

**David Patraiko**

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**From:** David Patraiko  
**Sent:** 22 January 2012 18:32  
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**Subject:** NI eNav Usability WS Report  
**Attachments:** NI eNav Usability WS Report.doc

Dear John Erik,

Attached is the report from the Nautical Institute eNavigation Usability Workshop held in Malmo from 20-21 January 2012.

We all thank you for your presentation and contribution to this event.

The report highlights some of the key issues that we discussed with reference to eNav being Usable, however when the group discussed the mechanism that might enable eNav to continually improve and mitigate risks, we naturally focussed on the ISM Code for the ship side and recommended something similar for the shore side.

We strongly recommend a framework of guidance within the ISM Code, but recognise that for usability to be adequately addressed, further guidance will need to be developed within the eNav strategic development plan.

With reference to your report to the STW 43 Sub-Committee, you might consider identifying the needs for crews and shore personnel to have the knowledge and competency to ensure that any software based systems are continually updated, and that all users are familiar with such updates.

We very much hope that our observations and recommendations will contribute to the successful development of the IMO eNav initiative.

Best regards,

David

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## **Nautical Institute e-Navigation Usability Workshop**

**20-21 January 2012 - Malmo**

### **Introduction:**

In order to further support the debate on usability within the context of the developing IMO e-Navigation initiative The Nautical Institute (NI), encouraged by a number of administrations and organisations, co-ordinated a workshop on the subject. The workshop was hosted by the Swedish Branch of the NI and was held at the World Maritime University (WMU) in Malmo from 20-21 January 2012.

The objectives were to bring together experts in the fields of Human Factors, Human Element and navigation / VTS specialists to discuss various e-Navigation usability documents, to explore how usability was addressed in other industries and to make recommendations to the IMO e-Navigation Correspondence Group.

In attendance were:

| Name                      | Organisation  |
|---------------------------|---|
| David Patraiko (Chairman) | The Nautical Institute  |
| Jens Schröder-Hinrichs    | The NI – Swedish Branch Chairman                                |
| Thomas Porathe            | Chalmers University of Technology                               |
| Jonathan Earthy           | Lloyd's Register  |
| Hugh Phillips             | UK Hydrographic Organisation                                    |
| Dimitris Lyras            | Ulysses Systems UK LTD  |
| Michael Bergmann          | Jeppesen Gmbh   |
| Akihiro Ban               | Ministry of Land, Infrastructure, Transport and Tourism - Japan |
| Nick Lemon                | Australian Maritime Safety Authority                            |
| Yasuyuki Niwa             | National Maritime Research Institute – Japan                    |
| Mads Bentzen              | Danish Maritime Authority                                       |
| Sun Young Kim             | Korea Ocean Research & Development Institute                    |
| Malin Dreijer             | Norwegian Coastal Administration                                |
| John Erik Hagen (Briefly) | Norwegian Coastal Administration                                |
| Margareta Lutzhoft        | Chalmers University of Technology                               |
| Jung Sik Jeong            | MOKPO National Maritime University                              |
| Antonio Di Lieto          | Australian Maritime College                                     |
| David Blevins             | Northrop Grummans Corp  |
| Michael Baldauf           | World Maritime University                                       |

The workshop opened with a welcome presentation by the President of the World Maritime University, followed by a welcome by the Chairman of the Nautical Institute Swedish Branch.

Mr Hagen from the NCA, and Chairman of the IMO e-Navigation Correspondence Group (CG) then gave an introductory presentation on the importance of the Human

Element and issues of usability within the development of e-Navigation. Mr Hagen was then called away by other business.

Following was a series of presentations on a variety of aspects concerning usability and the Human Element and much discussion focused on how these aspects could be managed to ensure the goals of e-Navigation to ultimately improve navigation safety. Some of the key issues discussed were as follows.

### **Key issues**

1. After discussing the scope of 'usability' it was suggested that the goal is an acceptable user experience, the process is human centred design, the measure is usability (quality in use) and the outcome is improved safety of navigation.
2. It was commented that the natural human reactions are 'fight or flight' and that to achieve usable navigation, systems need a focused emphasis on human centred design.
3. Before usability can be designed or assessed, the context of use must be defined. Context of use consists of: users' characteristics, their goals, tasks, physical environment, social and management environment and other associated equipment.
4. Tests for usability should not only address the ability to demonstrate the operation of the system, but the ability to solve operational problems in suitably realistic but demanding and complex conditions.
5. There is a need to address usability at several levels, including equipment level (little usability) and at the higher level utilising all systems and services and including the ship and shore interface (big usability).
6. If an overarching e-Navigation performance standard for e- (which has been suggested elsewhere) is developed, it should address issues of design and usability.
7. Following a discussion concerning SOLAS V/15, it was suggested that it is constrained from fully meeting its potential as a usability tool, due to the prescriptive nature of subordinate performance standards.
8. It was discussed that there are aspects of current performance standards that limit the ability of current technology to continually improve to meet evolving needs. This issue should be addressed in the development of e-.
9. Goal based standards may be needed to ensure continued useability based on the encouragement of innovation.
10. A proposal from Australia for a refined IMO HEAP process, tailored to e-Navigation was reviewed and it was agreed that this process could be of value in the development of e-navigation.
11. A proposal from Japan on developing guidance for usability evaluation (Nav 57/ Inf.7&8) was reviewed, and it was agreed that this could be a valuable tool for assessing effective usability within e-Navigation.
12. Achieving good usability in e-Navigation is not just about assessment, it is about following good practices during product development, understanding user needs and applying existing ergonomic knowledge.
13. Existing ISO general industry usability standards were identified as being applicable for use in e-Navigation, as being able to provide a framework or

template for the development and testing of systems for usability. Greater use of these standards should be actively encouraged.

14. ISO standards also exist detailing good practice in the specification and development of systems and software, and their use should be encouraged.
15. It was noted that in the case of critical systems, hidden logic must be understood by the users and that users must be able to effectively interrupt automatic functions.
16. It was suggested that an agreed level or benchmark for the time taken to achieve user 'familiarisation' for e-Navigation systems needs to be set as part of any usability assessment.
17. The achievement of 'usability' within the development of e-Navigation will be evolutionary and part of continuous improvement processes.
18. System updates are required to maintain usability and continual improvement and should be part of any e-Navigation strategy.
19. Those responsible for purchasing navigation systems in the marine industry are not always those who use and best understand the systems. There has been a tendency for systems and equipment to be acquired based on price and mandate, and this can be detrimental to the best practice for safe navigation.
20. It was noted that the responsibility for ensuring usability should be shared between the ship and shore operating organisations, the manufacturers and any service providers.
21. e-Navigation systems are more than just INS (onboard) and VTS or other shore based systems. e-Navigation systems are an amalgamation of hardware, software, data, information and services and need to be managed holistically.
22. The effectiveness of current type approval processes should be evaluated within the development of e-Navigation to ensure future type approval process takes into account usability and continual improvement.

### **Recommendations to the IMO e-Navigation Correspondence Group:**

It was agreed that the compelling need to develop e-Navigation as defined by the IMO in order to enhance navigational safety offered great potential benefits. However it was identified that, as with all change, there is a need to ensure continual improvement and to identify and mitigate risk.

Ensuring the continual improvement of 'usability' is a critical aspect of this process, but is in fact just one of several critical aspects that need to be under continual review. Other critical aspects within e-Navigation will at least include the quality of data, system resilience, and interoperability etc...

e-Navigation will need a mechanism for addressing continual improvement and risk mitigation for both ship and shore domains. It is suggested that a framework of e-Navigation critical issues should be established and that guidance on how to identify and mitigate risk in these areas be developed. Such guidance should include (but not be limited to) advice on ensuring usability, purchasing and maintaining systems, identifying and meeting competencies for use, and establishing contingency plans.

Recognising the value of the ISM Code in ensuring continual improvement and risk mitigation for shipping operations, it is recommended that the ISM Code might be the right mechanism for achieving this essential task for ships.

Consideration should also be given to identifying similar and suitable international guidance to assist national administrations to identify and mitigate such risks ashore as part of their national e-Navigation strategies.