E-navigation, process, results, status and delivery

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Shipping moves into the digital world

The last decades have seen huge developments in technology within navigation and communication systems.
Sophisticated and advanced technology is developing rapidly.
Mariners have never had more technological support systems than today.
There is a need to coordinate systems and more use of standards.

Is there a sufficient link between technology, procedures, people and training?
The 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
The purpose of e-navigation

• Enhance berth-to-berth navigation
• Simplification leading to improved safety, security and environment
• Facilitate and increase efficiency of maritime trade and transport by improved information exchange
Efficient transfer and harmonization of marine information/data

- **Promote** a workable and practical use of the information/data on board
- **Ensure** a holistic approach to the interaction between shipboard and shore-based users
- **Improve** decision support on board using verified information
- **Connect** ship and shore seamlessly by automated communication infrastructure
Proposed solutions criteria

e-navigation solutions have been chosen based on the following criteria:

1. Seamless transfer of data between various equipment on board;
2. Seamless transfer of electronic information/data between ship and shore and vice versa;
3. The solutions are based on systems and equipment that are already in place.
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.
Improving bridge systems and equipment

- Cost-beneficial and risk reducing measures to achieve solutions:
  - Integration of navigation information and equipment including improved software quality assurance;
  - Bridge alert management;
  - Standardized mode(s) for navigation equipment;
  - Improved reliability and resilience of onboard PNT systems;
  - Bridge and workstation layout standardization.
Efficient information exchange ship-shore

• Cost-beneficial and risk reducing measures to achieve solutions:
  – Automated and standardized ship-shore reporting;
  – Improved shore-based services
Communications is crucial

• E-navigation relies on a largely automated communication infrastructure, seamlessly connecting ship and shore in six areas:

1. port areas and approaches;
2. coastal waters and confined or restricted areas;
3. open sea and ocean areas;
4. areas with offshore and/or infrastructure developments;
5. Polar areas; and
6. other remote areas
Maritime Service Portfolio

- A set of services provided electronically from shorebased stakeholders such as VTS authorities, ports, hydrographic offices, meteorological organizations etc.

- The service will depend on the six geographical areas where the vessel sails
Some examples of Maritime Service Portfolio services

- VTS Information Service (IS)
- VTS Navigation Assistance Service (NAS)
- VTS Traffic Organization Service (TOS)
- Local Port Service (LPS)
- Maritime Safety Information (MSI) service
- Vessel shore reporting
- Nautical chart service
- Maritime Assistance Service (MAS)
- Nautical publications service
- Ice navigation service
- Meteorological information service
- Real-time hydrographic and environmental services
- Search and Rescue (SAR) Service.
Integration of e-navigasjon information used in emergency response service

Integrated technology:
- ENC
- AIS
- Ship Reporting System
- Radar image
- LRIT
- Meteorological information
Emergency response coverage with multiple assets in the framework of e-navigation

Incident management service provides functionality to manage:

- Search and rescue
- Oil spillages
- Collisions
- Groundings
- Fire fighting
- Medical evacuation
- Etc

Search patterns/areas are distributed to all units involved, such as:

- Navy, Coastguard, Marine Police, etc
- Fire, Ambulance, Police, etc
- VTS Centre(s) and Allied Services

Further development based on cooperation between Chile and Norway?
Software Quality Assurance (SQA)

• The quantity of software will increase with automation and with inter-connectivity

• SQA is considered as an important element in the implementation of e-navigation solutions.

• The key element of SQA will be life cycle management for software updates

• Guidelines are to be developed
Usability of navigational equipment

• Usability means the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use (ISO 9241-11:1998(E)).

• Guidelines will be developed
Human Centred Design (HCD)

- HCD describes the methodology used to implement usability goals and to assess the result
- Designable components of a system need to be fitted to the characteristics of the intended user(s)
- A guideline on Human Centred Design (HCD) for navigation equipment and systems will be developed
Test-bed reporting

- Test-beds are a useful opportunity for early implementation and user testing, evaluation and assessment.
- Test-bed guidelines should not limit the potential of innovative initiatives.
- Proposed guidelines on the reporting of e-navigation test-beds are to be developed.
e-navigation Testbeds
2009 • Survey and prioritizing of User Needs
2010 • Survey and prioritizing of User Needs, services and tasks • Description of functions and services
2011 • Selection overarching system architecture • Initial GAP analysis
2012 • Final GAP
2013 • Risk analysis and Cost/benefit analyses
2014 • Proposal for a final Strategy Implementation Plan • Final decision of Strategy implementation plan
Roadmap for implementation phase

"It is of utmost importance that a viable and functional e-navigation model should be made available to the industry to implement by 2016. Based on experience gained, this could be followed by another advanced e-navigation model in say another five years."

Secretary-General of IMO
The Strategy Implementation Plan

- Identification of responsibilities (organizations and other stakeholders)
- Transition arrangements
- A phased implementation schedule
  - Required regulatory framework and technical requirements for implementation
  - Possible training requirements to be identified, including changes to existing training regimes
- Priorities for deliverables
- Proposals for a systematic assessment of the development of new technology
- A plan for the requirements of e-navigation in the longer term
- Proposals on public relations
- Identification of potential sources of funding
## Some stakeholder benefits

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<thead>
<tr>
<th>Stakeholder group</th>
<th>Benefits</th>
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<tr>
<td><strong>1. Supranational organizations</strong></td>
<td>• Increased efficiency and improved safety for shipping.</td>
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<td>• Achievement of global harmonization of standards</td>
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<td>• Reduced environmental impact</td>
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<td><strong>2. State</strong></td>
<td>• Improved efficiency and management of costs in supervision, coordination, control, coordination and information</td>
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<td>• Easy access to standard and reliable information</td>
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<td>• Reduces risk of accidents and incidents</td>
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<td>• Reduces administrative burdens</td>
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<tr>
<td><strong>3. Branch/ industry</strong></td>
<td>• Improve efficiency and management of costs in operations</td>
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<td>• Improved safety on own fleet</td>
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<td>• Opportunity for innovative products services and solutions</td>
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<td>• Reduces administrative burdens</td>
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<td><strong>4. Users</strong></td>
<td>• Simplification of routine tasks and training</td>
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<td>• Improves robustness of, and confidence in, use of navigational equipment</td>
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<td>• Easy access to all information in a single window</td>
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<td>• Reduces administrative burdens</td>
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*Ref MSC 85/26/Add.1 ANNEX 20 annex 1 – IMO role*
Shipping moves into the digital world

e-navigation will provide digital information for the benefit of maritime safety, security and protection of the environment, reducing the administrative burden and increasing the efficiency of maritime trade and transport.