e-NAV14 Working paper

Agenda item 8.1

Task Number 1

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Software Quality Assurance for onshore systems

# Summary

The paper explains why Software Quality Assurance (SQA) is fundamental for the success of e-Navigation, why IALA has to produce its own requirements for onshore systems SQA, and a suggested solution(s) to developed by IALA and be submitted to IMO for their introduction in IMO regulations.

## Purpose of the document

The Committee should create a new task to define the SQA requirements or onshore systems, taking into account the parallel progress of SQA in IMO for shipborne systems.

## Related documents

1. NAV 58 - 14 - REPORT TO THE MARITIME SAFETY COMMITTEE
2. NAV 58/6/4 - Consideration of software quality assurance issues for e-Navigation development Submitted by the Republic of Korea
3. e-NAV13/45 – Software Quality assurance for Onshore Systems submitted by Yves Desnoës
4. e-NAV 13/40 - Software Quality assurance for Onshore Systems submitted by Nick Ward

# Background

Software Quality Assurance (SQA) has been recognized by the NAV sub-committee of IMO (NAV 58/WP.1) as an important element of e-Navigation and the Correspondence Group on e-Navigation has been tasked to “consider the issue of software quality assurance, taking into account document NAV 58/6/4, and provide comments and recommendations, as appropriate”. This last document gives a very good presentation of SQA, which will not be repeated here. Very briefly, SQA deals with all aspects of software development, validation, maintenance and life-cycle, including reliability, safety, availability, security and integrity.

As e-Navigation covers shore systems as well as ship systems, SQA impacts directly the activities of IALA and of its members. It is thus necessary for IALA to determine how SQA will be applied in systems under its supervision.

# Discussion

SQA is one of the tools necessary to simplify the IMO standardization process: when the adequate quality of a piece of software is demonstrable and demonstrated, it is no more necessary to specify the details of how this piece of software must perform[[1]](#footnote-1); this assurance of quality then allows the developers to introduce new products or to modify existing products without new standards (but with new validation), thus facilitating innovation and maintenance. SQA is not a burden; it alleviates recognized existing limitations of maritime standards for equipment and systems.

Software may be found in all solutions of e-Navigation[[2]](#footnote-2) and the quantity of software will increase with automation and with inter-connectivity, characteristics which tend to decrease reliability. If software quality is not improved with respect to the present situation (requirements for such an improvement must be expressed by verifiable standards), e-Navigation will have missed the target in its first version and the cost of improving it later will be higher than tackling the issue head-on.

SQA entails a number of activities for which specific requirements will have to be standardized, including activities contributing to the development and maintenance of software as well as activities contributing to the verification that the requirements are fulfilled. The conditions being different aboard and onshore, the requirements should be different, and adapted to the characteristics of the various systems. However, SQA requirements for shipborne systems and for onshore systems should be coherent: for instance, the need for high reliability of information onshore should correspond to such a need on-board.

For the sake of cost optimization, it is thus fundamental that the SQA requirements for onshore systems be adapted to each of those systems and not considered as identical to the SQA requirements for shipborne systems. Only IALA and IALA members can produce such requirements.

# Potential solutions

Software quality is covered by two related multipart International Standards: ISO/IEC 9126 (Software product quality) and ISO/IEC 14598 (Software product evaluation). The ISO 25xxx series has been created to provide a logically organized and unified series covering two main processes: software quality requirements specification and software quality evaluation, supported by a software quality measurement process.

ISO 25010 deals with Software Quality Models and is necessarily of a general, high-level nature. However, it contains material that could be useful in discussions about the software quality requirements for e-Navigation. In particular sections concerning quality models and measurement, user requirements, terms and definitions could provide useful references.

Consideration should also be given to:

* Compatibility with quality standards for shipboard systems
* Compatibility with the IHO S-100 Data Model
* Current IMO eNav CG work being done on ‘Usability and Software Quality’

# References

1. NAV 58 - 14 - REPORT TO THE MARITIME SAFETY COMMITTEE
2. NAV 58/6/4 - Consideration of software quality assurance issues for e-navigation development Submitted by the Republic of Korea

# Action requested of the Committee

The Committee is requested to consider creating a new task to define the requirements for SQA for onshore systems, taking into account the parallel progress of SQA in IMO for shipborne systems.

1. In particular, external tests performed for validation of the final systems can be simplified when the quality of the systems has been verified. [↑](#footnote-ref-1)
2. We may observe that most solutions are in fact based on new software. [↑](#footnote-ref-2)