



SUB-COMMITTEE ON SAFETY OF
NAVIGATION
55th session
Agenda item 11

NAV 55/INF.9
21 May 2009
ENGLISH ONLY

DEVELOPMENT OF AN E-NAVIGATION STRATEGY IMPLEMENTATION PLAN

Results of a worldwide e-navigation user needs survey

Submitted by Germany

SUMMARY

Executive summary:	This document describes the results of a worldwide survey conducted by Germany to determine detailed e-navigation user needs. The questionnaire used for the survey was developed based on the high-level user needs specified in NAV 54/25. The survey focused primarily on onboard user needs
Strategic Direction:	5.2
High-level action:	5.2.4
Planned output:	5.2.4.4
Action to be taken:	Paragraph 20
Related documents:	MSC 81/23/10; MSC.252(83); NAV 55/11/3; NAV 54/4, NAV 54/13, NAV 54/13/1, NAV 54/25; NAV 53/22, NAV 53/13, NAV 53/13/1, NAV 53/13/2, NAV 53/13/3 and COMSAR 12/11

Introduction

1 NAV 54 finalized the concept for the e-navigation strategy. It includes a draft framework for the implementation process of the e-navigation strategy with a time frame for implementation. According to NAV 54/25 detailed e-navigation user needs should be specified by 2009.

2 This document describes in detail the results of a worldwide survey organized and conducted by Germany to determine detailed e-navigation user needs. The questionnaire used for the survey was jointly developed by Canada and Germany and is based on the high-level user needs specified in NAV 54/25 and NAV 54/13. The survey focuses primarily on onboard user needs. The questionnaire is structured into three main sections: Maritime Communications, Human Machine Interface and Technical/Operational Enhancements. Due to the limited capacity

For reasons of economy, this document is printed in a limited number. Delegates are kindly asked to bring their copies to meetings and not to request additional copies.



of the questionnaire, some issues that were dealt by IMO in the framework of other tasks (e.g., bridge alert management) were not investigated.

3 The questionnaire could be completed in three different ways:

- web-based;
- in portable document format (PDF) to be completed at the computer; and
- in printed format.

A print-out of the questionnaire is attached as annex 1. The questionnaire was distributed worldwide to potential e-navigation users via e-mail with support of Member States, the Nautical Institute, the International Shipowners' Association, the International Maritime Pilots' Association, the International Chamber of Shipping, the Canadian Coast Guard, and others.

4 In addition to this survey, other Member States plan to conduct e-navigation user needs surveys using the jointly-developed questionnaire. From May to September 2009, Canada will be conducting a survey whereby both shore-based and shipborne personnel will be interviewed throughout Canada. Since these interviews will be based on the jointly-developed questionnaire, the results will provide an additional assessment of e-navigation user requirements. In the United States, the United States Coast Guard will pursue various avenues to ascertain e-navigation user needs of the many and diverse maritime operations, including Harbour Safety Committees, Maritime Pilot Associations, Marine Exchanges, Port Authorities, inland/shallow-draft vessels, and maritime academies.

Participants

5 In total 353 persons participated in the e-navigation user needs survey. The average experience of the participants as mariner is 16.6 years. The participants belong to various nationalities from all over the world (Figure 1). The largest group is from India (22%), followed by Canadians (18%), Germans (10%) and British (6%). Further nationalities of participants were Australian, Filipino and Finnish (5% each) as well as: United States, Argentinian, Belgian, Bulgarian, Chinese, Croatian, Danish, Dutch, Estonian, French, Irish, Italian, Japanese, Latvian, New Zealand, Norwegian, Panamanian, Polish, Portuguese, Romanian, Russian, Saudi Arabian, Singaporean, South African, Republic of Korea, Spanish, Swedish, Turkish and Ukrainian.

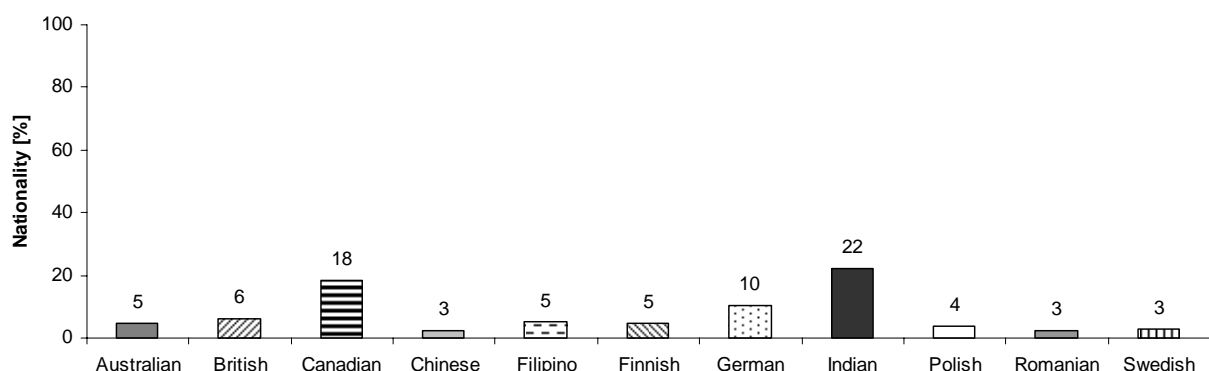


Figure 1: Participation by Nationality [%] > 2% (N=351)

6 The majority of the participants is currently working on board (88%, Figure 2), most of them on tankers (25%), bulk carriers (22%), container vessels (12%) and cruise ships (11%), mainly operating worldwide (Figures 3 and 4). According to their current position 1st officers (27%) and masters (25%) form the largest group, followed by 2nd (18%)

and 3rd/4th officers (11%). 6% of the participants working on board are maritime pilots (Figure 5). Participants working ashore include: operations manager, marine superintendents, simulator instructors and shipowners.

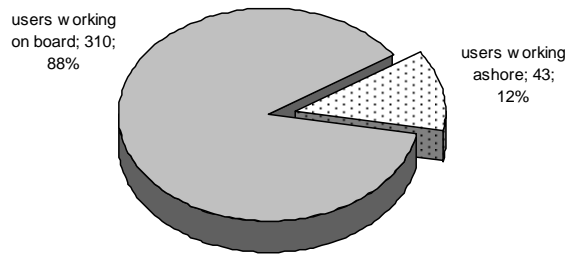


Figure 2: Participants according to onboard and shore-side working position (N=353)

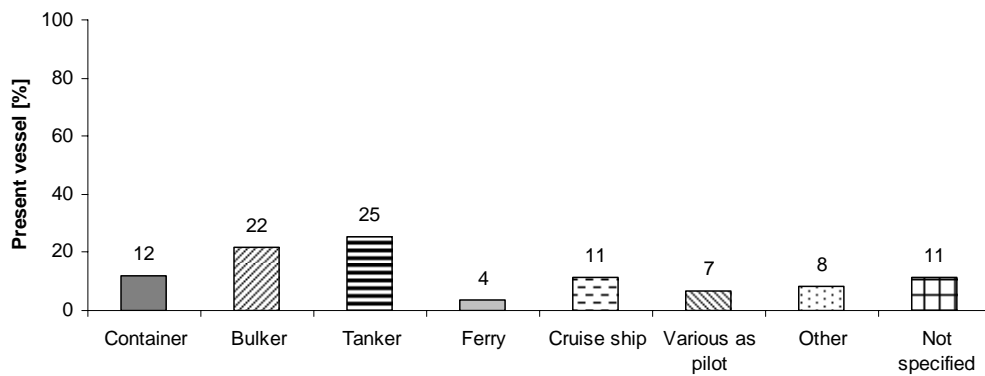


Figure 3: Present vessel [%] (N=310)

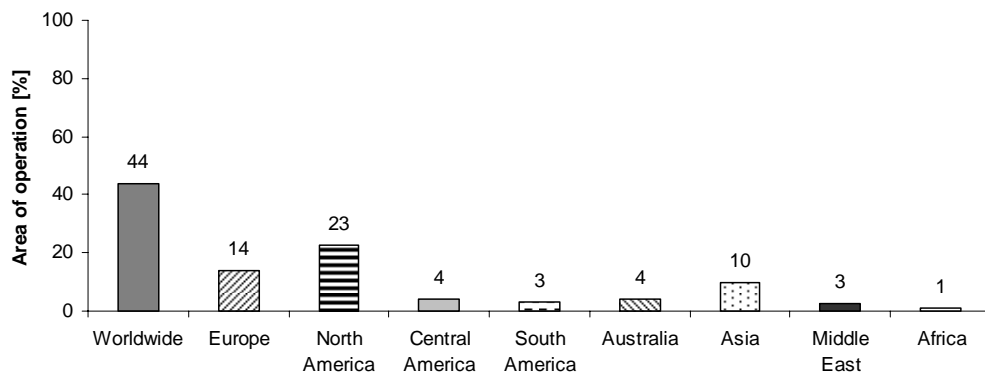


Figure 4: Geographical area of operation [%] (N=310)

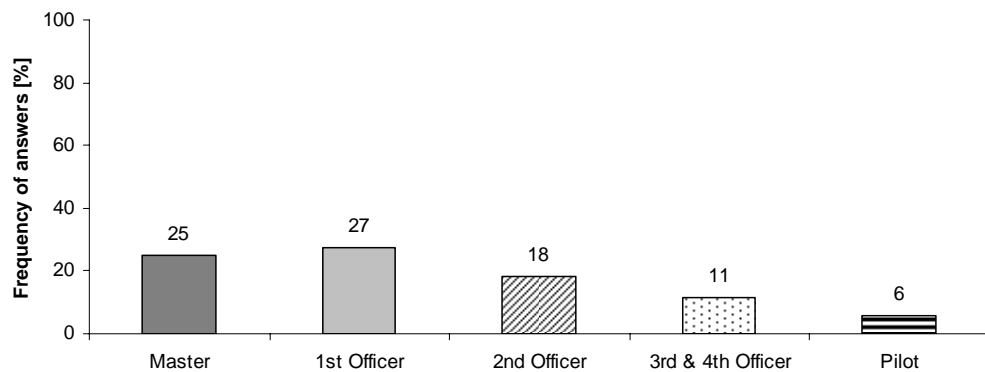


Figure 5: Current position of onboard users [%] (N=310)

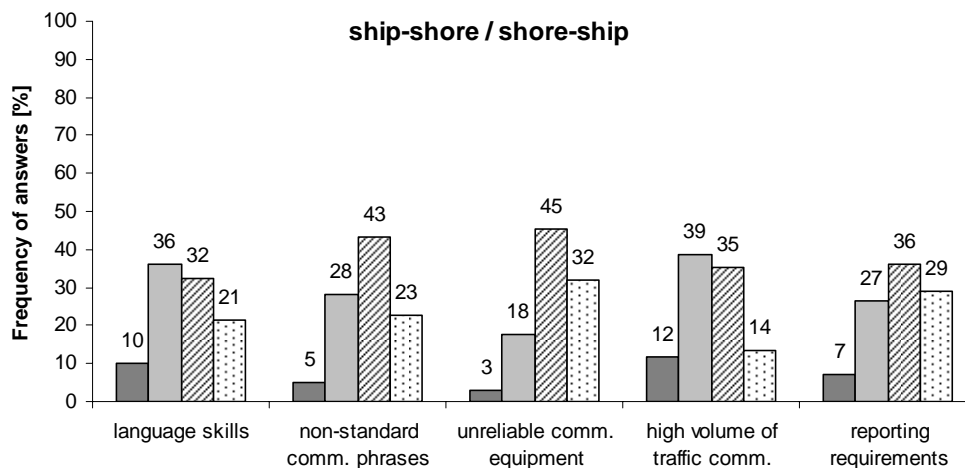
Maritime communications

General

7 Most participants do not see major problems in maritime communications (Figure 6). The greatest concerns in the communication between ships involve language skills (18% high degree, 44% moderate degree), and the missing use of standard communication phrases (13% high degree, 33% moderate degree). Problems in the communication between ship and shore/shore and ship are most often related to a high volume of traffic communication (12% high degree, 39% moderate degree).

Participants comment that:

- English language skills are not sufficient onboard and ashore. Problems are indicated regarding the pronunciation of the English language, accent, and the use of local language in non-English speaking countries;
- high volume of traffic communication is a problem in certain areas (e.g., Malacca Straits, Singapore Straits, Persian Gulf), and that in those areas VHF channel 16 is usually cluttered with non-urgent or non-distress routine communication (e.g., between trawlers, leisure boats);
- there is a problem with mariners using VHF for collision avoidance arrangements in open sea; and
- false alarms from the communication systems (e.g., GMDSS alerts) are distracting from navigational tasks especially when they occur in critical situations.



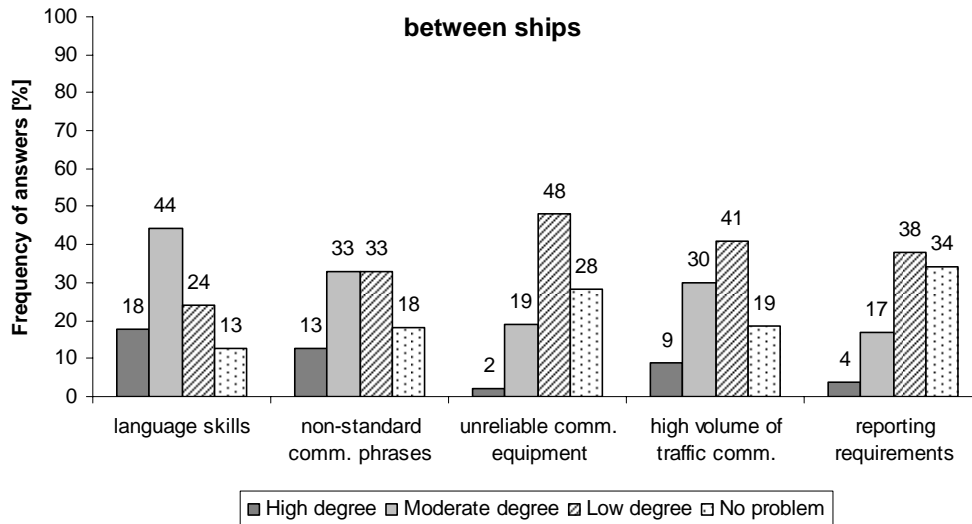


Figure 6: Opinions [%] on occurrence of problems in maritime communications (N=349-353)

Use of broadband for maritime communications

8 85% of the participants are in favour of using broadband for the provision and exchange of marine communications (Figure 7). They especially support the use of satellite broadband (Figure 8) for the communication between ship and shore (68% in favour) as well as between ships (52% in favour).

Comments raised on this issue are related to reliability, coverage, costs and safety:

- satellite broadband, though favoured due to its better coverage and greater reliability compared to the other solutions, should only be used for non-navigational, non-urgent communication, e.g., reporting;
- the coverage of Wi-Fi and mobile phone is seen as limitation. Participants feel that mobile phones can be effectively used for arrangements with pilots; and
- communication between vessels and VTS should be done via VHF for safety reasons – so that navigation-related information is available to all vessels in an area.

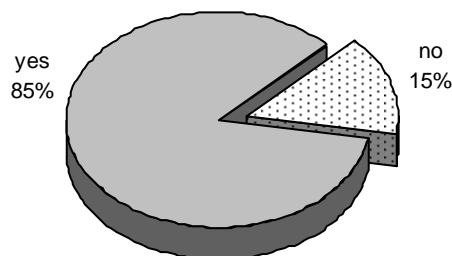


Figure 7: Preferences [%] for the use of broadband in marine communications (N=341)

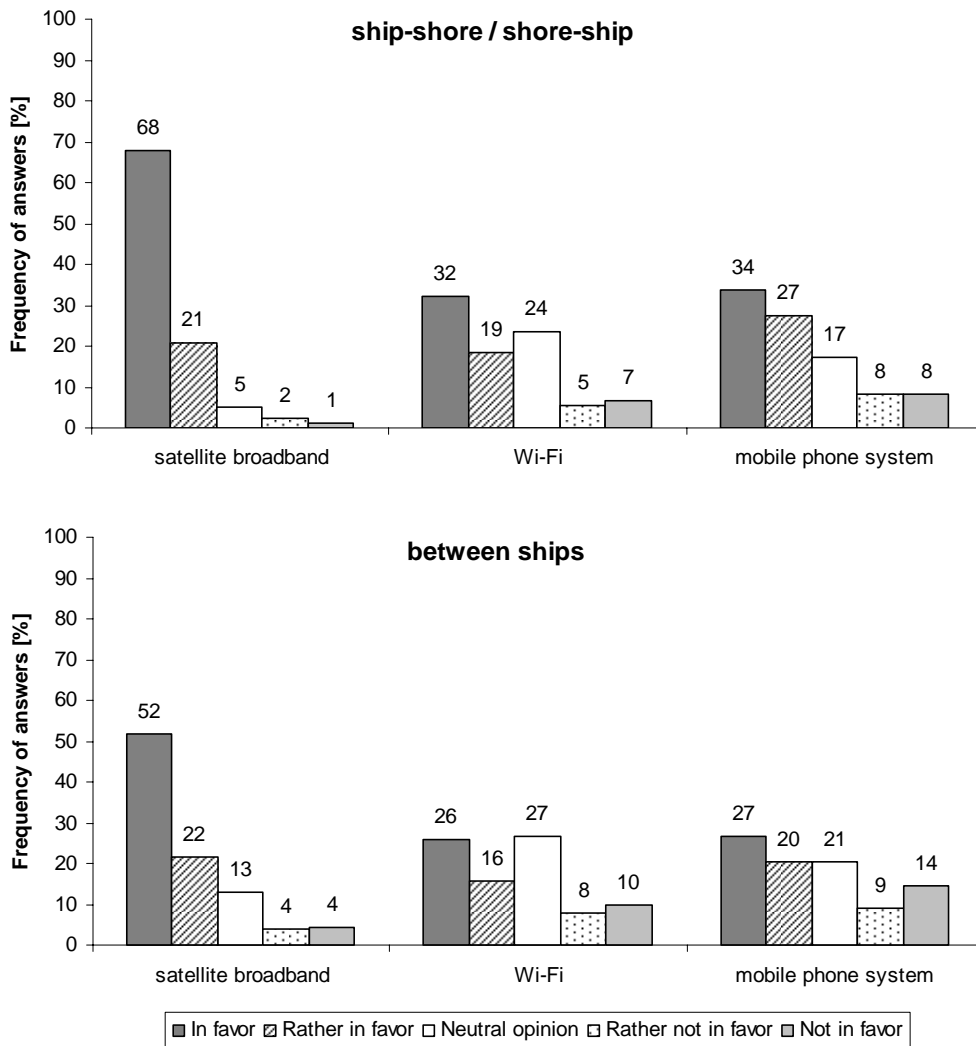


Figure 8: Preferences [%] on type of broadband (N=296-303)

Communication between shore authorities

9 Overall few participants see major problems in the communication between shore authorities (Figure 9). 17% feel that the use of different data formats is a high degree problem (28% moderate degree). Another deficiency rated high by 16% of the participants is the unwillingness of different parties to share certain types of information (34% moderate degree).

Participants comment that:

- they need to send the same information several times to different parties ashore, and in different required reporting formats. They feel that standardized reporting forms would reduce their workload to a great extent;
- improved sharing of information could reduce duplication of communication work.

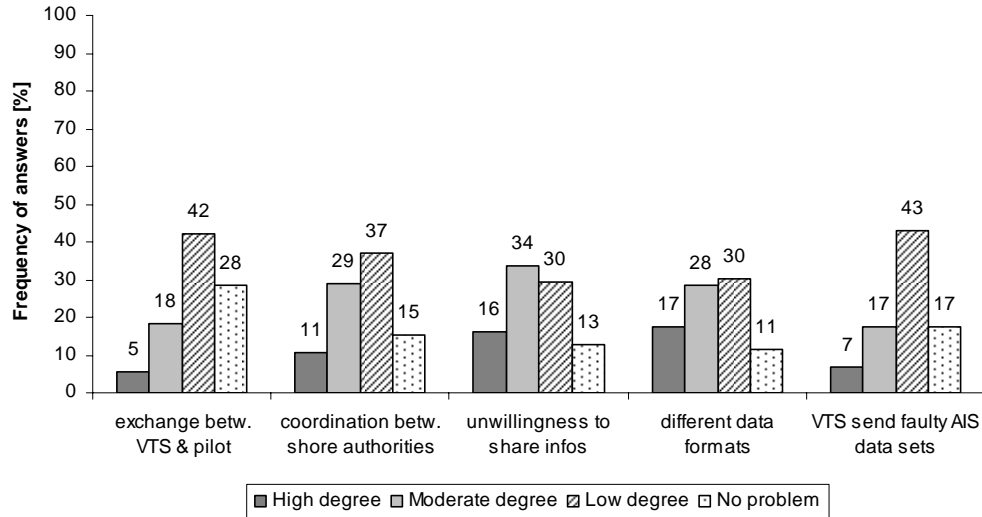


Figure 9: Opinions [%] on occurrence of problems in the communication between shore authorities (N=349-352)

Reporting requirements

10 The majority of the participants is in favour (74% in favour, 17% rather in favour) of a concept that vessels send the required reporting information only once and all required shore-based operations (e.g., VTS, harbours, agents) have access to this information so that only adjustments to the specific situations need to be communicated via voice (Figure 10).

Participants comment that:

- the current reporting requirements are distracting them from their navigational duties. Multiple reporting in different required formats is increasing workload especially in confined waters where there is heavy traffic; and
- the suggested concept would reduce their workload, save time, save costs, prevent errors and keep VHF channels free for other communication.

Overall, there seems to be a compelling need to standardize reporting procedures and forms globally to avoid repetition of reporting and reduce workload.

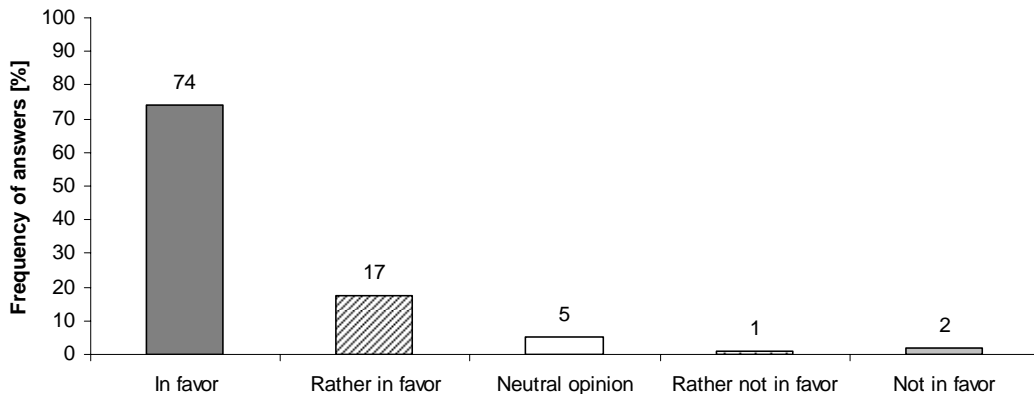


Figure 10: Opinions [%] on concept to send required reporting information only once (N=352)

AIS binary messages

11 About half of the participants have high (14%) or moderate (41%) knowledge or experience with AIS binary messages, while the remaining have low (27%) or no (17%) experience or knowledge with it (Figure 11). Overall, there are mixed opinions whether AIS binary messages are an effective means to transmit navigation-related information (21% yes/agree, 23% rather agree, 14% rather disagree, 14% no/disagree; Figure 12). According to experience the percentage of agreement (yes/agree) varied. While 29% of those experienced with AIS binary messages feel it is an effective means to transmit navigation-related information, only 11% of those with limited experience think so. 18% of the participants with limited experience have no opinion on the topic.

Participants comment that the interface of most AIS units is not suitable for the use of AIS binary messages:

- it takes too much time and is ineffective to type in a message (e.g., no keyboard, having to use the cursor to select letters from a displayed alphabet) especially for time-critical information; and
- AIS binary messages are often not read due to, e.g., missing adequate audible alarms or unfamiliarity with the equipment.

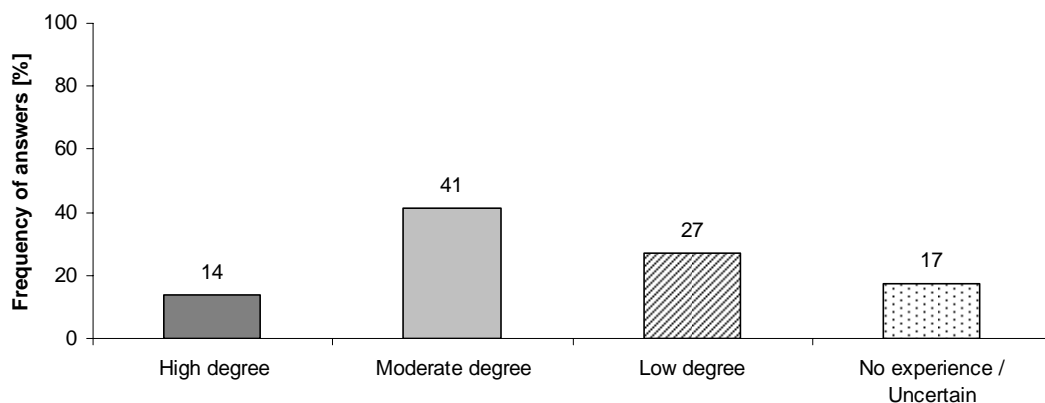


Figure 11: Knowledge or experience with AIS binary messages [%] (N=352)

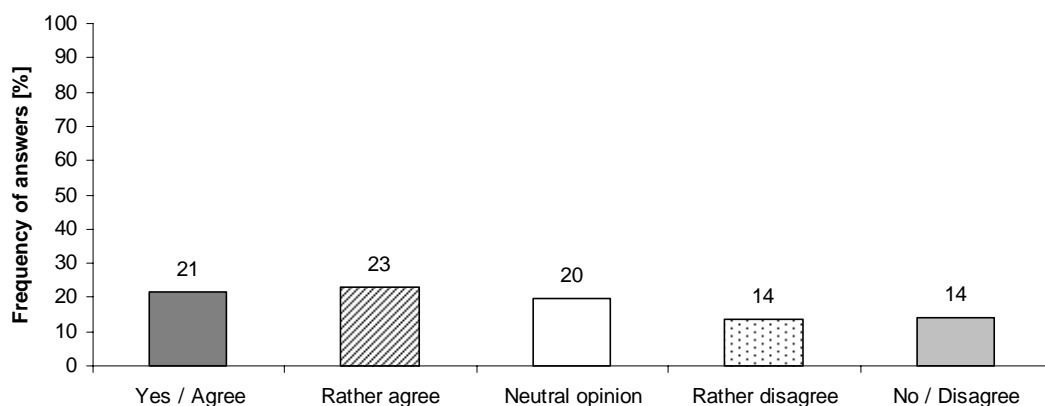


Figure 12: Opinions [%] on AIS binary messages as an effective means to transmit navigation-related information (N=336)

Both experienced and inexperienced participants raised concerns regarding the use of AIS binary messages for the transmission of navigation-related information (Figure 13). Main concerns are that no feedback is provided on whether the message was received (39% high degree, 36% moderate) and understood (41% high degree, 31% moderate). Other concerns included: vessels without AIS (40% high degree, 28% moderate) and that AIS binary messages may be too slow for time-critical information (40% high degree, 29% moderate).

Participants comment that:

- the alarm indicating that an AIS message is received (if existent) is often switched off and officers are too occupied with other duties to recognize the messages;
- there is no confirmation that a message was received unless a reply has been send;
- there is a need of AIS units to be more user-friendly. Participants experience that it is too difficult and time-consuming to type in a message. This results in statements that AIS binary messages are too slow for time-critical information; and
- AIS should only be used for identification and tracking.

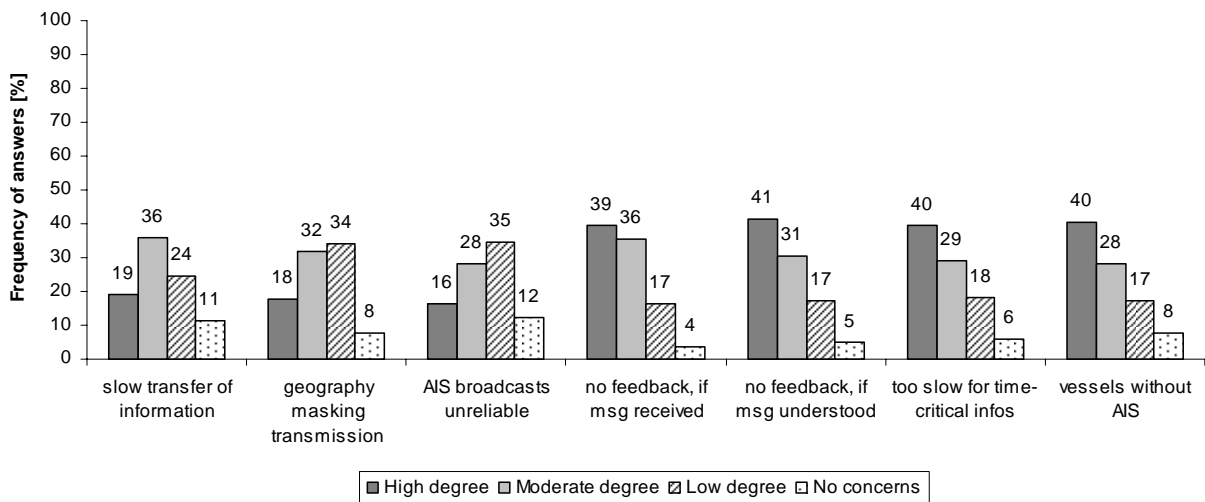


Figure 13: Concerns [%] regarding the use of AIS binary messages for transmission of navigation-related information (N=329-333)

Human Machine Interface

General

12 213 participants answered the open-ended question: “From your point of view, what should be improved regarding the Human Machine Interface (presentation of information and operation of the systems) at your workplace?”. The main topics raised were user friendliness, standardization, integration, ergonomic issues, alarm management, reliability, and training.

Participants comment that:

- systems and equipment need to be more user-friendly and simpler in their operation. Information should be easily accessible and presented in a simple way. There should be less information on the navigational displays - no unnecessary information should be displayed;

- equipment operation and the presentation of information should be standardized for all manufacturers;
- all information should be accessible at one place, e.g., a multi-functional workplace;
- the bridge design should be user-friendly (layout of equipment on the bridge);
- equipment or buttons need better illumination at night; the dimming of screens should be centralized and effective;
- there is a need for the introduction of a central alarm management system (centralized presentation of alarms) as well as for the introduction of priorities for alarm presentation;
- reliability of equipment needs to be improved in general and in particular with regard to communication systems; and
- proper training should be emphasized and users should be trained how to operate navigation equipment before they use it on board.

Presentation of further information on navigational displays

13 In general, there is support for the presentation of user-selectable information received via communication equipment on the navigational displays on the ship's bridge (Figures 14 - 17). The participants are especially in favour of presenting information regarding vessels in distress (78% in favour), wind speed/direction (75%), Aids to Navigation status (e.g., buoy off station) (74%) and restricted areas (temporary) (71%). There is also strong support for presenting information on real-time tide/water levels (68% in favour), forecast tide/water levels (60%), closed fairways (66%) and closed harbours (61%) as well as search and rescue information (63%) and pilot information (60%).

Participants comment that:

- the availability of information in real-time and with presentation on the navigational displays would be an advantage for mariners regarding informed decision-making and safety of navigation;
- information overload needs to be prevented;
- the presentation of information should be user-selectable to filter required information; and
- information should be provided on an additional dedicated screen.

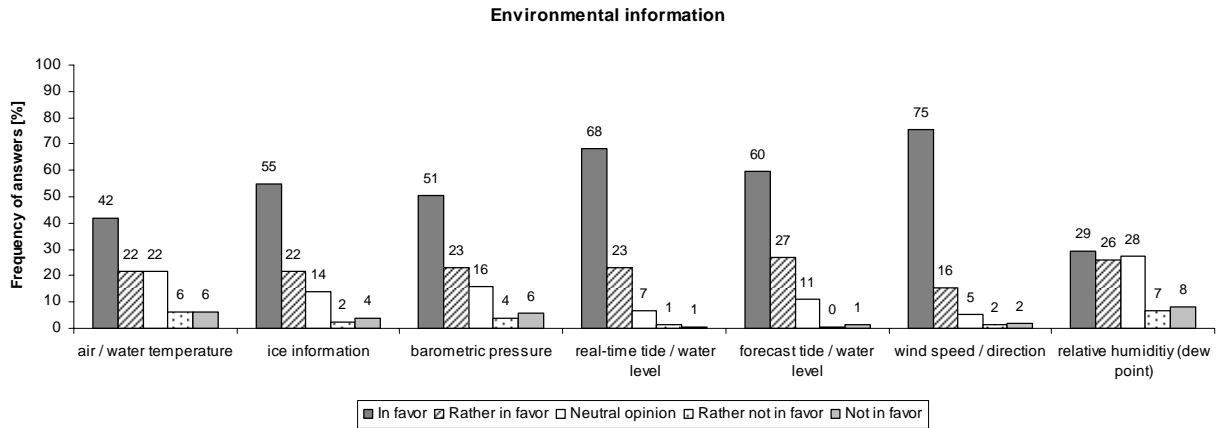


Figure 14: Preferences [%] for presentation of environmental information on navigational displays on the ship's bridge (N=326-329)

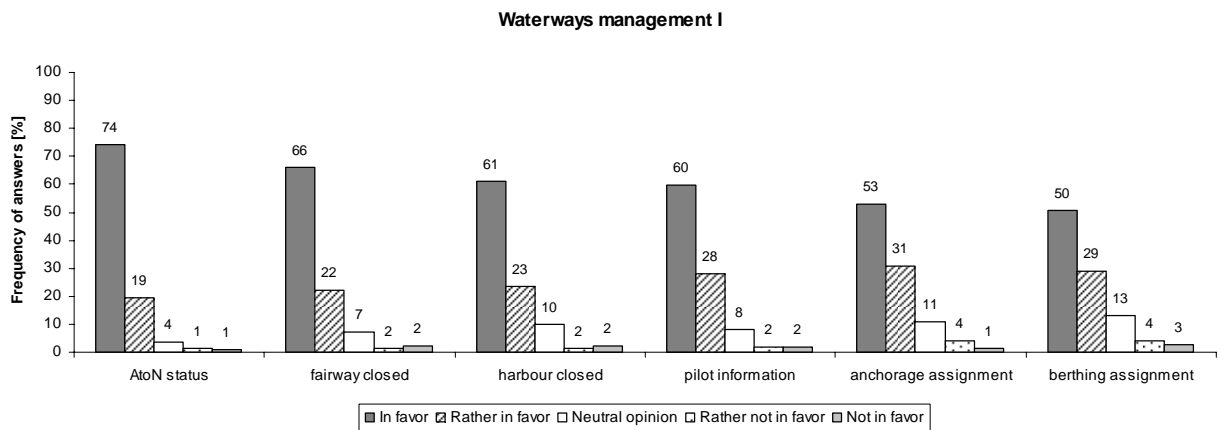


Figure 15: Preferences [%] for presentation of waterways management information (part 1) on navigational displays on the ship's bridge (N=327-328)

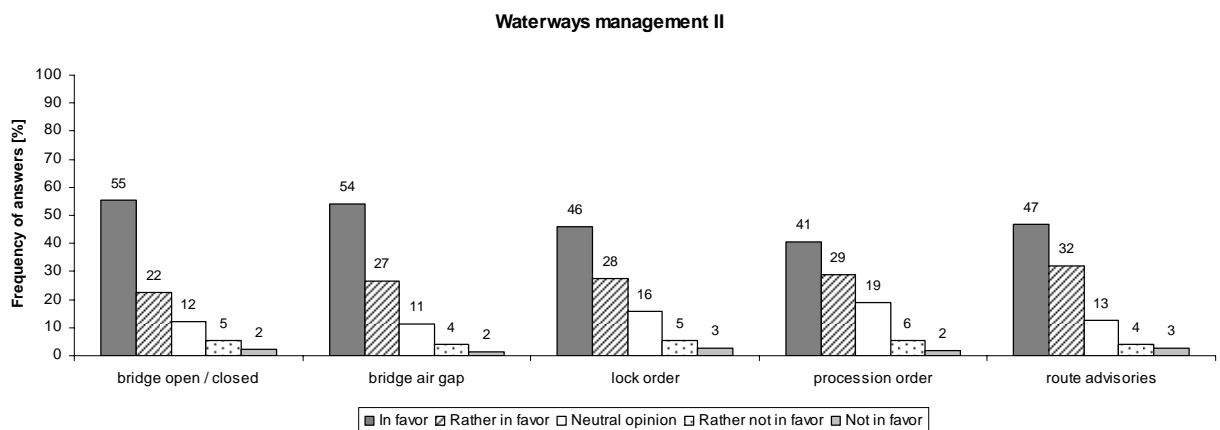


Figure 16: Preferences [%] for presentation of waterways management information (part 2) on navigational displays on the ship's bridge (N=325-328)

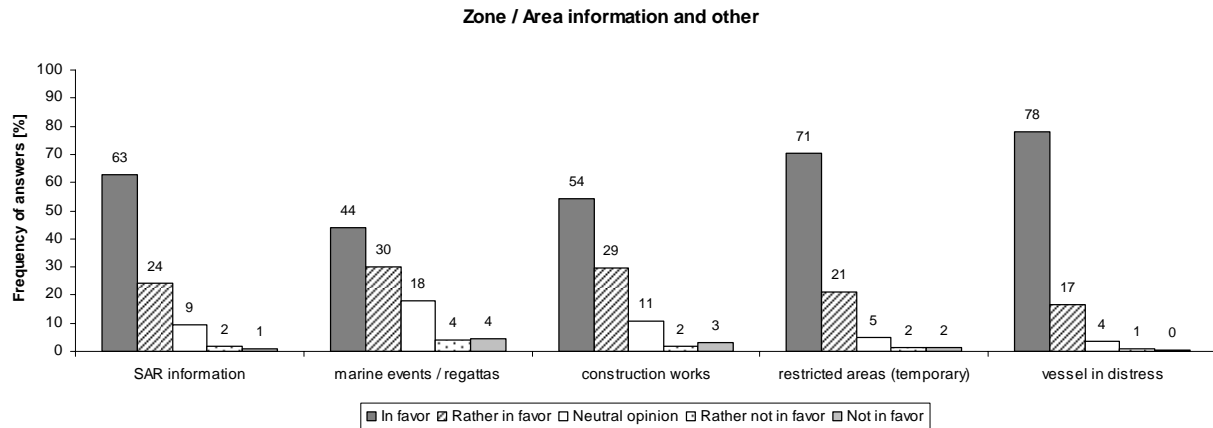


Figure 17: Preferences [%] for presentation of zone/area and other information on navigational displays on the ship's bridge (N=320-329)

Filtering of information for presentation

14 Participants feel that during certain circumstances there should be a possibility to filter some transmitted data according to user-set parameters (Figure 18). As an example, 54% are in favour to set filters so that only information from user-selected sea areas is displayed (24% rather in favour).

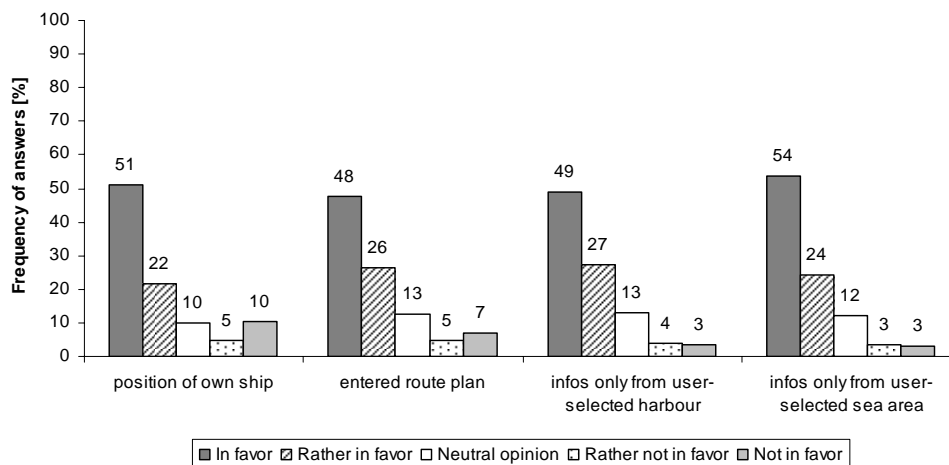


Figure 18: Preferences [%] for the possibility to set filters according to parameters (N=327-328)

S-Mode concept

15 Most participants are in favour of the S-Mode concept (50% in favour, 30% rather in favour), while 2% are not in favour and 3% are rather not in favour (Figure 19).

Participants comment that:

- standardization will be very helpful for navigation control and monitoring and that S-Mode will be an advantage for pilots and mariners changing ship or company;
- there will still be development of innovations;
- S-Mode might concentrate innovations on the needs and capabilities of the users and make new technology solutions more user-friendly;

- S-Mode may suppress the development of new technology solutions;
- information which is important only in certain navigational situations might be filtered out;
- S-Mode should be designed to permit easy updating;
- regular reviews of S-Mode standards should ensure that latest innovations are taken into account;
- collaborative research and development programs by groups of several companies should be set up; and
- manufacturer specific training and proper handover are better than introducing S-Mode.

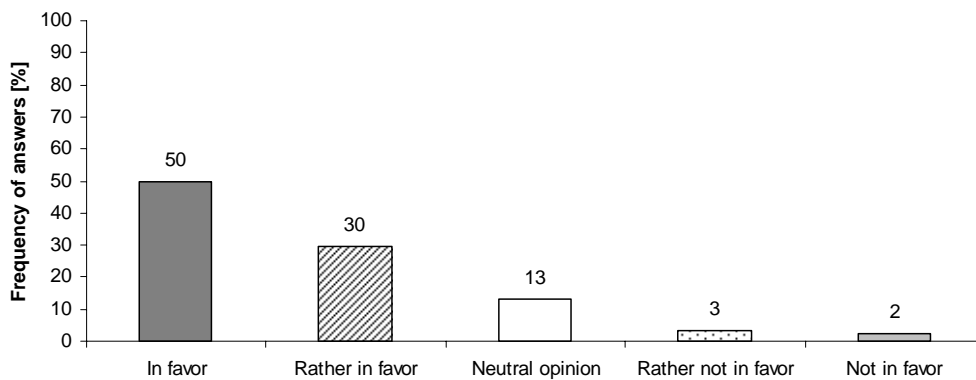


Figure 19: Opinions [%] on S-Mode concept (N=327)

Technical/Operational Enhancements

Preferred redundancy for a GNSS

16 Most participants indicated a preference for another GNSS as a redundancy for a GNSS (68% in favour, 17% rather in favour; Figure 20). There is also support for the use of radar positioning (42% in favour, 23% rather in favour). Only 8% are in favour of Loran C as a redundancy for a GNSS, 40% are not in favour, 16% rather not in favour.

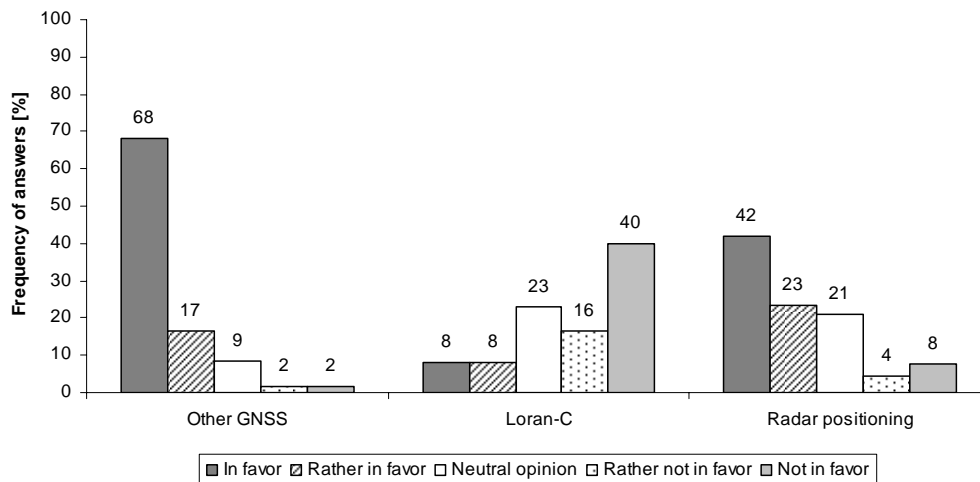


Figure 20: Preferences [%] for redundancy for a GNSS (N=324-341)

Strategic coordination of the traffic flow from shoreside

17 Most participants are in favour of having a more overall strategic coordination of the traffic flow from a shoreside (Figure 21), e.g., regarding very large or special vessel movements (58% in favour, 31% rather in favour) and according to the traffic density (53% in favour, 35% rather in favour).

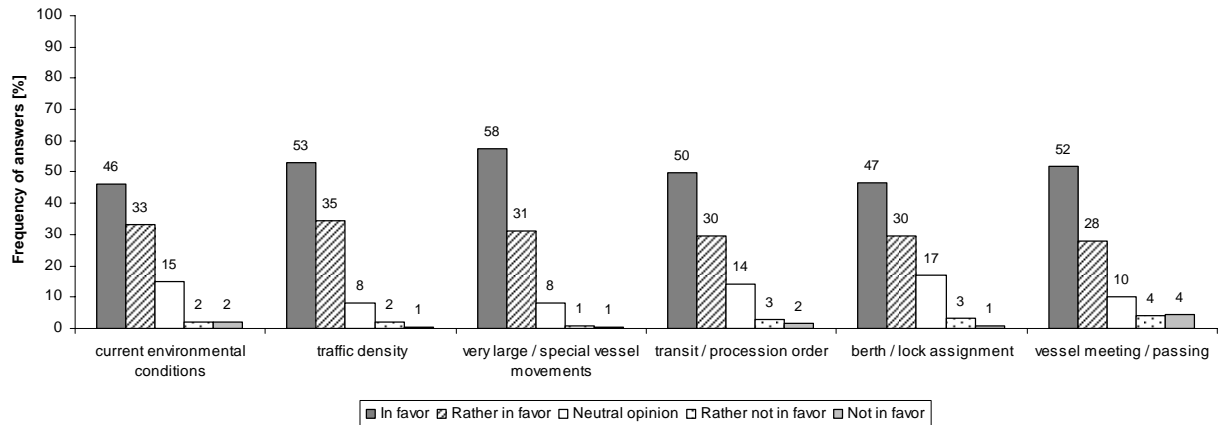


Figure 21: Preferences [%] for a more overall strategic coordination of the traffic flow from shoreside according to parameters (N=349-351)

Automatic checks for required shipboard routines

18 There is a tendency of support for having automatic checks for certain required shipboard routines (43% in favour, 28% rather in favour), while 7% are not in favour, and 8% rather not in favour (Figure 22).

Participants comment that:

- automatic checks would reduce the risk of human error and neglect, save time, reduce paperwork, and ensure compliance with the checklists;
- automatic checklists mitigate liability;
- automatic checklists are not reliable and therefore cause additional workload;
- it would be too difficult to find one standard for the various types of vessels;
- automatic checks should only be an additional tool for regular manual checks;
- paper checklists should not be duplicated;
- the system would require random checks, being fail-safe; and
- overrides for unforeseen circumstances should be provided.

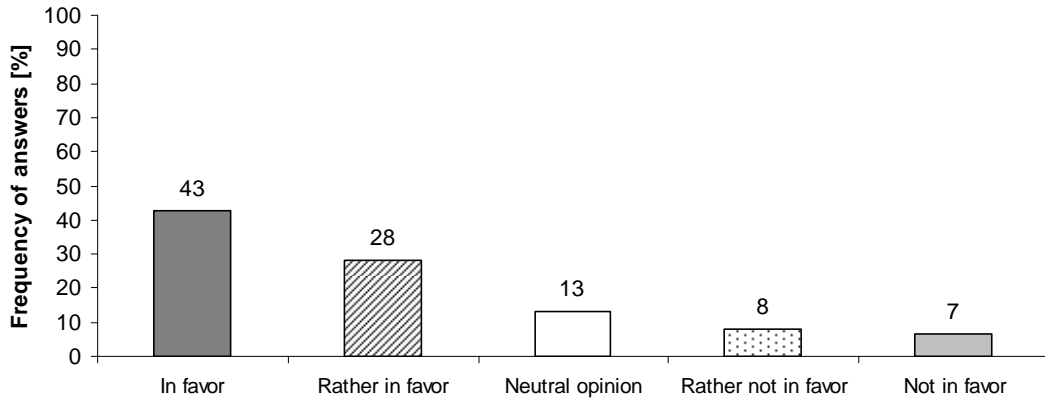


Figure 22: Opinions [%] on automatic checks for certain required shipboard routines (N=322)

Paper information in electronic form

19 The idea of having paper information and documentation provided in electronic form is supported by most of the participants (52% in favour, 31% rather in favour; Figure 23).

The comments show that participants would like to reduce the amount of paperwork in general.

They comment that:

- the use of electronic versions saves time due to easier localisation of information in the documents (e.g., with the help of a search function), automatic updates (e.g., of Notices to Mariners), and possible integration of information on other systems on the bridge (e.g., ECDIS);
- electronic documents should have a user-friendly design, be printable, or be additionally provided as paper version; and
- it is easier to work with paper copies, e.g., not to depend on a unit to display electronic information, or when reading a document.

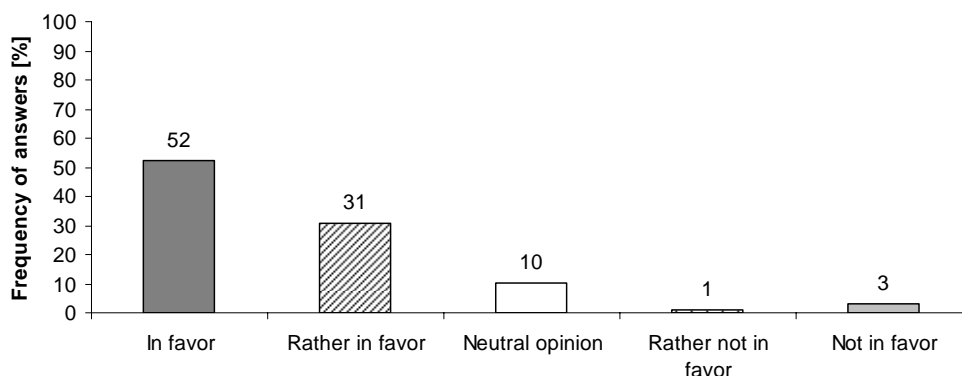


Figure 23: Preferences [%] for provision of paper information and documentation in electronic form (N=344)

Action requested of the Sub-Committee

20 The Sub-Committee is invited to note the information provided and make use of it in its deliberations on e-navigation.

ANNEX

e-Navigation User Needs Survey Questionnaire

e-navigation is a new strategy of the International Maritime Organization (**IMO**) that may have impact on your work environment.

It is defined as: ... *the harmonised collection, integration, exchange, presentation and analysis of maritime information onboard 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.*

The vision of e-navigation is embedded in the following general expectations:

On board

Navigation systems that benefit from the integration of own ship sensors, supporting information, a standard user interface, and a comprehensive system for managing guard zones and alerts.

Ashore

The management of vessel traffic and related services from ashore enhanced through better provision, coordination, and exchange of comprehensive data in formats that will be more easily understood and utilized.

Communications

An infrastructure providing authorized seamless information transfer on board ship, between ships, between ship and shore and between shore authorities.

e-navigation is supposed to be **user-driven**, not technology-driven. The first step of the e-navigation strategy is the determination of user needs.

Therefore, **this is a survey to collect e-navigation user needs worldwide.**

The German FGAN-Research Institute for Communication, Information Processing and Ergonomics, which does research in the maritime sector since 15 years, is conducting this survey for the German Federal Ministry of Transport, Building and Urban Affairs, in co-operation with the Canadian Coast Guard.

The results will be presented to IMO this summer as a joined paper by several member states.

Please use this link to fill in the e-navigation user needs questionnaire online:

<http://www.earsandeyes.com/e-navigation>

OR

Fill in this document and send it via e-mail to: e-navigation@fgan.de

OR

Fill in this document as a print-out and send it to:

e-navigation
FGAN-FKIE
Neuenahrer
53343
Germany

Str.

20
Wachtberg

Please fill in the questionnaire preferably until the 25th of April, 2009.

Experience background

In order to evaluate the responses, it is useful to know the background and experience of those participating in the survey.

0.1 What is your current position?

Master	1 st Officer	2 nd Officer	3 rd Officer	Pilot	Harbor master	VTS operator
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	_____					
<input type="checkbox"/>	<i>(Please specify)</i>					

0.2 How many years have you been sailing as a mariner?

(Please type in the number of years)

Number of years as a mariner (total): _____

as Master _____ , as Officer _____ , as Pilot _____ , Other _____

_____ *(Please specify)*

I have never been sailing as a mariner *(Skip questions 0.3 and 0.4)*

0.3 On what kind of vessels have you been working?

(You may mark more than one option)

None	Container	Bulker	Tanker	Fishing	Ferry	Cruise ship
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	_____					
<input type="checkbox"/>	<i>(Please specify)</i>					

0.4 On what kind of vessel are you working at present?

None	Container	Bulker	Tanker	Fishing	Ferry	Cruise ship
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	_____					
<input type="checkbox"/>	<i>(Please specify)</i>					

0.5 How many years have you been working ashore?

(Please type in the number of years)

at a VTS center _____ , at a shipping company _____ , for a manufacturer _____ ,

Other _____
(Please specify)

I have never been working ashore

0.6 Please indicate your geographical area of operation.

0.7 Please mark your age.

< 26	26–35	36–45	46–55	56–65	65 +
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

0.8 Please mark your gender.

Male	Female
<input type="checkbox"/>	<input type="checkbox"/>

0.9 Please indicate your nationality.

*The questions that follow are intended to gain a better understanding of **your views and preferences** related to e-navigation.*

There are no correct or incorrect answers. Instead, we are interested in your opinions. Your answers may reflect both past experience and present job position.

Maritime Communications

1.1 Based on your experience, which problems in maritime communications occur most often?

First answer regarding ship-to-shore / shore-to-ship communications, then communication between ships.

Mark how often you encounter those problems.

	<u>Ship-shore / Shore-ship</u>				
	High degree	Moderate degree	Low degree	No problem	No opinion
language skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
non-standard communication phrases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
unreliable communication equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
high volume of traffic communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
reporting requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Mark how often you encounter those problems.

	<u>Between ships</u>				
	High degree	Moderate degree	Low degree	No problem	No opinion
language skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
non-standard communication phrases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
unreliable communication equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
high volume of traffic communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
reporting requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Of all problems you rated high (ship-shore/shore-ship AND between ships), which is the most important? *(Please circle / underline or type in below.)*

Comments:

1.2 In your opinion, should broadband be used for the provision and exchange in marine communications?

Yes No

If yes, what type?

	<u>Ship-shore / Shore-ship</u>					
	In favor	Rather in favor	Neutral opinion	Rather not in favor	Not in favor	No opinion
satellite broadband	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wi-Fi	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
mobile phone system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	<u>Between ships</u>					
	In favor	Rather in favor	Neutral opinion	Rather not in favor	Not in favor	No opinion
satellite broadband	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wi-Fi	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
mobile phone system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

1.3 Based on your experience, where do you see problems in the communication between shore authorities?

(e.g., VTS, SAR, oil pollution response, port security, etc.)

Mark the level of severity.

	High degree	Moderate degree	Low degree	No problems	No opinion
exchange between VTS-center and pilots	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
level of coordination between shore authorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
different parties unwilling to share certain types of information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
different data formats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
other VTS centers send incomplete / faulty AIS data sets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Of all problems you rated high, which is the most important?

(Please circle / underline or type in below.)

Comments:

1.4 With the aim of improving efficiency and reducing the workload regarding reporting procedures there are ideas that vessels send the required reporting information only once and all required shore-based operations (VTS, harbors, agents, ...) have access to this information – so that only adjustments to the specific situations need to be communicated via voice.

(e.g., at a VTS reporting point only ship position and changed data need to be transmitted)

What is your opinion about this concept?

In favor	Rather in favor	Neutral opinion	Rather not in favor	Not in favor	No opinion
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Although AIS (the Automatic Identification System) was primarily developed for ship identification and tracking, it has a capability of providing additional information via binary messages (*e.g., in digital format*).

Currently, there are efforts underway to exchange navigation-related information via AIS binary messages between shore and ship or between vessels.

1.5 What is your level of knowledge or experience with AIS binary messages?

High degree	Moderate degree	Low degree	No experience / Uncertain
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

1.6 Are AIS binary messages an effective means to transmit navigation-related information?

(*e.g., to send a digital message to one specific vessel rather than by VHF voice communications.*)

Yes / Agree	Rather agree	Neutral opinion	Rather disagree	No / Disagree	No opinion
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

1.7 What concerns do you have about using AIS binary messages to transmit navigation-related information?

Mark the level of severity.

	High degree	Moderate degree	Low degree	No concerns	No opinion
vessels without AIS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
slow transfer of information (additional loading)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
geography masking transmission / reception	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AIS broadcasts are unreliable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
no feedback, if message was received	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
no feedback, if message was understood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
too slow for time-critical information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Of all concerns you rated high, which is the most important?
(Please circle / underline or type in below.)

Comments:

Human Machine Interface

2.0 From your point of view, what should be improved regarding the Human Machine Interface (presentation of information and operation of the systems) at your workplace?

All following questions of the section 'Human Machine Interface' apply only to ship borne users. As a shore based user please continue with question 3.1 on page 12.

There are plans to present user-selected information received via communication equipment (e.g. NAVTEX, weather fax) on the navigation displays on board of vessels.

(e.g., special attention areas or points like an area where an oil spill has occurred / a malfunctioning light buoy / area with harsh weather conditions)

2.1 Please indicate if it should be possible to present the following types of information on navigational displays on the ships bridge.

Environmental information	In favor	Rather in favor	Neutral opinion	Rather not in favor	Not in favor	No opinion / Not applicable
air / water temperature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ice information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
barometric pressure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
real-time tide / water level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
forecast tide / water level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
wind speed / direction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
relative humidity (dew point)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Zone / Area information	In favor	Rather in favor	Neutral opinion	Rather not in favor	Not in favor	No opinion / Not applicable
search and rescue information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
marine events / regattas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
construction works	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
restricted areas (temporary)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Waterways management	In favor	Rather in favor	Neutral opinion	Rather not in favor	Not in favor	No opinion / Not applicable
Aids to Navigation status (e.g. buoy off station)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
fairway closed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
harbour closed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pilot information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
anchorage assignment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
berthing assignment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bridge open / closed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bridge air gap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
lock order	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
procession order	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
route advisories	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other	In favor	Rather in favor	Neutral opinion	Rather not in favor	Not in favor	No opinion / Not applicable
vessel in distress	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

2.4 During certain circumstances, some transmitted data could be filtered according to user-set parameters. (Like what you do with a spam filter for e-mails.)
(e.g., weather / environmental information, GMDSS alerts, information regarding waterways management, special zones or another vessel)

Should there be a possibility to set filters according to the following parameters?

	In favor	Rather in favor	Neutral opinion	Rather not in favor	Not in favor	No opinion
Position of own ship	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Entered route plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information only from user-selected harbor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information only from user-selected sea areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

2.5 There are discussions about introducing a “Standard mode” (so-called **S-Mode**) for shipborne navigation displays. It would require that *all navigation displays have the capability to be switched to a standard, default presentation, menu system and interface* (operation) depending on the type of navigation equipment (e.g. radar, ECDIS) regardless of the manufacturer.

In concept, S-Mode could be used,

- to operate unfamiliar equipment (e.g., when you arrive on a ship and need to take over the bridge with little time for hand-over)
- for a pilot going onboard of ships with different equipment and configurations everyday
- to improve training / certification (training with special regard to S-Mode)

On the other hand S-Mode (if it becomes the mode that is used most often) might take away the incentive for manufacturers to invest in innovation and therefore might suppress the development of new technological solutions.

What is your opinion of the **S-Mode** concept?

In favor	Rather in favor	Neutral opinion	Rather not in favor	Not in favor	No opinion
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Technical / Operational Enhancements

3.1 Currently, GPS is the most widely used Global Navigation Satellite System (GNSS) for marine navigation. What type of electronic navigation system(s) would you prefer as a redundancy for a GNSS (e.g., GPS)?

	In favor	Rather in favor	Neutral opinion	Rather not in favor	Not in favor	No opinion
Other GNSS (e.g., GPS / GALILEO / GLONASS / any other new regional satellite system)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Loran-C	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radar positioning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

3.2 Ideally, e-Navigation will lead to improved vessel traffic flow in and out of ports. Potentially, this could include an overall strategic coordination of the traffic flow considering for example the availability of berths / berth assignments, environmental conditions, traffic density, or very large / special vessel movements.

(e.g., in approach to an harbour: coordinate the traffic flow that locks are open, when the vessel arrives there / to straighten the traffic for each vessel to have more navigating space / to lessen the overall waiting time at a channel [e.g., Kiel Canal])

What is your opinion in regard to having more overall strategic coordination of traffic flow from a shore-side regarding the following parameters?

	In favor	Rather in favor	Neutral opinion	Rather not in favor	Not in favor	No opinion
current environmental conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
traffic density	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
very large / special vessel movements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
transit / procession order	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
berth / lock assignment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
vessel meeting / passing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Question 3.3 applies only to ship borne users.
As a shore based user please continue with question 3.4.

3.3 It may be useful to have automatic checks for certain required shipboard routines (e.g., an automated pre-departure checklist, that detects what routines have been fulfilled, and indicates what is still missing).

Please indicate your opinion on having automatic checks for certain required shipboard routines.

In favor	Rather in favor	Neutral opinion	Rather not in favor	Not in favor	No opinion
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

3.4 Should paper information and documentation be provided in electronic form? (e.g., with a search function, possibility to filter, integration of updates with indication of changed parts)

In favor	Rather in favor	Neutral opinion	Rather not in favor	Not in favor	No opinion
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Additional comments

4.1 Do you have any additional comments, requests or suggestions about any of the previous sections?

4.2 Is there anything else that you would like to bring up that we overlooked?

Thank you for your participation!
