 Working Paper ENAV15- 14.2.1

E-Navigation Lessons Learnt Process

Testbeds-in-the-Loop

# Summary

The purpose of this document is to describe the “e-Navigation Lessons Learnt (eNaLL)” process to collect, exchange, and consolidate experiences from existing and (currently) emerging e-Navigation testbeds. The consolidated experiences from this eNaLL process are supposed to form a feedback loop on the implementation on e-Navigation solutions and will be the basis to provide guidance for the implementation and / or revision of e-Navigation concepts and solutions.

## Purpose of the document

E-Navigation testbeds are the major means to assess and conduct proof-of-concepts for the e-Navigation concepts that have been developed so far and to be developed. The experiences gathered from the testbeds can and should be the basis for a “Testbed-in-the-loop (TITL)” approach that guides further testbed activities and implementation of e-Navigation solutions.

The proposed process needs to be reviewed and released by the Committee and then will be the basis to conduct the lessons learnt from testbeds.

## Related documents

[IALA Guideline No. 1107 on The Reporting of Results of e-Navigation Testbeds, Edition 1, December 2013](http://www.e-navigation.net/uploads/Reporting%20of%20results%20of%20e-Navigation%20testbeds%201107%20(PDF%20en).pdf)

This template will be the basis for the information collection from testbeds.

# Background

The ENAV committee has identified the need to establish a structured process to learn from the experience made in e-Navigation testbeds.

Benefits of the process will be the harmonization of testbed activities, improved interoperability and cooperation of testbeds as well as support of the implementation of e-Navigation solutions.

This document is based on the experiences from testbeds so far including academic and industrial perspectives.

# Discussion

## Inputs to the Process

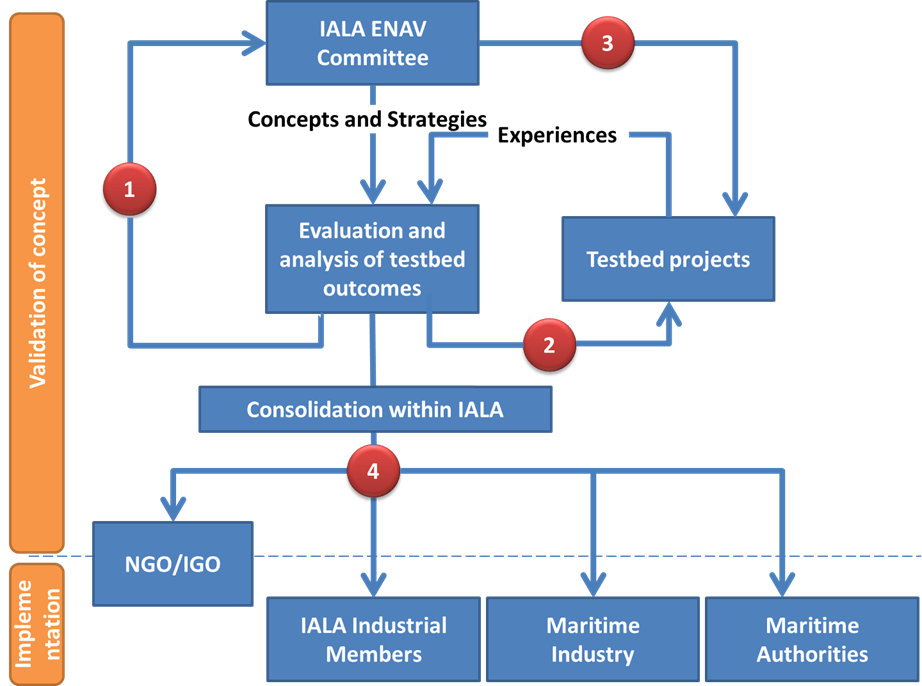
Inputs to the eNaLL process are information and experiences from testbeds. Considered testbeds are those currently listed on the e-navigation.net web pages as well as the following not yet listed testbeds\*: SENA (SESAM, STMS), TICON, SMART Shipping, BLAST, MARNIS, ST LAWRENCE SEAWAY, Under Keel Clearence Management System in Torres Strait Australia, DUBLIN BAY DIGITAL DIAMOND, MONALISA 2.0, MICE, ICE-NAVIGATION IN POLAR REGIONS (RUSSIA), and SMART-Nav (KOREA).

\*Some of the above testbeds are now operational services.

\*\* Current list of known testbeds is available at [www.e-navigation.net](http://www.e-navigation.net).

## Outputs of the Process

The expected outputs of the process as well as the receiving parties are shown in the following figure:



1. Expected Outputs of e-Navigation Lessons Learnt process

\*\*\* Authorities and services providers needs to be add to the diagram

\*\*\*\* Before 4) activities for consolidation of the guidance within IALA are required.

IALA/IMO 🡪 IALA

Legend to Figure 1:

1. **Feedback from testbed to IALA/IMO ENAV:**

* Uniform/structure information on ~15 testbeds on e-navigation.net, compiled report
* Analysis on “coverage” of ENAV concepts by testbed
* Identified deviations from ENAV concepts and reasons
* Preliminary Hazard List (PHL) for MSPs
* Request to change/correct ENAV concepts
* Draft standard of operational concept of selected ENAV services
* Common issues with implementation of ENAV concepts
* Common positive results from implementation of ENAV concepts

PHL needs to be explained.

1. **Feedback for the new testbed instances:**
   * Best practices accumulated from feedback from testbeds
   * Common issues with implementation of e-Navigation concepts
   * Common positive results from implementation of e-Navigation concepts
2. **Inputs for the evaluation and analysis of testbeds:**

* Items to be addressed by testbed
* Communication/collaboration tools for use between testbeds
* Guidance to testbed (implementation/operation/maintenance)
* Guideline on CMDS and architecture of testbeds for realizing MSP 1-16
* Guideline on interoperability aspects of testbeds
* Guideline for seamless transition from simulation to physical tests

1. **Input for implementation stakeholders:**

* Circulars to IALA Industrial Members
* Inputs to NGO/IGO
* Requirements for selected ENAV solutions

## Steps, Responsibilities and Timeline of the eNaLL process

The proposed process consists of the following steps:

1. Prepare the process for identify if the testbed is sufficiently related to e-Navigation or not(until: 30/11/2014, responsible: ??)
2. Prepare the template for collecting inputs from testbeds (until: 30/11/2014, responsible: ??)
   1. Define success criteria and metrics to measure success for the overall eNaLL process
   2. Review released template [IALA Guideline No. 1107 on The Reporting of Results of e-Navigation Testbeds, Edition 1, December 2013](http://www.e-navigation.net/uploads/Reporting%20of%20results%20of%20e-Navigation%20testbeds%201107%20(PDF%20en).pdf) – possibly extend it if additional aspects are identified that should be collected from the testbeds
   3. Aspects to be covered by the template are experiences/issues/feedback concerning:
      1. CMDS – Common Maritime Data Structure
      2. Architecture (of the testbeds and of eNAV solutions realized in the testbeds)
      3. Communication
      4. Resilience of PNT
      5. Services (from Maritime Service Portfolio 1-16) – technical, operational, safety, legal, training aspects
      6. Transition from simulation to physical testbed
      7. Big Data approaches – also as basis for lead indicators to assess safety improvements in maritime traffic by eNAV approaches (e.g. collection of near-misses/near-groundings)
      8. <any other?>
3. Perform a trial information collection to refine process and information collection (until: 31/12/2014, responsible: ?)
   1. Candidates for trial information collection:
      1. MonaLisa 1.0 (contact: Anders Brodje) – placeholder for a completed testbed
      2. SMART-Nav (contact: Jin Hyoung Park) – placeholder for running testbed
      3. eMIR (contact: Michael Siegel) – placeholder for an emerging testbed
   2. use template version 0.9 for information collection
   3. incorporate feedback from trial information collection to provide improved template version v1.0
   4. provide collected, consolidated information from MonaLisa, Korean testbed and eMIR on [www.e-navigation.net](http://www.e-navigation.net) as example for subsequent testbed owners that will fill in the information collection template version 1.0
4. Define collaboration infrastructure to establish a testbed community for experience exchange between testbeds to support the eNaLL process (until: 31/1/2015, responsible: ?)
5. Information collection from testbeds (until: 28/2/2015, responsible: ?)
   1. Use template v1.0
   2. Consolidate provided feedback
6. Analyse collected information - identify the common/repeatable issues/improvements (until: 31/3/2015, responsible: ?)
7. Discuss analysis results in F2F meetings with representatives from the testbeds (option: Asian Pacific eNAV Conference in April 2015)
8. Elaborate eNaLL reports, guidelines, etc. (see section “Outputs of process”) (until: 31/8/2015, responsible: ?)
9. Align results of the process with IALA (until: 31/10/2015, responsible: ?)
10. Disseminate results (until: 31/12/2015, responsible: ??)
11. Iterate process (start: 1/1/2016)

# References

1. Please add details
2. ..........

# Action requested of the Committee

The Committee is requested to:

1. Revised and approve process (incl. suggested timeline)
2. Assign responsibilities for the individual process steps
3. Announce the process to relevant stakeholders of testbeds
4. ........
5. Annex Heading 1
   1. Annex heading 2
      1. Annex heading 3
6. ........
7. Appendix heading 1
   1. Appendix heading 2
      1. Appendix heading 3