



**KYSTVERKET**  
NORWEGIAN COASTAL ADMINISTRATION

# 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!

