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**IALA Guideline No. ####**

**On**

**The reporting of results**

**of**

**e-Navigation testbeds**

**Edition 1**

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Revisions to the IALA Document are to be noted in the table prior to the issue of a revised document.

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The reporting of results of e-Navigation testbeds

# INTRODUCTION

This document offers guidance on the reporting of results of e-Navigation testbeds.

# BACKGROUND

The 58th session of the IMO Sub-Committee on Safety of Navigation (NAV 58, WP 6 Rev. 1 refers) agreed to the development of guidelines for the harmonization of e-navigation testbeds.

Additionally, the e-Navigation Underway 2013 Conference (January 2013) identified the need for a body to coordinate the harmonisation of testbed results. The conference concluded that IALA could consider taking on this role and submit its results to the IMO.

Some e-Navigation testbeds, such as MARNIS[[1]](#footnote-1) and EfficienSea[[2]](#footnote-2) have already taken place. Additionally, there are a growing number of testbeds currently under way. Some examples are:

* ACCESEAS[[3]](#footnote-3) in the North Sea;
* MONALISA[[4]](#footnote-4) in the Baltic Sea;
* MONALISA 2.0[[5]](#footnote-5) across European waters; and
* The Marine Electronic Highway[[6]](#footnote-6) in the Straits of Malacca and Singapore.

# TESTBEDS

The purpose of testbeds is to test new solutions. Testbeds allow for early detection of new system functionality, areas of enhancements and identification of weaknesses. Testbeds should not be limited or restricted in any way by current or planned architecture, data structures or existing procedures.

Tests are typically conducted in a controlled environment, so that they do not adversely affect real-life situations. Test results can be gathered, analysed and conclusions drawn, for example, with regard to functionality, feasibility and risk.

As e-Navigation evolves from concept to operational reality, the importance of testbeds will continue to grow.

# harmonisation of REPORTING of Testbed RESULTs

A number of testbeds are currently being established. However, at present, there is no guidance on how the results from testbeds can be presented for sharing with the global maritime community. Therefore, IALA considers it is important to develop guidelines on the reporting of testbed results.

It is important that the results of testbeds are shared, as there will be outcomes and lessons learnt that will be useful to the maritime community. In order to do this and to allow for ready comparison of the relevant elements of testbed results (and map them to elements of the IMO e-Navigation Strategy Implementation Plan), reporting of the results of testing of e-Navigation solutions, systems and services should be harmonised.

# Benefits and scope of the guidelines

Harmonisation of the reporting of results from testbeds will allow the results of e-Navigation solutions being tested to be shared and compared. This guidance includes, but is not limited to, the following:

* Initial considerations when planning a testbed (Annex 1)
* Reporting the results of a testbed (Annex 2)

# testbed Results

For testbed results to be useful to other parties, tests/simulations/trials must have scientific rigour (with regard to, for instance, set-up, collection of data and analysis). Additionally:

* The results presented should be objective
* Trials should be reproducible
* Data gathered should be statistically sound and meet generally accepted “scientific standards”
* Test results should be presented in acceptable scientific formats (i.e. they should be suitable for publication in a peer-reviewed journal)

Harmonisation also allows future meta-analyses[[7]](#footnote-7) of specific aspects. Other organisations can recreate trials both to verify results and refine various factors within the trials, in order to further develop the concepts being trialled.

A framework has been developed by IALA (see Annex 2) that addresses the presentation of results, (i.e. a template for reporting). This can be taken into account when reporting results.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

1. CONSIDERATIONS WHEN PLANNING A TEST BED

When planning testbeds, where possible, the e-Navigation applications selected should be linked to established user requirements and targeted towards the objectives of e-Navigation. Where possible, the applications should address identified gaps in the e-Navigation gap analysis.

It is essential that tests meet an agreed standard which takes into account a structured, transparent, objective and repeatable methodology. Where the output is in the form of software tools, these should ideally be open-source, with arrangements in place for collaboration, user feedback and improvement.

## Architecture

It is advisable that, without stifling innovation, testbeds align with the IMO e-Navigation architecture and the technical and operational services in the Maritime Service Portfolio.

## User and stakeholder involvement

Testbeds should involve users and stakeholders at every stage - from planning to implementation and assessment of results.

## Human centred design principle for navigational equipment

It is advisable that navigational equipment is designed taking into account human centred design principles.

## Data structures

For results to be valuable to the development of e-Navigation, it is advisable that e-Navigation applications use a data model readily available to the e-Navigation community. Therefore, either the IHO S-100 Data Registry or another model designed for evaluation and validation should be used.

## Reference to the IMO Strategy Implementation Plan (SIP)

It is strongly advised that details of the testbed, including the outcomes and lessons learnt (in the context of, for instance, user needs, gap analysis and practical solutions in the IMO Strategy Implementation Plan (SIP)) are recorded.

## Sharing of information

Information on the progress of testbed trials should, if possible, be provided on websites that can be accessed by all interested parties. If possible, information should be provided to IALA to be posted on its e-Navigation web portal (<http://www.e-navigation.net>), and, in particular, results of trials of testbeds.

1. REPORTING TEMPLATE

The purpose of this reporting template is to serve as a harmonised framework for reporting results from e-Navigation testbeds. It is strongly advised, for the reliability and validity of testbed results and for results to be valuable to the e-Navigation development process, that as many of the suggested headings as possible are addressed when reporting results.

By reading the testbed report, other bodies should be able recreate trials both to verify results and refine various factors within the trials, in order to further develop the concepts being trialled.

**Preliminary matters**

* Name of testbed:
* Location of testbed:
* Contact person(s):
* Organisation(s):

**Executive summary**

**Terms of reference for the testbed and background**

* The type of user group/s involved in the test
  + *[Shipboard users, shore-based users and/or SAR users]*
* Details of e-navigation gap/s considered in the test (for instance as outlined in NAV 58/WP.6):
  + *Information/data management*
  + *Effective and robust voice communication and data transfer*
  + *Systems and equipment*
  + *Ship reporting*
  + *Traffic monitoring; and/or*
  + *Training and familiarization*
* Information about similar / relevant testbeds (if any)
* The category of e-navigation gap/s considered in the test:
  + *Technical*
  + *Regulatory*
  + *Operational; and/or*
  + *Training*
* The category of e-navigation solution/s considered in the test
  + *Procedure*
  + *Design; and/or*
  + *Communication*
* Details of e-navigation solution/s considered in the test (for instance as outlined in NAV 58/WP.6 Rev1):
  + *S1: Improved, harmonized and user-friendly bridge design*
  + *S2: Means for standardized and automated reporting*
  + *S3: Improved reliability, resilience and integrity of bridge equipment and navigation information*
  + *S4: Integration and presentation of available information in graphical displays received via communication equipment*
  + *S5: Information management*
  + *S6: Improved access to relevant information for Search and Rescue*
  + *S7: Improved reliability, resilience and integrity of bridge equipment and navigation information for shore-based users*
  + *S8: Improved and harmonized shore-based systems and services; and/or*
  + *S9: Improved Communication of VTS Service Portfolio*

**Testbed methodology**

* Methodology used for data collection:
  + *Method*
  + *Validity*
  + *Reliability*
* The type of user group/s involved in the test
  + *Shipboard users*
  + *Shore-based users; and/or*
  + *SAR users*
* Details of persons involved in testbed
  + *Number*
  + *Background*
  + *Experience*
  + *Demographics etc.*
* Procedure used in the test
  + *Testbed setup*
  + *Technical solutions used*
  + *Standards*
  + *Guidance documents*
  + *SOPs; etc.*

**Testbed results**

* Details of the findings:
  + *Presentation of data;*
  + *Statistics;*
  + *User-experiences; etc.*

**Conclusions and recommendations**

* Conclusions;
* Lessons learnt;
* Future plans;
  + *Own plans*
  + *Suggested studies*

**Reference material**

* List of reference material used in the test

**\*\*\*\*\*\*\*\*\*\***

1. MARNIS was an Integrated Research Project in the 6th Framework Programme of EU aimed at developing Maritime Navigation and Information Services. [↑](#footnote-ref-1)
2. EfficienSea was a Baltic Sea Region project aimed improving maritime safety and the environmental state of the Baltic Sea region, by the implementation of e-Navigation tools developed and improved with a transnational perspective. Website: www. efficiensea.org [↑](#footnote-ref-2)
3. ACCSEAS is a North Sea Region project to demonstrate how e-Navigation can assist accessibility of shipping to the region, whilst recognising the increased pressure of non-shipping use of the sea space. Website: [www.accseas.eu](http://www.accseas.eu) [↑](#footnote-ref-3)
4. MONALISA is a Motorways of the Sea project within EU, contributing to the efficient, safe and environmentally friendly maritime transport through development and demonstration of innovative e-navigation services for the shipping industry. Website: [www.monalisaproject.eu](http://www.monalisaproject.eu) [↑](#footnote-ref-4)
5. MONALISA 2.0 is a continuation of MONALISA, contributing to further improving and developing efficient, safe and environmentally friendly maritime transport in the EU by accelerating the Motorways of the Sea concept through the implementation of pilot actions. Website: [www.monalisaproject.eu](http://www.monalisaproject.eu) [↑](#footnote-ref-5)
6. The Marine Electronic Highway is a regional demonstration project aiming at enhancing maritime services, improving navigational safety and security and promoting marine environment protection and the sustainable development in the Straits of Malacca and Singapore. [↑](#footnote-ref-6)
7. Meta-analyses are when results from a great number of experiments / tests are gathered, compared and trends, if any, analysed. A single experiment or test usually only offers limited information on a specific question / hypothesis; meta-analyses, however, can paint a bigger picture. [↑](#footnote-ref-7)