IMO update – e-navigation strategy implementation plan done!

E-nav underway  North America  April 2014

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Technology Development

• The last decades have seen huge developments in technology within navigation and communication systems.

• Although ships now carry Global Satellite Navigation Systems (GNSS) and will soon all have reliable Electronic Chart Display and Information Systems (ECDIS), their use on board is not fully integrated and harmonised with other existing systems and those of other ships and ashore.
Human Element

- The human element, including training, competency, language skills, workload and motivation are essential in today’s world.
- Administrative burden, information overload and ergonomics are prominent concerns.
- A clear need has been identified for the application of good ergonomic principles in a well-structured human machine interface as part of the e-navigation strategy.
The purpose of e-navigation

• Improve electronic information exchange to:
  – Enhance berth-to-berth navigation;
  – Provide simplification to improve safety, security and environment and;
  – Facilitate and increase efficiency of maritime trade and transport.
e-navigation aims to...

- Minimize navigational errors, incidents and accidents through the transmission and display of positional and navigational information in electronic formats.
e-navigation aims to...

- Improve monitoring capability of coastal states and reduce costs.
e-navigation aims to...

- Use up-to-date **electronic charts to facilitate** route, position and other related information making full use of electronic charts and position fixing systems.
IMO’s vision of e-navigation

- **Navigation systems on board**
  - Integration
  - Standard user interface
  - Preventing distraction and overburdening

- **Management of vessel traffic information ashore**
  - Coordination
  - Exchange of comprehensive harmonized data

- **Communications infrastructure**
  - Seamless harmonized information transfer

*The vision of e-navigation was defined in MSC 85/26 annex 20 paragraph 4*
Five agreed solutions

1. Improved, harmonized and user-friendly bridge design;
2. Means for standardized and automated reporting;
3. Improved reliability, resilience and integrity of bridge equipment and navigation information;
4. Integration and presentation of available information in graphical displays received via communication equipment; and
5. Improved Communication of VTS Service Portfolio.

The solutions focus on improved bridge systems and equipment and efficient information exchange ship-shore vv.
Objective of the SIP

• To implement the five prioritized e-navigation solutions, from which a number of tasks have been identified.
• These tasks should, when completed in the period 2015 - 2019, provide the industry with harmonized information, in order to start designing products and services to meet the e-navigation solutions.
• The SIP identifies the list of tasks which would need to be performed during the coming years in order to achieve the five prioritized e-navigation solutions.
New guidelines

• The user needs and the gap analysis identified the need for **enhanced usability** by the mariner of the equipment.

• Resulted in the need to improve the **interaction** between the user and the systems on board.

• As electronic systems take on a greater role, there is a clear need for the application of **ergonomic principles** both in the physical layout of equipment and in the use of light, colours, symbology and language.
New guidelines

• This results in two guidelines:
  – Human centred design principles
  – Usability evaluation on navigational equipment.

• Together they provide a complete methodology from the concept of development to the evaluation of that concept as final equipment and systems.
New guidelines

• The user needs experience with the introduction of software based electronic systems showed that the control of software development and software lifecycle maintenance needed to be improved.
• Resulted in a guideline on Software Quality Assurance (SQA).
• Can be applied to any type of e-navigation software system, including onboard or shore-based.
The Four Guidelines

1 Guidelines on Human Centred Design (HCD) for e-navigational equipment and systems
2 Guidelines on Usability Testing Evaluation and Assessment (U-TEA) of e-navigation equipment
3 Guidelines for Software Quality Assurance (SQA) in e-navigation
4 Guidelines for the Harmonisation of test beds reporting
Maritime Service Portfolios

• There is a need to identify shore based functions and services.
• There are many different types of services in most given situations or locations such as ports, coastal and high seas.
• Harmonising and standardising these services results in the Maritime Service Portfolios (MSPs), such as: Local Port Service, MSI, Nautical Publications service, Ice navigation service, Meteorological information service, Real time Hydrographic and information service.
Legislation

• The provision and development of e-navigation should consider relevant international conventions, regulations and guidelines, national legislation and standards.

• The development and implementation of e-navigation should build upon the work of IMO.

• It is an IMO strategy and the Organization has the ownership.
The Tasks

• For each Solution tasks have been identified in order to:
  – Break the project into manageable pieces which are of one technology or specialization.
  – Define a time scale for the task.
  – Define any milestones in the task so that approval can be obtained before moving on.

• The timeline for this work is 2015 to 2019.
Task Inputs

• In order to fully scope the tasks and complete the process we need:
  – Approval of the tasks (MSC)
  – Volunteers (Member States)
  – Task specific time scales (within 2015 – 2018)

• From this we can prepare planned/unplanned outputs for each task for inclusion in the High-level Action Plan of IMO.
 Tasks

T1 Draft *Guidelines on Human Centred Design (HCD)* for e-navigation systems.

T2 Draft *Guidelines on Usability Testing, Evaluation and Assessment (UTEA)* of e-navigation systems.

T3 Develop the concept of electronic manuals.

T4 Formulate the concept of standardised modes of operation.
Tasks

T5  Investigate whether an extension of existing Bridge Alert management Performance Standards (PS) is necessary.

T6  Develop a methodology of how accuracy and reliability of navigation equipment may be displayed.

T7  Investigate if an Integrated Navigation System is the right integrator and display of navigation information for e-navigation.
Tasks

T8 Member States agree on standardised format guideline for ship reporting so as to enable “single window” worldwide.

T9 Investigate the best way to automate the collection of internal ship data for reporting.

T10 Investigate the general requirements resolution A.694(17) and IEC 60945 to see how Built In Integrity Testing (BIIT) can be incorporated.
Tasks

T11  Draft *Guidelines for Software Quality Assurance (SQA) in e-navigation.*

T12  Develop guidelines on how to improve reliability and resilience of onboard PNT systems by integration with external systems.

T13  Develop guidelines showing how navigation information received by communications equipment can be displayed in a harmonised way.
Tasks

T14  Develop a Common Maritime Data Structure and include parameters for priority, source, and ownership of information based on the IHO S-100 data model.

Harmonization will be required for both use on shore and use on the ship and the two must be coordinated.
Tasks

T15 Identify and draft guidelines on **seamless integration** of all the currently available **communications infrastructure** and how they can be used (range bandwidth etc) and what systems are being developed (for example, maritime cloud) and will be in use when e-navigation is live.

The task should look at **short range systems** such as VHF, 4G and 5G as well as HF and satellite systems taking into account the **6 Areas defined for the MSPs**.
Tasks

T16 Investigate how the **Harmonization of conventions and regulations** for navigation and communication equipment would be best carried out.

T17 Further develop the **Maritime Service Portfolios** to refine services and responsibilities ahead of implementing transition arrangements.

T18 Draft Guidelines for the **Harmonization of test beds reporting**.
Communications

• Communications are a key for e-navigation.
• Any communications systems used must be able to:
  – deliver appropriate electronic information to and from ships and shore and between ships and between shore
  – in a harmonised and structured way using the agreed IHO S-100 data structure and the approved overarching e-navigation architecture wherever possible.
Public Awareness

• Member States and organizations are encouraged to use a wide range of appropriate communication channels in order to communicate key e-navigation messages to key stakeholders.

• A co-ordinated e-navigation website is to be considered during the implementation phase.

• Could provide a coordinated approach to distributing/sharing information on e-navigation implementation electronically.

• Member States and relevant organizations will be encouraged to contribute to this coordinated e-navigation website.
Key enablers for Global Implementation

- The guidelines on HCD, SQA and usability
- Global standard for data exchange
- Maritime service portfolios
- Resilient PNT
- Harmonised equipment standards on-board
- On-board interconnectivity and integration
- VTS and Coastal state infrastructure
Conclusions

- The success of the implementation requires the **on-going support** of member States and Organizations.
- Follow the **IMO process** for the planned/unplanned outputs for IMO’s High-level Action Plan.
- The SIP to NCSR1 will endeavour to satisfy IMO’s method of work.
- Each task must have expected **target completion** and **implementation dates** including possible/necessary transition arrangements.
Thank you for your attention!