

## Conference Report

# E-NAVIGATION UNDERWAY

## INTERNATIONAL CONFERENCE ON E-NAVIGATION

M/S Crown of Scandinavia, Copenhagen–Oslo–Copenhagen  
31 January - 2 February 2011

Jointly organized by the EfficienSea project and the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)  
Supported by the Nautical Institute and  
the International Association for Marine Electronics Companies

### Executive Summary

*The 2011 “e-Navigation Underway” conference gathered 136 delegates from 21 countries. A number of presentations were given on general developments, opportunities and barriers in e-Navigation. Experiences gained from existing e-Navigation test beds and reports on planned test bed activities were presented and discussed. Live demonstrations were given on the existing e-Navigation services provided within the EfficienSea project.*

*The conference arrived at 19 conclusions concerning the e-Navigation process, the need for standards and regulations, the value of test beds, bridge solutions, user needs, and the need for forums such as this conference to share knowledge and coordinate test bed activities for the benefit of the general e-Navigation process.*

*Conference participants were generally very satisfied with the conference. Many participants expressed that the conference had helped to provide clarity, and pragmatism to e-Navigation.*

### Table of contents

Setting the scene .....	2
Reports from test beds.....	2
Presentations inspired by the conference.....	4
Panel discussion .....	4
Conference conclusions.....	5
The way forward .....	7
The IMO e-Navigation Implementation Strategy.....	7
Closing remarks.....	9

## Setting the scene

The e-Navigation Underway conference was held onboard the M/S Crown of Scandinavia. It was jointly organized by the EfficienSea project and International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), and supported by the Nautical Institute and the International Association for Marine Electronics Companies. The conference attracted 136 delegates from 21 countries.

The conference was opened and chaired by Mr Ómar Frits Eriksson, Chairman of the EfficienSea Project Management Board, after which the following speakers sat the scene for the conference:

- *Key note speech:* Mr Gary Prosser, IALA, Secretary General
- *IHO's role in e-Navigation:* Mr Robert Ward, International Hydrographic Organisation, Director
- *The work of the IALA e-Navigation Committee:* Mr Nick Ward, IALA e-Navigation Committee, Vice Chair
- *Users involvement in test beds:* Mr David Patraiko, Nautical Institute, Director of Projects
- *The importance of testing applications:* Mr John Murray, International Chamber of Shipping, Director Marine
- *of test beds for the implementation of e-Navigation:* Mr John Erik Hagen, IMO e-Navigation Correspondence Group, Chairman
- *Commonalities between e-Navigation and eMaritime,* Mr Christos Pipitsoulis, European Commission - DG MOVE: Maritime transport policy, Ports & Inland waterways, Project Officer
- *From test bed to implementation,* Mr Michael Rambaut, International Association for Marine Electronics Companies (CIRM), Secretary General

## Reports from test beds

The sessions of day two of the conference were chaired by Mr Jon Leon Ervik, Norwegian Coastal Administration (morning), and Mr Rolf Zetterberg, Swedish Maritime Administration (afternoon). The sessions encompassed numerous presentations on test bed activities around the world (see conference presentations):

- *UKC management in Torres Strait:* Mr Nick Lemon, Australian Maritime Safety Authority
- *Admiralty e-Navigator, UKHO take on e-Navigation:* Mr Thomas Mellor, United Kingdom Hydrographic Office
- *Portable Pilot Unit – a trendsetter for e-Navigation and an essential part of Vessel Traffic Management in Ports?* Mr Maarten Betlem, Dutch Pilot Association
- *The Baltic Sea e-Navigation test bed in EfficienSea:* Mr Thomas Christensen, Danish Maritime Safety Administration
- *Making the phantom real: a case of applied maritime human factors:* Mr Erik Styhr Petersen, SAM Electronics, Lyngsø Marine

- *What can shore-side authorities bring to e-Navigation:* Dr. Nick Ward, General Lighthouse Authorities of the United Kingdom & Ireland
- *High Speed Maritime Mesh Network System for e-Navigation:* Mr Pankaj Sharma, Institute of Infocomm Research, Singapore
- *e-Navigation test beds in the United States - interagency cooperation in alignment with international efforts:* Mr Brian Tetreault, Coastal and Hydraulics Laboratory, US Army Corps of Engineers
- *AIS+ facilitating on board use of AIS Application:* Mr Markus Porthin, Baltic Sea Specific Messages Action Group / VTT, Technical Research Centre of Finland
- *Testing of AIS Application Specific Messages to Improve U.S. Coast Guard VTS Operations:* Mr William Burns, U.S. Coast Guard Headquarters
- *Satellite based AIS:* Mr Robert Tremlett, exactEarth
- *New opportunities with AIS information from satellite:* Mr Jon Leon Ervik, Norwegian Coastal Administration

The conference delegates were invited to live demonstrations of EfficienSea e-Navigation services on the M/S Crown of Scandinavia bridge. The first EfficienSea e-Navigation services developed and demonstrated are:

### 1 Meteorological and Oceanographic data on route (METOC)

The information is linked directly to the specific vessels position and planned route and is presented graphically on vessels navigation display.

The EfficienSea e-Navigation service proposes that while the vessel creates its route on the ECDIS and requests METOC data (forecasts and warnings include all meteorological and oceanographic information that can be forecasted, such as current, wind, waves, swell, sea level, seawater density, visibility, temperature, etc) along its route, the data is presented along the route on requested waypoints (e.g. each 15 min)

### 2 Maritime Safety Information (MSI)

Maritime Safety Information (MSI) is navigational and meteorological warnings, meteorological forecasts and other urgent safety-related messages.

The EfficienSea e-Navigation proposal is to present MSI with symbols in the chart (a user friendly way to present today's text messages, in order to facilitate for the navigator to more easily access, interpret and screen the data). Additional (more detailed) information can be seen by a click on a symbol or through mouse-over. The idea is that MSI messages not relevant for a specific vessel should not be shown, e.g. messages far from vessels position and intended route, a wreck with a depth of 100 meters on board a vessel with a draught of 6 meters and a firing exercise on Tuesday when passing the area on Monday.

### 3 Route Exchange

The Route exchange concept includes **Exchange of intended route** – the vessel's intended route is transmitted to other vessels and to shore authorities. This would for example allow vessels and shore authorities to identify vessels on an obvious collision course; and **Route suggestion** – the vessel receives route suggestions from shore authorities. Shore authorities could thus assist vessels in optimising their routes, for example according to current traffic situation and risk.

## Presentations inspired by the conference

Day three was chaired by Mr Omar Frits Eriksson, beginning with three presentations prepared by conference participants on the fly:

- *Observations by a participant:* Mr Pieter Paap, Netherlands Ministry of Transport, Public Works and Water management
- *How to achieve both lasting flexibility for and step-by-step introduction of e-Navigation:* Jan-Hendrik Oltman, Wasser- und Schifffahrtsverwaltung des Bundes
- *The EU e-Maritime initiative,* Mr Christos Piptsoulis, European Commission - DG MOVE

## Panel discussion

After these presentations, a panel discussion took place with the participation of Mr Omar Frits Eriksson (below referred to as OFE), Mr John Erik Hagen (JEH), Mr Christos Piptsoulis (CP), Mr Robert Ward (RW), Mr Gary Prosser (GP), Mr David Patraiko (DP), and Mr Michael Rambaut (MR).

The following text encompasses most of the discussion that took place (many thanks to Dr. Mike Hadley for capturing the discussion):

OFE. We've been introduced to test beds around the world. What is the best practice for e-Navigation test beds?

JEH. Methodology is important, and it is easier to accept a process if an agreement on the methodology can be reached.

RW. Not sure you can standardise methodology; the applications are so different. Must communicate with all stakeholders and agree underlying assumptions; stakeholder buy in. Where possible, build on previous work. The success of e-Navigation will depend on demonstration and dissemination of results.

JEH. Agree, no common methodology but there must be a basis of meeting user needs. How to ensure this? Test beds must be 'usable'.

Michael Bergman. Based on experience, what do you want to test against and what are you testing?

John Murray. IALA has produced much documentation but not all has appeared under the IMO banner. It would seem sensible if prospective test beds were to pick up on this documentation, otherwise effort will have been wasted.

GP. Reality of amount of documentation since e-Navigation began. Perhaps some needs to be distilled but it should not be ignored where it can be of help to test beds.

Yves Desnoës. E-Navigation is about harmonisation and it's complex. How can test beds be used to investigate these issues?

CP. No standard methodology, but e-Navigation do require a framework, to set a firm path for much future work (at least 5-6 major projects in the pipeline). Stress importance of user requirements and GAP analysis.

Pieter Paap. Recalls NAV54 comment about a quality management system being required. Could we draft a guideline for test beds, to ensure that quality criteria are covered? Emphasise the need for keeping each other informed.

DP. A good idea and agree with many previous comments. It is critical to ensure a substantial user input. If this cannot be achieved, then try for sequential test beds in different areas, to prevent regional bias. IMO has given primary objectives and these might be a good starting point.

Thomas Porathe. Human factors and user centred design must be an early consideration when designing a test bed.

Peter Sørensen. Support importance of the human element. However, work not complete until equipment has been fitted and tested.

Pieter Paap. Who is going to write the guideline?

JEH. Guidelines should include user requirements and usability. It will include in the IMO e-Navigation Correspondence Group report.

Erik Styhr Petersen. Could be covered by an ISO reference.

RW. A member of the Correspondence Group should be able to produce a draft that the CG can massage into shape.

OFE. Is there a big role for industry in test beds?

MR. Yes if paid for but there will be no interest if the goal is not firmly established and the commercial benefits are visible; still a bit early to judge. Technology is generally not a problem so concentrate on user needs and benefits to be realised.

OFE. Does e-Navigation need to be radical?

John Murray. Important to keep coming back to what e-Navigation is meant to be. It is meant to be grounded in improving using what we already have. It does not need to be radical not 'Star Wars'. Keep our feet on the ground.

Yves Desnoës. Much literature about test beds and simulation. Choosing a framework within which the test bed will operate should simplify the writing of a guideline.

CP. Agree, not radical in the short term but don't forget the long term and the strategic aims, which must not be closed out and will have to accommodate change.

MR. This is difficult. Thinking of the manufacturers and their regular customers, there are two options. You must carry it or demonstrate its viability, so that the customer will want it. e-Navigation will not fly unless the customer wants it or is told he must have it.

GP. Saving the ship owner money is a powerful argument but should not be the only consideration and could call for aspects of e-Navigation to be mandated.

DP Support for GP. Some aspects of e-Navigation are not 'sexy', such as automatic reporting, but will have significant intangible (non-commercial) benefits.

JEH. John Murray has a good point. e-Navigation should embrace the integration of current functionality.

## Conference conclusions

The conference chairman presented 19 draft conclusions that had been drafted by an authoring group as well as the conference steering group. These were reviewed in plenary and amended. The chairman stressed that these were conclusions not recommendations. The conclusions will be provided as an input to the IALA e-navigation Committee for consideration. In plenary, it was recommended that the European Commission and the Danish Maritime Safety Administration provide the conclusions as an input to the IMO Correspondence Group on e-Navigation.

### The e-Navigation Process

1. The e-Navigation implementation should be a process of evolution rather than revolution. E-Navigation will progress incrementally and iteratively.
2. There is a need to consider the alignment between e-Navigation and other related initiatives such as e-Maritime. This could be achieved through harmonization and cooperation across these initiatives.
3. The IMO Strategy Implementation Plan should identify a method for testing the usability and effectiveness of new additional elements of e-Navigation in terms of operations, technical, regulatory aspects and training.
4. It is important to evolve core elements of e-Navigation, meeting common global needs before expanding to non-core applications.

### Need for standards and regulations

5. Some e-Navigation elements, user driven, should be regulated while others should only be guided to the extent of design principles.
6. Standards are needed to ensure global compatibility. Regulations may be needed for core components of e-Navigation.
7. There is a compelling need to address the IMO, ITU, IEC processes for dealing with new developments and maintaining existing systems that are based on rapidly changing technology and evolving user needs.

### Value of e-Navigation Test Beds

8. Test beds can contribute to the GAP analysis and subsequently provide useful input to the development of operational systems i.e. "closing the gap".
9. As users' needs and levels of training will vary, it needs to be recognized that test bed results from one region are not necessarily globally applicable. The challenge is to take this into account whilst seeking global solutions.
10. Existing standards and data structures should be used in test beds, in particular S-100, in order to explore their suitability on a global scale.
11. A test bed driven approach to the development of e-Navigation is useful given similar test methodologies and evaluation criteria as well as proper dissemination of results.

### Bridge Solutions

12. An e-Navigation bridge environment should provide for value added applications guided by design principles rather than regulations to encourage innovation.
13. INS is a possible basis for the future development of on board e-Navigation. Use could be made of the IMO modular approach used in the INS performance standards.
14. INS could be a core platform on the bridge enabling the addition of specialized applications that may be required by specific users and in particular regions.
15. There is a need to start the process for INS carriage requirement. This should be a part of the e-Navigation strategy implementation plan.



### User Centric

16. User centred design is important to ensure the success of e-Navigation both onboard and ashore. Attention should be paid to the operational context and procedures as well as technology.
17. It is important to inform, educate and work with users prior to and during test bed projects. In working with users, the ability to observe them and properly assess their needs is paramount.

### Value of Discussion Forums

18. There are many pioneering activities apart from test beds that can contribute to e-Navigation. Events such as the e-Navigation Underway Conference are useful as forums for information exchange on such developments.
19. The wide range of participants and views expressed during the e-Navigation Underway Conference has shown the value of sharing test bed information and results.

## The way forward

Following the discussion of the conference conclusions, Dr. Nick Ward presented his thoughts on the way forward.

Dr. Ward discussed the e-Navigation timescale and pointed out that the way ahead is partly to sell the idea and partly to harmonise the efforts being put into e-Navigation.

Selling the idea encompasses identifying, evaluating and demonstrating the benefits of e-Navigation. Some of the benefits are fewer accidents, more efficient use of resources, reduced damage to environment, better voyage planning and track-keeping. On the bridge the benefits are that all, relevant information is more readily available, clear, uncluttered presentation, and avoidance of information overload.

Harmonisation is needed between e-Navigation and e-Maritime as well as between parallel developments in other sectors.

In conclusion Dr. Ward stressed the importance of exchanging information between test-beds and encouraged all stakeholders to continue to share and exchange information on e-Navigation.

## The IMO e-Navigation Implementation Strategy

Then Mr John Erik Hagen presented his personal thoughts on how test bed outcomes could be implemented in the e-Navigation implementation strategy (again many thanks to Dr. Mike Hadley):

Test beds will provide valuable inputs. Examples, such as the Torres Strait UKCM are valuable.

e-Navigation means improved situational awareness.

STW42 has indicated that navigators will continue to navigate, although monitoring may be an increasing part of their role.

Am aware of the focus on INS+, which could be one of the core components of e-Navigation

Noted several recommendations noted from the conference:

- Develop an Information System Framework Standard based on existing INS structure;
- Develop a Data Integration Framework Standard;
- Develop Framework standards, which are focusing on the “What” not the “How” within their domain allowing integration of new and not foreseen data streams and technical innovations but defining the borders, in which they can develop;
- Utilise ECDIS within current performance standards;
- Define a framework in which a growing number of data streams are integrated and harmonized to allow the creation the necessary information for increased Situational Awareness in an environment of growing complexity;
- Proposals for a systematic assessment of how new technology can best meet defined and evolving user needs.
- Systems developed within the framework should create a compelling need for their usage by increasing safety of navigation (compelling need for coastal administration) and improved efficiency of voyage (compelling need for ship owners and operators);
- A plan for the development of any technology and institutional arrangements necessary to fulfil the requirements of e-Navigation in the longer term.

The conclusions drawn are interesting and some will be carried forward to the IMO e-Navigation Correspondence Group report.

Another important issue has been carriage requirements, including type approval.

Concerns have also been noted about the quality of data from shore side data flows and services, such flows will be important for the transmission and reception of e-Navigation data. In this context it will be important that shore and ship components of e-Navigation be harmonised.

As part of the e-Navigation Strategy Implementation Plan process, it could be necessary to discuss whether procedures should be developed for radio maintenance and the updating of equipment on board (and their performance standards), without compromising any future type approval regime that it might be necessary to develop. Such a regime could be a building block for e-Navigation.

Part of the plan will be a direct consequence of the conclusions of technology and legal categories of the GAP analysis. NAV53 underlined the importance of active endorsement from the shipping industry as crucial to the success of e-Navigation and recommended that future work should include a formal study by an appropriate organisation to provide credible and rigorous information about the likely cost implications to the industry of developing and implementing e-Navigation.

A significant challenge will be the integration of test bed results. Therefore we should consider guidelines for test beds. The plan would also be enhanced by the introduction a possible methodology for updating, further integration and integrating new ideas into e-Navigation.

Test bed topics should be connected to the IMO human element assessment process. The Correspondence Group will then be asked how this should be taken into consideration for the further progress of the IMO Strategy Implementation Plan.

If you want to influence progress of e-Navigation, provide input to the CG. They will be considered and you should see them in the final report for discussion at MSC and the three associated sub-Committees.

The draft report of the IMO Correspondence Group on e-Navigation will be available at the end of February.

I look forward to your input.



## Closing remarks

Following these interesting inputs, Mr Gary Prosser, Secretary General of IALA summarized the conference with the following words (once again tanks to Dr. Hadley):

It has bee intensive three days. The concept for the conference was a good idea and has produced good results.

Commenting on issues raised. Speakers have added considerable value to the e-Navigation debate, with such issues as:

- S-100
- User involvement in test bed development;
- e-Navigation applications, not to be overwhelmed by them or reduce the responsibility of the OOW;
- Complementary roles of associated initiatives;
- How to update e-Navigation without locking new existing technology;
- Regulatory regime;
- Practical examples demonstrated;
- Real time test bed on board;
- Human factors;
- Collaboration;
- Potential solutions described;
- Test bed applications in other countries;
- Application Specific Messages;
- AIS via satellite and its varied applications;
- Observations from the floor, the architect;
- Panel discussion;
- Use of twitter, both good and bad

IALA will be looking carefully at how what has emerged can be taken forward, both by the Committees and with the IALA Council.

Need to get the likeminded member states on board before any approach is made to IMO.

A fantastic two days with expectations exceeded. Congratulations to EfficienSea. Should the experience be repeated? Please pass views to the EfficienSea team.

Thanks to attendees for a very interactive participation, with a high calibre of delegates.

Thanks also to the speakers and the crew of the Crown of Scandinavia.

Special thanks to EfficienSea and in particular the Danish Maritime Safety Administration team, also the DFDS team.

Mr Gary Prosser ended by closing the e-Navigation Underway conference with a wish for a safe journey home.