e-NAVIGATION UNDERWAY 2013
CONFERENCE REPORT
Final report, rev. 1

EXECUTIVE SUMMARY

The third e-Navigation Underway conference was held from 29 – 31January, 2013 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 141 delegates, representing 22 countries. The associated exhibition attracted 5 exhibitors, displaying the latest developments in e-Navigation.

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

A series of 26 presentations were given under these broad headings:

- Strategic views;
- Getting all stakeholders on board
    - Implementation Strategies;
    - Ship - Shore integration;
    - Operations
    - Data modelling / Infrastructure.

The conference ended with a panel discussion. A summary of conference conclusions is available in section 9, together with a summary of conclusions of relevance to the IMO process.

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e-Navigation Underway 2013

1   INTRODUCTION

The third e-Navigation Underway conference was held from 29 – 31January, 2013 on board the DFDS ferry M/S PEARL SEAWAYS, which during that time, sailed from Copenhagen to Oslo and then back to Copenhagen, experiencing wind gusts in excess of 25 m/s and 3½ m waves. The conference was attended by 141 delegates, representing 22 countries. The associated exhibition attracted 5 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

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)

Mr. Gary Prosser welcomed the audience, thanking the DMA and supporting organizations for organizing the event, noting that this e-Navigation Underway conference had record attendance.

This is quite a unique event in the e-NAV calendar. The e-Navigation calendar is getting bigger every year, yet this conference seems to be the premier event, where all the right people are under the same roof (or deck rather), regulators, users, designers, manufacturers, and representatives of key international organisations – and it is important that we have everyone onboard. Furthermore the fact that this conference is conducted onboard a ship, implies that the participants are trapped – and have the opportunity to get together and talk 24/7 on e-Navigation.

IALA has been working for several years to support work of IMO together with IHO ICRM, and other organisations, and the record attendance to IALA's e-NAV committee has even required a new headquarter.

Going to many forums, Mr. Prosser had noted one phrase being reiterated: "You cannot compare aviation with maritime." Yet - he asked – why not? 100 years ago the aviation industry took the best from maritime and made it better. Maybe it's time to look at the best aviation industry and other modes of transport has achieved – and make it better, capitalizing the lessons learned.

The full presentation is available at

http://www.e-navigation.net/index.php?page=conference-opening

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

Mr. Andreas Nordseth welcomed the participants to the 3rd e-Navigation Underway conference. Focus will be on the stakeholders - have we got everyone onboard?

E-Navigation is all about practical aspects, what makes it relevant and exciting, but this event is all about maritime professionals getting together, sharing knowledge on - and use of - e-Navigation.

Looking forward to disseminating the results of testbeds, and judging by the impressive number of esteemed speakers, who will take a look at e-Navigation from their perspective, we have a lot waiting for us. The conference will cover lot of ground in 3 days. Perhaps the Costa Concordia

incident is a good reminder what e-navigation is all about. How can e-Navigation assist to enhance safety and prevent accidents? Have you deviated from intended route - and what is the current risk of grounding?

We need to continue to work hard on practical, legal, technical and perhaps cultural issues. E-Navigation may bring us huge step towards preventing accidents, and improving efficiency.

There are other reasons for giving e-Navigation priority: Financial crisis is putting pressure for ever increasing efficiency - certainly in maritime domain – as well as ever increasing demands for safety or security issues. e-Navigation is the key to handle these challenges.

But how do we implement e-Navigation? There is a traditional regulatory track, with prescriptive mandatory carriage requirements – but theres another track we need to consider: The voluntary track. Industry may choose to implement e-Navigation services, because they improve efficiency and business in general. High quality shipping operators can become early adopters, increasing safety and efficiency, driving potential synergy with the equipment industry. Fully user driven, but it is important to involve manufacturers early in the process. Exactly this conference bring together users, policy makers and manufacturers.

If we act smart we can use e-navigation in e-maritime, reduce the administrative burden, improve safety and efficiency.

Maritime business is a people to people business – and it is important that we meet face to face. Denmark has a keen interest in developing e-Navigation, together with our partners, and we hope you will enjoy next few days.

The full presentation is available at

http://www.e-navigation.net/index.php?page=conference-opening

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.

On February 21st 2005, he remembered receiving an important letter from the UK department of Transport, 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 the 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 heart of the process.

It was envisaged at the time, that achieving a fully viable system would probably take years, he recalled, and as commonly known, Rome wasn't built in a day - yet someone had told him that the whole world was developed in just 7 days, so let's get some results on the table.

The full presentation is available at

http://www.e-navigation.net/index.php?page=setting-the-scene

2.4   Key Note Speech – Mr Peter Hinchcliffe, Secretary-General of the International Chamber of Shipping (ICS)

Mr. Peter Hinchcliffe expressed his thanks to IALA and DMA for inviting him to give the key note speech.   Normally the key note speaker can be controversial, and leave the room for the conference participants to debate the issues raised, however on this occasion he, as well as the other participants, would be trapped on board for the next few days.

The different perspective represented by different stakeholders was elaborated – the IMO, IALA, National Administrations, the electronics industry, research institutions, as well as the ICS. As much as it is tempting, the opportunity to participate in technical developments is not always in synchronization with the IMO perspective of e-Navigation. VTS services may be extended beyond the usual coastal limits, and Industry may develop new products – yet the e-Navigation solutions must perform. We must not develop solutions, *not just because we can*.   While research community seems to take e-Navigation as an opportunity for funding, this should not be another stepping stone of the gaming industry - one foot should remain on board the ship.

While standardization is important, the data management needs to be harnessed, not to make a slave of the navigator. We should bear in mind human nature. If computer does a reliable job, the watch keeper tends to rely on the system. It is time to remember the original objectives of e-Navigation.

The interaction between ship and shore may be improved, and once technology and procedure has been confirmed to be operationally sound, and performance standards properly developed, and not before, it may be time to mandate appropriate carriage requirements.

Concerns were raised on the issues of implementation. Nobody appears to exercise jurisdiction towards ports and coast. al states to deliver their end of the bargain. How will ports and coastal states respond to e-Navigation? Will they provide firm commitment to implementation – or will the ships have to carry implementation costs, while the other end of the line remains unclear?

The shore side needs to develop along with the shipside. Will shore side e-Navigation be harmonized - or even resembling each other - across the continents? e-Navigation must work in practice – and the ship side must have a reliable shore side counterpart – two matching halves are needed.

The lessons learned from the introduction of ECDIS must be part of e-Navigation. Development without the sufficient input from shipping industry must not be reiterated. The real user needs must be taken into account this time. Make no mistake: Shipping wants standardized interfaces and controls – to ensure reliable operation and reduce the need for equipment specific training.

The full presentation is available at

http://www.e-navigation.net/index.php?page=the-future-of-e-navigation-the-ship-owners-view

Themed Sessions

Five themed technical sessions were held.

3   THEME 1 – e-NAVIGATION: STRATEGIC VIEWS

Chair: Mr Ómar Frits Eriksson, DMA

3.1   It's all about the data

3.1.1   Presenter and author

Dr Nick Ward, General Lighthouse Authority Research & Radionavigation (GLA RRNAV) & Vice Chair of the IALA e-NAV Committee

3.1.2   Abstract

Dr. Nick Ward recalled the objectives of e-Navigation, emphasizing that safe, secure navigation can be facilitated by efficient communication, including data exchange between vessels and shore, combined with the integration and presentation of information onboard and ashore. Availability of the same information by various stakeholders during the execution of a vessels voyage, will minimize risk of confusion, however consistent standards and interoperability of systems is a prerequisite.

A communication and information infrastructure – the maritime service portfolio – and a Common Information Data Structure will enable data – or rather *information* – transfer.

The IHO S-100 registry has been acknowledged as the common baseline for a Common Information Data Structure. Product specification for relevant objects can be defined within this framework, based on exist data models such as IVEF(inter VTS exchange format). It is an open online system from where updates of many domains can be requested.

Standard data formats should assist in eliminating ambiguity and hopefully improve interpretation.

Looking at the timescale for e-Navigation, the question was raised whether developing Maritime Service Portfolios and Product Specifications would have to be a parallel development process.

3.1.3   Discussion

David Patraiko from the Nautical Institute asked: How do we ensure data stays good quality data, and how do we know if this is not the case?

Dr. Nick Ward replied: Acknowledging that in many cases bad data is worse than no data, one of the advantages of the S-100 is that quality marking of data is available.

The full presentation is available at

http://www.e-navigation.net/index.php?page=it-s-all-about-the-data

3.2 The status of the IMO e-Navigation work and strategy implementation plan

3.2.1 Presenter and author

Mr John Erik Hagen, Norwegian Coastal Administration and Chairman of the IMO e-Navigation Correspondence Group.

3.2.2 Abstract

Mr. John Erik Hagen repeated the definition of e-Navigation, emphasizing the intent to enhance berth-to-berth navigation, in order to promote safety, security and efficiency in global shipping, and consequently protect mariners and the environment.

Mr. Hagen took the audience through the achievements of the e-Navigation Correspondence Group so far, noting that NAV58 had finalized the list of 87 identified GAPS, categorized within four areas: Operational, technical, regulatory and training. The main issues appear to be information and data coordination, effective communication, navigation systems and ship reporting, training and usability,

e-Navigation has a wide scope. Risk and cost benefit analysis has to be delivered to NAV59. A large number of proposed solutions for e-Navigation has been processed, but a new way forward for the Correspondence Group has been introduced, shifting focus to 5 selected solutions, aiming to ensure a timely completion of the first iteration of e-Navigation, assigning the remaining proposed solutions to a roadmap for the future e-Navigation evolution. This should in no way be seen as a reduction of ambition level for e-Navigation, but rather a way of ensuring a realistic focus for the first iteration.

The Strategy Implementation Plan will have to take into account responsibilities, transition arrangements, phased implementation schedule, priorities for deliverables, proposals for systematic assessment of new technology, a plan for requirements in the longer term, proposals on public relations, and identification of potential sources of funding, including capacity building in developing countries.

Mr. Hagen stated that the following question will be raised many times in the near future: How can we ensure global implementation? After 2014 – can we say: mission completed? No, we are not at the end. Not even the beginning of the end. We are merely at a start of a long term process.

The maritime industry needs to move quickly into digital age and make benefit of this transition. This is sometimes a question about attitude and will.

3.2.3 Discussion

Pieter Paap, complimenting Norway for the work on the Correspondence Group, shared the view on the need for a future roadmap, but remained puzzled: In NAV59 (September this year) we should have risk analysis, cost / benefit analysis ready – is this really realistic? How can we achieve this, when we don't the what or how, or how to evaluate?

Mr. Hagen replied by pointing out the necessary to prioritize initial solutions and focus on a few. 5 main solutions have been discussed with deadline yesterday, CG will be informed on 5 main solutions in beginning of next week. Those solutions will be part of risk / cost /benefit analysis. Those will be prioritized, outcome of that analysis will be presented to NAV59,.rest reflected in roadmap for future.

The full presentation is available at

http://www.e-navigation.net/index.php?page=the-status-of-the-imo-e-navigation-work-and-the-strategy-implementation-plan

3.3 Developing e-Navigation in a multi-organizational environment – challenges and leadership

3.3.1   Presenter and author

Mr Michael Rambaut, Secretary-General of the Comité International Radio-Maritime (CIRM)

3.3.2   Abstract

While e-Navigation has the potential to be the best thing ever happened to maritime safety, we need to focus on getting it working – not just take care of the needs of each particular stakeholder.

Recalling the start of his professional career, working on a multibillion GBP aircraft project with continuously changing specifications, which ended up being cancelled, Mr. Rambaut recalled a statement that "All modern aircraft have 4 dimensions: Length, width, height and politics." Keeping the politics in mind, Mr. Rambaut offered an observation that we still have a sales job to do here; There's a lot of flag states not present in this community.

Mr. Rambaut asked: Who is at the controls (of e-Navigation), and listed the following international organizations involved:

IMO – the owner of e-Navigation, with an effective correspondence group, yet little time for working. This organization has 'a technical GAP' – representatives are primarily lawyers from flagstates, not technology or user experts.

ITU - similar story, yet the role of this organization should not be underestimated. We will need them to allocate spectrum, solve interference problems, and we need to be ready for the next World Radio Conference – do we know what we need??

IHO – is an intergovernmental body, providing the S-100 key knowledge

IALA, currently an NGO, is seen by many members as filling the technical GAP. It has an e-NAV committee which meet twice a year, providing the e-Navigation CG good input

CIRM – is an NGO representing industry, working on onboard stuff, has developed IEC Ethernet interface for onboard equipment (61162-450) and the firewall between the navigation system and rest of bridge (61162-460).

ICS – is an NGO representing ship owners. They provide Constructive criticism.

IMPA – brings pilotage experience

NI – bring the mariners view

...but ultimately this community will have to sell the brilliance of e-Navigation to ship owners – and flag states. But what is brilliance? Why don't we know? We need to focus of the efficiency and value of investment.

What is e-Navigation: It is the International Marine Intranet, connecting ships, VTS/VTM, RCC, customs, service providers of weather routing etc., owners, and so on. We are often excited about the applications, not yet concentrating on the infrastructure on board and ashore. The skeleton of e-Navigation is the seamless communication and information backbone. This requires integrated navigation and communication solutions onboard - suitably firewalled.

CIRM already support this with the IEC 61162-450 / 460 standards, however some existing equipment may have to be modified, to maximise performance of the network. It is not entirely true, that the goals can be reached using existing equip in a better way. Some equipment may not network. And communication solutions come with a price. Who will pay? A number of technologies were mentioned – but considering the lack of shore stations, Mr. Rambaut asked whether there really exist a role for HF in the future?

Mr. Rambaut stated that there is a need for closer cooperation between the involved organisations. Now IMO intends to merge COMSAR and NAV subcommittees. How will this affect ability to make all the performance standards? Mr. Rambaut suggested that a the only way to get the job done, would be through a group of experts, as was the case when GMDSS was introduced.

3.3.3   Discussion

John Murray (ICS) extended question on communication cost to: Who will pay *and for what*?

Interesting question, Mr. Rambaut replied: When a VTS want information from ship – should they enter their credit card details? Satellite service will come at a cost. Focus on data structures is not enough. In LRIT, billing was the hardest barrier to negotiate. Shipowners are not prepared to pay for it. Ship had to initiate the call, but not pay for the call.

John Murray: reference to LRIT is very interesting. If someone else want the information, someone else should be prepared to pay for it. If ship is using the communication link to order engine spares, then they should carry the cost.

The full presentation is available at

http://www.e-navigation.net/index.php?page=developing-e-navigation-in-a-multi-organizational-environment-challenges-and-leadership

3.4   Have we addressed Human Element user needs?

3.4.1   Presenter and author

Mrs. Margareta Lützhöft, Chalmers University of Technology

3.4.2   Abstract

The presentation discussed the human element, factors contributing to failure and their relation to design and training. Furthermore, looked at whether user needs have been addressed, who should do it, how and when.

The aim of Chalmers University: Shaping ships for people, based on a background of real mariners. The Human Element is not limited to the navigators – crew, deck and onboard engineers, VTS, pilots, are all part of a social-technical system. Don't forget the marine engineers, they are the heart, the navigators are the brain.

Mrs. Lützhöft debated the needs versus the wants, and took a perspective from the aviation industry: Why do aviators fail?: Typically in situations requiring rapid response, challenges of managing concurrent tasks, ... – all about context of work, not about navigation or communication equipment, but about the situation. Needs depends on the situation.

We need to consider that development engineers and naval architects are not necessarily taught human centred design, or have been on a ship. Harmonization is a key word here, to save hours on training: Design for the users!

The full presentation is available at

http://www.e-navigation.net/index.php?page=Have-we-addressed-Human-Element-user-needs

3.1 e-Navigation – How do we proceed from here

3.1.1 Presenter and author

Mr Christian Breinholt, Deputy Director General, DMA and Chairman of IMO MSC

3.1.2 Abstract

Mr. Breinholt thanked for the opportunity to address e-Navigation, taking the opportunity to take a deep look into the process, noting that while acting as a chairman of MSC, he did not have any own views, but administer the views of others.

The process has delivered much information– but most of it is yet to be matured. The Strategy Implementation Plan need focus, providing a roadmap for the e-navigation evolution, describing initial steps with sufficient degree of detail that implementation can begin, but less detail on future steps to be taken, while providing a picture of where we are going.

We must face the challenges of complexity without lowering ambition – but we cannot do it all at once. Initial steps must provide the infrastructure to facilitate the exchange of information in all directions of communication; however the first iteration should also deliver some valuable App's – a few services to demonstrate the value of the harmonized information exchange infrastructure. Nothing is as convincing as real usable examples. We need to show the community what they don't know yet that we can't live without.

Such apps could - for instance - be:

MSI promulgation and graphical presentation

Automated collection of SAR information

Exchange of vessels intentions

Automated reporting.

Certainly, a prioritized list of solutions must be agreed, to enable the first iteration timely completion. Mr. Breinholt is looking forward to receiving the next submissions from the subcommittees, but keep in mind: The MSC has a long list of decisions for adoption on their agenda – the input on e-Navigation must be mature otherwise it will be returned to subcommittees.

3.1.3 Discussion:

Pieter Paap stated that communication infrastructure is essential to the e-navigation initiative. Yet it is important to pay attention to the use, reuse and possible misuse of *information*, and legal aspects of data sharing must be addressed. Legal principles of liability must be considered – and useful if MSC would instruct legal groups to address these issues in the subcommittees.

Mr. Breinholt replied that MSC basically receive report from it's subcommittees, and reflect on the report and recommendations, including their recommendations for expanding particular tasks. Member states can also bring up any issue.

The full presentation is available at

http://www.e-navigation.net/index.php?page=e-Navigation-how-do-we-proceed-from-here

3.2 e-Navigation: The way ahead

3.2.1 Presenter and author

Gurpreet Singhota, Deputy Director Maritime Safety Division, IMO

3.2.2 Abstract

Mr. Singhota stressed that the presentation contained his own views, not the official views fo the IMO secretariat.

He outlined the history from 2006 onwards, recalling the strategy for the development and implementations, and stressed the need for a *globally* harmonized implementation.

Based on procedural constrains he envisaged the earliest possible opportunity for an intercessional working group meeting would be in 2014. This might be a way for provide specific focus to the e-Navigation process, rather than a few hours during a subcommittee meeting.

However the reorganizing of NAV and COMSAR must be considered.

The secretariat has recommended that the Correspondence narrow their focus to 5 solutions. We now only have 4 months to work until deadline for NAV!

3.2.3 Discussion

Mr. John Murray expressed concern that the discussion at NAV58 had been rather hurried. This was making the CG discussions consequentially difficult. As for the cost/benefit analysis he cas concerned we should not to fall in same pit. The time allocated at subcommittee level does not allow face to face discussion on this crucial element. He fully supported the idea for an intercessional meeting, but this would be after NAV.

Mr. Singhota replied that the secretariat had noted the concerns raised by BIMCO, ICS, Intertanko, etc – and this was why the CG had been instructed to focus on only 5 solutions.

The full presentation is available at

http://www.e-navigation.net/index.php?page=e-navigation-the-way-ahead

END OF DAY ONE

4   THEME 2 – IMPLEMENTATION STRATEGIES

Chair: Thomas Christensen, Project manager at the Danish Maritime Authority

4.1   e-Navigation in China: strategy and practical trials

4.1.1   Presenter and author

Mr. Zhenjie Liu, Sino-European Usability Center, Dalian maritime University

4.1.2   Abstract

Mr. Zhenjie Liu gave a description of the development and initiatives related to e-Navigation in China in the past and at present, and relevant work in Dalian Maritime University.
Work on digital Aids to Navigation started in 1990s. Over the past years, China has established RBN / DGPS chain, AIS, and today a total of 28 VTS centers and a complete AIS network is in place. The establishment of AIS for inland waterways is underway. Since 2008 official ENC's are available for the nations coastal ports and channels.
China is working with strategic planning for the future of e-Navigation, including further expansion of the use of AIS including space based detection, R-mode positioning, as well as expanding ENC and other hydrographic data availability.

On relevant work at the Dalian Maritime University, Mr. Liu noted that the university founded in 1909 has 286 professors, 1000 academic staff and 25.000 students, and is one of the top 100 universities in China. It is a national key engineering research center for navigation, and encompass simulators as well as sea-going vessels for research, education and training.

Current work is on AIS technologies, automatic testing, theories for AIS R-mode, standards and development of Beidou satellite navigation receiver, etc.

A number of projects were mentioned on SAR, broadband wireless communication and demonstration applications and information management related to e-Navigation, monitoring of ocean-going vessels and cargo.

The Sino-European Usability Center provides research on maritime human-machine interaction research working with industry and international partners. In cooperation with Chalmers University, some cultural aspects of usability have been studied.

The full presentation is available at

http://www.e-navigation.net/index.php?page=e-navigation-in-china-strategy-and-practical-trials

4.2   e-Navigation developments in Russia: the industry view

4.2.1   Presenter and author

Mr Sergey Cherepanov, Transas.

4.2.2   Abstract

Mr. Sergey Cherepanov informed about a series of major nationally funded projects in Russia, looking at VTS upgrades and area expansion, extension and integration of AIS networks, RIS implementation, shore GMDSS regular upgrade, national LRIT and monitoring center.

In 2009 a government program APPROACH was started, aimed to develop a national e-Navigation implementation programme in Russia. Al though aged, research results may be valid:

Considering the Russian sea area specifics, covering different climatic zones with almost non-existing infrastructure in vast remote areas, the cost of building infrastructure could be extremely high. Also Inland waterways are considered, yet to what degree are river waterways part of e-

Navigation? Cost considerations on replacing existing systems with new systems tend to result in interfacing existing systems as most realistic.

Mr. Cherepanov took the audience through the proposed e-Navigation service layout, from national services level, area focused service levels down to local services level, with VTS centers, etc.

Part of the system would be an e-Navigation service catalogue, a sort of registry providing service specifications and a list of service instances, at the national or even international level.

An e-Navigation mockup had been developed, simulating services such as auto selection of relevant chart requesting updates of those not already installed, VTS assigning port entry route, digital reporting, etc. Communication was simulated to be based on AIS or wideband internet connectivity.

Since 2010 a test bed in the Gulf of Finland is scheduled for 2014, and a national initiative on satellite AIS is planned for launches in 2013 and 2014. Technical development continue in the industry, on auto chart updating and billing, route exchange with ship office for optimized fuel efficiency, logistics, etc.

The full presentation is available at

http://www.e-navigation.net/index.php?page=e-navigations-development-in-russia-industry-view

4.3 Sharing of Complex Maritime Information

4.3.1 Presenter and author

Mr Ulf Svedberg, Swedish Maritime Administration.

4.3.2 Abstract

Mr. Ulf Svedberg reported on the MONALISA 2.0 project: Information management: "The next generation".

In order to improve new services for seafarers and increase the amount and quality of data exchange and data processing between stakeholders within the maritime domain, we have to alter the way of handling our data from the "Need to Know" basis as we know it today and put more focus in a "Need to Share "basis of tomorrow.

The ongoing and paradigm shifting EU- projects "SESAR" for the aviation business and "CISE" dealing with security and surveillance, are now taking place within the European community could also be adopted into our maritime world. A new way of sharing and processing our data could be used and this presentation will give You an brief introduction into how this can be done.

The 'Monalisa movie' was presented.

4.3.3 Discussion

Question by David Patraiko: So much money is spent on aviation in the EU and USA – there must be specific risks to be managed or increased efficiency to be achieved. Why is the European Commission not putting similar effort into the maritime?

Ulf Svedberg replied: Expectations are, that European air traffic systems simply cannot cope with the projected increase in traffic.

The full presentation is available at

http://www.e-navigation.net/index.php?page=Sharing-of-Complex-Maritime-Information

4.4 Water Space Management – Developments in Australia

4.4.1 Presenter and author

Mr Nick Lemon, Australian Maritime Safety Authority.

4.4.2 Abstract

The IMO led work to develop e-navigation is highlighting the need for greater coordination between multiple shore organizations and authorities. Such coordination is vital to ensure that an increasingly complex range of jurisdictional and maritime safety measures can operate without conflict and without unintended overlap or duplication.

Over the past several years in Australia major reviews of maritime activity off the NW and the NE Australian coasts have highlighted the need for tools to bring together a range of spatial enabled datasets to identify potential safety implications in the face of rapidly expanding activity, whether it be offshore resource related or simply increases in shipping traffic volume.

In 2010 a geospatial resource atlas was created for the NW Australian coast which contained relevant information in layers that could be used to show emerging interdependencies between human activities, and between human activities and environmental parameters such as whale migration and tropical storm patterns.

Currently, similar work is being done for the NE Australian coast, which includes the Great Barrier Reef, Torres Strait and the Coral Sea. In the NE a living, updatable and online geospatial tool is being used; the Australian Maritime Spatial Information System (AMSIS), which is provided by Geoscience Australia. As work is commencing to develop a new shipping management plan for the NE of Australia, a dedicated water space management working group has been established, and will be using AMSIS to help address several existing water space management issues and to identify and appropriately manage any new or emerging water space management issues.

The full presentation is available at

http://www.e-navigation.net/index.php?page=water-space-management-development-in-australia

4.5 Resilient PNT: from PNT – Unit concept to first realisation

4.5.1 Author

R. Ziebold, Z. Dai, L, Lanca, D. Minkwitz, T. Noack, E. Engler

4.5.2 Presenter

Mr Ralph Ziebold. German Aerospace Centre.

4.5.3 Abstract

Resilient determination of position, navigation and time (PNT) data of the vessel has been recognized as one core element of IMO's e-Navigation strategy. As an associated member of the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the German Aerospace Center (DLR) is proposing the introduction of a shipside PNT Module as part of a future Integrated Navigation System (INS). The core of the ship side PNT Module is a sensor fusion based processing system (PNT Unit) using available radio navigation systems and services in combination with on-board sensors for PNT data generation. A focus of the PNT Unit is provision of integrity information for all PNT data in accordance with changing performance requirements during berth to berth navigation. Within the Maritime Traffic Engineering project the development of a first prototype of such a PNT Unit has been started in order to demonstrate the feasibility of such a PNT Unit. This paper will shortly introduce the basic concept of the PNT Module. The focus here will lie on the discussion on open regulatory aspects which have been raised during the prototype development. Secondly the results of a first realization of a PNT Unit will be presented. In the last

part an overview of our latest developments of the shore based services at the Research Port Rostock will be given.

The full presentation is available at

http://www.e-navigation.net/index.php?page=resilient-pnt-from-pnt-unit-concept-to-first-realization

4.6 ACCSEAS: improving Access for Shipping in the North Sea Region

4.6.1 Authors

Alwyn Williams, ACCSEAS Project Manager, George Shaw, Principal Development Engineer, General Lighthouse Authorities, Dr Nick Ward, General Lighthouse Authority Research & Radionavigation (GLA RRNAV) & Vice Chair of the IALA e-NAV Committee.

4.6.2 Presenter

Dr Nick Ward, General Lighthouse Authority Research & Radionavigation (GLA RRNAV) & Vice Chair of the IALA e-NAV Committee.

4.6.3 Abstract

This presentation provided an update on progress with ACCSEAS, giving examples of results achieved and expected outcomes.
ACCSEAS (Accessibility for Shipping, Efficiency Advantages and Sustainability) is a project led by the General Lighthouse Authorities of the UK and Ireland with eleven other partners: from Denmark, Germany, The Netherlands, Norway and Sweden. Started in April 2012, and being delivered within a three-year timescale to February 2015, the project is funded under the INTERREG IVB North Sea Region programme.
The principal aim of ACCSEAS is to implement and demonstrate a practical e-Navigation test-bed for the North Sea Region.
Harmonised, integrated and exchangeable electronic maritime information on-board and ashore should contribute significantly to the resilience of critical maritime infrastructure and ship-to-shore services to improve safety, security and environmental protection. ACCSEAS aims to build on the development of e-Navigation in Europe to date, through co-ordination with related projects – namely EfficienSea (Baltic Sea) and Mona Lisa.
An important aim is to inform policy/decision makers, standards and regulatory bodies in Europe and internationally (including IALA, IHO and IMO) through practical experience and the engagement of stakeholders. Within this international framework and outreach, a further aim is to establish ways in which future e-Navigation solutions can be sustained and expanded in the region, thereby contributing global leadership for implementation issues based on practical experience.

The Accseas movie was presented.

The full presentation is available at

http://www.e-navigation.net/index.php?page=accseas-improving-access-for-shipping-in-the-north-sea-region

4.7 IALA Participation in the IHO Registry

4.7.1 Presenter and author

Dr Nick Ward, General Lighthouse Authority Research & Radionavigation (GLA RRNAV) & Vice Chair of the IALA e-NAV Committee.

Abstract

e-Navigation is the future, digital concept for the maritime sector; integration and harmonization are keywords in the definition of e-Navigation. The objectives of e-Navigation include: safe and secure navigation of vessels; facilitating communications, including data exchange between vessels and shore; integration and presentation of information onboard and ashore to maximize navigation safety benefits and minimize risk of confusion; global coverage with consistent standards and interoperability.

Mariners require information for planning and execution of voyages, assessment of navigation risk and compliance with regulation and this information should be accessible from a single, integrated system.

Shore users require information for their maritime domain; static and dynamic information on vessels and their voyages, all in an internationally agreed common data structure.

The IHO Registry has been accepted by IMO, IALA and other international bodies as a baseline for this Common Maritime Data Structure. The IHO Geo-spatial Information Registry provides a framework for product specifications in different fields, within IALA's remit, these include AtoNs, VTS and AIS. The product specifications are based on data models, produced using generally accepted methods, such as Unified Modelling Language (UML) and employ standard data exchange formats, for example XML or GML (Extensible/Geographic Markup Language).

The IHO Standard S-100 provides the data framework for the development of the next generation of Electronic Navigation Chart (ENC) products, as well as other related digital products required by hydrographic, maritime and Geographic Information System (GIS) users. An S-100 online registry has been established by IHO for the registration, management and maintenance of the items recognised under the S-100 framework.

The registry contains the following principal subordinate registers: Feature Concept Dictionary (FCD) register; Portrayal register; Metadata register; Product Specifications register; Data Producer Code register.

This leads to standardised methods for exchanging information: between VTS authorities; between AtoN Service providers and Hydrographic Offices; between service providers and ships and between ships. Potentially, generic standards can be developed for presentation and handling of information.

IALA is committed to participation in the IHO Registry, as a first step towards the Common Maritime Data Structure that is necessary for e-Navigation. The resulting standardization of information exchange should lead to increased efficiency, fewer errors, simpler training, with common equipment and interfacing.

The full presentation is available at

http://www.e-navigation.net/index.php?page=iala-participation-in-the-iho-registry

4.8   e-Navigation: The Canadian experience

4.8.1   Presenter and author

Mr Daniel Breton, Canadian Coast Guard

4.8.2   Abstract

The presentation from Daniel Breton of the Canadian Coast Guard spoke about Canada's experience to date in implementing the e-Navigation concept in Canada. The presentation provided the principles set to guide the work, along with the close partnership adopted by the Canadian Coast Guard with all the various stakeholders that will be affected by the initiative. The

development and implementation processes were detailed along with Canada's concept of operations for e-Navigation.

The full presentation is available at

http://www.e-navigation.net/index.php?page=e-navigation-the-canadian-experience

5   THEME 3 – SHORE INTEGRATION

Chair: Mr Rolf Zetterberg, Swedish Maritime Administration

5.1   Wireless broadband networks for e-Navigation – towards the future

5.1.1   Presenter and author

Mr Krzysztof Bronk, National Institute of Telecommunicaitons

5.1.2   Abstract

The quality and availability assessment of the currently existing wireless broadband networks was done during an extensive measurement campaign at the Baltic Sea waters conducted as a part of the Work Package 4 of the EfficienSea project. This survey was carried out by the National Institute of Telecommunications (NIT) in cooperation with other EfficienSea partners, i.e.: Maritime Office in Gdynia and Gdynia Maritime University. The campaign took place in the second part of 2011 and comprised four parts lasting from one to five days, during which a total of over 40000 measurement points have been gathered. In general, these results showed some flaws of the existing solutions and the necessity of finding a new wireless broadband system which could improve both quality and availability of the data transmission-based services at sea.

Therefore, NIT in cooperation with Gdansk University of Technology has applied for the R&D national funds to start a new project called: "NetBaltic – self-organizing multisystem broadband network for the purposes of the e-Navigation, Baltic monitoring and internet services availability enhancement". Its purpose is to define the infrastructure elements of the new self-organising wireless broadband network for data exchange between ships, between ships and data storage/processing centers and between ships and the Internet network. To achieve this goal, it will be necessary to create some novel procedures for the wireless access-network, based on the self-organizing mesh network structure, and the multi-hop transmission algorithms. The important components of the system will be the mechanisms of users' management/identification and safety. Several dedicated e-Navigation services will also be introduced for the system.

The project's result will be a feasibility study of the new wireless broadband system and its verification in the real environment. The created hardware will be tested in the pilot installation, consisted of the system's shore infrastructure and the client devices installed on-board the Bay of Gdansk-based vessels. Those tests will allow to verify the system efficiency in its destined area of operation and to prove its superiority in comparison with existing solutions.

The full presentation is available at

http://www.e-navigation.net/index.php?page=Wireless-broadband-networks-for-e-Navigation-towards-the-future

5.2   Solution-oriented concepts for the integration of information received via communication equipment with onboard navigational systems

5.2.1   Authors

Mr Eric Holder, Fraunhoffer - Institute for Communication, Information Processing and Ergonomics

Mr. Florian Motz, Fraunhoffer - Institute for Communication, Information Processing and Ergonomics

Mr. Hans Callsen-Bracker - Federal Ministry of Transport, Building and Urban Affairs, Germany

5.2.2   Presenter

Mr Eric Holder, Fraunhoffer.

5.2.3   Abstract

The continuously-developing e-navigation concept of the International Maritime Organization (IMO) aims to harmonize the collection, integration, exchange, presentation and analysis of maritime information onboard and ashore by electronic means to enhance berth to berth navigation and related services. The current separation of communication systems and navigational systems doesn't meet the requirements for safe navigation to include all means and information in the decision making. Onboard the hydrographical, meteorological and safety-related information is typically presented on the communication equipment without filtering or solely as paper print-outs with minimal options for efficient use with the information presented on navigation tools and displays. Technical as well as legal conditions (separation of responsibilities in the Safety of Life at Sea Convention – SOLAS chapters IV and V) hinder the integration of information provided by communication equipment in the navigational systems, which reduces their utilization.
A task-oriented integration and presentation of information, when all the necessary information for the respective task and situation is available in a fast, reliable, consistent and easily interpretable format, will support the officers onboard and personnel ashore in their decision making and enhance the safety of navigation. The solutions for integration should improve the safety of navigation and enhance data transfer both between vessels and also between vessels and shore-based authorities without increasing the workload of the user or producing information overload.
The aim of a project for the German Ministry of Transport, Building and Urban Affairs (BMVBS) is to perform an in-depth evaluation of the transfer and presentation of communicated information required for maritime safety. The goal was to identify safety-relevant information items and then map the flow (present and into the potential future) of these items when received via communication systems and integrated into navigational systems, identifying the optimal workflow, display and format for presentation.
This presentation will outline an architecture based on the INS concept including a concept for integrated radio communication; the classification and prioritization of safety-relevant information objects; and the definition of the task and information-related design requirements for integration, presentation, and usage of the prioritized information items onboard. Included is a concept for a novel human machine interface (HMI) for message/information handling. Project tasks were conducted with special reference to the modular concept of an Integrated Navigation System and developments within e-Navigation.

5.2.4   Discussion

Pieter Paap made a statement that this community should be carefull not to misuse of term 'MSI', which is a well defined term in Radio Regulation. If a new concept is needed to describe information content of a broader nature within e-Navigaiton, and alternative name should be defined.

The full presentation is available at

http://www.e-navigation.net/index.php?page=solution-orientated-concepts-for-the-integration-of-information-received-via-communication-equipment-with-onboard-navigational-systems

5.3 Vessel Monitoring and Advisory Service

5.3.1   Presenter and author

Mr Robert Tremlett, Consultant

5.3.2   Abstract

Mr. Tremlett introduced a proposed concept of VMAS – Vessel Monitoring and Advisory Service.

Vessel Monitoring (VM) required dynamic tracking and monitoring data as well as static or voyage related data, related to a vessel – to monitor risk levels, and apply various means for risk mitigation.

Advisory (AS) should be available to ALL vessels – in language independent terms, as well as individually as a result of requests for advice.

Mr. Tremlett then went through possible communication solutions which could form an infrastructure supporting VMAS.

The LRIT Data exchange and National Data Centers could form an information backbone. A Data Library and Common Information Data Structure is needed.

Communication should be available to all vessels, not just certain types. Developments currently proposed by IALA, ESA and other parties on VDE (VHF Data Exchange) or VDE via satellite (VDES), potentially including a multihop mesh-networking capability, is a very promising candidate to support general availability, but requires novel spectrum protocols. HF data for small data packages could provide a long range backup.

Nobody seems to have looked at the bandwidth needed by e-navigation yet, but we need to know the scope and scale for communications.

The full presentation is available at

http://www.e-navigation.net/index.php?page=vessel-monitoring-and-advisory-service

6   THEME 4 – OPERATIONS

Chair   Mr David Patraiko, The Nautical Institute

6.1   Working with the human element: Decision support systems and human factors

6.1.1   Presenter and author

Mr Thomas Porathe, Chalmers University of Technology

6.1.2   Abstract

Most often you will hear of the human element onboard as a "human error," the single person failure in the sharp end of the accident pyramid. In many accident reports "human error" is the final conclusion with which an investigations is closed and put on the shelf. But human error is not a cause of failure, it is the effect, or symptom, of deeper trouble, Dekker writes (2002). And he goes on saying: "Human error is not random. It is systematically connected to features of people's tools, tasks and operational environment." Or as Norman (2002) more bluntly puts it: Human error? It sounds to me as serious design error!

 We need to be perfectly clear about this: humans do make errors. It is part of the human conditions. We forget; we are un-concentrated; we misunderstand, and we even fall asleep when we should not. The question we must put to ourselves is: how can we device e-navigation services that supports and aids the human element in his task?

In this talk I will present three examples of how the Maritime Human Factors group at Chalmers work with the human element. I will present some findings from a field study onboard an icebreaker which revealed some interesting new suggestions of how e-navigation could support escort service in arctic waters. I will present some findings from a "system simulation" of the new suggested e-navigation service route exchange. And finally I will present finding from a sea trial using the route exchange service during a SAR drill in Denmark to send search areas and search patterns between MRCC and on-scene units.

6.1.3   Discussion

David Patraiko noted as food for thought that 90 % of the time, there is a single human decision maker available on the bridge of a vessel – who is expect to be error free.

The full presentation is available at

http://www.e-navigation.net/index.php?page=working-with-the-human-element-decision-support-systems-and-the-human-factors

6.2   Innovation – the contribution of industry in the e-Navigation domain

6.2.1   Presenter and author

Mr Michael Bergmann, Jeppesen

6.2.2   Abstract

When reading the various documents on in e-Navigation, especially those from IMO, it is clear that the drive towards e-Navigation is coming from the understanding that the current navigational situation at sea needs improvement. The world in which we live is constantly and in every area trying to look for creative ways to make things better and satisfy the ever changing needs of all of us.

The world has moved from the industrial age to the digital age and lately the term "shift age" has come up, indicating that we are migrating towards a world of constant, rapid change and increase "connectivity" and "availability". The speed of innovation has increased tremendously in the last 10 years and exponential in the last 50 years. In fact to support the rapid and sometimes drastic changes in our world not only supports constant innovation but rather requires it. The inspiration created by the inception of e-Navigation is picking up this situation and looks for ways to address it in a professional manner.

Giving this innovation is an integral part of e-Navigation and the concept can only be successful if it respects, satisfies and supports the need of innovation, but at the same time ensures the quality and usability of any change in technology or processes to be implemented.

A second paradigm in the world we live in is the growing complexity and interrelations of life. In order to master the task we need to do, more and more information is needed to create the necessary situational awareness. This development doesn't stop in the maritime world.

Governmental organizations need to realize that they need to adapt to the speed of change as well as coping with the growing complexity of today's society. With e-Navigation the maritime community is working on mastering this situation. The different working groups and committees of organizations like IMO, IHO or IALA are increasingly trying to involve industry, well aware that industry is better equipped than government to handle innovation and speed of change.

Given the experience, the trace record and the adaptability industry can and is willing to support governmental organizations to help migrate the maritime industry towards the "shift age", mastering the demands of today's maritime world.

The presentation will highlight the described situation and focus on role of the industry in managing the paradigm change of the maritime world towards a successful implementation of innovative e-Navigation solutions.

The full presentation is available at

http://www.e-navigation.net/index.php?page=innovation-the-contribution-of-industry-in-the-e-navigation-domain

6.3 What are the benefits and risks of electronic devices in shipping?

6.3.1 Presenter and author

Mr Erik Styhr Petersen, SAM Electronics.

6.3.2 Abstract

Mr. Petersen mentioned all the things we would be missing, if it wasn't for the electronics including cost for crew sizes, safety, etc., however there are also risks.

An EC project ATOMOS in 2004 applying Human Centred Design predicted huge savings on crew cost as a function of applying proper equipment, depending on ship types. Not surprisingly, highly automated ships have large savings on crew cost.

As for safety, 70% increases in safety for highly automated ships were estimated, compared to all manual operation.

Taking a look at the risk side – incident report findings indicate that improved alarm design and prioritization is clearly needed. More automation - as in more alarms - does not provide fit for purpose solutions alone. Unfamiliarity with specific equipment and lack of training is also commonly found in incident reports.

Four aspects seem to be consistent in incident reports, requiring our attention:

- Lack of crew training
- Lack of crew understanding of novel systems
- Design flaws in systems (probably introduced by inexperienced designers not understanding the users work situation)
- Inadequate alarm/warning design.

Unless addressed, exactly the same aspects appear relevant to introducing e-Navigation systems.

Mitigation measure is Human Centred Design. Usability must be demanded, designed and delivered. A plan to institutionalize usability in e-Navigation is required.

6.3.3 Discussion

Pavid Patraiko raised a question on applying Human Centred Design to different customer groups with different preferences, versus the need for uniformity of user interfaces (S-Mode).

Mr. Petersen replied by asking: Are the requirements for user interfaces for different customer groups really uniform – or do they really need to be differentiated?

The full presentation is available at

http://www.e-navigation.net/index.php?page=what-are-the-benefits-and-risks-of-electronic-devices-in-shipping

6.4   e-Navigation already onboard pleasure craft?

6.4.1   Presenter and author

Mr Anders Bergstrom, True Heading

6.4.2   Abstract

The complicated, political and long procedures to create marine standards and to ensure development towards "modern" technology are something we all know are problematic issues that we have to face in the development of new regulations and for marine equipment manufacturers that want to produce products against such regulations.

In the leisure market, technology has before always followed developments within the professional areas, such as naval and merchant marine technology. Today this might be the opposite. Technology available on a pleasure craft is maybe more flexible and advanced than ever before. Maybe even leading the way forward and could be a valuable source in the coming implementation of e-navigation. The pleasure craft market is less bound by politics and not at all by procedures that are time consuming or complicated.

The industry can deliver what the customer wants and needs within the lifespan of modern technology and with great innovative solution being the essence that the users can enjoy. Is this something that e-navigation developments should neglect or take onboard?

The full presentation is available at

http://www.e-navigation.net/index.php?page=e-navigation-already-onboard-pleasure-crafts

6.5   The role of the IALA World Wide Academy in supporting the e-Navigation concept

6.5.1   Presenter and author

Mr Stephen Bennett, IALA World Wide Academy (WWA)

6.5.2   Abstract

The role and aims of the IALA World-Wide Academy (The Academy) was presented by Mr Bennett, reviewing its achievements during 2012 focussing on how the concept of e-Navigation, particularly its shore-based component, was conveyed to target audiences at key events. Mr Bennett outlined the Academy's Action Plan for 2013 drawing particular attention to how the e-Navigation concept will be highlighted. The presentation explained work done to integrate e-Navigation components into Academy model courses and other deliverables.

The full presentation is available at

http://www.e-navigation.net/index.php?page=the-role-of-the-iala-world

7   THEME 5 – DATA MODELLING / INFRASTRUCTURE

Chair: Mr Jon Leon Ervik, Norwegian Coastal Administration (NCA)

7.1   The voyage towards e-Navigation starts with voyage planning

7.1.1   Presenter and author

Mr Geir Olsen, Jeppesen.

7.1.2   Abstract

The navigational world is getting more and more complex. And the need for a "single window" and intelligent solutions to handle the workflow processes both aboard and in the shore-ship collaboration, are in high demand. This includes all tasks; from the information gathering in the voyage planning and optimization process, to reporting regimes and berth to berth safe navigation based on up to date and real time situation awareness.

Not only to get more data out to the mariners whom are taking navigational and other operational decisions, but to enhance the ship – shore cooperation. And present it as Integrated Intelligent Information. Because the hazard of having good data, but presented and compiled in an "unintelligent" way (compiling "raw" chart data into navigational system, i.e. ECDIS without a SENC, or cluttering of objects), are already a hazard to the navigational safety. The same goes for the workflow for the mariners: the process from Voyage Planning, Optimizing and Reporting, to berth to berth navigation; it is only as good as the weakest link of the bridge crew team. And with no integrated tools to handle this workflow, the risk for fatigue and human errors are present.

I will in this paper present two central challenges and potentials the voyage in e-Navigation will and may front: 1) More optimized and safer navigation based upon closer ship-shore collaboration and 2) the need for a "single window" concept aboard to optimize the voyage planning, optimization and reporting process.

On the first topic, a demonstration of the results from the first "S100" e-Navigation sea-trials done in Singapore in April will be presented with the latest developments. These tests were done in context with "Marine Electronic Highway Project" and the IMO e-Navigation workshop hosted by Norwegian Coastal Administration (NCA) and represents a collaborative effort between NCA, Kongsberg NorControl and Jeppesen. This topic will further include thoughts on further potentials in the ship-shore collaboration process towards safer and more optimized use of waterways.

On the second topic, the need for intelligent tools to optimize the Mariners workflow from preparing, planning and reporting, to the actual navigation, will be highlighted. The elaboration of a "single window" development parallel with meeting the ECDIS mandate will be discussed, together with potential solutions.

Both topics will be presented from a former young mariner and now e-Navigation enthusiast's point of view. From this perspective, existing and potential solutions to meet the new e-Navigation paradigm will be presented "live". With the overall objective to show that the e-Navigation paradigm shift for safer and more efficient navigation is here already, but that the voyage has just begun.

The full presentation is available at

http://www.e-navigation.net/index.php?page=the-voyage-towards-e-navigation-starts-with-e-voyageplanning

7.2   IHO S-100: an essential contribution to Maritime Spatial Planning and e-Navigation

7.2.1   Presenter and author

Gilles Bessero, International Hydrographic Organization (IHO).

Abstract

Maritime Spatial Planning and e-Navigation both require easy access to standardized high quality digital geographic information describing the marine environment.

The International Hydrographic Organization (IHO) is an intergovernmental consultative and technical organization established in 1921 to support the safety of navigation, and to contribute to the protection of the marine environment. One of its primary roles is to establish and maintain appropriate standards to assist in the proper and efficient use of hydrographic data and information with a "measure once, use many times" approach.

S-100 - the IHO Universal Hydrographic Data Model - has been developed since 2001 to provide a contemporary hydrographic geospatial data standard that can support a wide variety of hydrographicrelated digital data sources, and is fully aligned with mainstream international geospatial standards, in particular the ISO 19100 series of geographic standards, thereby enabling the easier integration of hydrographic data and applications into geospatial solutions.

The primary goal for S-100 is to support a greater variety of hydrographic-related digital data sources, products, and customers. This includes the use of imagery and gridded data, enhanced metadata specifications, unlimited encoding formats and a more flexible maintenance regime. This enables the development of new applications that go beyond the scope of traditional hydrography - for example, high-density bathymetry, seafloor classification, marine GIS, et cetera.

The paper reviews the present status of S-100 based product specifications and related standards and considers the perspectives within the context of the simultaneous development of e-Navigation and Maritime Spatial Planning.

The full presentation is available at

http://www.e-navigation.net/index.php?page=iho-s-100-an-essential-contribution-to-maritime-spatial-planning-and-e-navigation

7.3   E-Navigation infrastructure design considerations

7.3.1   Authors and presenters

Mr Fred Pot, Marine Management Consulting and Geir Fagerhus, MARSEC-XL

7.3.2   Abstract

The presentation examined detailed requirements for the on-board systems architecture and made the case for using an open "Platform-as-a-Service" (PaaS) reference system architecture as a standard that can be applied to all ships irrespective of the IT hardware they carry.

Adopting a reference system architecture avoids committing the e-navigation infrastructure to a specific solution for each of its layers and instead allows it to build on the computing environment that is already available on most ships, yet provide a standard platform (Private PaaS Cloud) that allows all certified, standard e-Navigation service applications to run on any ship. Using a reference system architecture as a standard for the ship-board e-navigation infrastructure has the advantage of being technology neutral thus taking maximum advantage of (IT) industry innovation and thereby making it future proof.

By keeping the reference system architecture open source (much like Linux) and by allowing an instance of the reference system architecture to run, not only on the on-board IT infrastructure but even on electronic equipment with embedded (ARM) processors, most if not all on-board e-

Navigation Infrastructure requirements can be met while opening the door to replace the current "One Function per Box" environment with a cluster of Common Of The Shelf (COTS) computers. Doing so will likely drive down electronic equipment acquisition and maintenance cost. Doing so would, also, significantly reduce the cost of ensuring redundancy of all mission critical electronic equipment.

Geir Fagerhus presented the MARSSA concept, delivering open source solution to achieve the above.

The full presentation is available at

http://www.e-navigation.net/index.php?page=e-navigation-infrastructure-design-considerations

7.4   The structure of the Maritime Service Portfolios (MSP)

7.4.1   Presenter and author

Mr Jan-Hendrik Oltmann, German Federal Waterways and Shipping Administration.

7.4.2   Abstract

The International Maritime Organisation (IMO) has identified the concept of the "Maritime Service Portfolios (MSPs)" as an essential element of their e-Navigation Strategy, as it is presently under further development in the IMO NAV e-Navigation Correspondence Group. Some have recently dubbed the concept of the MSPs one of the "Seven Pillars of e-Navigation".

Also, at the IALA VTS 2012 Symposium in Istanbul there was a discussion as to the extent of the concept of the MSPs beyond the scope of e-Navigation, the latter of which appears to be confined by its very definition to "electronic means". I. e. at the IALA VTS 2012 Symposium there was the question raised whether the concept of the MSPs actually transcends the scope of e-Navigation proper and thus provides the future fundamental framework for maritime services, operational and technical, at large, thereby introducing new options in regard to aspects like service level definitions and service quality. The present initial list of services, operational and technical, as identified by the IMO NAV e-Navigation Correspondence Group as part of the MSP concept seems to support this conclusion.

While the relevance and strategic importance of the concept of the MSPs for e-Navigation and beyond thus appears to be evident, the immanent structure of the MSPs has not been studied well, at present. A proper understanding of the immanent structure of the MSPs is necessary, however, to arrive at a globally harmonized understanding of the MSPs – "harmonization" is one of the key goals of e-Navigation – and, not less important, to allow for a smooth future implementation of the concept of MSPs on a global scale. Recognizing this, at the IALA e-NAV Committee work has started in regard to the immanent structure of the MSPs and its implications.

On a more regional scale, the ACCSEAS project (EU INTERREG IVb programme) has started to investigate the implications of the concept of the MSPs in and for the North Sea Region.

The proposed presentation thus intends to provide an overview of the context of the MSPs and a flashlight brief of the on-going work presently done regarding the immanent structure of the MSPs and regarding the potential implications of relevant findings. Such a presentation appears to be appropriate for a conference which calls itself "e-Navigation Underway".

The full presentation is available at

http://www.e-navigation.net/index.php?page=the-structure-of-the-maritime-service-portfolios

<div style="background:#6699cc; text-align:center;">END OF DAY TWO</div>

8   THE WAY FORWARD

Dr. Nick Ward chaired the panel discussion on the last day of the conference.

8.1   Panel

The discussion panel consisted of:

- David Patraiko, The Nautical Institute
- John Erik Hagen, Norwegian Coastal Administration, Chairman of the IMO e-Navigation CG
- Gary Prosser – Secretary-General of IALA
- Peter Hinchcliffe, Secretary-General of ICS
- Michael Rambaut, Secretary-General of CIRM
- Gurpreet Singhota, Deputy Director Maritime Safety Division, IMO

8.2   Discussion

The panel debated

1) Are all the stakeholders on board
2) What's the expected outcome in 2014?
3) Who will bear the cost of e-Navigation
4) Is Freedom of the seas dead
5) How do we obtain harmonisation and coordination between test beds
6) Maritime Spatial Planning and e-Navigation – how do they marry

Statements were made towards

- The need to coordinate with the GMDSS review and associated ITU work
- Need not mandate, but stimulate voluntary uptake
- Who are affected by e-Navigation? Do those people recognize themselves in e-Navigation?
- Need to take a project approach rather than continuous R&D
- Need to take lessons from ECDIS into account
- Preference to Traffic Coordination over Traffic Management
- A need to address controversial items, such as UNCLOS
- The need of the equipment industry to identify funding, if they are to contribute to the development
- The need for manufacturers as well as governments to give up their pride in individual products, in order to achieve something greater.
- IALA will conduct a workshop on MSP in May.

Video of the panel discussion is available at

http://www.e-navigation.net/index.php?page=the-way-forward-panel-discussion-in-plenum

9 CONCLUSIONS

9.1 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 drawn, together with the basis for the Chairman's accompanying remarks, were:

1   A large number of proposed e-Navigation solutions have been developed over a broad front. The Strategic Implementation Plan of e-Navigation needs to be focused on essential foundation solutions, perhaps with a limited number of services demonstrating value, whilst maintaining the overall ambition laid out in the original IMO Strategy.

2   A roadmap for the future implementation of further proposed solutions should be developed as part of the Strategy Implementation Plan.

3   The SIP solutions should facilitate the establishment of essential infrastructure including integration of communication systems. This will enable seamless ship-ship, ship-shore, shore-ship , shore-shore information transfer including all stakeholders.

4   The Human Element remains vital. The minimization of accidents and incidents due to human errors, including single person error is essential. This can be assisted by applying Human Centred Design as well as risk and error management. Systems and displays need to be designed to fit the work process of the humans involved, providing safe decision support rather than a lot of alerts.

5   Following an accident or incident where human error has been identified as a contributing factor, the underlying factors should be the starting point of further learning, for the continued improvement of maritime safety.

6   Where regional variations exist, it is important that harmonized interoperability is ensured globally.

7   Within the cost / benefit analysis it should be recognized that cost and benefits could be attributed to different stakeholders.

8   It was recognized that a repository has been established for collecting experiences from test beds, which is useful for the harmonization of testbeds.

9   There is a need for a body to coordinate the harmonization of testbed results. IALA should consider taking on this role and submit its results to the IMO.

10   It was recognized that the continued value of any system was dependent upon its ability to be available and supported throughout its lifetime, and therefore maintainability will be essential to e-Navigation. Industrial product management lifecycle procedures could be considered.

11   Supporting a phased implementation of e-Navigation, voluntary industry uptake should be considered, rather than introducing new carriage requirements.

12   In recognition of shipping being one of the many sectors of maritime activity, Marine Spatial Planning and Water Space Management help facilitate cross sectorial consultation and can inspire e-Navigation solutions and developments and vice versa.

13   It would be valuable for stakeholders to have realistic demonstrators and pilot projects e.g. test beds on long distance inter continental voyages (e.g. Europe – China)

Video of the conference conclusions is available at

http://www.e-navigation.net/index.php?page=conclusions-of-days-1-and-2-of-the-conference

9.2 Conference conclusions of relevance to the IMO process

Mr John Erik Hagen, Chairman of the IMO e-Navigation Correspondence Group noted that on the first day, I stated that is has been necessary to prioritize 5 solutions from the list of solutions for the first iteration of e-Navigation.

The first 5 prioritized solutions will be Solutions 1, 2, 3, 4, and 9.

Going through the inputs from the Correspondence Group, trying to identify a common thread of work, common to all those solutions, I see as a personal opinion that E-Navigation is a framework for sharing essential information for navigation.

Deadline for submission to NAV is approaching.

The first posting will be the final list of proposed prioritized solutions, timeline up to NAV59, and a request for input on infrastructure description. We need a more precise description of Maritime Service Portfolios.

Second posting on risk assessment and preparation for cost/benefit analysis

Third posting will be initial cost/benefit result

Fourth posting will be draft report to NAV59.

We do not have much time.

Need also need to start identification of responsibilities for different organisations in the further process to distribute work and avoid parallel work.

Usability is essential to e-Navigation. The upcoming workshop in Australia is very valuable in this respect.

It was noted that the industry is ready for e-Navigation – a very important signal.

Mr. Hagen noted that initial call for services such as MSI promulgation, ice charts, automated reporting, automated collection of SAR information and exchange of vessel intentions all matched the proposed prioritized solutions.

Video of the conclusions by the IMO CG chair are available at

http://www.e-navigation.net/index.php?page=conference-conclusions-of-relevance-to-the-imo-process

10   CLOSING OF THE CONFERENCE

Closing remarks is available as video only at

http://www.e-navigation.net/index.php?page=closing-remarks

11   EXHIBITION

11.1   Exhibitors

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

Name of exhibitor	Products
Chalmers University of Technology Thomas Porathe **Frauenhofer Center for Maritime Logistics and Services** Hans-Christoph Burmeister **MARINTEK** Ørnulf Jan Rødseth	**MUNIN project** Maritime Unmanned Navigation through Intelligence in Networks
Kongsberg Seatex A/S * Tony Haugen	**DGNSS Infrastructure, AIS shore and onboard systems**
Swedish Maritime Administraiton, Ulf Svedberg	**MONALISA project** Moterways of the Sea
General Lighthouse Authorities William Cook	**ACCSEAS project** Accessibility for Shipping, Efficient Advantages and Sustainability
Aerobytes-Marine Ltd, Kevin Martin	**Quality Assurance software systems for analyzing VDR data**

* Indicates an IALA Industrial member

12   SOCIAL EVENTS

12.1   Welcome Reception

On day 1, a welcome reception was held in the Columbus Club of the M/S Pearl Seaways. Annemette Knagaard 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.

12.2   Bridge visit

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

12.3   Weather

Participants had an opportunity to experience the conditions under which seafarers conduct their work, as the dinner on day 2 had to be accelerated to avoid the worst sea state conditions. Wind picked up to gusts of 25-30 m/s and waves of more than 3½ meters.

12.4   Acknowledgments

The conference expressed its appreciation to the Danish Maritime Authority and IALA for its joint organisation of e-Navigation Underway 2013. It wished particularly to acknowledge the support given by:

> The Nautical Institute (NI)
>
> Comité International Radio-Maritime (CIRM)
>
> The ACCSEAS project

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

Photographs 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.

13   ANNEX A – PARTICIPANTS LIST

Surname	First name	Organisation	Country
Andersen	Peter	Cobham Satcom	Denmark
Astrup	Sune Ewert	Danish Maritime Authority	Denmark
Atanassov	Victor	Bulgarian Ports Infrastructure Company	Bulgaria
Bang	Jakob	Danish Maritime Authority	Denmark
Baskerville	Frances	CIRM	United Kingdom
Becker	Christoph	Raytheon Anschütz GmbH	Germany
Bennett	Stephen	IALA WWA	United Kingdom
Bentinck	Willem	Nederlandse Loodsen Corporatie	Netherlands
Bentzen	Mads	Danish Maritime Authority	Denmark
Bergmann	Michael	Jeppesen	Germany
Bergström	Anders	True Heading AB	Sweden
Bessero	Gilles	International Hydrographic Organization	France
Bessero	Annick	International Hydrographic Organization	France
Borup	Ole Bakman	Danish Maritime Authority	Denmark
Brandenborg	Peer	DanPilot	Denmark
Breinholt	Christian	Danish Maritime Authority	Denmark
Breton	Daniel	CANADIAN COAST GUARD	Canada
Brodje	Anders	Swedish Maritime Administration	Sweden
Bronk	Krzysztof	National Institute of Telecommunications	Poland
Brouwers	Willem	Thrane & Thrane A/S	Denmark
Buch	Erik	Danish Meteorological Institute	Denmark
Burmeister	Hans-Christoph	Fraunhofer Center for Maritime Logistics and Services CML	Germany
Camilo	António	Instituto Hidrografico	Portugal
Camre	David	Danish Maritime Authority	Denmark
Card	Michael	IALA	France
Cherepanov	Sergey	Transas	Russia
Chr. Pedersen	Frank	DA NORDEN AS	Denmark
Christensen	Thomas	Danish Maritime Authority	Denmark
Claesen	Hugo	IT-DIGIN	Belgium
Clementsen	Jorunn	Norwegian Coastal Administration	Norway
Cook	William	General Lighthouse Authorities	United Kingdom
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Dahn	Stein Inge	EMPA - European Maritime Pilots' Association	Norway
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Douglas	Peter	Northern Lighthouse Board	United Kingdom
Dr. Ziebold	Ralf	German Aero Space Center	Germany
Eliassen	Cato	Kongsberg Seatex	Norway
Erdogan	Ilknur	Jacobs University Maritime Logistics Workgroup	Germany
Eriksson	Omar Frits	Danish Maritime Authority	Denmark

Surname	First name	Organisation	Country
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Ervik	Jon leon	Norwegian Coastal Administration	Norway
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Franke	Leo	Imtech Marine	Netherlands
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Froese	Jens	Jacobs University Bremen	Germany
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Girardin	Yoan	DCNS	France
Glamsø	Morten	Danish Shipowners' Association	Denmark
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Grape	Torbjörn	Swedish Maritime Administration	Sweden
Gruber	Florian	Frequentis AG	Austria
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Holder	Melanie		Germany
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Høy-Petersen	Ulrik	GateHouse A/S	Denmark
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Ivanova	Ludmila	Bulgarian Ports Infrastructure Company	Bulgaria
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Jokinen	Antti	Baltic Sea Action Group BSAG	Finland
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Knagaard	Thomas	SIMAC	Denmark
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Le Franc	Yves	SHOM	France

Surname	First name	Organisation	Country
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Nordseth	Andreas	Danish Maritime Authority	Denmark
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Olsen	Marta	Jeppesen Norway (accompany)	Norway
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Rasmussen	Hans E	CIRM (President)	Denmark
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Schuitema	Bart	Imtech Marine	Netherlands
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Sørensen	Mads Friis	FURUNO European Branch Office	Denmark
Terp Nielsen	Jonas	Furuno Denmark A/S	Denmark
Tops	Benny	IT-DIGIN	Belgium
Tremlett	Robert	Kystverket	United Kingdom
Uttula	Aleksi	Finnish Transport Safety Agency	Finland
Ward	Nick	IALA	United Kingdom
Weijers	Peter	Free Technics BV	Netherlands
Williams	Alwyn	General Lighthouse Authorities	United Kingdom
Wouters	Siddi	Kongsberg Norcontrol IT AS	Norway
Yatchenko	Valentin	ERNC Ltd	Russia
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