



## **e-NAVIGATION UNDERWAY 2014 CONFERENCE REPORT Final Report**

### **EXECUTIVE SUMMARY**

The fourth e-Navigation Underway conference was held from 28 – 30 January, 2014 on board the DFDS ferry M/S PEARL SEAWAYS, during which time she sailed from Copenhagen to Oslo and then returned to Copenhagen. The conference was attended by 173 delegates, representing 30 countries and 110 organisations. The associated exhibition attracted 8 exhibitors, displaying the latest developments in e-Navigation.

Following welcoming remarks from the Director-General of the Danish Maritime Authority (DMA), Andreas Nordseth and the Secretary-General of the International Association of Marine Aids to Navigation (IALA), Gary Prosser, the conference chairman Omar Frits Eriksson set the scene and a key note speech was given by the Director Marine of the International Chamber of Shipping (ICS).

A Memorandum of Understanding was signed between the Danish Maritime Association, the Swedish Maritime Association and the Ministry of Oceans and Fisheries of the Republic of Korea regarding the establishment and use of a global e-navigation bed.

A series of 29 presentations were given under the following broad headings:

- Strategic views;
- Diving into the details
  - Advanced contemporary solutions;
  - e-Navigation at large;
  - Regional efforts and issues;
  - Tomorrows possibilities;
  - The way forward.

The conference ended with a panel discussion and an invitation to e-Navigation Underway – North America in April 2014.

A summary of ten conference conclusions is available in section 10.

The inaugural e-Navigation Underway (North America) Conference to be held on April 3rd and 4th April, 2014 at the California Maritime Academy in Vallejo, CA, USA was noted.

The presentations and videos of the sessions are provided on the e-navigation.net web site.



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## **e-Navigation Underway 2014**

### **1 INTRODUCTION**

The fourth e-Navigation Underway conference was held from 28 – 30 January, 2014 on board the DFDS ferry M/S PEARL SEAWAYS, which during that time sailed from Copenhagen to Oslo and then back to Copenhagen, experiencing fair weather. The conference was attended by 173 delegates, representing 30 countries and 110 organisations. The associated exhibition attracted 8 exhibitors, displaying the latest developments in e-Navigation.

A list of participants is at ANNEX A.

All presentations can be found at <http://www.e-navigation.net/index.php?page=presentations-2014>

#### **1.1 Welcome by Mr Andreas Nordseth – Director General of the Danish Maritime Authority (DMA)**

Mr. Andreas Nordseth welcomed the participants to the 4<sup>th</sup> e-Navigation Underway conference. Focus will be on waypoints beyond the strategy implementation plan (SIP).

Noting the record attendance at the Conference, he commented on the importance of the event to the global e-Navigation community and the move from an abstract conceptual view of e-Navigation to a more practical execution phase. A number of important milestones such as the IMO Strategic Implementation Plan (SIP) and the Common Reference Implementation were mentioned.

The signing of a Memorandum of Understanding (MoU) at the Conference is an important milestone in establishing a global test bed and will reap benefits in terms of maritime safety and protection of the marine environment as well as lean efficient operations leading to reduced workload on-board and ashore. The Arctic Web is a simple but effective system for exchange of information between all vessels in range.

The full presentation is available at <http://www.e-navigation.net/index.php?page=conference-opening-welcome-address>

### **2 OPENING OF THE CONFERENCE**

#### **2.1 Welcome by Mr Gary Prosser – Secretary-General of the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)**

Following on from the welcome made by Andreas Nordseth, Mr Gary Prosser, Secretary-General of IALA, also relayed his welcome to the attendees at the Conference. He noted that he has attended all the e-Navigation Underway events. Mr Prosser thanked the DMA and supporting organizations for organizing the event. He commented on the success of the e-Navigation Conferences and that yet again, the event had managed to attract the best of the world's experts on this important topic for the future of Navigation Safety worldwide.

Mr Prosser stated that 2014 would be a milestone year for e-Navigation with the release of the IMO Strategy Implementation Plan for e-Navigation and reiterated IALA's intention to play a prominent role in further enhancing e-Navigation development. He noted the recently approved IALA 12 year strategy which will strongly support the development of e-Navigation.

In relation to milestone e-Navigation events for 2014, Mr Prosser informed the attendees of the Conference about the valuable 2<sup>nd</sup> Global e-Navigation workshop that had been hosted the preceding day by the Danish Maritime Authority and initiated by the Korea Research Institute of Ships and Ocean Engineering (KRISO).

He welcomed the signing of a new Memorandum of Understanding (MoU) between Denmark, Korea and Sweden establishing a framework for a global e-Navigation test bed, noting that it is a small step for mariners and a giant leap for e-Navigation.

The full presentation is available at <http://www.e-navigation.net/index.php?page=conference-opening-welcome-address>

## **2.2 Signature Ceremony on the establishment of a global e-navigation test bed - Secretary-General of the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)**

As an important next step in establishing global e-Navigation test beds, there was a signing ceremony on a new Memorandum of Understanding (MoU) between Denmark, Korea and Sweden on further work to be conducted on establishing a framework for a global e-Navigation test bed. It was stated that this will pave the way for a more practical level of cooperation to provide lean, efficient and safe navigation and will make a great contribution to testing the efficiency and safety of e-Navigation.

The MoU was signed by Mr Jae Hak Son, Vice Minister, Korean Ministry of Oceans and Fisheries, Mr Peter Fyrby, Director Research and Innovation, Swedish Maritime Administration, Mr Andreas Nordseth, Director General, Danish Maritime Authority. Conference participants and regions were invited to join the forum.

A video of the signing ceremony and a presentation of the MoU is available at

<http://www.e-navigation.net/index.php?page=signature-ceremony-on-the-establishment-of-a-global-e-navigation-test-bed-2>

## **2.3 Setting the scene – Mr Ómar Frits Eriksson, DMA and conference chairman**

Mr Omar Frits Eriksson welcomed the audience, seeing many familiar, but also new faces, and took the participants through the practicalities, including an invitation to provide questions for the panel discussion at the end of the conference.

He also noted that all the presentations are being filmed, and if any of the speakers were uncomfortable with the presentation and video to be put on the internet, they were welcome to request that the material not be made available online. He invited attendees to contribute to twitter at hash tag #eNav14.

He recalled receiving an important letter from the UK department of Transport on February 21<sup>st</sup> 2005 discussing a window of opportunity for marine e-Navigation. It was an invitation for discussion of a vision of e-Navigation, what is it, why is it needed and a suggested aim to replicate what had been achieved in the aviation industry. It had been mentioned that no new technologies were needed to implement a lot of advanced information services, but common standards and protocols were at the heart of the process.

It was envisaged at the time that achieving a fully viable system would probably take years. However the SIP is now available, authorities are ready, ship owners are looking for benefits and the needs of stakeholders rather than users are being considered, indicating that e-Navigation is getting there.

The full presentation is available at <http://www.e-navigation.net/index.php?page=setting-the-scene-2>

## **2.4 Key Note Speech: e-nav ... where are we going? – Mr Andy Winbow, Director of Maritime Safety Division, IMO**

Mr Andy Winbow posed the questions “where were we?”, “where are we now?”, and “where are we going?” He recalled the traditional methods of navigation using compass, chart, sextant and pencil, the evolution to echo sounder, X-band radar, Loran-C and Decca and eventually to e-Navigation. He noted the increase in maritime cargo carried from 8000m tons in 1970s to 8000m tons today. The number of ship has doubled in that time but the number of accidents has remained steady at 30%.

Considering the present status, he commented on the IMO NAV and COMSAR sub-committees after MSC81 and the five prioritised e-Navigation solutions from the IMO Correspondence Group.

He noted the importance of training on the IMO strategy and advocated that the human should be at the centre of e-Navigation development.

Considering the future he questioned if progress is on the correct path and warned against repeating the errors of the past. He felt that the key issues were training, seamless communications and focus on use of data rather than more data.

The full presentation is available at <http://www.e-navigation.net/index.php?page=key-note-e-nav-where-are-we-going>

## Themed Sessions

Six themed technical sessions were held.

### 3 THEME 1 – e-NAVIGATION: STRATEGIC VIEWS

Chair: Mr Ómar Frits Eriksson, DMA

#### 3.1 IALA's leading technical role in e-Navigation: After the SIP

3.1.1 Presenter and author

Mr Michael Card, Deputy Secretary-General of the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)

3.1.2 Abstract

Michael Card, Deputy Secretary-General of IALA, described the work that had been carried out by IALA during 2013, leading to the creation of a new strategic plan for the period 2014-2026. He described the components of the plan which were directly linked to the development of e-Navigation.

The work priorities for IALA for e-Navigation for the next four years to 2018 were described and linked to the Solutions in the draft IMO Strategic Implementation Plan. He then reviewed the tasks for the IALA ENAV Committee to 2018, covering shore infrastructure, PNT, data modelling, communications, and Maritime Service Portfolios. The work on the VDES communications plan was explained, and also the role of IALA within the Far East Radio Navigation Service.

IALA's leadership in Vessel Traffic Services was noted, and it was expected that some convergence of IALA's e-Nav and VTS activity may be expected within IALA as 2018 approaches, especially given the effect of projects such as MonaLisa 2.0.

The address concluded with a description of the technical domains which will define the work of the IALA ENAV and VTS Committees for the next four years, and an indication of meeting dates for 2014.

The full presentation is available at <http://www.e-navigation.net/index.php?page=iala-s-leading-technical-role-in-e-navigation-after-the-sip>

#### 3.2 Benefits from e-navigation in terms of shipping communities

3.2.1 Presenter and author

Mr John Murray, Director Marine, ICS.

3.2.2 Abstract

Mr Murray observed that the e-Navigation community may be at a cross roads and may not be globally supported at present. After five years there are no standards and many administrations are not engaged. The challenge is therefore to deliver on standards and procedures. He advocated that IMO carriage requirements for new systems should only apply to new vessels and different equipment should be accepted on old ship under a "grandfather clause". There is also a need for

integration and harmonisation of equipment with older shore systems. There is a need for global compatibility between on-board and ashore system.

Noting that accident investigations often conclude that watchkeepers are at fault, this is mainly caused by distraction or confusion, emphasizing the need to retain the skills of watchkeepers while simplifying displays. In simulator tests, ECDIS navigation has given rise to more groundings than navigation using paper charts.

He argued that e-Navigation should be defined by the IMO S-100 framework. More work is needed to provide e-Navigation bearing in mind the need to deliver cost saving, quality, reliable and safe systems at reasonable cost.

The full presentation is available at <http://www.e-navigation.net/index.php?page=benefits-from-e-navigation-in-terms-of-shipping-communities>

### 3.2.3 General discussion

Responding to a question re satellite communications, three satellite AIS projects were described. The capability of satellite AIS was demonstrated by monitoring vessels through the NW passage and providing information on a sinking vessel outside the range of terrestrial AIS.

Responding to a question regarding IMO GMDSS improvement plans, it was stated that this could be addressed at the next NCSR meeting but input is required.

A video of the discussion is available at <http://www.e-navigation.net/index.php?page=day-1-session-1-discussion>

## 3.3 Can e-navigation be implemented in the real world?

### 3.3.1 Presenter and author

Mr Lars Robert Pedersen, Deputy Secretary General, BIMCO.

### 3.3.2 Abstract

Mr Pedersen presented argued that sailing is not like flying from a navigation management standpoint because of the free movement rights afforded maritime traffic under UNCLOS, the frequency of maritime destination changes en-route, the confined nature of marine traffic routes. Further constraints arise from 70,000 legacy ships that would need to be reequipped. He considered that e-Navigation supplements and supports on-board decision making.

He advocated a principle of think big/ think small in which vessel traffic control (VTC) could be successfully applied to small areas such as the Malacca straits but not to global waters. The Single Window is fragmented from port to port, from country to country and from administration to administration. Port clearance remains inefficient. He suggested that automation of ETA information would allow just-in-time arrival at destination by slow sailing providing overall cost savings.

A number of areas of concern were considered and put forward a wish list of future easy deliverables.

The full presentation is available at <http://www.e-navigation.net/index.php?page=can-e-navigation-be-implemented-in-the-real-world>

## 3.4 The ship, The people, The equipment - Ensuring integration for the right reason

### 3.4.1 Presenter and author

Mr Phillip Belcher, Marine Director, INTERTANKO

### 3.4.2 Abstract

Mr Belcher considered the human aspect of e-Navigation, raising questions regarding “what do we want, why do we want it, when do we want it and what do we do if things go wrong?”. He noted

that 80% of accidents arise because of human error and this could be considered as 100% since all accidents had their origins in human activity at some level.

He discussed compliance with regulations culture and felt that there is a need to go beyond mere compliance. He advocated the use of S-mode, making an analogy with road car design. He concluded by suggesting that the seafarer should be considered as an asset.

The full presentation is available at <http://www.e-navigation.net/index.php?page=the-ship-the-people-the-equipment-ensuring-integration-for-the-right-reason>

#### 3.4.3 General Discussion

A video of the discussion is available at <http://www.e-navigation.net/index.php?page=day-1-session-2-discussion-2>

### 3.1 European Initiatives on Simplifications of Port Processes

#### 3.1.1 Presenter and author

Mr Markku Mylly, Executive Director, European Maritime Safety Agency.

#### 3.1.2 Abstract

Mr Mylly addressed the simplification of administrative procedures for maritime transport as an important step, not only because it reduces the costs of maritime transport, which is used to deliver a high percentage of goods to, from and between EU Member States, but also because maritime transport is considered as a cleaner and safer mode of transport. To cater for these business requirements the European Union has embarked on several initiatives to simplify the administrative procedures encountered by ships in ports.

One of the main measures adopted, to reduce the administrative burdens for ship operators, was Directive 2010/65/EU of the European Parliament and of the Council of 20 October 2010 on reporting formalities for ships arriving in and/or departing from ports of the Member States. Some of the larger ports do have advanced electronic systems for receiving information from ships, but these systems do not cover all the reporting formalities mentioned in the Directive. On the other hand, the smaller ports are often inadequately equipped with electronic data transmission systems. To resolve these problems the Directive requires Member States to accept the transmission of reporting formalities in electronic format via a single window by 1 June 2015.

He identified another challenge of how to build on what already exists in order to avoid major changes. Harmonisation of reporting formalities at EU level is a crucial point for the shipping industry because if the different Member States share the information between them then the shipping operators do not need to resend the same information every time their ships call in EU ports.

The Blue Belt concept, developed in 2011, is another measure which envisages an environment where ships can operate freely within the EU internal market with a minimum of administrative burden and in which safety, security and environmental protection as well as customs and tax revenues are ensured by an optimal use of existing capabilities to monitor maritime transport and the cargo concerned. 250 vessels participated and reported via SafeSeaNet. However legal issues blocked simplification of administrative procedures.

A further initiative is the development of an e-Maritime environment which envisages the use of electronic information for improving efficiency and reducing administrative burden along the transport chain.

The full presentation is available at <http://www.e-navigation.net/index.php?page=european-initiatives-on-simplifications-of-port-processes>

### **3.2 e-Navigation NOW. The Arctic case**

#### **3.2.1 Presenter and author**

Mr Francis Zachariae, Deputy Director, Danish Maritime Authority

#### **3.2.2 Abstract**

Mr Zachariae postulated that e-Navigation is not a new concept, as it has been used for many years by NATO forces in the Atlantic. He noted the need for traffic control in waters such as the Danish strait where there are 70,000 transits annually and the Greenland coast of 40,000km which is used frequently by tourist liners. He recalled the absence of emergency response capability on the Greenland coast due to its nature and extent.

Noting that it the DMA had developed a tool to assist safe shipping in Greenland waters, he described the Greenland legislation which includes mandatory pilotage. He presented a detailed description of the Arctic Web, noting that 10-15 ships are using the system and communications is via three satellites, 2 commercial and 1 DMA provided satellite. Access is available on the internet using password available from the DMA.

The full presentation is available at <http://www.e-navigation.net/index.php?page=e-navigation-now-the-arctic-case>

### **3.3 Engaging users during implementation**

#### **3.3.1 Presenter and author**

Mr David Patraiko, Director of Projects, The Nautical Institute

#### **3.3.2 Abstract**

David Patraiko FNI, Director of Projects for The Nautical Institute and long time member of the eNavigation community presented the issue of how to keep users engaged during the implementation of eNavigation. Mr Patraiko outlined the predicted benefits of e-Nav based upon five prioritised solutions, and speculated on the application of Murphy's Law – what happens when inevitably something goes wrong with Bridge design, automated reporting, improved reliability, etc.

How will users, either on board or ashore, recognise and report faults? The proposed e-Nav Human Centred Design (HCD) process calls for a continual process for improvement, but how will this happen in practice? Mr Patraiko speculated on how this may be practiced, he outlined a range of options such as easy screen grabs with voice reporting, and delivery options of the VDR, Manufacturer, Flag or an Industry reporting centre.

In conclusion, he suggested that the eNav SIP recognise the need for a 'user feedback facility' and perhaps goes further to identify stakeholders and operational practices.

The full presentation is available at <http://www.e-navigation.net/index.php?page=engaging-users-during-implementation>

### **3.4 Need for Capacity Building in the Development of eNavigation and Activities in Asia and Pacific Region**

#### **3.4.1 Presenter and author**

Mr Bekir Sitki Ustaoglu, Head of Asia Pacific Section, Technical Cooperation Division, IMO.

#### **3.4.2 Abstract**

Mr Ustaoglu note development of e-navigation work has been going on at IMO since 2006 and SIP will be finalised at the ninety-third session of MSC in May 2014. However, for a global implementation human element perspective – which may be called “the other side of the coin” of e-navigation, to differentiate from the very strong technical component should be adequately addressed without any further delay. This includes capacity building support for those who will be involved ashore as well as those are onboard who should be the first in line to benefit from e-navigation.

There is a need for a holistic approach of standardisation, interoperability and seamless transfer of information. Noting the role of IALA in supporting the World Wide Academy (WWA), he described collaborative projects between IMO, IHO and IALA in various capacity building projects and identified a number of future projects in 2014 and 2015.

The full presentation is available at <http://www.e-navigation.net/index.php?page=need-for-capacity-building-in-the-development-of-e-navigation-and-activities-in-asia-and-pacific-region>

#### 3.4.3 General Discussion

Responding to a question regarding coordination, Mr Zachariae said that there is no overlap in function between the Ice Advisory service in Canada and the Arctic Web and he noted that there have been coordination discussions between Canada and Denmark.

Mr Amadou suggested that CCTV surveillance on the outside of ships could help with security in areas where pirates are a risk. He noted that pirate boats do not carry AIS and are impossible to identify on radar.

Mr Marinescu stated that seafarers are making mistakes because of stress, which has increased over the years. Notwithstanding the good that IMO is trying to do with the National Single Window, he noted that e-Navigation should not add additional stress. In counter argument, it was stated that the purpose of e-Navigation is to reduce stress and workload. The principle of think big/ start small should be applied. Human error is a much bigger issue than workload stress.

While it was felt that shipping agents are reluctant to change, customs offices are the major problem with port entry and are inflexible.

It was suggested that there is a need to start e-Navigation via the 17 MSPs.

A video of the discussion is available at <http://www.e-navigation.net/index.php?page=day-1-session-3-discussion>

### END OF DAY ONE

## 4 THEME 2 – ADVANCE CONTEMPORARY SOLUTIONS

Chair: Mr Jon Leon Ervik, Norwegian Coastal Administration.

### 4.1 Smart navigation buoys provide real-time situational data on the Gulf of Finland

#### 4.1.1 Presenter and author

Mr. Seppo Virtanen, MeriTaito

#### 4.1.2 Abstract

Mr Virtanen described how Finland is piloting the performance of Smart Navigation Buoys in the Gulf of Finland. The aim of the project is to provide real-time and in-situ oceanographic data for safer navigation and for protection of the sensitive marine environment. Smart Buoy is a combination of robust polyethylene spar buoy and versatile selection of monitoring sensors with mobile communication technology. Networking of Smart Buoys enables intelligent solutions for many applications such as ENC, VTS, SAR, Ports, etc. The concept has been developed over the last two years.

The full presentation is available at <http://www.e-navigation.net/index.php?page=smart-navigation-buoys-provide-real-time-situation-data-on-the-gulf-of-finland>

## **4.2 AVANTI – Foundation for e-navigation**

### **4.2.1 Presenter and author**

Mr Ben van Scherpenzeel, Port of Rotterdam.

### **4.2.2 Abstract**

Mr van Scherpenzeel commenced by stating that e-Navigation is to serve shipping and he focussed on ship / port interface. The needs were subdivided into the requirement for static information such as location of a berth, and the requirement for dynamic data such as ETA and the time a berth will be available.

Avanti is an on-line web based application that provides validated nautical information for port users. The AVANTI project commenced with identifying the needs of shipping and shipping agents. It was apparent that different sources of static information are not consistent. A Rotterdam Port information guide was prepared as a definitive source of information. The information required by ships before sailing was identified in consultation with OCIMF in London.

Further work is planned in 2014 to test the prototype in four ports. A 10 year collaboration between shipping, agents, ports and hydrographic offices is planned. e-Navigation should mean berth to berth navigation with all stakeholders speaking the same language through the whole nautical chain.

The full presentation is available at <http://www.e-navigation.net/index.php?page=avanti-foundation-for-e-navigation>

## **4.3 Maritime Industry contributing to the benefit of e-Navigation; e.g. GreenSafeShip project turning today's Weather Optimization upside down**

### **4.3.1 Presenter and author**

Mr Bjørn Åge Hjøllo, NAVTOR.

### **4.3.2 Abstract**

Mr Bjørn Åge Hjøllo described how Navtor AS was established in 2011 to focus entirely at e-Navigation, starting with a new electronic navigation chart (ENC) distribution concept, including an Integrated Service Chain. This ship-shore Service Chain consists of an on-board bridge platform (ECDIS or Back of Bridge Station), ship-shore communication and shore based server platform(s) with web interface.

In the GreenSafeShip project funded by Norwegian Research Council, Navtor and the two partners StormGeo and Telko, have enhanced this Service Chain and used the close relations to the project's user group, to simplify the way e-Navigation information may be exchanged and utilized by the Navigator.

This presentation's main focus was how the e-Navigation concept turns today's weather optimization upside down by introducing "Shore Based Routing". Having the ENC charts as the gateway to updated e-Navigation services and route planning, the ECDIS user may easily gain significant fuels savings by utilizing far better forcing data and safer sailing by utilizing a Holistic Service Concept.

Mr Hjøllo noted that some other benchmarking e-NAV services asked for by bridge crew, will also be looked into.

The full presentation is available at <http://www.e-navigation.net/index.php?page=maritime-industry-contributing-to-the-benefit-of-e-navigation-e-g-greensafeship-project-turning-today-s-weather-optimization-upside-down>

#### 4.3.3 General Discussion

Responding to a question, Mr Ben van Scherpenzeel confirmed the global aspect of AVANTI.

Responding to a query regarding the GreenSafeShip project, Mr Bjorn Age Hjollo stated that the system can deliver wave and tide forecasts but needs real observations. Information is limited to the ships area in order to minimise data and avoid overload.

It was stated that e-Navigation has been in progress since 2006 but it looks like it may be a further 3 to 4 years before effective implementation. The question of how to speed up the process of e-Navigation implementation might be achieved. It was noted that the formal IMO process is running in parallel with an informal industry process and it is up to industry to develop products to speed up implementation.

The question of cyber security was raised and it was stated encrypted security is reasonably robust. There is a need for the navigator to trust the information from e-Navigation systems.

A video of the discussion is available at <http://www.e-navigation.net/index.php?page=day-2-session-1-discussion>

## 5 THEME 3 – E-NAVIGATION AT LARGE

Chair: Mr David Patraiko, Nautical Institute.

### 5.1 Key Success Factors for Global e-Navigation Adoption

#### 5.1.1 Presenter and author

Ms Krystyna Wojnarowicz, MARSEC-XL.

#### 5.1.2 Abstract

In line with the conference main theme: "Waypoints beyond the Strategy Implementation Plan" and addressing one of the key discussion subjects raised, i.e.: "Have the benefits of e-Navigation become any clearer?" Ms Krystyna Wojnarowicz, discussed the critical elements necessary for e-Navigation to achieve its mission and gain a world-wide adoption. She identified the key issues and success factors for the adoption of e-Navigation, bearing in mind the interests of various stakeholder groups involved. In a vox pop survey of Conference attendees, the majority felt that STM is part of e-Navigation.

She considered the topic of driving the strategy forward and beyond its implementation plan, trying to answer the question of "Why would the various stakeholders adopt e-Navigation solutions?" looking at it through the prism of actual benefits of e-Navigation as well as touching upon its perceived disadvantages.

She considered both technical and non-technical factors relevant for a successful adoption of e-Navigation, touching upon the emerging Sea Traffic Management issues in their relation to e-Navigation. She advocated sophisticated rather than complicated systems and learning from earlier successful systems such as http.

In concluding, she proposed some Key Performance Indicators allowing measurement and quantification of the objectives of e-Navigation adoption versus the identified Critical Success Factors and a list of key "take aways".

The full presentation is available at <http://www.e-navigation.net/index.php?page=key-success-factors-for-global-e-navigation-adoption>

## **5.2 Concepts and Principles of a Global e-Navigation Test Bed**

### **5.2.1 Author**

Dr Jin Hyoung Park, Korea Research Institute of Ships and Ocean Engineering.

### **5.2.2 Abstract**

Dr Park opened his presentation with a reference to development work on the wingship “wing in ground” concept. He considered the use of testing for proof of concept validation, noting that testing can achieve buy-in from regional and global stakeholders in investment, safety, commercial value and customers. He noted that NAV59/6 annex 5 provides a definition of the objectives of test beds to provide proof of concept and a global e-navigation test bed is supposed to be one of the “top-gears” to accelerate the implementation of e-navigation. He considered that there is a very large number of stakeholders in e-Navigation and advocated that global test beds can bring together all stakeholders and identify the benefits and risks of e-Navigation. The global e-Navigation Test Bed is a solid basis for “continuous” innovation for navigational safety by applying e-navigation. That can be regarded as a tool for “the e-navigation life-cycle” from its birth to growth.

Using the Olympic 2014 logo, he advocated global cooperation of all stakeholders in implementing e-Navigation. He concluded by recommending open source software free to all users for the benefit of mankind rather than pure commercial gain and that the results of test beds should be shared and harmonized as is required by the current draft guidelines on test beds from IMO and IALA.

The full presentation is available at <http://www.e-navigation.net/index.php?page=concepts-and-principles-of-a-global-e-navigation-test-bed>

## **5.3 IALA-NET within e-Navigation**

### **5.3.1 Presenter and author**

Jean-Charles Leclair, IALA World-Wide Academy.

### **5.3.2 Abstract**

Mr Leclair described IALA-NET and encouraged National Authorities to participate to the system. IALA-NET is a near real time AIS data exchange service provided through Internet. It is a worldwide service open only to national Authorities who provide AIS data from their own country. The service is intended to assist these Authorities to fulfil their duties regarding safety, security, protection of the marine environment and efficiency of navigation. It is presently used for shore AIS data exchange. Satellite AIS data exchange is also possible but only between countries providing such data. In the future, IALA-NET could be extended to exchanging data from other sources of information such as radar. The system can be the main part of the “maritime cloud”, which is essential for the development of e-Navigation, by providing all information on movements of ships.

Mr Leclair also informed the participants that the IALA World-Wide Academy plans to organize the first training seminar on the introduction to e-Navigation in July 2014, based on the IALA Model Course L1.4.

The full presentation is available at <http://www.e-navigation.net/index.php?page=iala-net-within-e-navigation>

## **5.4 Human-Centred Design and Usability Evaluation for e-navigation – from SIP to commercial reality**

### **5.4.1 Authors and presenters**

Dr Benjamin Brooks, Australian Maritime College,

Dr Andreas Luedtke, OFFIS Institute for Information Technology.

#### 5.4.2 Abstract

Human-Centred Design (HCD) describes the methodology used to implement usability goals and to assess the result. The premise of HCD is that designable components of a system need to be fitted to the characteristics of the intended user(s), rather than selecting and/or adapting humans to fit the system, product or service.

Dr Brooks presented a historical perspective, drawing parallels between John Harrison's solving of the longitude problem in the 1700's with the challenges of e-navigation. In both instances challenges were large, solutions required innovation, and governing authorities struggled to assess the outcome.

At NAV 59, the IMO agreed to continue the development of guidelines associated with Human Centred Design (HCD), Usability Evaluation and test-bed results. Dr Brooks discussed the core elements of these guidelines and the implications for how those guidelines might be applied in the commercial reality of the e-navigation technology development and to perform Usability Testing, Evaluation and Assessment (UTEA) using a models based approach.

Dr Luedtke presented a combination of empirical and model-based techniques which he suggested as a means of compliance for human-machine requirements definition, design, evaluation and test. He demonstrated how these techniques can be integrated into industrial development processes.

Finally, he discussed the current gaps in knowledge and methods with respect to these issues and how maritime stakeholders might come together to fill them.

The full presentation is available at <http://www.e-navigation.net/index.php?page=human-centred-design-and-usability-evaluation-for-e-navigation-from-sip-to-commercial-reality>

## 6 THEME 4 – REGIONAL EFFORTS AND ISSUES

Chair: Mr Thomas Christensen, Danish Maritime Association

### 6.1 e-Navigation activities in Japan and our future plans

#### 6.1.1 Presenters and Authors

Mr Junji Fukuto, National Maritime Research Institute, Japan.

Mr Yasuhiro URANO, Japan Ship Technology Research Association.

#### 6.1.2 Abstract

Mr Junji Fukuto introduced the following e-Navigation related activities in Japan:

1. Development of new safety management support system using ICT, aiming at reducing marine accidents in congested waters to half using a three year project for developing a Next Generation Navigation Display presenting AIS, AIS/ASM, AIS/AtoN and other value-added information on a chart based display;
2. Visual lookout support system (VLSS) with the introduction of a commercialized Heads-Up Display (HUD) displaying AIS and ARPA information overlaid on the actual ship silhouette;
3. Development of an Intelligent Simulator for evaluating e-Navigation services in the laboratory with the introduction of an Intelligent Simulator which provides a framework for controlling target ships based on the support evaluated e-Navigation related equipment and services.

Mr Yasuhiro URANO introduced an e-Navigation implementation project by Japan Ship Technology Research Association (JSTRA). JSTRA is acting as a coordinator to promote tie-ups among maritime industries (shipbuilding/ship machinery/marine transportation), academic communities (universities/research institutes/academic authorities) and the administration. JSTRA will soon start the e-Navigation implementation project by establishing an official platform for considering how the Japanese maritime industries implement the coming e-Navigation SIP with advanced technologies/systems.

The platform will deal with the relevant technical issues such as usability evaluation methods and communication means and its standards like the "Maritime Cloud" as well as the SIP implementation in order to contribute to various discussions on e-Navigation in the IMO by providing practical and reasonable inputs based on the industries' experiences and the outcomes of relevant R&Ds which have been conducted and planned in the near future.

The full presentation is available at <http://www.e-navigation.net/index.php?page=e-navigation-activities-in-japan-and-our-future-plans>

## **6.2 ACCSEAS: Designing e-Navigation services in the North Sea Region**

### **6.2.1 Presenter and author**

Mr Alwyn Williams, General Lighthouse Authorities, UK & Ireland

### **6.2.2 Abstract**

ACCSEAS is an EU project with the objective to investigate improvements to maritime accessibility in the North Sea Region by using the IMO's e-Navigation concept. Over the last year, the project has released the Baseline and Priorities Report, which identifies the problems and potential e-Navigation solutions for the Region. The project has been moving forward with the continued development of those proposed services, such as Maritime Safety Information, Vessel Operations Co-ordination Tool, No-go areas, and Resilient PNT services.

The presentation gave an update on the project progress, and the lead-up to the demonstrations those services in the latter half of 2014. This will give an opportunity for potential users to feedback on the usability of the services, and a means to show how these services can improve accessibility to the Region.

There was also a reminder that the ACCSEAS Conference, being held beginning of March 2014, is a great opportunity for the stakeholders to air their views on the situation in the North Sea Region.

The full presentation is available at <http://www.e-navigation.net/index.php?page=accseas-designing-e-navigation-services-in-the-north-sea-region>

## **6.3 Industrial drives towards strategically and practical e-navigation initiatives in Korea**

### **6.3.1 Presenter and author**

Dr JJ Unggyu Kim, HYUNDAI e-MARINE

### **6.3.2 Abstract**

Mr Kim noted that e-Navigation is a convergence of the marine industry with information and communications technology (ICT). He commented that e-Navigation is underway in Korea, which is a leading country in both fields. He described in detail the S-100 project in Korea, noting that IHO and IALA have adopted the S-100 standard for e-Navigation, setting out the four tasks in the project.

He noted that there are proactive approaches from many directions in collaboration of government, academy and industry. Among the activities, the S-100 project was highlighted as the objective of e-Navigation is to built on the data model.

The full presentation is available at <http://www.e-navigation.net/index.php?page=industrial-drives-towards-strategic-and-practical-e-navigation-initiatives-in-korea>

### **6.3.3 General Discussion**

A video of the discussion is available at <http://www.e-navigation.net/index.php?page=day-2-session-2-discussion>

## **7 THEME 5 – TOMORROWS POSSIBILITIES I**

Chair Mr Jin Hyoung Park, Korea Research institute of Ships and Ocean Engineering.

### **7.1 Trial results of Radar Positioning for resilient positioning**

7.1.1 Presenter and author

Mr Tatsuya Kojima, Furuno.

7.1.2 Abstract

Radar Positioning is a position fixing system that is completely independent of GNSS technology. The results of the first trial have been reported by Jens. K. Jensen of Danish Maritime Authority during E-Navigation Underway Conference 2012.

Mr Kojima provided more specific performance results of Radar Positioning, evaluated during a second trial done by Furuno Electric Co., Ltd., Tideland Signal Corp. and Research and Radionavigation of General Lighthouse Authorities in UK, in July 2013. The results show that the accuracy of Radar Positioning is, with one racon, 7 – 8 m (95%) per mile from it, and with two racons, less than 7 m (95%). Availability of better than 80% was achieved but multipath effects were detected.

The full presentation is available at <http://www.e-navigation.net/index.php?page=trial-results-of-radar-positioning-for-resilient-positioning>

### **7.2 Taking ICT Solutions further within Sea Transport: The MONALISA 2.0 project**

7.2.1 Presenter and author

Mr Anders Brodje, Swedish Maritime Administration.

7.2.2 Abstract

Efficiency of ship operations can be further enhanced by the introduction of Sea Traffic Management (STM). The MONALISA project has shown that implementing STM in sea transport would result in increased safety yet also result in reduced environmental effects and increased efficiency. An example is the voyage optimisation tool developed within the project, reducing bunker consumption by up to 12%.

Mr Svedberg described how the MONALISA 2.0 project continues these advancements and contributes with a holistic approach to the maritime domain by developing a means for the sharing of information in order to distribute, elaborate and process common data within the whole transport chain. Through the introduction of ICT solutions, STM is further advanced by the development of new tools enabling more efficient planning, booking, monitoring of sea traffic, cargoes and passengers.

It is crucial that these e-solutions are developed in a common manner and experiences from the EU-project SESAR, within the air domain, is used in order to find the safest and most cost effective solutions. Also, service oriented architectures like the EU projects CISE (Common Information Sharing Environment) and the SWIM concept (System Wide Information Environment) is used for the continued development of STM. The purpose is to establish a maritime federation of information or “maritime cloud” which is an essential step for the introduction of unique voyage numbers. As a carrier of information, the voyage numbers will provide the ultimate keys for efficient cross sectorial intermodality, in order to obtain real sharing of maritime related information. By implementing this enhanced STM service it is envisaged that the environmental footprint of sea transport will be reduced even further while still raising safety and efficiency levels.

The full presentation is available at <http://www.e-navigation.net/index.php?page=taking-ict-solutions-further-within-sea-transport-the-monalisa-2-0-project>

### **7.3 Beyond the e-Navigation implementation plan: Development towards the unmanned merchant vessel?**

#### **7.3.1 Authors**

Dipl.-Wirtsch.-Ing. Univ. Hans-Christoph Burmeister, Fraunhofer Center for Maritime Logistics and Services CML, Hamburg.

Ørnulf Jan Rødseth, M.Sc., MARINTEK Department Maritime Transport Systems.

#### **Presenter**

Dipl.-Wirtsch.-Ing. Univ. Hans-Christoph Burmeister.

#### **7.3.2 Abstract**

Implementing e-Navigation is a major challenge for the maritime community in the near future and remarkable progress has been achieved in the last years. Besides test-beds and implementation strategies there are also on-going activities focusing on the future of shipping beyond the horizon of the e-Navigation implementation. However, these are taking into account the e-Navigation concept and its benefits for their further research.

One of these activities is the research project MUNIN, which is funded by the European Commission's Seventh Framework Programme and aims to develop a concept for unmanned and autonomous ship operation. While the name is an acronym for Maritime Unmanned Navigation through Intelligence in Networks, it also makes reference to a character from old Norse mythology. Munin, meaning memory or mind, who is one of the god Odin's ravens who flies around the world independently during the day and distributes what he has gathered to his master in the evening. Like the raven, the unmanned ship shall travel autonomously around the world, but return safely home to its harbor.

Mr Burmeister gave a short overview about MUNIN's rationale and vision, described the current status of the project and the progress achieved so far. The focus is on the deep sea phase of the voyage of bulk carriers. After approximately one year, MUNIN has finalized the draft concept of an autonomous vessel and is now commencing the first prototype developments. He presented an overview of the connections between MUNIN and e-Navigation, with a special focus on how MUNIN can contribute to prioritized e-Navigation solutions. For the future he identified a number of areas for improvement.

#### **7.3.3 Discussion**

It was stated that a 10% reduction in costs is possible with the unmanned vessel in dynamic mode. Although longer routes may be chosen with unmanned vessels to avoid congested waters, on average savings can be achieved. The shortest route may not always be the most economical. Further savings can be achieved by choosing routes with adequate keel clearance which avoids vessel squat.

The full presentation is available at <http://www.e-navigation.net/index.php?page=day-2-session-3-discussion>

## **8 THEME 5 – TOMORROWS POSSIBILITIES II**

Chair Mr. Fred Pot, Marsec-XL.

### **8.1 The Maritime Cloud and its applications**

#### **8.1.1 Presenter and author**

Mr Thomas Christensen, Danish Maritime Authority.

#### 8.1.2 Abstract

Thomas Christensen recalled the origins of the need for a communication infrastructure in MSC85/26/Add. 1 Annex 2, and explained how the Maritime Cloud could provide this infrastructure. Data communications needs integrity, confidentiality and authenticity. He suggested that the Maritime Cloud could be considered as a refinement of the overarching e-Navigation architecture and provides a short and long term support of e-Navigation to solutions relying on e-Navigation.

The Maritime Cloud is mainly a software system (but also a governance model and a legal framework) comprising three components – a Maritime Identity Register, a Maritime Service Portfolio Register and a Maritime Message Services Register. Internet is not necessary to utilize the Maritime Cloud.

Mr Christensen provided a graphical demonstration of one of the key components of the concept; the Maritime Service Portfolio Registry.

The present and future positions were considered. For the future it is hoped that the system can be further developed with others, that testing will continue and that the Maritime Cloud will become the e-Navigation infrastructure component.

The full presentation is available at <http://www.e-navigation.net/index.php?page=the-maritime-cloud-and-its-applications>

### 8.2 Safe Navigation Support System based on e-Navigation Concept

#### 8.2.1 Presenter and author

Mr Jaeyong Oh, Korea Research Institute of Ships and Ocean Engineering.

#### 8.2.2 Abstract

Mr Oh described his research which defines the maritime services between ships and shore in the port area with e-navigation concept. The server system in the shore-side provides additional information to the ship-side about the maritime environment and traffic. The weather service includes more accurate weather information for the port area or on route. Statistical information about vessel tracking and maritime accident data can be provided through the traffic information services. Collision avoidance and UKC (Under Keel Clearance) services on the ship-side can estimate collision risks between vessels and UKC in real-time, and recommend an effective avoidance route.

He stated a test-bed using the ship handling simulator system has been established. Following the simulation test, it is planned to test the global e-Navigation test-bed in Korea. It is hoped that the proposed system will be beneficial for supporting safe navigation and decision making.

The full presentation is available at <http://www.e-navigation.net/index.php?page=safe-navigation-support-system-based-on-e-navigation-concept>

#### 8.2.3 General discussion

Responding to a query regarding sovereignty of data in the Maritime Cloud, Thomas Christensen noted that this is an important issue that has not yet been resolved.

In relation to availability of the internet, it was stated that the Maritime Cloud is not a web based system and it can operate within a ship environment without internet communications. Communications of many forms can be used to transfer data.

The Maritime Cloud can be used by pay-for-service operators, if required.

The question of use of the Maritime Cloud between countries was discussed. The main focus of the Maritime Cloud is data transfer and transfer of any data can be provided from any one country to all users on the Cloud, noting Notices to Mariners as an example.

Responding to a question re who pays for the Maritime Cloud, Thomas Christensen reiterated that the cost of provision is minimal and costs would be borne by user while shore authorities would pay for safety services.

A video of the discussion is available at <http://www.e-navigation.net/index.php?page=day-2-session-4-discussion>

### **8.3 Critical System Engineering Platform for e-Navigation**

#### **8.3.1 Authors**

Axel Hahn, University of Oldenburg, Germany

Ben Brooks, Australian Maritime College, University of Tasmania.

#### **8.3.2 Presenter**

Axel Hahn, University of Oldenburg.

#### **8.3.3 Abstract**

The design of human machine interaction for modern ship electronic systems has a significant impact on the safety of seafaring. Maritime safety performance is not as good as aeronautical. Consideration of efficiency and safety in early design phases of e-Navigation systems or other bridge equipment will improve the engineering processes in order to reduce design errors. Using the case of VTS and ECDIS Integration this paper gives an overview about the eMaritim Integrated Research Platform consisting of a physical test bed and a simulation system to support engineering methods for safety critical systems.

The full presentation is available at <http://www.e-navigation.net/index.php?page=critical-system-engineering-platform-for-enavigation>

### **8.4 A practical example of using S-100**

#### **8.4.1 Presenter and author**

Mr Jonathan Prichard UKHO.

#### **8.4.2 Abstract**

Maritime Safety Information (MSI), NavTex, NAVAREA warnings and Notices to Mariners are currently compiled and made available in a variety of ways and in disparate formats. The text is currently difficult to parse automatically which precludes its widespread addition to situational awareness displays. The ACCSEAS project, assisted by the United Kingdom Hydrographic Office, has developed an S-100 compatible model for MSI data. It intends to progress this work to distribute it through the maritime cloud infrastructure as part of the ACCSEAS test beds during 2014. Users will benefit from seeing MSI data in its actual geographic location back of bridge and will see a reduction in duplication of messages. This work will be shared with wider IHO bodies seeking to standardise this data further.

The full presentation is available at <http://www.e-navigation.net/index.php?page=a-practical-example-of-using-s-100-msi-nm>

## **8.5 An industry standard for a route exchange format**

### **8.5.1 Presenter and author**

Mr Anders Rydlinger, Transas.

### **8.5.2 Abstract**

Considering the prerequisites for an industry standard for a route exchange format, Mr Rydlinger concluded that there is a need for a standardized Route Exchange Format to be used in the industry. The need has also been identified in the ongoing MonaLisa2 project as one of the key elements. He noted that IMO resolution A.893(21) Guidelines for Voyage Planning is outdated.

Noting that revision of IEC 61174 ed4 is very timely, he reviewed the objectives and areas of use can be defined for the Route Exchange Format and the information needed in the route exchange format to comply with the project goals.

In considering how to introduce standardisation of route exchange, he queried whether it is better to Just include the minimum required for standard exchange of routing information between different equipment on the bridge leave the rest for IEC61174 ed.5 (2020) or go the "Bluetooth Way" in which a small number of developers cooperated to develop the product in a short time.

He set out a route plan format for Import and Export based on three independent units - Route General Information block, Route geometry block, and Route Schedule block. He concluded by setting out a way forward.

The full presentation is available at <http://www.e-navigation.net/index.php?page=an-industry-standard-for-a-route-exchange-format>

### **8.5.3 General discussion**

Mr Pieter Papp observed that there are a variety of ideas as to what constitutes e-Navigation. He stated that global harmonisation remains a long way in the future. He felt that everyone is waiting for e-Navigation and everyone is claiming e-Navigation from their own perspective. He observed that the identified benefits of e-Navigation cannot be achieved under the present legal framework in relation to marine navigation.

He said that speeding up the process of e-Navigation through coordination of the development of standards should be a priority and set out three tasks.

1. IMO should schedule the development of performance standards as one of its priorities. In cases of insufficient capacity in IMO, the development of draft performance standards should be assigned to subject related organisations or groups.
2. IMO should develop and decide on carriage and implementation requirements based on user needs.
3. IMO should task a group or organisation to draft a legal framework in the form of a guideline for e-Navigation.

A video of the discussion is available at <http://www.e-navigation.net/index.php?page=day-2-session-5-discussion>

END OF DAY TWO

## **9 WHATS NEXT - THE WAY FORWARD**

Chair Mr. Omar Frits Eriksson, Danish Maritime Association.

### **9.1 The Industry Vision for e-Navigation – How to find the waypoints beyond the horizon**

9.1.1 Presenter and author

Mr Michael Bergmann, President, CIRM.

9.1.2 Abstract

The e-Navigation idea has taken off and is emerging from a conceptual into a tangible phase, where test beds are showing concrete results. In order to execute and gain success, all stakeholders need to be aware of the context in which e-Navigation is situated. The accident rate of 550 accidents per year, averaging 1.5 accidents per day with loss of life of 82500 per year is damaging to the maritime industry.

It needs to be understood that the e-Navigation discussion and the execution in test beds are based on different clusters and different focus areas. The different regional clusters are trying to resolve regional issues in the e-Navigation context. While this is a valid approach, e-Navigation needs to ensure the cluster interpretations are compatible. The same is true for the focus areas: each interpretation thought test beds is focused on certain aspects of e-Navigation given the mix of stakeholders involved. These focus areas can be the needs of coastal administration, ship operations or other focus areas. Those focus areas are building aspects of the full e-Navigation solution. The vision is that both clusters as well as focus areas are orchestrated in a way that they support and supplement each other and start to form an e-Navigation solution portfolio, which delivers the expected results.

The full presentation is available at <http://www.e-navigation.net/index.php?page=the-industry-vision-for-e-navigation-how-to-find-the-waypoints-beyond-the-horizon>

9.1.3 Discussion

Questions were raised regarding the accident statistics quoted by Mr Bergmann. It was stated that the figures were from the 1980s and no longer applicable. In addition the comparison between passenger air transport and cargo maritime transport was not valid as the air transport safety statistics are much worse than passenger figures. Quoting these figures could be misleading and have a negative effect on support for e-Navigation.

In response Mr Bergmann stated that the statistics were quoted to raise awareness and stimulate discussion. e-Navigation was initiated by the poor safety record in the past. There was considerable support for this view, noting the negative perceptions arising from accidents such as the Costa Concordia and Titanic. Sea safety can be improved step by step with a focus on asset protection across the whole maritime community.

A video of the discussion is available at <http://www.e-navigation.net/index.php?page=day-3-session-1-discussion>

### **9.2 SIP done – how to ensure global implementation?**

9.2.1 Presenter and author

Mr John Erik Hagen, Chairman IMO e-Navigation Correspondence Group.

9.2.2 Abstract

Mr Hagen provided a clear vision of the IMO strategic implementation plan (SIP) and its main objective to identify the list of tasks which would need to be performed during the coming years in order to achieve the five agreed prioritized e-navigation solutions. Version 2 of the SIP will be sent to the Correspondence Group in February 2014.

He mentioned the four guidelines identified by NAV59 that are needed to support the SIP. He described the five prioritised solutions and the 18 tasks that arise from them, noting that the 18<sup>th</sup> task was a late addition. He noted that there is currently only one planned output (5.2.6.1 "E-navigation strategy implementation plan") listed under the High-level Action Plan "Development and implementation of the e-navigation strategy", with target completion date of 2015.

He stated that the success of the implementation requires the on-going support of member States and Organizations. He described the IMO process for delivering the 18 tasks in the SIP in line with the IMO High Level Action Plan and the planned/unplanned outputs for IMO's High-level Action Plan. Of the 18 tasks identified, 4 are in progress and volunteers are required for the remaining 14 tasks.

He noted that forwarding the SIP to NCSR1 will endeavour to satisfy IMO's method of work. However, a possible intersessional meeting after NCSR1 will complete any additional work to meet the IMO process

Each task must have expected target completion and implementation dates including possible/necessary transition arrangements. He concluded by noting that inputs should be complete for MSC 95 in November 2014.

The full presentation is available at <http://www.e-navigation.net/index.php?page=sip-done-how-to-ensure-global-implementation>

### **9.3 Panel Discussion**

Mr Nick Lemon, Australian Maritime Association, chaired the panel discussion on the last day of the conference.

#### **9.3.1 Panel**

The discussion panel consisted of:

- Nick Lemon, Australian Maritime Safety Authority;
- Andy Winbow, Director of Maritime Safety Division, IMO;
- Gary Prosser, Secretary-General of IALA;
- John Murray, Director Marine, ICS;
- Philip Belcher, Marine Director, INTERTANKO;
- John Erik Hagen, Norwegian Coastal Administration, Chairman of the IMO e-Navigation CG
- Michael Bergmann, President, CIRM.

#### **9.3.2 Discussion**

Responding to questions from the floor, the panel debated

- 1) The need for an intersessional meeting of IMO MSC to complete the SIP by 2015;
- 2) The method by which cyber security is being addressed;
- 3) Work that is being done to address the work overload and stress being experienced by navigators;
- 4) The challenges arising from lack of sufficient training for officers on e-Navigation due to time constraints;
- 5) The need for a communications plan and a training plan in the SIP;
- 6) VHF data exchange system (VDES) test beds available;
- 7) VDES compatibility with older technology systems;
- 8) The need for system installer competence;

- 9) The expected date for implementation of e-Navigation;
- 10) How to engage port authorities in implementation of e-Navigation by integration of shore services;
- 11) The value of integrating forward looking sonar into bridge displays in order to reduce groundings.

Statements were made towards

- The lack of e-Navigation Cloud on board leading to uncertainty regarding ICT recovery procedures;

Video of the panel discussion is available at <http://www.e-navigation.net/index.php?page=panel-discussion>

## **10 CONCLUSIONS**

### **10.1 Conference conclusions**

Ómar Frits Eriksson, the Conference Chairman ran through the conclusions derived from the conference's proceedings.

It was made clear that IALA will consider the following Conference conclusions and identify any appropriate actions required, thus there are no associated Recommendations.

The conclusions were:

- 1 The conference noted that significant progress has been made in moving e-Navigation from the inception phase into the prototyping phase, while the SIP is nearing completion.
- 2 Commercial benefits to the whole supply chain were considered to be a major driver for the development of e-Navigation and quantified examples were given (Mona Lisa).
- 3 It was apparent at the conference that there was significant increase in interest from the marine electronics industry in developing e-Navigation products. However, the Industry is seeking direction and/ or timeframe certainty in relation to R&D and product development.
- 4 Important initiatives in advancing e-Navigation included completion of the IALA test bed guidance and signing of the international global test bed MoU as well as the new IALA strategic plan.
- 5 The conference highlighted further important work including that on PNT, the VHF Data Exchange System, traffic monitoring, sea traffic management and implementation of regional route exchange trials.
- 6 Early e-Navigation related initiatives were noted including e-Maritime, EU National Single Window implementation, under keel clearance management, Arctic Web and AVANTI which is a common port logistics and clearance tool.
- 7 In finalising the IMO SIP there is a need to address the implications of the existing legal framework, and data ownership for e-Navigation to drive resolution of legal impediments to the development of e-Navigation.
- 8 The Maritime Cloud, and the communication chain were mentioned as important component of the entire information transport chain (SWIM). While cyber security was considered to be a concern, it was stated that there are ways of addressing these concerns.
- 9 The Human Element remains vital and examples of human centred design and usability evaluation applied to e-Navigation were presented.
- 10 The conference expressed a need to identify the roles and responsibilities to enable implementation of e-Navigation.

\* Avanti is an on-line web based application providing validated nautical information for port users

The presentation of the conference conclusions is available at  
<http://www.e-navigation.net/index.php?page=conference-conclusions>

## **10.2 Announcement of e-Nav Underway – North America**

### **10.2.1 Presenter**

Mr Fred Pot, California Academy.

### **10.2.2 Abstract**

The inaugural e-Navigation Underway (North America) Conference will be held on April 3rd and 4th April, 2014 at the California Maritime Academy in Vallejo, CA, USA and will be a regional version of e-Navigation Underway Conference. It will be hosted and managed by California Maritime Academy in close cooperation with IALA and the Danish Maritime Authority.

The conference will address a variety of issues including status and benefits of e-Navigation and will provide an opportunity to influence how e-navigation is implemented in North America. Transas is sponsoring the conference and the media partner is The Maritime Executive. The conference is supported by IHO, CIRM, Nautical Institute, RTCM, Chamber of Shipping of America, World Ocean Council, The Maritime Alliance, California Office Oil Spill Prevention and Response, Maritime Information Services of North America.

### **10.2.3 Discussion**

Omar Frits Eriksson noted that there is also a regional Asia-Pacific e-Navigation underway planned.

The presentation is available at <http://www.e-navigation.net/index.php?page=announcement-of-e-navigation-underway-north-america>

## **11 CLOSING OF THE CONFERENCE**

Mr Gary Prosser, Secretary-General of the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) in his closing address to E-Navigation 2014 commented that this year's event had again exceeded all expectations, with delegates from over 30 countries representing all regions of the world. Additionally it was rewarding to note that the record attendance of 180 delegates included a large percentage of first time 'Underway' participants.

The quality of the presentations, exhibition and general engagement by all who attended was also another highlight of the 2014 event. Mr Prosser congratulated all attendees, speakers, supporting organisations and the steering committee for the excellent arrangements. In particular, on behalf of all attendees, he thanked the Danish Maritime Authorities 'Dream Team' and Jane Graham for all of their dedicated efforts and preparations.

Although a parallel event to the main 2014 programme, Mr Prosser made special mention of the significance of the signing of the Global e-Navigation testbed MoU between Sweden, Korea and Denmark. The MoU is seen as a prime catalyst for the evolution of e-Navigation worldwide, Mr Prosser encouraged all other parties to give serious consideration on how they could also contribute to the important testbed work.

Mr Prosser concluded that e-Navigation is no longer a concept and that the excellent examples demonstrated at this event will ensure its future benefits are realized into the future. In noting this development, Mr Prosser also reminded delegates of the IALA Councils' recent decision to incorporate e-Navigation into the future strategy of the organization.

There are many further developments expected in 2014 with the Maritime Community greatly looking forward to the IMO concluding its current work on eNavigation with the release of the Strategy Implementation Plan and again Norway's leading role in this work is greatly appreciated.

The future of the 'brand' E-Navigation Underway is looking extremely positive with the announcement of the first regional event, E-Navigation North America and preliminary discussions on an Asia based event. The Denmark based event will continue to be the signature International event for E-Navigation.

In closing, Mr Prosser wished all delegates a safe voyage home and looked forward to attending the 2015 E-Navigation Underway Conference.

Closing remarks is available as video at <http://www.e-navigation.net/index.php?page=closing-remarks-2>

## 12 EXHIBITION

### 12.1 Exhibitors

The names of the exhibitors and their products are given below:

Name of exhibitor	Products
<b>Swedish Maritime Administraiton, *</b> Anders Brodje	<b>MONALISA project</b> Sea traffic management Dynamic route exchange in practice
<b>MARSEC-XL</b> Pal Hernes	<b>Open bridge platform</b>
<b>DLR – German Aerospace Centre *</b> Ralf Ziebold	<b>PNT</b> Onboard system for resilient PNT data generation
<b>General Lighthouse Authorities *</b> Georgina Button	<b>ACCSEAS project</b> Accessibility for Shipping, Efficient Advantages and Sustainability
<b>SeaHow *</b> Hannu Hoviniemi	<b>Ice buoy</b> Video demonstration
<b>Jeppesen *</b> Geir Olsen	Working towards the single window
<b>Chalmers University of Technology</b> Thomas Porathe <b>Fraunhofer Center for Maritime Logistics and Services</b> Hans-Christoph Burmeister <b>MARINTEK</b> Ørnulf Jan Rødseth	<b>MUNIN project</b> Maritime Unmanned Navigation through Intelligence in Networks
<b>Cobham SATCOM</b> Peter Andersen	Satcom equipment

\* Indicates an IALA member

## **13 SOCIAL EVENTS**

### **13.1 Welcome Reception**

On day 1, a welcome reception was held in the Columbus Club of the M/S Pearl Seaways. Omar Frits Eriksson from DMA welcomed the delegates and wished a pleasant journey towards Oslo, reaching for the goals of e-Navigation. The subsequent welcome dinner was held in the 7-Seas restaurant. On day 2, a 3 course dinner was provided in the Blue Riband Restaurant.

### **13.2 Bridge visit**

On day 2, the conference attendants had opportunity to visit the bridge of Pearl Seaways in teams.

### **13.3 Weather**

Participants had experienced fair weather conditions throughout the voyage with moderate winds and calm seas.

### **13.4 Acknowledgments**

The conference expressed its appreciation to the Danish Maritime Authority and IALA for its joint organisation of e-Navigation Underway 2014. It wished particularly to acknowledge the support given by:

- The Nautical Institute (NI)
- Comité International Radio-Maritime (CIRM)
- International Hydrographic Organisation (IHO)
- The ACCSEAS project

Thanks were also extended to those who contributed to the drafting of the Conclusions.

Presentations and video clips of the conference were taken and provided by DMA, and are available at <http://www.e-navigation.net/index.php?page=presentations-2014>. Photographs provided by DMA are available at <http://www.e-navigation.net/index.php?page=e-nav-underway-2014>.

## 14 ANNEX A – PARTICIPANTS LIST

Last name	First name	Organisation	Country
Ahmed	Mohamad Halim Bin	Marine Department Malaysia (Light Dues Board Peninsular Malaysia)	Malaysia
Andersen	Peter	Cobham SATCOM	Denmark
António	Carvalho	Ministry of Transport of Angola	Angola
Astrup	Sune Ewert	DMA	Denmark
Bang	Jakob	Danish Maritime Authority	Denmark
Baskerville	Frances	CIRM	United Kingdom
Becker	Christoph	Raytheon Anschütz GmbH	Germany
Belcher	Phillip	Intertanko	United Kingdom
Bentzen Billesø	Mads	Danish Maritime Authority	Denmark
Bergmann	Michael	Jeppesen	Germany
Blackhurst	Peter	Inmarsat	United Kingdom
Boettcher	Gabriele	Federal Ministry of Transport and digital Infrastructure	Germany
Bolles	André	OFFIS	Germany
Bondo	Poul	GateHouse	Denmark
Borup	Ole Bakman	Danish Maritime Authority	Denmark
Bransby	Martin	General Lighthouse Authorities of the UK & Ireland	United Kingdom
Brödje	Anders	Swedish Maritime Administration	Sweden
Brooks	Benjamin	Australian Maritime College	Australia
Brouwers	Willem	Cobham SATCOM	Denmark
Burke	John	Commissioners of Irish Lights	Ireland
Burmeister	Hans-Christoph	Fraunhofer CML	Germany
Button	Georgina	General Lighthouse Authorities	United Kingdom
Callsen-Bracker	Hans-Heinrich	Ministry of Transport	Germany
Camre	David	Danish Maritime Authority	Denmark
Card	Michael	IALA	France
Cegarra	Jesus	European Satellite Services Provider	Spain
Cherepanov	Sergey	Transas	Russia
Christensen	Thomas	Danish Maritime Authority	Denmark
Clements	Jorunn	Norwegian Coastal Administration	Norway
Cornillou	Jean Charles	CETMEF	France
Cruddace	Phillip	General Lighthouse Authorities	United Kingdom
DeBievre	Aline	DMA	United Kingdom
Doherty	Richard	CIRM	United Kingdom
Doyle	James	IALA	France
Dutzler	Guenter	Frequentis AG	Austria
Engler	Evelin	DLR	Germany
Eriksson	Omar Frits	Danish Maritime Authority	Denmark
Ervik	Jon Leon	Norwegian Coastal Administration	Norway
Fabritius	Gaetan	CLS	France
Fadaie	Dr. Kian	Canadian Hydrographic Service	Canada

Last name	First name	Organisation	Country
Francisco	Manuel	Ministry of Transport of Angola	Angola
Fukuto	Junji	National Maritime Research Institute, Japan	Japan
Glamsoe	Morten	Danish Shipowners' Association	Denmark
Grape	Torbjörn	Swedish Maritime Administration	Sweden
Guest	Steve	Kongsberg Norcontrol IT	Norway
Hagen	John Erik	Norwegian Coastal Administration	Norway
Hägg	Mikael	Chalmers University of Technology	Sweden
Hahn	Axel	OFFIS	Germany
Hansen	Freddie	FURUNO DANMARK A/S	Denmark
Haugen	Tony	Kongsberg Seatex	Norway
Heikonen	Kaisu	Finnish Transport Agency	Finland
Henny	Chris	Astrium Services	Belgium
Hernes	Pål	MARSEC-XL	Norway
Hjøllo	Bjørn Åge	Navtor	Norway
Hong	Soonbae	Ministry of Oceans and Fisheries	South Korea
Hosken	Edward	UK Hydrographic Office	United Kingdom
Hoviniemi	Hannu	SeaHow	Finland
Ibrom	Christian Ernst Erwin	Schnoor Industrieelektronik GmbH & Co. KG	Germany
Imset	Marius	Buskerud Vestfold University College	Norway
Irons	Sebastian	Swedish Transport Agency	Sweden
Jensen	Palle Broberg	Scandlines Danmark A/S	Denmark
Jensen	Jens K.	Danish Maritime Authority	Denmark
Jeong	Jung Sik	Mokpo National Maritime University	South Korea
Jik Nyo	Kim	GCSC	South Korea
Jiyoon	Kim	HYUNDAI eMARINE	South Korea
Jung	Sung Heon	Dongkang M-Tech, Co. Ltd.	South Korea
Karlsson	Fredrik	Swedish Maritime Administration	Sweden
Kim	JJ Unggyu	HYUNDAI eMARINE	South Korea
Kim	Joon-Bum	Korean Register of Shipping	South Korea
Kim	Sun Young	Korea Research Institute of Ships & Ocean Engineering	South Korea
Kim	Ju Young	Electronics and Telecommunications Research Institute	South Korea
KIM	Bu Young	Korea Ship Safety Technology Authority	South Korea
KIM	JaeMyoung	ETRI	South Korea
Kirchner	Paul	American Pilots' Association	United States
Klindt	Holger	ATLAS Elektronik GmbH	Germany
Klippen	John K	Jeppesen	Norway
Kojima	Tatsuya	Furuno Electric Co., Ltd	Japan
Kruuse	Torsten	DMA	Denmark
Kuiters	Lea	I&M, Rijksaterstaat	Netherlands
Larsen	Svend	Consultant	Denmark
Le Franc	Yves	SHOM	France

Last name	First name	Organisation	Country
Leclair	Jean-Charles	IALA	France
Lee	Seojeong	Korea Maritime and Ocean University	South Korea
Lee	Chi Kyoung	Ministry of Oceans and Fisheries	South Korea
Lee	Sang Gil	GCSC	South Korea
Lemon	Nick	AMSA	Australia
Lentfer	Andreas	CIRM	Germany
Lim	Hyun Churl	Ministry of Oceans and Fisheries	South Korea
Ljungquist	Markus	Norwegian Hydrographic Service	Norway
Luedtke	Andreas	OFFIS	Germany
Manuel da Conceição	Tavares	Ministry of Transport of Angola	Angola
Marinescu	Alius	Romanian Maritime Training Centre - CERONAV	Romania
Matthiesen	Bo	Scandlines	Denmark
McClenahan	Harold	Commissioners of Irish Lights	Ireland
Medhaug	Svein David	The Norwegian Maritime Authority	Norway
Mendalka	Krzysztof	Sprint S.A.	Poland
Mikkelsen	Jørgen Fløe	FURUNO DANMARK A/S	Denmark
Motz	Florian	Fraunhofer FKIE	Germany
Muñoz	David	DIRECTEMAR	Chile
Murray	John	International Chamber of Shipping	United Kingdom
Myly	Markku	EMSA - European Maritime Safety Agency	Portugal
Narciso	Manuel	Ministry of Transport of Angola	Angola
Ndiaye	Amadou	Port Autonomous of Dakar Phares et Balises	Senegal
Nielsen	Brian Schmidt	DanPilot	Denmark
Nielsen	Jonas Terp	FURUNO DANMARK A/S	Denmark
Nordseth	Andreas	Danish Maritime Authority	Denmark
Oh	Jaeyong	Korea Research Institute of Ships & Ocean Engineering(KRISO)	South Korea
Olsen	Geir	Jeppesen Norway AS	Norway
Oltmann	Jan-Hendrik	German Federal Waterways and Shipping Administration	Germany
Paap	Pieter	NL Ministry of Infrastructure & the Environment	Netherlands
Park	Suhyun	Dongseo University	South Korea
Park	Jin Hyoung	Korea Research Institute of Ships & Ocean Engineering	South Korea
Patraiko	David	The Nautical Institute	United Kingdom
Pearce	Jonathon	OMC International	United Kingdom
Pedersen	Bjørn Borbye	Danish Maritime Authority	Denmark
Peiponen	Hannu	Furuno Finland Oy	Finland
Pelletier	Simon	IMPA	Canada
Pharaoh	Anthony	International Hydrographic Bureau	Monaco
Pop	Florin	Romanian Maritime Training Centre - CERONAV	Romania

Last name	First name	Organisation	Country
Porathe	Thomas	Chalmers University of Technology	Sweden
Pot	Fred	MARSEC-XL	United States
Pratt	Ben	Mackay Marine	United States
Pritchard	Jonathan	UKHO	United Kingdom
Procee	Stephan	Maritiem Instituut Willem Barentsz	Netherlands
Prosser	Gary	IALA - AISM	France
Rajabally	Eshan	Rolls Royce	United Kingdom
Rambaut	Michael	Consultant	United Kingdom
Rasmussen	Peter Lundahl	BIMCO	Denmark
Rasmussen	Hans E	CIRM	Denmark
Bruhn	Wilko	Fraunhofer CML	Germany
Rings	Christian	Schnoor Industrieelektronik GmbH & Co. KG	Germany
Rødseth	Ørnulf Jan	MARINTEK	Norway
Romers	Ingird	IHMA	Netherlands
Rufino da Conceição	Hélder	Ministry of Transport of Angola	Angola
Rydlinger	Anders	Transas Marine International AB/CIRM	Sweden
Savo	Jukka	European Commission	Belgium
Schaab	Axel	Raytheon Anschütz GmbH	Germany
Schröder	Björn	Raytheon Anschütz GmbH	Germany
Setterberg	Per	SMA - Swedish Maritime Administration	Sweden
Shapchenko	Oleksii	State Hydrographic Service of Ukraine	Ukraine
Silva	Rodolfo	DIRECTEMAR	Chile
Sitki Ustaoglu	Bekir	International Maritime Organization (IMO)	United Kingdom
Siwe	Ulf	SMA - Swedish Maritime Administration	Sweden
Skov	Michael	Danish Maritime Authority	Denmark
Sobiech	Cilli	OFFIS eV	Germany
Sorensen	Aron	BIMCO	Denmark
Sørensen	Mads Friis	FURUNO European Branch Office	Denmark
Steenberg	Cathrine M.	FORCE Technology	Denmark
Suleiman	Anas	Nigeria High Commission	United Kingdom
Sundström	Magnus	SMA - Swedish Maritime Administration	Sweden
Svanes	Tor	Navtor	Norway
Svedberg	Ulf	Swedish Maritime Administration	Sweden
Theodossiou	Socrates	Tototheo Group	Cyprus
Thorn	Jan	Danish Maritime Authority	Denmark
Toskas	Dimitrios	Tototheo Group	Cyprus
Tremlett	Robert	Robert Tremlett	United Kingdom
Tuxen Johannessen	Jens	Danish Maritime Authority	Denmark
Urano	Yasuhiro	Japan Ship Technology Research Association	Japan
van Scherpenzeel	Ben	International Harbour Master Association	Netherlands

Last name	First name	Organisation	Country
Varbanov	Tsvetomir	Bulgarian Maritime Training Centre	Bulgaria
Verbeek	Eduard	Dutch Pilots Corporation	Netherlands
Verrier	Cyrille	VisSim AS	Norway
Virtanen	Seppo	Meritaito Ltd	Finland
Waimatsu	Kazuma	FURUNO ELECTRIC	Japan
Williams	Alwyn	General Lighthouse Authorities	United Kingdom
Winbow	Andy	IMO	United Kingdom
Wojnarowicz	Krystyna	MARSEC-XL	Malta
Wouters	Siddi	Kongsberg Norcontrol IT	Norway
Wright	Glenn	GMA Industries, Inc.	United States
Yatchenko	Alexander	ERNC Ltd.	Russia
Zachariae	Francis	Danish Maritime Authority	Denmark
Zetterberg	Rolf	SMA - Swedish Maritime Administration	Sweden
Ziebold	Ralf	DLR	Germany