as well as his remarks at NAV 56, in which he had stressed the importance of remaining focused on the agreed work programme and to not become distracted by tangential matters such as individual technology or policy. These were matters that should perhaps be addressed in the context of e-navigation but not at this juncture. It was imperative that the Sub-Committee should now focus attention primarily on the system architecture and the gap analysis.

6.9   The Sub-Committee considered document NAV 57/6 (Norway) containing the report of the Correspondence Group on e-navigation and presenting the developed complete, overarching architecture on e-navigation, an enabling maritime data framework, the progress of the gap analysis, as well as a draft outline for the final Strategy Implementation Plan on e-navigation.

6.10   The observer from ITF, with reference to pargraph 61.9 of document NAV 57/6, inviting comments on the two scenarios of the navigating navigator and the monitoring navigator, was of the view that there was no need to differentiate between the two. The delegation of the Marshall Islands concurred with this view, whilst the delegation of Germany suggested that the terminology be amended to reflect these to be monitoring tasks/functions or navigating tasks/functions.

6.11   The Sub-Committee agreed that document NAV 57/6 should be used as the basic document for further work during this session and that it would be advisable to instruct the e-navigation Working Group, proposed to be established under this item, to undertake a thorough review of the document before the Sub-Committee could take the requested relevant actions.

6.12   The Sub-Committee noted with interest the information provided by IHO (NAV 57/6/1) in line with the Sub-Committee's request to IHO, at its fifty-fourth session, on the progress made in worldwide ENC coverage as of 28 March 2011. Of the 154 States with coastlines, there were now only six States, and Antarctica, where five or more ENCs remained to be produced in order to match corresponding paper chart coverage at medium scale. For the world's top 800 ports (by total gross tonnage), only eight coastal States had yet to produce ENCs that matched the coverage provided by paper charts of those same ports. IHO had submitted document MSC 87/25/3 indicating that of the 169 IMO Member States and 159 Contracting Governments to SOLAS, only 80 were members of the IHO. For the most part, many coastal States were relying on a relatively small number of IHO Member States to create and maintain their paper chart and ENC coverage – most often with little or no direct support from the State being charted. In IHO's view, this was an unsustainable situation. All Contracting Governments to SOLAS, rather than just the 80 IHO Member States, should acknowledge their obligations under SOLAS regulation V/9, to ensure that appropriate hydrographic services were in place and take appropriate steps to, at least, assist in the provision of these services. The IHO was ready to provide support and advice to any coastal State on how it could best fulfil its international obligations for the provision of appropriate hydrographic services.

6.13   The Sub-Committee considered documents NAV 57/6/2 and NAV 57/6/3 (Republic of Korea) outlining the need of back-up or redundancy for GNSS, which was considered as a primary source of position-fixing system in e-navigation. In addition, the Republic of Korea provided the survey result of the user preference to be implemented primarily among the shipboard user needs and functions of e-navigation. The Republic of Korea was of the view that in the iterative process of e-navigation development, careful consideration should be given to the user feedback which should be given priority in the implementation plan.

6.14   There was general support for the proposals by the Republic of Korea and the Sub-Committee agreed to refer documents NAV 57/6/2 and NAV 57/6/3 to the e-navigation Working Group for consideration and advice.

6.15   The Sub-Committee considered document NAV 57/6/4 (IALA) proposing the need for Resilient Position, Navigation and Timing (PNT) within e-navigation.

6.16   The Sub-Committee considered document NAV 57/6/6 (United Kingdom) commenting on the IALA document (NAV 57/6/4) and outlining the options and conclusions of a study into Resilient PNT, including an economic appraisal for alternative positioning. The United Kingdom study had concluded that the preferred option on purely economic grounds would be Maritime eLoran.

6.17   The Sub-Committee also considered document NAV 57/6/7 (Australia) commenting on the submission by IALA (NAV 57/6/4), discussing the need for Resilient PNT within e-navigation, and supporting the general thrust of the document, and in particular the combining of different PNT solutions and the setting of some standards to facilitate a standard multi-system PNT receiver.

6.18   Several delegations and industry observers spoke on the issue. The ICS observer was of the view that Resilient PNT within e-navigation should ensure redundancy and be terrestrial based and Administrations should bear the cost for providing this service. Several

other delegations supported the view of Australia that Resilient PNT services should be provided through existing shipboard systems. The delegation of Norway stated that the e-navigation strategy and user surveys had underlined the need for a terrestrial backup system. It was important that a backup system was evaluated thoroughly in relation to its purpose, which in accordance to the e-navigation strategy should undergo a risk and cost benefit analysis before a final conclusion was made. Loran C could also be vulnerable to solar weather and security-related threats. In addition, it had its limitations in accurately positioning and navigation in coastal waters. Construction and annual maintenance amounted to a substantial cost. The use of existing solutions as backup systems, such as, use of AtoNs, radar, pilot service, VTS should be taken into consideration. Inertial Navigation Systems which would operate regardless of solar weather and security-related threats should also be evaluated.

6.19   The Sub-Committee agreed to refer documents NAV 57/6/4, NAV 57/6/6 and NAV 57/6/7 to the e-navigation Working Group for consideration and advice.

6.20   The Sub-Committee considered document NAV 57/6/5 (Japan) proposing a way forward in the development of guidelines for a usability assessment methodology for navigational equipment.

6.21   The delegation of Japan was of the view that the Sub-Committee should focus its efforts on the development of the implementation plan. Japan, therefore, considered that it might be better at this stage not to consider the development of guidelines for usability evaluation of navigational equipment. Accordingly, Japan suggested that the development of the guidelines should be incorporated in the implementation plan so that the Sub-Committee could revisit the issue of the usability evaluation in the future.

6.22   The delegation of the Cook Islands was of the view that the human element was essential and offered the following guidance from Admiral Hopwood in the 19th century, which it suggested was also relevant today:

> "In an age of swift invention it is frequently believed
> That the pressure of a button is as good as work achieved;
> But the optimist inventor should remember, if he can,
> Though the instrument be perfect, there are limits to the man."

6.23   The Sub-Committee also agreed to refer document NAV 57/6/5 to the e-navigation Working Group for consideration and advice.

6.24   The observer from the European Commission (EC) stated that, as announced last year at NAV 56, they intended to lay out a framework for e-Maritime in 2011 and a roadmap for e-services to be in operation around Europe in 2018. The observer was of the view that if the main aim of e-navigation was to enhance the navigation capabilities of a ship without compromising its efficiency, e-Maritime aimed to increase its profitability without compromising its safety. Due to the cooperation of the European partners involved close coordination had been established between the two initiatives. The EU e-Maritime initiative supported the deployment of e-navigation services in Europe, while e-navigation provided a global perspective for the EU initiative. A public online consultation to assess the stakeholder support for the proposed measures and to hear opinions on the potential impacts, was carried out which had confirmed a general agreement that e-Maritime was important and valuable. Although e-navigation and e-Maritme were not the same, both were addressing the same strategic aims for safety and efficiency of maritime operations and progress in synergy. In essence, IMO's e-navigation focused primarily on shipborne navigation, so on the development of electronic technology, processes and services.

Europe's e-Maritime focused on shore-based facilitation and aims to develop European capabilities for seamless and effortless exchange of maritime transport information in order to facilitate the transport of goods and passengers over sea – and consequently the ships sailing to, from and around Europe. In its development of the e-Maritime concept the EC intended to make use of electronic technologies, processes and services that are being developed within IMO for navigation wherever possible. It was intended to lay out a framework for e-Maritime in 2011 and a roadmap for e-services to be in operation around Europe in 2018, which should provide the necessary infrastructure and organization for the application of e-navigation services in Europe as would have been developed by IMO.

6.25   The Sub-Committee noted with appreciation the information provided by Australia (NAV 57/INF.5) on a research project. Potential areas of investigation that would be covered by the research include the extension of the Human Element Analysing Process (HEAP), by assessing the measurement tools within the scope of e-navigation. Within the simulated environment, or from the observational studies on board ships, the data collection would need to consider the human element with regard to the usability of e-navigation applications and devices such as Electronic Chart Display and Information System (ECDIS) and Integrated Navigation Systems (INS). An important element of this research would be to explore successive iterations of e-navigation systems and to define the principles applicable to the extension of the HEAP.

6.26   The Sub-Committee noted with appreciation the information provided by Japan (NAV 57/INF.7) on preliminary draft guidelines for usability evaluation of navigational equipment, which could be used as a basic document for the consideration by the Sub-Committee in the future. These preliminary draft guidelines were developed on the basis of Japan's study on methodologies for assessing the usability of equipment in the other sectors which have already established such methodologies, taking into account the unique characteristics in the maritime sector. In the process of the development of the preliminary draft guidelines, they were applied to actual equipment of ARPA and Navigational Intension Exchange Support System (NIESS) and were improved based on experiences obtained.

6.27   The Sub-Committee noted with appreciation the information provided by Japan (NAV 57/INF.8) on a sample summary report to help understand the outcome of a usability test and what kind of information a report of a usability test contains. The Sub-Committee also recalled that, at NAV 56, Japan (NAV 56/INF.13) had provided background information for the consideration of the development of preliminary draft guidelines for the usability of navigational equipment and identified five points to be addressed in a usability evaluation.

6.28   The Sub-Committee noted with interest the information provided by the Republic of Korea (NAV 57/INF.4) about the results of a research project on effects of auditory warning types on response time and accuracy in the Integrated Ship Bridge Alarm System, which was expected to contribute to the discussion on the Bridge Alert Management, one of the major modules of Integrated Bridge System (IBS). The Republic of Korea was of the opinion that in future, the result of this research should be reflected upon when reviewing the guidelines on Integrated Bridge System (IBS), as appropriate.

6.29   The Sub-Committee also agreed to refer document NAV 57/INF.4 to the e-navigation Working Group.

Establishing the e-navigation Working Group

6.30   After a preliminary discussion, as reported in paragraphs 6.1 to 6.21, the Sub-Committee re-established the e-navigation working Group and instructed it to consider the relevant documents submitted under agenda item 6, in particular, NAV 57/6 (Norway),

NAV 57/6/2 and NAV 57/6/3 (Republic of Korea), NAV 57/6/4 (IALA), NAV 57/6/5 (Japan), NAV 57/6/6 (United Kingdom), NAV 57/6/7 (Australia) including the information provided in documents NAV 57/INF.5 (Australia), NAV 57/INF.7 and NAV 57/INF.8 (Japan) and NAV 57/INF.4 (Republic of Korea), plus the outcome of NAV 56, STW 42, COMSAR 15 and taking into account any decisions of, and comments and proposals made in Plenary, undertake the following tasks:

.1   review the report of the Correspondence Group and provide comments and recommendations with respect to the actions requested in paragraphs 61.1 to 61.8 and 61.10 of document NAV 57/6;

.2   review document NAV 57/5/1 concerning Report ITU-R M.2201 (11/2010) – Utilization of the 495-505 kHz band by the maritime mobile service for the digital broadcasting of safety and security related information from shore-to-ships and identify its relevance with respect to e-navigation;

.3   review and update the table on the overall planning for the 2009–2012 strategy element plan (MSC 86/23/4, annex, page 7);

.4   review and consolidate the process of completing the initial gap analysis and provide comments/recommendations; and

.5   review and revise the terms of reference for a correspondence group to progress work intersessionally for reporting to COMSAR 16, STW 43 and NAV 58, based on the joint plan of work approved by MSC 86.

Report of the e-navigation Working Group

6.31   Having received and considered the e-navigation Working Group's report (NAV 57/WP.6), the Sub-Committee (with reference to paragraphs 8.1.1 to 8.1.13, and annexes 1 to 3) took action as summarized in the ensuing paragraphs.

6.32   The Sub-Committee agreed on:

.1   the current overarching e-navigation architecture (NAV 57/WP.6, paragraphs 3.4 to 3.8 and figure 1);

.2   the proposed way forward for developing a Common Maritime Data Structure (CMDS) (NAV 57/WP.6, paragraphs 3.12 and 3.13 and figure 2); and

.3   the use of the IHO's S-100 standard as the baseline for creating a framework for data access and services under the scope of SOLAS (NAV 57/WP.6, paragraphs 3.15 and 3.16),

with a view to approval by MSC 90.

6.33   The Sub-Committee invited the Committee to authorize, in consultation with other organizations, the establishment of an IMO/IHO Harmonization Group on Data modelling and approve its terms of reference (annex 5).

6.34   Regarding the use of the IHO's S-100 Registry, operated by IHO, for the ongoing development on product specifications, as and when required, the Sub-Committee invited IHO and IALA to continue advising the correspondence group and the IMO/IHO Harmonization Group on Data modelling, if established, in this respect.

6.35   The Sub-Committee noted the comments of the Working Group regarding Maritime Service Portfolios (MSPs) and agreed with their further development.

6.36   The Sub-Committee also noted the progress made on the development of the gap analysis and encouraged the participation of Member States, international organizations and interested parties in its preparation.

6.37   The Sub-Committee further noted the preliminary comments provided by the Working Group regarding the draft outline of a Strategy Implementation Plan on e-navigation and encouraged Member States, international organizations and other interested parties to advise on and share the results of relevant regional developments, conferences, workshops and testbeds related to e-navigation.

6.38   Regarding the allocation of the frequency band of 495-505 kHz for e-navigation, the Sub-Committee noted that the Working Group, acknowledging the current difficulties for frequency allocation and taking into account the further expected needs of additional frequency spectrum, had recognized that the above-mentioned frequency band should be claimed for future uses of e-navigation.

6.39   The Sub-Committee recalled that MSC 89 had already approved an IMO position on WRC-12 Agenda items concerning matters relating to maritime services (COMSAR 15/16, annex 4 refers) for submission to the ITU World Radiocommunication Conference (23 January to 17 February 2012). In particular, one of the IMO positions regarding the examination of frequency allocation requirements with regard to operation of safety systems for ships and ports and associated regulatory provisions, in accordance with Resolution 357 (WRC-07) (Agenda item 1.10) was:

> "4   Taking into account (1) the possible requirement in future for the promulgation of additional security-related information, (2) the developments in IMO with regard to e-navigation and (3) a review of the elements and procedures of the GMDSS, IMO supports an exclusive primary allocation to the maritime mobile service in the band 495-505 kHz in all three regions and a co-primary allocation in the band 510-525 kHz in Region 2, whilst maintaining the existing maritime mobile primary allocation in the band 415 kHz – 526.5 kHz."

6.40   Taking into account the above information, the Sub-Committee decided that, for the time being, no further action was required until future uses of the frequency band of 495-505 kHz were identified for e-navigation.

6.41   The Sub-Committee invited the Committee to approve the proposed joint plan of work for the COMSAR, NAV and STW Sub-Committees for the period 2012–2014 (annex 6) and extend the target completion date for the work programme item "Development of an e-navigation strategy implementation plan" to 2014.

6.42   The Sub-Committee re-established the correspondence group on e-navigation under the coordination of Norway[*] and instructed it to, taking into account the joint plan of work for the COMSAR, NAV and STW Sub-Committees for the period 2012–2014, the comments and general views expressed at NAV 57 and, decisions taken by NAV 52

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including the guidance in MSC/Circ.1091 on Issues to be considered when introducing new technology on board ship and MSC/Circ.878-MEPC/Circ.346 on Human Element Analysing Process (HEAP):

.1   using the overarching e-navigation architecture as a framework, further develop the detailed architecture of both the ship and shore sides, as appropriate, taking into account the outcomes of the gap analysis;

.2   consider the development of Maritime Service Portfolios to achieve harmonization, modernization, integration and simplification on board and ashore, taking into account the use of the IHO's S-100 standard, and recommend the approach to be taken;

.3   further develop and complete the gap analysis with a view to finalization at NAV 58, taking into account the relevant documents submitted in this respect;

.4   further develop the draft Strategy Implementation Plan;

.5   consider the development of guidelines for usability evaluation of navigational equipment during the preparation of the Strategy Implementation Plan, taking into account the information provided in documents NAV 57/6/5, NAV 57/INF.7 and NAV 57/INF.8 (Japan) and NAV 57/WP.6, and recommend the approach to be taken;

.6   further progress the preparation of cost benefit and risk analysis processes;

.7   submit interim reports to COMSAR 16 and STW 43 raising specific questions, if required, that should be addressed by the STW and COMSAR Sub-Committees; and

.8   submit a consolidated progress report to NAV 58.

6.43   The delegation of the Islamic Republic of Iran, whilst supporting any kind of innovations that could help enhancement of maritime safety and security, was of the view that e-navigation was an innovation which was expected to have valuable effect in this regard. It was known that the technologies for such innovation were important and crucial and were considered as a pre-requirement for fulfilling the obligations stipulated in the relevant instruments. The delegation of the Islamic Republic of Iran expressed its deep concern with regard to safety being affected by some unfair treatments and restrictions in providing safety equipments or facilities which was totally unacceptable and against the spirit of IMO goals as well as peaceful international maritime transportation. According to the above-mentioned issue, the delegation of the Islamic Republic of Iran strongly believed that the maritime safety, security and marine environment protection shall not be affected at any time and in any case by such unfair treatments.

7   ~~REVIEW OF VAGUE EXPRESSIONS IN SOLAS REGULATION V/22~~

~~7.1   The Sub-Committee recalled that MSC 82 (MSC 82/24, paragraphs 21.39 and 21.40) had considered a proposal by Germany (MSC 82/21/11) to develop, in view of some cases of stowage of containers above the line of visibility, a clarification of SOLAS regulation V/22 (Navigation bridge visibility) or revision of the regulation, to ensure safe navigation and to avoid ship detentions and, agreed to include, in the NAV Sub-Committee's work programme, a high priority item on "Review of vague expressions in SOLAS regulation V/22". In this~~