ACCSEAS Annual Conference Report 2014

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Contents

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1   Introduction

The second ACCSEAS Annual Conference was held at Dynamic Earth, Edinburgh, United Kingdom on 4th – 6th March 2014. This report summarises the discussions and conclusions of the Conference.

Presentations and videos of the presentations are available on the ACCSEAS website (www.accseas.eu), and should be consulted with reference to the summaries given below.

2   Day 1

The first day was concerned with introducing the project and the progress of a number of services, followed by a panel discussion.

2.1   Welcome and introduction to the Conference, RAdm. Nick Lambert

RAdm. Lambert provided the opening address to the conference, welcoming everyone to second ACCSEAS Annual Conference. He thanked the organisers of the conference, the Dynamic Earth team, Georgina Button for arranging the conference, the global audience and gave special thanks to Mr. George Shaw who was unable to attend for family reasons.

e-Navigation will inform and change how maritime and its related industries will operate. This project and its success marks a step change from analogue to digital, under the guiding principles of e-Navigation. We will see over the course of this conference where the project has got to and some of the solutions that are emerging.

2.2   HRH The Princess Royal

Her Royal Highness The Princess Royal welcomed the delegates to the conference. She expressed her pleasure that so many people were here, which spoke to the success of the project and what has happened in a relatively short time period.

As Patron of the Northern Lighthouse Board and Master of Trinity House, Her Royal Highness has been taught very well about the operational challenges and the ways navigation must look to the future. The ACCSEAS Baseline & Priorities Report really highlights the work already undertaken in this project, as well as the trends and emerging difficulties faced in the region, it shows that there is potential to make real progress in a short space of time.

One downside of technology is the massive amount of information burdened upon the user; one of the biggest challenges facing us is how that information should be managed. There is a growing need to assess what the user actually needs to know and to present it sufficiently: this is the real challenge facing us. It is a huge achievement that such a large number of nations have come together to achieve this, driving innovation forward. It is important that these technical advancements happen and this is the first time that these innovations will have been brought to fruition.

2.3   Key note speech: Evolving Navigation - The continuous development of the concept of the future, e-navigation, Mr. Michael Card

Mr. Card introduced his organisation, IALA; he then went on to introduce e-Navigation from before its inception to today.

He pointed out that the work on e-Navigation may potentially benefit the entire logistics chain. One of the great benefits of e-Navigation will be the reduction in costs, through efficiencies, to all stakeholders. IALA has provided a lot of the technical input to IMO to allow it to continue its work on e-Navigation, Mr. Card gave a comparison to aviation and

expressed his hope that the work being done in ACCSEAS and other projects will link to test beds and initiatives in other parts of the world.

Mr. Card gave an overview of the IMO's draft Strategic Implementation Plan, and of a number of areas where the principles of e-Navigation are being employed internationally. He went on to describe where e-Navigation fits into IALA's priorities and strategic plan to 2026 before discussing the intended outcomes of the implementation of e-Navigation, including reduced workload, increased safety at sea and protection of the environment.

Mr. Card pointed out that, in order to further this effectively, we need to agree on a minimum set of technical standards for e-Navigation, similar to cell phone applications.

2.4   EU e-Maritime Initiative, Mr. Jukka Savo

Mr. Savo opened by pointing out that the EU is highly dependent on maritime transport, with 74% of trade conducted this way. There is a drive towards smart, sustainable and inclusive growth, with strict EU targets on emissions control. 30% of road freight over 300km should shift to other modes by 2030, rising to more than 50% by 2050. The 2025 estimate for container handling in EU ports is 145 million TEU. Not only that but vessels are getting larger, the cruise vessel Oasis of the Seas is roughly the size of a Nimitz class air class carrier.

The EU e-Maritime initiative is looking at the use of electronic information for improving efficiency and reducing the administrative burden on the mariner, this is leading towards the establishment of the national single windows, which will be harmonised at an EU level, leading to a massive reduction in administrative reporting. The EU e-Maritime initiative aims to foster the use of advanced information technologies for working and doing business in the maritime transport sector.

The accelerated emergence of information and communication technologies is shaping our professional lives. Internet has dramatically affected jobs and business practices in all professional sectors. It obliges organisations to search for ways to realise the full benefits for competitive advantage and sustainability.

Maritime transport administrative procedures are complex, time-consuming and, even today, are often done on paper. Major European ports have advanced information systems, which deliver considerable quality and efficiency gains. However, the interoperability between port information systems is practically non-existent limiting the potential for new services and economies of scale. Small ports might not be equipped with electronic data transmission at all. Normally at each port call, shipping companies have to enter the same data repeatedly and often manually, resulting in duplication and errors.

Not only is the internet changing the way we do business, but also how we communicate with our social networks, how we search for information, and even how we learn new skills for our trade. For the "internet" generation, access to cyberspace is a must. Also in the future Europe will need skilful and experienced European seafarers. This will be possible only if future mariners are offered the same possibilities to keep in touch and to learn as other professions on land.

The EU e-Maritime envisages promoting interoperability in its broader sense. It aims to stimulate coherent, transparent, efficient and simplified solutions in support of cooperation, interoperability and consistency between Member States and transport operators.

2.5   ACCSEAS Project, the story so far…, Dr. Alwyn Williams

Dr. Williams, project manager of ACCSEAS, provided an overview of the issues facing the North Sea Region now and in the future:

- Growth in off-shore Installations
- Reduced sea-space and manoeuvrability
- Increased shipping density
- Traffic pinch-points

before outlining the objectives of the ACCSEAS Project: devising a number of solutions to make navigating the region safer, more efficient and more environmental. He also gave background information into the origin of the project and the partner organisations involved.

He then highlighted the solutions posited by ACCSEAS:

- Resilient PNT
- Route Topology Modelling
- Tactical Route Exchange and Route Suggestion
- Maritime Safety Information/Notice to Mariners
- No-go Area Service
- Augmented Reality Heads-up Display
- Automated FAL Reporting
- Vessel Operations Co-ordination Tool
- Dynamic Ship Movement Prediction
- Inter-VTS Exchange System

discussing how they will help the region.

He discussed how the solutions will be demonstrated on-board vessels and in simulators, as well as what the expected outcomes of the project as a whole are:

- Geographic Information System (GIS)
- Ship equipment and shore infrastructure prototypes
- Evaluation of the technology and training analysis
- Support and advise EU initiatives, particularly e-Maritime
- Support e-Navigation and S-100 developments at IMO and IALA
- Future coordination of North Sea Region services
- Propose a sustainability workplan to enhance accessibility to the North Sea Region (2015 to 2020)

before coming to some conclusions:

- Potential for making an impact on maritime accessibility and safety in the North Sea Region and potentially, worldwide
- Many questions on the practical implementation of e-Navigation remain to be answered
- This is your chance to have your say!

2.6   Potential ACCSEAS solution - Vessel Operations Co-ordination Tool, Mr. Mads Bentzen Billesø and Mr. Thomas Steen Christensen

Mr. Bentzen Billesø of ACCSEAS partner Danish Maritime Authority (DMA) gave an overview of the Search and Rescue (SAR) test conducted in Denmark earlier in 2014 and described the current time-consuming methods of manual calculation and planning for search operations.

The Vessel Operations Co-ordination Tool (VOCT) brings together all of the key parameters (inputted by the SAR Co-ordinator) and automatically calculates search area and pattern

before transmitting the information to each relevant search vessel. This significantly cuts down administration time and the possibility of human error, making for increased efficiency in SAR operations.

Mr. Bentzen Billesø and Mr. Steen Christensen gave a demonstration of the VOCT tool in action, showing the shipboard viewpoint as well as the viewpoint of the SAR co-ordinator.

2.7 Potential ACCSEAS solution: Maritime Safety Information (MSI), Mr. Mads Bentzen Billesø

Mr. Bentzen Billesø began by pointing out that currently notices to mariners are disseminated using multiple channels and representations, leading to the need for several messages being distributed for each event. Because distribution mechanisms are often non-digital and in varying formats the information is not uniformly displayed or relayed, can be unclear or misleading. The information is often required to be translated before it is useful.

Transmitting information over the Maritime Cloud direct onto the display allows for quality assurance, the ability to disseminate notices uniformly and accessibly and the opportunity to confirm receipt. Mr. Bentzen Billesø gave an example of the possible interface for the MSI.

The next steps for this solution are to complete the model; ensure the categories are complete and the relationships are meaningful; ensure accurate data portrayal; develop encoding; and liaise with standardisation bodies to formalise a product specification

2.7.1 Post-presentation Discussion

Question: Does ACCSEAS envisage the solutions being available on an e-Navigation enabled ECDIS?

Answer: It is vital that all the solutions posited do not necessitate the purchasing of new shipboard equipment, rather the updating of existing software.

Question: Is there a budget for implementation of these solutions?

Answer: The scope of the project does not stretch to implementation, ACCSEAS can inform the standardisation but implementing is not up to ACCSEAS.

2.8 Potential ACCSEAS solution: Dynamic Predictor, Mr. Oscar Lexell

Mr. Lexell of ACCSEAS partner SSPA gave a background of the dynamic predictor solution. He discussed how it can use a ship's existing data to accurately predict its course and highlight possible issues. The predictor was tested in the EfficienSea project and it was concluded that it was not useful as a collision avoidance tool. It was identified at the EfficienSea project, however, that dynamic prediction may be useful at the beginning and end of voyages and during tug operations. This is what is being tested in ACCSEAS. Tests are carried out in simulators and in interviews with users, including VTS operators, pilots and the bridge team.

Mr. Lexell gave an example of the possible portrayal of the predictor on the ship-board e-Navigation Prototype Display (EPD), the interface for which is yet to be developed. He then discussed the working plan for testing and evaluating applications for the predictor. One such application is for VTS operators, where the predictor can sound an alert when a ship is diverging from normal behaviour and is at risk of grounding. This can also be relayed to the watch officer on the ship.

The plan is to demonstrate this solution at the Final ACCSEAS Conference in 2015.

2.9   Potential ACCSEAS solutions: Panel discussion

The audience asked the panel (consisting of Mr. Oscar Lexell, Dr. Alwyn Williams, Mr. Thomas Steen Christensen and Mr. Mads Bentzen Billesø) questions about ACCSEAS and its solutions. The discussions and questions are highlighted below.

A question was raised about how the dynamic predictor would be used, and by whom. Would it be VTS operators, navigators or another party? Who would be responsible for monitoring?
ACCSEAS are testing the system for use by a number of parties to see where it would be employed. It has been suggested that tugmasters and pilots may benefit from this, as well as VTS operators who could get a notification if a vessel was predicted to be heading into trouble.

Another discussion followed about what need the dynamic predictor is addressing. There was concern expressed that this solution is going to make navigation more complicated, unnecessarily.
ACCSEAS has engaged with masters of ferries who have tried this system and found it useful, particularly leaving/approaching ports, or on vessels with which the master is not familiar. It was pointed out that these tools are up to the discretion of the user and that ACCSEAS can suggest solutions and find out by testing how well they work.

The next conversation focused on what members of the panel and audience believed to be the factors and outcomes that are going to gauge the success of ACCSEAS. Responses included:

- A forum which will carry on after the project
- Increased safety and efficiency in the NSR
- The ability to assess the services developed

The potential to trial the solutions with VTS centres was raised by a member of the audience. Although not all of the services will be applicable, it was stated that the principles of each relevant service will be trialled either on desktop or in simulators.

The audience discussed whether there was a global player unifying and coordinating the regional and national initiatives. A number of organisations such as IALA and IMO are taking an international approach and there are web portals where each party can share their experiences.

It was asked whether there were any statistics (such as a reduction in accidents at sea) that can justify the installation of the systems under consideration at ACCSEAS to those who will have to pay for their implementation. Ultimately, the value of the systems will be determined in testing. Hence, there are a number of measurements that the partnership are using in their user-evaluations to determine usability. ACCSEAS are also interviewing mariners and other users to find out their reactions to the services.

Several members of the audience asserted that standardising data formats across projects and regions was important. It was highlighted that, in Korea, they are developing something with similar characteristics as the Dynamic Predictor, and it would be positive if both were developed using the same data standards so that sharing the positive attributes of each would be possible. This could prove to be important when it comes to implementing solutions as well.

Maritime Safety Information and the need for reliable notifications was discussed. It was pointed out by an audience member that there is a need to make sure the mariner is notified,

but also that the VTS receives a warning if the mariner has been sent but has not received pertinent information. Also a possible need for a way of prioritising notifications based on urgency/relevance was identified by another member of the audience. It was noted that it is important to make sure that information is interpreted correctly ship-side, it was pointed out that not all vessels have ECDIS or AIS, so other channels than these need to be maintained to make sure all vessels are receiving notices.

Finally, there was a brief polling of the audience about certain topics. The results are as follows:

Question 1 Who from the following list do you represent?

1. Policy maker - **7% (4)**
2. Ports - **0% (0)**
3. Administration - **30% (18)**
4. Education/ Training - **17% (10)**
5. Shore based operator - **5% (3)**
6. Shipowner - **5% (3)**
7. Mariner - **12% (7)**
8. Other - **24% (14)**

Question 2: What has the biggest influence on the implementation of e-Navigation?

1. Political support - **20% (12)**
2. User acceptance - **39% (23)**
3. Technical Advances - **5% (3)**
4. Commercial opportunities - 3**1% (18)**
5. Environmental benefits - **2% (1)**
6. Other - **3% (2)**

Question 3: What do you see as the main benefit of e-Navigation?

1. Increased safety - **32% (19)**
2. Environmental protection - **5% (3)**
3. Operational efficiency - **48% (29)**
4. Ease of use – Improved user experience - **3% (2)**
5. Interoperability/ compatibility - **10% (6)**
6. Access to ports - **0% (0)**
7. Other - **2% (1)**

3 Day 2

3.1 Potential ACCSEAS solution: Route Topology Model, Mr. Jan-Hendrik Oltmann

Mr. Oltmann of the German Federal Waterways and Shipping Administration gave an introduction to the Route Topology Model, which he described as a tool to represent voyage/traffic relations using mathematical graph theory. It does this by harmonising features of a given sea area into legs, junctions and nodes. This is a useful tool for Maritime Service Portfolios; for maritime traffic management; for voyage planning and optimisation, including just-in-time arrival processes; and for visualising and disseminating maritime data tailored to different user groups.

He explained that the intention is to define this model generically and globally, in a harmonised way, to eventually become a part of the IMO envisaged Common Maritime Data Structure. There will also be instances of the RTM, one for each sea area under consideration (i.e. a North Sea Region Route Topology Model).

He continued to elaborate that as different users have individual priorities and requirements they need different portrayal modes of the RTM. ACCSEAS is developing three such modes: ENC/ECDIS Mode; London Tube Map Mode; Augmented HUD mode. It is important to note that different applications of the RTM can coexist, though the data for each will come from the same database. This is scalability, as required by IMO's e-Navigation strategy.

Mr. Oltmann described how to derive a RTM, then discussed the potential applications and benefits of utilising a harmonised and standardised RTM, before pointing out what the next steps are for this tool within the project: to compile a description document of the RTM; to create a database of tables of legs and nodes in the North Sea Region; finalise the modes of portrayal.

3.1.1 Post-presentation Discussions

Question from the audience: During the data modelling phase, did you look at the ongoing works on reporting formalities of National Single Windows? Also the World Customs Organization Data Model: was this considered?

Answer: This has not been considered, but there is a contact with Inspire at the EU JRC - they would be happy to find a project to exchange views and data models.

Second Question: Who do you expect to own/maintain/regulate this model and what responsibility would these owners have?

Answer: The data modelling would be kept within the S-100 framework, and would use the IHO's Registry. Hence, the Hydrographic offices will have a role when it comes to product specification, in accordance with the requirements of IHO's S-99 standard. Harmonisation would thus be guaranteed, the ownership would belong to the appropriate international body. For the instances, such as NSR, a body needs to be found, maybe an inter-governmental organisation.

3.2 Potential ACCSEAS solution: No-go Area, Mr. Mads Bentzen Billesø

Mr. Bentzen Billesø described the No-go Area Service as a tool to indicate unsafe areas for an individual vessel. He pointed out the information the service will use to calculate these areas, including the wanted Under Keel Clearance (UKC) of the vessel (based on draught, squat, heave etc.) as well as environmental information such as detailed bathymetry, tidal levels and weather reports.

He discussed another potential portrayal of the No-go Area with the Under Keel Clearance Advice Service. This takes into account changing tides and shifting sand-banks etc., as well as the heading, route and speed of the vessel to work out the UKC of a vessel as it will reach each point on a journey. This presents some difficulties with visualisation, for which Mr. Bentzen Billesø displayed a potential resolution in his presentation.

Mr. Bentzen Billesø used the Costa Concordia disaster as an example to describe the usefulness of the Horizontal Safety Distance information.

He then went on to describe the tests which will take place in the Humber Estuary, which presents a number of navigational challenges that the No-go Area Service could help to mitigate, he then displayed a potential visualisation of the solution on the EPD.

3.2.1   Post-presentation Discussions

Question: There was a concern from the audience about the reliability of hydrographic data, on which many of ACCSEAS' solutions rely. Is the data updated often and reliably enough to be useful for these solutions?

Answer: Mr. Bentzen Billesø pointed out that in busy and unsafe areas, such as the Humber Estuary, hydrographic surveys are frequently carried out in order to mitigate this risk. In less high risk areas, surveys on a less regular basis would be sufficient. A representative from the UKHO highlighted that one benefit of developing solutions which rely upon accurate hydrographic data is that it justifies the need for more surveying. Hydrographic offices need to have justification for surveys before they can conduct them, projects such as ACCSEAS contribute to this.

Suggestion from audience: It was suggested that the project ought to connect with a working group in the IHO to make sure the display will not hide something on the ENC.

Plenary discussion: There was a discussion about how many additional meters should be added as a safety margin for ships, a concern was raised that the mariner may see take more risks based on this tool, so a safety margin should be included. This will be taken into consideration during the testing phase of the development of this service.

3.3   Potential ACCSEAS solution: Tactical Route Exchange, Dr. Thomas Porathe

Dr. Porathe of Chalmers University used the example of the Fu Shan Hai – Gdynia collision from May 2003, where both vessels had noticed the threat and had taken measures to avoid collision, but did not communicate this to one another and a collision still occurred.

Dr. Porathe stated that the cause of this accident was human error, which contributes to 89-96% of collisions. Human error should not be considered as a cause of failure. Rather, it is the effect, or symptom, of deeper trouble. Human error should not be considered as the conclusion of an investigation. Rather, it is should be the starting point. Human error is not random. It is systematically connected to features of people's tools, tasks and operational environment. People will always make mistakes, we should make sure that the systems we have in place help the user to make the right decisions, rather than complicate the decision making process.

Dr. Porathe explained complacency, confirmation bias and cognitive tunnelling and how they can contribute to accidents, and that it is important that any system put in place mitigates these psychological phenomena, simplifies the processes and improves situational awareness: in the case of the Fu Shan Hai – Gdynia collision, if each vessel could see a picture of the intentions of the other ship on their screen, they could make sure that the

evading actions they undertake are suitable and communicated to the vessel without any great effort on the part of the navigator.

Dr. Porathe used this situation to introduce how Tactical Route Exchange could work to improve situational awareness by giving the navigator the information they need in the format that suits them best. He showed an example of how the service could be portrayed on the e-Navigation Prototype Display (EPD) in a clear and simple way.

He used examples in the North Sea Region where, with developments with wind-farms, increased traffic and difficult approaches to ports, the Tactical Route Exchange solution could become vital. He described a focus group which was held with pilots and port masters in Humber region in 2013 and highlighted some of the issues they face.

3.3.1   Post-presentation Discussions

The rules of the road were discussed by the audience, a number of people pointing out that if each party had observed the rules of the road in the Fu Shan Hai – Gdynia case there would not have been a collision. The response was that even though each party had tried to communicate with one another in this instance, they were unable to, and they were unable to apply the usual rules without understanding the intentions of the other party. A simple, clear way of demonstrating a ship's route, and intended evasive actions, would make the user more able to adhere to the rules of the road. To that end the electronic exchange of route intentions amongst vessels, i.e. part of the potential solution under consideration at ACCSEAS, would contribute.

3.4   Potential ACCSEAS solution: Multi-Source Positioning Service, Dr. Paul Williams

Dr. Williams of the General Lighthouse Authorities of the UK and Ireland (GLA) began by describing why there is a need for a Multi-Source Positioning Service to the mariner. He described the reasons why GNSS can be vulnerable, leading to the requirement of a backup if this primary source of positioning fails. This addition of a backup or secondary source of positioning is referred to as Resilient PNT. Dr. Williams described the proposed architecture of Resilient PNT onboard a ship, and that ACCSEAS is implementing a prototype version of this to demonstrate how effective Resilient PNT solution can be.

Dr. Williams continued by stating that rather than relying entirely on GNSS, ACCSEAS is positing a Multi-Source Positioning Service with three terrestrial backups should GNSS fail: eLoran, R-Mode and Radar Absolute Positioning. ACCSEAS' PNT data processor (which is currently in development) will detect GNSS interference, assess the quality of the signal from the three backups and switch to the most reliable source of positioning, meaning that the navigator is never unclear as to their position.

Dr. Williams specified the infrastructure required for Multi-Source Positioning both shore-side and ship-side before detailing the three additional sources for Resilient PNT, how they work and the locations of the transmitters for the North Sea Region.

He then discussed the trials that have already taken place for Radar Absolute Positioning (which had an accuracy of 5-10m with a range of 10nm), another trial will be conducted. A full report of this is available, with pros and cons.

Dr. Williams then described the Multi-Source Positioning Receiver and the features it possesses, how it detects interference, decides the best source of information, processes it, outputs it onto the e-Navigation Prototype Display EPD and notifies the mariner that they are navigating using a secondary source of PNT. He informed the audience of the procurement plan for the receivers and where they would be installed and tested.

Dr. Williams went on to introduce simulation of the Multi-Source Positioning Service. The service will be simulated on a desktop and on a full-bridge simulator; the software to simulate GPS interference has been written and a method and scenario for testing has been developed.

Dr. Williams finally concluded that S-100 data models and product specifications for technical service data are required.

3.5   Potential ACCSEAS solutions: Panel discussion

The audience asked the panel (consisting of Dr. Paul Williams, Dr. Thomas Porathe, Mr. Jan-Hendrik Oltmann and Mr. Mads Bentzen Billesø) questions about the solutions presented to them. The discussions and questions are highlighted below.

The first discussion looked at how the source of positioning is selected by the multi-source receiver in the Multi-Source Positioning Service. Dr. Williams described the integrity equations built into the receiver, which identify the most accurate source of data, it also takes into account the whereabouts of the land infrastructure for each source and estimates which should be the most robust. The ECDIS will have indicators to clarify which source of positioning is being used and how accurate it is.

The panel discussed the importance of implementing these systems and solutions alongside more traditional methods as a backup should they ever fail, it will be important to train mariners comprehensively in all aspects of navigation.

An audience member commented on how Loran systems are not currently receiving support from the European Commission and from the European Parliament. Dr. Williams pointed out that eLoran implementation made business sense in the UK in terms of return on investment. It is up to each nation to decide whether they wish to employ this solution. In terms of cost benefit, setting up transmitters, reference stations and receivers is considerably cheaper than launching a satellite.

A member of the audience asked whether the panel were aware of any projects working on related resilient solutions to land-based GPS interference. Dr. Williams answered that there are a lot of projects working on this and similar topics, as well as integrating both maritime and land-based transportation more closely, such as SISTALS.

The accuracy of data was discussed, and the possibilities presented by crowd-sourcing data. This was agreed to be taken up in the afternoon workshop on the Provision of e-Navigation Services in the Future.

User-friendliness was suggested to be of key importance in the development of any solutions by a member of the audience. Services need to be 'decision support tools' – ones which aid the mariner to make the correct decision. Unintended consequences of the use of these tools must be identified, mitigated and eradicated in testing.

There was a second brief polling of the audience about certain topics. The results are as follows:

Question 1 How resilient are navigation systems?

1.   Very resilient - 9% (5)

2.   Prone to minor issues - 16% (90)

3.   Needs further development - 24% (13)

4.   Major concerns – accident waiting to happen - 35% (19)

5.   Fine for now, but not in the future - 14% (8)

6.   Other - 2% (1)

Question 2: What poses the biggest threat to accessibility in the North Sea Region?

1.   Increase of windfarm installations - 42% (23)

2.   Increase in overall vessel traffic - 34% (19)

3.   Larger vessels - 2% (1)

4.   Increase of oil and gas extraction - 2% (1)

5.   Workload on the mariner - 16% (9)

6.   Land based transport infrastructure - 2% (1)

7.   Other - 2% (1)

Question 3: What is your main concern about e-Navigation?

1.   Cost – who will pay for it? - 22% (12)

2.   Deskilling of existing/traditional methods - 11% (6)

3.   Risk of failure – electronic systems - 11% (6)

4.   Reduced ship to shore human interaction - 0% (0)

5.   Risk of mariner becoming a monitoring navigator - 14% (8)

6.   Overconfidence leading to navigation risk taking - 24% (13)

7.   Other - 18% (10)

3.6   Introduction to the NSR e-Navigation Forum, Mr. Pieter Paap

Mr. Pieter Paap of Rijkswaterstaat, The Netherlands, introduced himself and his role in ACCSEAS. As leader of Work Package 8 in ACCSEAS, he is responsible for coordinating the organisational aspects of further developing ACCSEAS and e-Navigation after the end of the project in 2015. This presentation will discuss the background to this, and the ways in which the legacy of the project will be maintained: what we know, what we expect and what we need to do.

We know, thanks to the Baseline and Priorities Report, that there are major challenges ahead for the NSR, an increase of traffic intensity, diversity, scale enlargement – compounded by demands for alternative use (e.g. energy sources, fish farms). Consequently, safety, protection of the environment, accessibility of NSR/ports is being put under pressure. There is also a large variety of users with different interests and needs and authorities from eight coastal states with different agendas.

Thanks to this report and other bodies of work, the needs and requirements of users in the regions have been identified. This has resulted in the Strategic Implementation Plan for e-Navigation by the IMO. The SIP provides areas of solutions and options for risk control, implementation of which starts in 2015. This concept of e-Navigation, as well as the work of ACCSEAS, fits into, contributes to and supports the IMO concept of a Sustainable Maritime Transport System and e-Maritime.

ACCSEAS and the Maritime Service Portfolio sit within the Applications and Services, Equipment and Infrastructure areas of the e-Navigation concept.

Mr. Paap then listed what we expect in the years to come. Mr. Paap explects ACCSEAS to contribute to IMO/IALA developments, as well as to relevant EU programs; have an example function for Europe and other parts of the world; contribute to future situational awareness in the NSR; deliver a number of promising potential services and tools that in future may contribute to enhanced safety and accessibility in the region; and generate future work on the further development and implementation of e-Navigation after project ends.

He also expects that, in the years to come: IMO will approve the Strategic Implementation Plan (SIP) on e-Navigation in late 2014; the gradual implementation of e-Navigation services worldwide will begin in 2015; e-Navigation will be indicated to be supportive to the concepts SMTS and e-Maritime; and that there will be no single solution for identified challenges, rather that e-Navigation will always be in conjunction with other measures (e.g. Marine Spatial Planning, extended VTS, Routing). In the North Sea region there will be the establishment of regional collaboration on various levels, this is essential for the harmonized implementation of e-Navigation. Decisions will have to be made, the consequences of the implementation of e-Navigation will be identified. He estimates that a first set of e-Navigation services will be in place by 2020 which will lead to safety and accessibility levels remaining at least the same as they are at present – in spite of the increased risk.

What to do. Mr. Paap discussed the steps ACCSEAS must take to make sure that the legacy of the project reaches its potential:

- Identify support for Regional cooperation
- Establish a Regional e-Navigation Forum
- Secure framework & relationships with international policies/programs
- Coordinate dissemination of ACCSEAS results and NSR views
- Continuation on ACCSEAS WP8 sustainable Work plan 2020+
- Secure on-going communication between parties involved

Mr. Paap introduced the e-Navigation Forum to the audience which will be an organisational legacy of ACCSEAS. He described where the Forum is positioned, in terms of what role it plays in the development of ACCSEAS both during and after the project.

He described how it compares to other meetings and workshops arranged by ACCSEAS as part of the projects ongoing development, it is an opportunity for regional users, providers, policymakers, industry etc. to engage in the development of the solutions and influence the progress of the project as a whole. It helps us to disseminate our results, raise awareness of e-Navigation, encourage industry people to raise issues, encourage collaboration, involve stakeholders, stay in line with developments and continue collaboration on the organisational and structural legacy of ACCSEAS; after the project the e-Navigation Forum will continue in some form.

3.7 Plenary: Presentation of Workshop results, Overall facilitation by Rear Admiral Nick Lambert

The delegates split into three groups to form workshops as part of the 2nd North Sea Region e-Navigation Forum, this was an opportunity for delegates to interact with their chosen element of the ACCSEAS Project and engage in its development. Once the workshops were complete, the conference reconvened for a plenary, led by RAdm. Nick Lambert. RAdm. Lambert thanked everyone for participating in the workshop and invited the workshop facilitators to present the results to the audience.

3.7.1 The results from Workshop "*Beyond ACCSEAS: The wider logistics chain*", presented by Dr. Alan Grant, General Lighthouse Authorities of the United Kingdom and Ireland

The Workshop aims were:

- To explore the wider impact of e-Navigation to North Sea Region ports and logistic chains.
- Discussion to include the effect on
    - safety
    - operational efficiencies (cost, resource, time)
    - the role of e-Navigation and e-Maritime

It was agreed amongst workshop participants that one key area of the logistics chain missing from the workshop was port operations. Though while there are no port representatives present, there were logisticians and audience members representing different shipping sectors.

There was a discussion on what the potential is for e-Maritime to be, with the conclusion that there is some overlap between e-Navigation and e-Maritime ideas and areas. e-Maritime is developing 24 national single windows as the first step towards e-Maritime.

The participants discussed the IMO Sustainable Maritime Transport System document, produced by the IMO Secretary General and how it highlighted that all individual organisations should be working towards a common goal. The e-Maritime action plan will form part of the way forward on this.

During the workshop, participants discussed the term "efficient", which can mean different things to different people – for some it may be the quickest, for others it's the most reliable or most cost effective method.

It was agreed amongst workshop participants that congestion exists and is something that can be addressed, for example in the approach to pinch points such as the Humber entrance and the Kiel Canal. It was noted that improving efficiency in one place could create an issue elsewhere. Some ports are used as delays are known, whereas others are variable, so while it can be quicker, it's an unknown quantity.

A question was posed to the workshop participants: What is the relevance of e-Navigation to North Sea Region ports and their inland logistics? Is it: safe, just in time arrival; less congestion within port environs; more/less variation on transport time of arrival? The answers of the workshop participants were as follows:

- If there was an aviation type route plan (deep sea passage management) then ships can know when they are scheduled into ports/locks and owners will know the expected duration and fuel costs etc. Such an approach would require a policy change and change in working and mind-set.
- Timeliness of data is a key component.
- Single reporting would help reduce the work effort of the mariner, but data integrity is required. Single reporting requires data to be distributed to the right people at the right time, noting that some of these bodies are not administrations, but commercial organisations and data can have a commercial value.
- Inland logistics can be a benefit of e-Navigation, it can help demonstrate the benefits of e-Navigation. Sharing of information in a timely manner can help all parts of the logistics chain.
- Safe and predictable movement of cargo.
- Congestion in pinch points exist – with greater ETA and scheduling the holding zones (such as those at Humber) wouldn't be needed. Pilots are often elsewhere or on call.

What will be the role of pilots in the future? If equipment and position is reliable, what services can they offer and how?   Changes of insurance liability?

- E-navigation can give greater predictability, enabling business to take advantage of this predictability making their route planning more efficient, leading to cost savings.

A second question was posed to the workshop participants: What aspects of the ACCSEAS solutions would improve the logistics chain and situational awareness across the Region? The answers by workshop participants were as follows:

- No-go area Service: comments made on the reliability of the charts which can affect the usability of this approach – service can be considered a local service where good, known, guaranteed data is available. Can commercial survey data be used and shared? Crowd sourcing? Some commercial data may not be appropriate (within exclusion zones) but it may also be subjected by licensing. Potential for shipping companies to form alliances for sharing data.
- Route Topology Model: Data modelling can help all parts of the logistic chain to capture relevant data across the different stakeholders.

The workshop participants assumed that there will be different adoption rates for different parts of the world and for different users. Regional activities may develop quicker rather than international activities.

The workshop concluded that the ACCSEAS Project could lead to increase efficiency in the NSR and provide increased predictability, benefiting the stakeholders in this region; while at the same time giving examples to other regions.

A third and final question was addressed by the workshop participants: How could the ACCSEAS solutions be extended in the future to support littoral logistic chains? What's missing? What next? By when?

The answers by workshop participants were as follows:

- Port involvement is missing in this workshop – port services are looking at this logistics but everyone needs to work together.
- Does it matter where e-Navigation stops and starts? It will to some (those that pay) but not to others (those who may benefit).
- The benefit will be a factor of the impact - what's the impact of getting a ship to arrive at the right time, safely etc.
- Getting maintenance workers to wind turbines is a new service area for some ship operators. However, tenderers are looking at more information than cost, looking for efficiency information and green credentials, so rather than the vessel master travelling at full speed, it could be good to have some kind of dynamic scheduling too. Possible re-use of Vessel Operations Coordination Tool (VOCT) to allocate vessels to collect people in an efficient and cost effective manner.
- Challenge – getting people to share information can often be a problem and will need an altruistic approach.
- There is a potential for different regional projects to work together to impact/influence the larger European/world-wide problems.
- ACCSEAS can work with other projects or consider these items within a suite of continuation projects.

Project ideas:

"Traffic Organisation Service (TOS) Version 2" – getting all relevant stakeholders responsible or having a role in traffic organisation together to consider the next version in the light of the above emerging or intensifying constraints to vessel traffic.

3.7.2 The results from the "*The future of e-Navigation Training*" workshop, presented by Mr. Anders Brodje

Using a few PowerPoint slides a short introduction to the Workshop session was given by the two chairs Prof. Michael Baldauf (World Maritime University (WMU)) and Mr. Anders Brödje (Swedish Maritime Administration (SMA)).

The aims and objectives of the workshop were defined as

- providing an overview of present state of e-Navigation training

- looking at responsible institutions and

- presenting methods and ways how e-Navigation training will be offered in the future

- to identify current gaps in today's e-Navigation training and discuss

- What are the expected best ways to provide e-Navigation training?

- How could we support approaches to best training?

The present situation is mainly defined by relevant rules and regulations as well as model courses of IMO but also IALA. Public and private training institutions are offering different types of training measures related to e-Navigation.

In order to fuel a debate some prepared thesis and were put forward. One of which was that the cause for maritime accidents is not 80-90% due to the human factor, as mentioned in several literature sources, but more due to poor equipment design including not only the Human-Machine-Interfaces but also handling, operation of those systems as well as the provided operating manuals, and raised the question whether this is true.

Opinions ranged from full agreement to disagreement. Agreement was supported by giving another example of having been involved in work on lifeboats. A very central issue was; where to draw the border for what is in fact human error, does it stop at the person expected to operate a tool or solution or is there a need to further include the designer of that very same tool or solution.

Disagreement was forwarded by arguing that accidents do happen even though there is a lot of information and support available. Also organisational aspects, as e.g. required by UCD/HCD methodology recommended by IMO e-Navigation SIP, need to be included. Referring to the Costa Concordia accident the discussion also pointed towards the organisational factors both onboard as well as ashore, with regard to the company. In order to ensure quality of training on e-Navigation in the future, there is also a need to overcome lack of availability of accident investigation reports.

The conclusion from the discussion among the participants was that it is very central for the future that any solutions or tools developed should take into account the human operators involved in the operations of those solutions or tools. There is a very strong need to refer to the actual users.

Another hypothesis discussed was; that new e-nav-based application much more supports thorough and comprehensive situational awareness (SA) than it degrades good seamanship.

During the discussions the participants mentioned that training must contribute that experience and knowledge of hundreds of years are transferred to operators but also shall or can be included into new equipment. e-Navigation solutions will make navigation more easier as might become a kind of a Play Station, but steering a ship will never become a computer game. Training must ensure a sufficient level of responsibility of the operators. However, the discussions reflected the expectation that technology will probably rather contribute to an increasing loss of SA by no longer directly observing and experiencing the environment but using displays and sensor information instead.

Alerts of e-Navigation based solutions are another highly important question that needs to be carefully and thoroughly be considered to avoid false and overburden warnings and alarms. In this respect the question of type specific training was discussed and argued that even if the general idea of this is good, the comparison between aviation and shipping in this respect does not necessarily hold.

The conclusion from the discussion was that training must cover the behaviour of the mariner and how they are expected to operate onboard. The content remains the same to a large extent, but there should be no need for new types of training.

Taking into account e-Navigation solutions suggested by ACCSEAS and the present situation of delivering VTS from ashore the workshop further focussed on 'Ironies of Automation' and how negative side effects can be avoided through comprehensive training. The participants looked at different types of training and concluded that there is no single answer and a need for a case-sensitive approach and provide a reasonable blended learning approach including simulations, on-the-job-training sessions, CBT, web-based and other methods.

Training should also try to contribute to cooperative work between operators ashore and on-board. Common training sessions can help to initiate communication and support understanding.

Overall, training for the future e-Navigation environment needs to ensure sufficient transfer of skills and knowledge from experienced to new staff. Maritime training and education will need to go along with the legal requirements but needs to be accompanied by taking into account new solutions that are driven by technological developments and their transfer and implementation in the daily business. Long-life learning with certain kind of obligatory refresher courses can be an approach to ensure a sufficient level of quality of the personnel. Reduction of training needs and degrading of jobs seem to be not appropriate to approach challenges of the future e-Navigation world.

3.7.3 The results from the *Provision of e-Navigation Services in the future* workshop, presented by Mr. Mads Bentzen Billesø

The workshop was held in an open manner with free discussions on topics related to services presented during the conference.

The link between services developed and tested in ACCSEAS and the IMO MSP/solutions was discussed and the view was that a mapping between them was needed.

A delegate raised the question on how to get the ship owners on board and if they would invest in the services developed and tested in ACCSEAS. It was agreed that good communication of test results and possible benefits are needed.

The equipment manufacturers are ready and several projects show good collaboration between industry, ship owners and authorities.

What are needed are internationally agreed standards, such as S-100. Standards are being developed in different working groups.

The No-go area service was discussed and several delegates mentioned that data quality and validity is of outmost importance and must be controlled. The majority was of the opinion that No-go areas should be presented on the ECDIS screen and that limitations by regulation, MSI and others could be incorporated.

A different approach to No-go area – areas where the vessel cannot go – are to display areas where the vessel CAN go, e.g. the Safe-Haven concept where the vessel is presented with a box within which it is safe (depth, traffic, etc.).

A long discussion on Tactical Route Exchange followed. Most delegates were of the opinion that exchange of intended routes is a good idea as long as the COLREGs are dealt with. Multi-ship collision situations will have to be addressed in some way as well.

The floor discussed the risk of cluttering displays with presentation of a large number of intended routes together with other information. Some kind of filtering or user selection is needed.

Maritime Safety Information/Notices to Mariners, Temporary & Preliminary notices (MSI/NM T&P) was discussed, especially the split between chart updates (chart updating NM's) as one and MSI and NM (T&P) as the other. The delegates were of the opinion that this was the right way to go considering the timing issues and different promulgation technologies and solutions.

The delegates discussed the VOCT service and saw the VOCT and the possibilities of receiving and portraying search areas and patterns on e-navigation enhanced navigational systems as a good idea.

After discussing the different services the floor was open for a more general discussion on e-navigation and the future of e-navigation.

4 Day 3

4.1 The Way Forward: North Sea regional e-Navigation and accessibility, Dr. Alwyn Williams

Nick Lambert introduced Dr. Williams and pointed out that, at the end of his presentation, Michel Hoppe will introduce the R-Mode feasibility study.

Dr. Williams reiterated the format of the conference and noted that he is trying to capture the essence of the discussions in this short presentation. He began by describing the issues in the NSR as mentioned in his first presentation on Day 1. He then pointed out that ACCSEAS is looking at potential solutions to improve the situation and get feedback from users and stakeholders of the region to see what they think. As you have seen, ACCSEAS has proposed and started to develop potential solutions to improve accessibility to the region's ports:

- Resilient PNT
- Route Topology Modelling
- Tactical Route Exchange and Route Suggestion
- Maritime Safety Information/Notice to Mariners
- No-go Area
- Augmented Reality Heads-up Display
- Automated FAL Reporting
- Vessel Operations Co-ordination Tool
- Dynamic Ship Movement Prediction
- Inter-VTS Exchange System

This is a diverse set of potential solutions, some of which are services to be provided, with the mariner and shore-based operators at their heart.

Demonstrations of several of those potential solutions will take place later this year and at next year's Annual Conference. They will be done in simulators and on-board vessels. They will demonstrate how well the services have performed and how they will improve accessibility to the region, capturing the some assessment of the benefit and potential pitfalls of the e-Navigation concept, as well as highlighting areas that still require development and

improvement. Feedback from users and stakeholders will be key here to make sure that solutions and services that are implemented are a benefit to the region and do not add risk. Dr. Williams thanked those present for their feedback.

Maritime accessibility and e-Navigation appear to be linked. Dr Williams discussed how ACCSEAS may have an impact on three levels:

1. Regional impact:

North Sea Region e-Navigation Forum

- Direct legacy of the ACCSEAS Conference

Service Providers Co-ordination Group (SPCG)

- To ensure that e-Navigation service providers are working together in a cohesive way

e-Navigation Transnational Advice and Guidance Group (TAGG)

- Regional policy advising group on e-Navigation matters
- Impact on maritime accessibility

Propose the North Sea Region e-Navigation Sustainability Plan

- Identify areas for further research and development

Evolve the testbed to demonstrate the services and concepts

- Open-source software

2. European impact:

e-Maritime Initiative

- Integrate e-Navigation with e-Maritime

e-Navigation in the context of the logistics chain

- "Silent user" of e-Navigation?
- TEN-T Network
- MONALISA 2.0

Extend the ACCSEAS testbed beyond the North Sea Region

- Atlantic, Arctic, Baltic and Mediterranean

3. Global Impact:

Support and encourage the world-wide e-Navigation testbed

- Opportunity to demonstrate the global benefits of e-Navigation

Present results into IMO, IALA and IHO

- Results of service testing with users
- Continued development of the Maritime Cloud and S-100 descriptions

Conclusion:

- Potential for making a positive impact on maritime accessibility and safety in the North Sea Region and potentially worldwide
- Many questions on the practical implementation of e-Navigation remain to be answered
- ACCSEAS is developing and will demonstrate innovative solutions in its testbed
- Future project(s)

Dr. Williams finished by announcing the final ACCSEAS Annual Conference in Rotterdam 17-18 February 2015. For more information visit www.accseas.eu

4.1.1 Post-presentation Discussions

A member of the audience pointed out the need, in light of the developments of the new technologies, that not only do the users need education for the use of the navigation solutions but also the trainers themselves require rigorous re-training.

4.2 An Update on the R-Mode Feasibility Study, Mr. Michael Hoppe

Mr. Hoppe (German Federal Waterways and Shipping Administration) introduced the first results from the feasibility study on the so-called "Ranging-Mode" as a terrestrial backup using MF transmission as part of a future Resilient PNT solution set-up. He began by introducing the concept or R-Mode: R-Mode (Ranging Mode) is the add-on of accurate synchronized timing signals from existing terrestrial maritime radio infrastructure. It uses terrestrial radio links which are standardized and globally distributed for maritime usage: MF (IALA Radiobeacon Service - DGNSS); VHF (AIS-shore based service); LF (eLORAN). It combines various terrestrial ranging signals (MF, VHF and LF).

Mr. Hoppe continued to explain the three parts of the ACCSEAS R-Mode Feasibility Study:

- Part 1, Investigation of R-Mode based on existing MF IALA radio beacons infrastructure;
- Part 2, Investigation of R-Mode based on existing AIS shore infrastructure (VHF);
- Part 3, Combination of R-Mode Signals from radio beacon, AIS and eLoran transmissions

He then went on to provide the context of the first results of Part 1, as noted above: Certain technical issues have to be taken into account, namely tracking bit transitions and carrier phase; variance metrics; propagation conditions; geometry; noise; interference; and sky wave.

Mr. Hoppe pointed out the results of the geometry metric, based on existing MF station installations around the NSR, before discussing the results of the timing: The feasibility study showed that with R-Mode using MF transmissions has an accuracy of less than ten nanoseconds, which is equivalent of 3m range. Mr. Hoppe then compared the accuracy difference between daytime and night-time for Part 1.

Mr. Hoppe then pointed out the next steps, namely continue the work regarding

- the feasibility study of R-Mode based on AIS transmissions and
- the feasibility study of R-Mode based on combinations of MF, VHF and LF transmissions.

    It is also planned to perform practical tests (proof of concept) within the ACCSEAS project.

Finally, Mr. Hoppe drew the following conclusions:

- R-Mode on MF Radiobeacons is feasible;
- Existing infrastructure on Radiobeacons in North Sea provide good coverage and geometry
- Only minor modifications are required with respect to a stable timing source and an appropriate MSK-Modulator.
- Further improvements can result from a combination with other existing infrastructure (AIS or eLoran)

4.3   Conference Conclusion, Rear Admiral Nick Lambert

RAdm. Lambert offered closing remarks. He thanks all participants and comments that it has been a pleasure to be here, thanking the audience for all comments feedback and interaction.

He applauded the potential solutions that are being developed; he commended the methods being undertaken by the partnership, with emphasis on their efforts to involve the stakeholders to make sure that the potential solutions and services developed are suitable. He highlighted the importance of the way ACCSEAS is looking to the region as a whole, which poses a challenge, mentioning the links between ACCSEAS and similar projects such as MONA LISA, as well as integrating with and learning from projects from around the world.

RAdm. Lambert outlined his hopes for the outcomes of the next twelve months for ACCSEAS: further develop the solutions; develop the notion of a follow-on project; test the solutions at sea; get practical user feedback.

He commented how, rather than being a threat to the traditional mariner, this should be seen as an opportunity to better employ the skills of the mariner.

RAdm. Lambert than thanked the project team, Dr. Williams in particular for what he felt was a very good conference.

4.4   Closing Remarks, Rear Admiral Roger Lockwood

RAdm. Lockwood commented how far the project has come from the 2013 Annual Conference in Flensburg, he added that it was telling how much more mature the services and solutions were.

RAdm. Lockwood thanked

- Dr. Alwyn Williams for leading the project;
- The venue and staff for their assistance throughout the conference;
- The EU Regional Development Fund and the INTERREG IVB programme for funding the project;
- Mr. Jukka Savo for representing the European Commission here;
- Ms. Georgina Button and Mr. Phillip Cruddace for their work producing the conference;
- The 13 speakers for contributing to the conference;
- RAdm. Nick Lambert for driving the conference forward as facilitator;
- Final thanks to the delegates for their input and participation.

He thanked the Project Steering Committee and announced his retirement, noting his sorrow that he will not be there as Chairman to see it to its conclusion. He then closed the conference officially.