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WORK PROGRAMME

Sub-Committees on Safety of Navigation (NAV) and on Standards of Training and Watchkeeping (STW)

Proposal for a new work programme item for the NAV Sub-Committee on carriage requirements for ECDIS, and for the STW Sub-Committee on ECDIS training and familiarization

Submitted by Denmark and Norway

SUMMARY

Executive summary:	This document refers to an ongoing FSA study on ECDIS/ENCs, the results of which will shortly be submitted to this Committee. The FSA study is nearly finalized, and the results indicate that ECDIS will be cost-effective for all types of cargo ships, but with a lower size limit yet to be determined. It has earlier been document by another FSA that ECDIS is cost-effective for large passenger ships. With reference to these results, this document proposes that the NAV Sub-Committee be tasked with a new work programme item, i.e. to develop draft SOLAS regulations on the carriage of ECDIS equipment by relevant ship types. It is also proposed that the STW Sub-Committee be tasked with considering the related issue of "ECDIS training and familiarization"
Action to be taken:	Paragraph 29
Related document:	NAV 51/19

Introduction

1 Australia submitted a proposal to MSC 78 regarding the use of ECDIS (MSC 78/24/3), and comments on this proposal were submitted by France (MSC 78/24/18) and Norway (MSC 78/24/17) respectively. After discussions, MSC 78 decided to include a new work programme item on NAV's agenda "Evaluation of the use of ECDIS and ENC development". This new item was given high priority, and it was decided to give preliminary consideration to the subject during NAV 50. This was done, and NAV 50 established a correspondence group under the co-ordination of Norway to exchange views on 6 specific subjects related to ECDIS, and to submit a report to NAV 51.

2 This correspondence group submitted its report (NAV 51/6) to NAV 51, which was firstly discussed in Plenary, then in a Working Group and finally in Plenary again at the end of the meeting.

3 As can be seen from the report of NAV 51 (NAV 51/19), there was considerable discussion on various issues related to ECDIS and, in particular, on the possible development of draft carriage requirements for ECDIS for certain types of ships. Even if opinions were divided, the following conclusion was reached towards the end of the meeting (NAV 51/19, paragraph 6.25):

> "The Sub-Committee was also of the view that there should be an FSA on the use of ECDIS on ships other than High-Speed Craft and Passenger Ships prior to any discussions on possible carriage requirements and that the outcome of this FSA would be taken into account when developing any proposal for a carriage requirement."

4 Shortly after NAV 51, the following countries agreed to initiate and fund a Formal Safety Assessment (FSA) on the use of ECDIS in various types of cargo ships: Denmark, Norway, Sweden and the United Kingdom. The work on this FSA study was started in September 2005. At the time of submission of the present document, the FSA study is nearly finalized and a report describing the work done, the results achieved and the final recommendations will be submitted to MSC 81 prior to the deadline for "bulky documents" (i.e. 7 February 2006).

5 A brief summary of the conclusions reached in the FSA study referred to above is given in the following:

a) It was decided to investigate a limited number of "representative" cargo ships types and sizes each sailing a "representative" voyage. When selecting types and sizes of ships, it was taken into account that the cost-effectiveness of risk control options investigated, will depend on a number of factors including the value of the ship, the value of its cargo, and the cost associated with any clean-up operations in case of an accident resulting in pollution caused by the ship's cargo. In order to establish a basis for drawing *general conclusions on cargo ships* it was therefore decided to include a ship type providing the combination of relatively low value of the ship itself; low value of its cargo as well as low pollution potential. A bulk carrier carrying coal as cargo was chosen for this purpose.

b) When deciding which ship type(s)/(size(s) to include in the FSA *additional* to bulk carriers, various alternatives were discussed. Taking into account that various types of tankers constitute a large percentage of the world fleet, the following choice was made: include *two* tankers but of significantly different sizes; carrying different types of cargo and sailing quite different routes, so as to be able to establish the effect of these parameters on the cost-effectiveness of ECDIS.

c) The details of the ship types/sizes/routes investigated in this FSA study are as follows:

- *Tanker for oil*, 80,000 DWT, approximately 40,000 GT, trading between the Middle East (Kuwait) and the Mediterranean (Marseille, France)
- *Product tanker*, 4,000 DWT, approximately 2,000 GT, trading between Mongstad Terminal, Norway, and Stockholm, Sweden
- *Bulk Carrier*, 75,000 DWT, approximately 38,000 GT, carrying coal between Newcastle, Australia, and Tokyo, Japan

d) The only Risk Control Option examined in this FSA was ECDIS equipment using Electronic Navigational Charts (ENCs), and complying with the present IMO Performance Standards for ECDIS (i.e. resolution A.817(19) as amended by resolutions MSC.64(70) and MSC.86(70).)

e) The risk assessment for all three cases concluded as follows: the fitting and use of ECDIS with ENCs will have a risk reduction effect on grounding risk of approximately *one third*. Such a reduction is in line with previous research in the industry. The cost benefit assessment for all three cases gave the following results: the cost of implementation was significantly lower than the benefit of implementation. The ratio between benefit and cost was approximately 5 for the two larger ship, and approximately 2 for the smaller ship. Thus for all three cases, the NetCAF value (CAF = Cost of Averting a Fatality) was less than zero; i.e. the risk control option "ECDIS with ENCs" is cost effective.

f) As explained in subparagraph a) above, generally speaking ECDIS/ENCs will be more cost effective for most *other* cargo ship types compared to bulk carriers. In view of this and the conclusion reached that ECDIS will be cost-effective for bulk carriers, we consider that the FSA study as conducted gives a basis for establishing an ECDIS carriage requirement applicable to all *types* of cargo ships. However, the cost effectiveness for very small ships may be questionable. We recommend that the subject of lower size limit, as well as other factors relevant to ECDIS carriage requirements (see paragraphs 26 and 27) be discussed in depth in the NAV Sub-Committee with a view to arrive at clear recommendations to the MSC on such issues.

g) In an earlier FSA study on large passenger ships, it has been documented that fitting ECDIS equipment on such ships will be cost-effective (see documents MSC 78/4/2 and NAV 51/10). As stated, this study only considered *large* passenger ships, but the results were extremely robust regarding cost effectiveness (by a factor of approximately 100), so there should be no doubt that ECDIS would be cost-effective also for much smaller passenger ships. In view of this, we recommend that the NAV Sub-Committee also be tasked with including passenger ships in general when drafting ECDIS carriage requirements.

Scope of the proposal

6 Norway and Denmark propose that the NAV Sub-Committee be tasked with developing draft carriage requirements for ECDIS equipment, intended for future adoption by the MSC and subsequent inclusion into chapter V of the SOLAS '74 Convention. The lower size limit of ships and possibly other ship parameters to be included within the new requirement should be recommended by the NAV Sub-Committee based on the results of the FSA study referred to in paragraph 4 above, as well as other relevant factors referred to during discussions at NAV 51 (see paragraphs 26 and 27). One of these factors was "ECDIS training and familiarization", and this subject should be put on the work programme of the STW Sub-Committee.

Need or compelling need

7 During the last decade, casualty statistics for the maritime industry indicate a clear improving trend. However, each year there are still a number of accidents resulting in loss of life and/or harm to the environment. A large percentage of these accidents are caused by navigational errors. There are a number of underlying causes of navigational errors, but common factors include:

.1 very high workload on navigators in general, but particularly during complex navigational situations;

.2 the navigator has to use different types of facilities and equipment normally situated/fitted at different positions on the bridge in order to acquire a complete picture of the position of the ship in relation to all relevant navigational dangers;

.3 some information available to the navigator might not be current and this can lead to erroneous decisions (i.e. actions taken too early or too late);

.4 some types of vital information currently need to be updated manually, and are therefore prone to human errors (e.g. plotting of a ship's track on charts and the updating of paper charts);

.5 some paper charts are based on old surveys and may contain significant errors or omissions; and

.6 a major problem is the maintenance of a large number of paper charts on board vessels trading world-wide.

8 Experience has shown that ECDIS equipment with ENCs will contribute to reducing or eliminating the above causal factors. More details on the advantages provided by ECDIS equipment in these respects, are given under the heading "Benefits that would accrue from the proposal" in paragraphs 13 to 15. The FSA study referred to in paragraph 4 will quantify the positive effects of ECDIS, and will document the cost-effectiveness of introducing mandatory carriage requirements for such equipment.

9 As summarized in paragraph 5 above, the FSA study referred to will document that ECDIS equipment will be cost effective as a risk control option in relation to the safety of navigation. Therefore, in the view of Norway and Denmark there is a compelling need to approve the line of actions proposed in this document.

Analysis of the issues involved: Costs to the maritime industry

10 Fitting ECDIS equipment and providing ships with ENCs will involve costs for shipowners. But, as will be documented by the FSA study, the benefits both in relation to the safety of navigation, and to avoiding/limiting damages/losses of ships and harm to the environment will justify such cost. It should also be noted that the "administrative burden" on board ships due to the need for executing chart corrections, will be significantly reduced when ships are fitted with ECDIS and ENCs.

11 It should also be taken into account that the adoption of mandatory carriage requirements for ECDIS and ENCs will significantly increase the market. Generally speaking, this will contribute to decreasing the cost for each ship to be fitted.

Analysis of the issues involved: Associated legislative and administrative burden

12 The associated legislative and administrative burden relating to adoption of mandatory ECDIS carriage requirements for certain types/classes of ships will be moderate. The savings to society relating to the expected reduction in casualties will justify any such legislative and administrative burden.

Benefits that would accrue from the proposal

13 The first IMO performance standards for ECDIS equipment were adopted in 1995 by resolution A.817(19). Since then the voluntary use of ECDIS equipment and Electronic Navigational Charts (ENCs) on ships have increased slowly but steadily. ECDIS equipment has been improved over the years, and the availability of ENCs has also been steadily improving year by year. However, various sea areas are not yet covered by ENCs. This is disappointing, but understandable due to the "chicken and egg situation" for ECDIS and ENCs: the sale of ECDIS equipment is hampered by the fact that ENCs are not available for all coastal areas, and production of ENCs is hampered by the fact that a limited number of ships are fitted with ECDIS equipment. This situation will of course change fundamentally if and when IMO adopts carriage requirements for ECDIS equipment: after such a decision both ECDIS manufacturers and hydrographic offices will know with certainty that there will be a market for their products.

14 There is widespread recognition of the main advantages provided by using ECDIS plus ENCs compared to using paper charts:

.1 the ship's actual position and track is instantaneously and continuously displayed directly in the chart. This reduces the workload and eliminates time delays and human errors experienced with manual plotting;

.2 all relevant navigational information can be displayed in one place at the ship's conning position. This gives navigators more time to concentrate on the traffic and other factors relevant for safe navigation;

.3 automatic alarms (e.g. anti-grounding) is available when using ENCs on ECDIS equipment;

.4 updating of ENCs can be done automatically. Manual chart corrections on paper charts are very time consuming, in particular for ships trading world-wide. Furthermore, the dangers of human errors or omissions regarding chart corrections carried out on board ships are significantly reduced by using ECDIS and ENCs;

.5 all ENCs are produced to a common and high quality standard;

.6 the need to manually change (paper) charts, with the risk of position transfer errors being made, is eliminated; and

.7 if a ship receives voyage orders for areas for which charts are not carried on board, the onboard ENC library CD may nevertheless contain such charts. In such cases, the Master may request and receive ENC chart permits via fax or e-mail, so that these charts can be unlocked for use while the ship is at sea.

15 In summary, the use of ECDIS will continuously provide navigators with more accurate and up-to-date navigational information. Furthermore, ECDIS will contribute to reducing the workload on navigators and will reduce or eliminate various types of human errors. Thus any mandatory requirement on ECDIS and ENCs will contribute to enhancing the safety of navigation and protection of the environment.

Priority and target completion date

16 In relation to the guidelines for establishing priorities (MSC/Circ.1099, annex, paragraph 2.11) the following factors are relevant:

".2 Measures aimed at substantially preventing maritime casualties or marine pollution incidents"; and

".5 Measures aimed at improving the safety and health of ships' crew or personnel".

17 As stated in the guidelines referred to, both these factors indicate that the task proposed should be given high priority.

18 Viewpoint on "Target completion date" is given in paragraph 25.

Indication of action required

19 See paragraph 28 below.

Is the subject within the scope of IMO's objectives?

20 The subject will contribute to enhancing safety at sea and improving protection of the marine environment, and is therefore clearly within the scope of IMO's objectives.

Do adequate industry standards exist?

21 The present industry standard for ECDIS equipment (the IMO performance standards) is resolution A.817(19) as amended by resolutions MSC.64(70) and MSC.86(70). Another relevant standard is "IEC 61174; Electronic chart display and information system (ECDIS) – Operational and performance requirements, methods of testing and required test results."

22 The present standards can be considered "adequate", but in view of various proposals for improvements of the IMO performance standards, MSC 80 decided that the present standard should be revised (MSC 80/24, paragraph 21.22). This revision is planned to be completed by NAV 53 in 2007, and the revised performance standards can then be adopted by the MSC in 2008. These facts should be taken into account when a future MSC meeting will decide on the entry into force dates for mandatory carriage requirements for ECDIS.

Do the benefits justify the proposed action?

23 As explained earlier, the action proposed will contribute to enhancing safety at sea and protection of the marine environment. Thus the action proposed is considered to be fully justified.

Identification of which committee/subsidiary body(ies) are essential to complete the work

24 The NAV Sub-Committee should be given the task of developing draft carriage requirements for ECDIS. However, as noted by NAV 51 (see paragraph 26) there are also factors related to ECDIS training and familiarization which should be considered. This should be done by the STW Sub-Committee.

Estimation of the number of sessions needed to complete the work

25 Due to the close proximity between MSC 81 and NAV 52, we recommend that NAV 52 only be requested to give preliminary consideration to this subject. Two more sessions of the NAV Sub-Committee may be needed to complete the work, so the target completion date of 2008 seems realistic. The STW Sub-Committee may also need two sessions to complete their work, and again 2008 should be realistic.

Additional comments on this proposal related to viewpoints expressed during NAV 51

26 As referred to in paragraph 6 above, NAV 51 was of the opinion that a number of factors should be taken into account in relation to discussing the results of a forthcoming FSA on ECDIS. This is summarized in paragraph 6.28 of the report from NAV 51, which reads as follows:

> "With respect to the feasibility of an appropriate FSA on the safety benefits of the carriage of ECDIS, the Sub-Committee was of the view that such an analysis was feasible and desirable. It was recognized that there were a number of factors which needed to be taken into account in assessing the benefits, cost and risks so as to ensure that the results of any FSA are meaningful.
>
> These factors include, but are not limited to:
>
> - clarification of the regulatory regime and the status of associated performance standards;
> - Electronic Navigational Charts (ENCs) coverage and ease of availability; and
> - ECDIS training and familiarization."

27 We have the following comments on the factors listed above: these factors (and possibly also other factors) are certainly relevant when conclusions are to be drawn regarding possible mandatory requirements on ECDIS. However, not all such factors can be taken into account within the actual FSA study. In view of this, we recommend that the NAV and the STW Sub-Committees should be tasked to also consider and take into account these and other factors relevant to benefits, cost and risks related to ECDIS, when reaching its conclusions and recommendations to the MSC on mandatory carriage requirements for ECDIS. A specific proposal is given below.

Proposal for a new work programme item for the NAV and the STW Sub-Committees

28 In summary, the recommendations on the complete scope of the proposals as described in paragraphs 6, 26 and 27 above, may be summarized as follows:

.1 The NAV Sub-Committee should be tasked with developing draft carriage requirements for ECDIS equipment on passenger and cargo ships, intended for future adoption by the MSC and subsequent inclusion into chapter V of the SOLAS '74 Convention. The types/sizes of ships and possibly other ship parameters to be included within the new requirement should be recommended by the NAV Sub-Committee based on the results of the FSA study referred to in paragraph 4 above, as well as other factors relevant to the benefits, cost and risks related to the use of ECDIS equipment. These factors include, but are not limited to:

- clarification of the regulatory regime and the status of associated performance standards; and
- Electronic Navigational Charts (ENCs) coverage and ease of availability; and

b) The STW Sub-Committee should be tasked with considering the issue of "ECDIS training and familiarization" on the assumption that the MSC may adopt carriage requirements for ECDIS equipment applicable to various types and sizes of ships. The STW Sub-Committee should advise the MSC on the possible need for new or amended mandatory and/or recommendatory provisions on such training and familiarization.

Action requested of the Committee

29 The Committee is requested as follows:

.1 to consider the viewpoints and recommendations provided in this document, as well as the conclusions of the related FSA study to be submitted to MSC 81 under agenda item 24 – Any other business; and

.2 to approve new work programme items for the NAV and the STW Sub-Committees as proposed in paragraph 28 above.
