e-navigation – Where is it going?

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Background
e-navigation is an IMO initiative for future, digital navigation in the maritime sector. It was conceived about ten years ago following an input to IMO’s Maritime Safety Committee from several leading maritime nations. This highlighted a clear need to equip the master of a vessel, and those responsible for the safety of shipping ashore, with modern, proven tools to make marine navigation and communications more reliable and thereby reduce errors.

Key objectives of e-Navigation include: safe and secure navigation of vessels, facilitating communications, including data exchange between vessels and shore, integration and presentation of information onboard and ashore to maximize navigation safety benefits and minimize risk of confusion, as demonstrated in projects such as Mona Lisa 2.0.

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Progress in IMO
The IMO Maritime Safety Committee (MSC), has developed and approved (in November 2014) an E-navigation Strategy Implementation Plan (SIP) to be implemented during 2015-19. Four work programmes are planned for this period covering:

- Revised performance standards for Integrated Navigation Systems relating to the harmonisation of bridge design and display of information;

- Guidelines for the harmonised display of navigation information received via communications equipment;
• Guidelines on standardised modes of operation (referred to as S-mode); and

• Revised general requirements for electronic navigational aids relating to ‘Built-In Integrity Testing’ for navigation equipment.

A further work item on Maritime Service Portfolios (MSP) was deferred until MSC 96 (May 2016). MSP have been identified as the means of providing electronic information in a harmonized way between shore and ships. This output proposes to harmonise the format, structure and communication channels, functional and physical links, and message formats used for exchange of that information. The input to MSC 96, supported by many national members and international organisations, should lead to an MSC Resolution providing general guidance to international organizations and service providers to develop MSP in a coordinated and harmonized manner.

In the long term and for complete harmonization of MSP and their display on board, it may be necessary to revise the requirements contained in SOLAS Chapter IV and V and some of the supporting performance standards for the relevant equipment.

Progress in IALA
At the 17th and 18th Sessions of the IALA ENAV Committee in October 2015 and March 2016 work continued on the development of standards, communication and navigation systems, Maritime Service Portfolios and product specifications for data exchange.

In December 2015 IALA held a Seminar on Maritime Digital Infrastructure and Test Beds in Gothenburg. The conclusions were:

1. Adoption of e-navigation and use of digital infrastructure depends on sound business cases with clear tangible benefits.

2. IALA should consider establishing a collaboration forum across the maritime domain including other IGO, NGO and industry, to ensure harmonious implementation of e-navigation.

3. There is merit in local and regional implementation as a means to obtain global acceptance of e-navigation solutions.

4. A coordinated, decentralized approach could be used for information sharing and service interaction between different domains.
5. The Maritime Architecture Framework can be useful for visualising different perspectives of e-navigation and their inter-relationships in the maritime domain.

6. There is a compelling need for universal identification of actors and information objects etc. to enable interoperability.

7. Cyber security issues need to be addressed.

8. IALA ENAV could consider hypothesis driven validation methodology when assessing test bed results

9. Increased visibility of themes being addressed in test beds and establishment of Special Interest Groups may enhance collaboration.

A workshop is taking place in May 2016 in Lisbon on Shore-based Maritime Services from Theory to Practical Use: Who Will Do What When. This is expected to move the MSP development process forward.

Projects & Test Beds
A repository of test beds is maintained on e-navigation.net and IALA encourages those establishing new test beds to provide information about them on that site. As part of its contribution to the EU Horizon 2020 Project EfficienSea 2, IALA is establishing links between that project and all other relevant test beds, particularly those developing e-navigation applications.

e-navigation communications
Two fundamental components are required for e-navigation to work. Resilient PNT (Positioning, Navigation and Timing) is covered in a separate article, but dependable communications are also essential. Automated reporting, route exchange, maritime safety information, virtual Aids to Navigation – almost every e-navigation solution relies on communications.

A recent report produced by the General Lighthouse Authorities and provided as an input to IALA, showed that new systems such as the VHF Data Exchange System (VDES) and Navigation Data (NAVDAT) had important roles to play in many e-navigation applications. A few applications demand very high bandwidth and would benefit from broadband via satellite, but most requirements can be met by VDES and NAVDAT, which use available maritime VHF and MF channels, respectively. The use of satellite (VSAT) based broadband is expanding, with the current number of terminals deployed rising from 20,000 today to a projected 40,000 terminals by 2020. This expansion of
use is being driven by the mariner’s requirement to be online all the time, particularly for infotainment and social media applications.

**Future Direction**
It seems likely that the ground work for implementation of e-navigation will continue in IMO, while the development and definition of MSP is progressed in parallel by IALA. Applications and solutions will be tested and demonstrated in the various test bed projects and those that offer real benefits to mariners, pilots, ship operators, ports and other stakeholders will be adopted and standardized. So e-navigation will be realized by a process of user selection, rather than top-down imposition.

**Picture caption**

*Being carried by a Trinity House engineer, a Tideland Sea Beacon 2 System 6 radar beacon or racon. This unit has been modified to provide data on location, but that is not visible.*

*Photo: ©Trinity House.*