

# E-Navigation Forum Final Report

2017



Marina Bay Sands  
26 April 2017  
Singapore



KYSTVERKET  
NORWEGIAN COASTAL ADMINISTRATION



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## Report of E-Navigation Forum

### Executive Summary

An E-Navigation Forum, organised by the Maritime and Port Authority of Singapore (MPA) and the Norwegian Coastal Administration (NCA), in partnership with International Hydrographic Organization (IHO) and International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), was held on 26 April 2017 at Marina Bay Sands in Singapore.

163 delegates from 17 countries attended the day-long forum. A list of delegates is at Annex C.

Presentations and discussions at the forum were structured in three sessions - practical insights and its future concept, testbeds projects and the industry need for e-navigation.

The forum generated four conclusions. They were:

1. *E-Navigation solutions and services have developed rapidly over the past few years (and continue to emerge), with contributions by industry and authorities. The gap between what is now available and desirable, can be bridged. However, for stakeholders to adopt these solutions and services, they must address user needs and be supported by clearly defined business cases.*
2. *Some countries have developed and tested advanced e-navigation solutions (e.g. single window reporting). This will enhance safety and reduce the workload on board and ashore – both now and when more automation is introduced in the future.*
3. *Any e-navigation solutions or services implemented should be harmonised globally. Implementing regional solutions will lead to non-uniformity. This can be detrimental to maritime safety and introduce implementation barriers. IMO, IALA and IHO efforts to harmonise maritime services are important and must be supported.*
4. *Vessel Traffic Services (VTS) is a central, shore-based element of e-navigation. There is merit in IALA progressing work on the “next generation of VTS”; this can enhance the safety of navigation and increase port efficiency.*

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# E-NAVIGATION FORUM

## 1. INTRODUCTION

The E-Navigation Forum, organised by the Maritime and Port Authority of Singapore (MPA) and the Norwegian Coastal Administration (NCA), in partnership with International Hydrographic Organization (IHO) and International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), was held on 26 April 2017 at Marina Bay Sands in Singapore.

163 delegates from 17 countries attended the day-long forum. A list of delegates is at Annex C.



*Dignitaries at the opening of the forum*

## 2. LIST OF ANNEXES

This report is set out in Annexes, as listed below:

- Annex A: Key note speeches
- Annex B: Summary of information presented during the three technical sessions (*these can be found at [www.ibc-asia.com/smtc/e-navigation-forum/login](http://www.ibc-asia.com/smtc/e-navigation-forum/login) (Password: ENAV) until 31 Jul 2017*).
- Annex C: List of delegates
- Annex D: Forum programme

## Annexes to the report

### ANNEX A KEY NOTE SPEECHES

#### 3. SESSION: OPENING OF FORUM

##### 3.1 Opening address: Ms Dilek Ayhan, State Secretary, Ministry of Trade, Industry and Fisheries, Norway

Ms Ayhan welcomed all delegates to the forum. She highlighted the importance of the strong bilateral relationship between Norway and Singapore, which manifests in trade, commerce and student exchange. She cited many examples of these. Both nations had strong ties to the seas, she added. Therefore, both countries naturally have strong maritime ties (for example, many Norwegian owners have their ships flagged in Singapore and many Norwegian ships call at Singapore). There is good cooperation on maritime research and development matters between both countries. She added that Norway has a large budget for maritime research and development in 2017. Norway is also working actively at IMO for the modernisation of navigational aids via the e-navigation initiative.



Ms Ayhan concluded by saying that the maritime industry, a key transport sector, is important to both countries. Both governments need to help maintain the industry's competitiveness. Both countries will continue to work together to assist their respective industries in this regard. Digitalisation of services are important, but there must be a global approach taken to their implementation.

##### 3.2 First key note address: Mr. John Erik Hagen, Regional Director, Norwegian Coastal Administration

Mr. John Erik Hagen also welcomed all the participants to the forum. He stated that the current generation of seafarers expected technology to be available at all times and everywhere. E-Navigation was a way of delivering this expectation, as it would provide bespoke information and decision-support tools to enhance the safety of navigation.



Mr. Hagen stated that e-navigation was, for now, about the exchange (between ship and shore) of harmonised information and improved bridge design. He cautioned that e-navigation ought to be developed in a globally harmonised manner. Mr. Hagen then elaborated on the significant involvement of four nations (Singapore, The Netherlands, US and Germany) in the development of e-navigation. Other countries had also demonstrated their will to participate, by way of their contributions and cooperation, he added. The SEASAME Straits project was a good example of global cooperation.

With regards to challenges, Mr. Hagen stated that it is vital to maintain safety, while enhancing efficiency and competitiveness. Interaction between man and machine and design is important in order to increase the utility of new navigation and communication technologies. However, more training will be needed as well as updating safety and operating procedures.

Mr. Hagen stated that in a 2016 speech, the IMO Secretary-General stated that the challenge was to turn the future to present. E-navigation was a prime example of this. He added that he had authored a book on e-navigation, which would be published in the United States in August this year.

Mr. Hagen concluded by saying that successful implementation of e-navigation hinges on cooperation and standardisation, delivering usable systems and the harmonisation of existing performance standards, including the development of a common maritime data structure.

### 3.3 Second key note address: Capt. M Segar, Assistant Chief Executive (Operations), Maritime and Port Authority of Singapore

Capt. M Segar, welcomed Ms Dilek Ayhan (the State Secretary of the Norwegian Ministry of Trade, Industry and Fisheries), Mr. Tormod C. Endresen (Norway's Ambassador to Singapore) and all participants to forum. He also thanked NCA for co-hosting the event, IALA and IHO for their support and Kongsberg NorControl and ChartWorld for their sponsorship.



Capt. Segar shared MPA's vision and plan for the development of Singapore's Next Generation of Vessel Traffic Management System (VTMS) with the forum. He briefly described the objectives and functions of VTS (as defined in the IALA VTS Manual), and outlined the current capabilities of Singapore's VTS. Singapore operated both a port and coastal VTS, and Singapore is developing its Next Generation VTMS, to address future challenges facing the maritime industry. These are:

- i) increasing vessel traffic and size
- ii) manpower constraints
- iii) limited sea room
- iv) disruptive technologies and new business models
- v) increasing safety and environmental protection requirements, and
- vi) sustainability

The planning and design of the new system will adopt a systematic approach. This involves a review of processes, adoption of new operational concepts and technologies, alignment with international efforts such as e-navigation and engagement with the shipping community. An analysis and assessment study has resulted in the development of a Next Generation VTMS framework, which consists of focus areas of improvements. These are:

- ship-to-shore reporting (i.e. single window)
- Information/data exchange (i.e. common maritime data structure or CDMS)
- traffic management (i.e. algorithms to detect potential collision situations)
- communications (i.e. VDES) and
- inclusion of the human element (e.g. human-centric design and usability of equipment).

Capt. Segar's keynote address ended with the screening of a video that showed a vision of Singapore's Next Generation VTMS.



#### 4. SESSION 1: PRACTICAL INSIGHT ON E-NAVIGATION AND ITS FUTURE CONCEPT

Mr. Jon Leon Ervik, Norwegian Coastal Administration, chaired this session.

##### 4.1 Presentation: Digitalization and Efficiency in Maritime Transport

Ms Kirsti L. Slotsvik, Director General, Norwegian Coastal Administration, highlighted the importance of digitalization of information and maintaining efficiency in maritime transport. She outlined the various modes of information transfer currently available to vessels. She added that overload of information provided to seafarers causes distractions. This could be detrimental to maritime safety. Ships also have to often report similar information to different authorities ashore. By introducing new systems such as SafeSeaNet Norway, Norway has reduced the administrative burden on board and improved efficiency. Ms Slotsvik added that there are various challenges with digitalisation in the maritime industry, particularly as there are currently no international standards.



###### 4.1.1 The key points made were

1. E-Navigation and digitalisation in the maritime industry are ways to improve efficiency and safety.
2. Introduction of digitalisation in the maritime industry is inevitable.
3. There are many risks to the introduction of e-navigation, including lack of global standards and cyber security.

##### 4.2 Presentation: E-Navigation - the Gap from vision to reality

Mr. Michael Bergmann, President, CIRM, stated that no matter how much work has been done in the maritime field so far to develop e-navigation, there will always be a gap between vision and reality. E-Navigation is not meant to change how ships are navigated. Rather, one of its aims is to relieve watch-keepers from routine tasks (this could be done by modern systems) and make better use of the equipment already on board. He then outlined briefly the roles IMO, IALA, CIRM and BIMCO had played.



Mr. Bergmann then introduced the PortCDM concept.

Mr. Bergmann called for incorporation of new technology in a structured way, so as to move forward in the e-navigation era. He listed many of the implemented testbeds and projects. An internationally harmonised system for data exchange needs to be in place in order to roll out e-navigation globally. All work towards development of e- navigation should be harmonised globally and must address end users requirements.

###### 4.2.1 The key points made were:

1. Defining and promoting the value proposition for stakeholders.
2. Finalising relevant standards.
3. Familiarize end users with project results.

##### 4.3 Presentation: Malaysia e-Navigation – the way forward

Mr. Arumugam V S Subramaniam, Senior Assistant Director, Malaysia Marine Department emphasised that Malaysia, being a maritime nation, has wide maritime responsibilities. The Malacca Straits is a vital shipping route. Malaysia is working together with IMO and IALA to ensure safe and efficient passages of vessels through Malacca Straits. Implementing e-navigation is one of the main initiatives Malaysia is pursuing. He stressed the importance of data analysis to assist with choosing appropriate solutions. He also provided information on the two e-navigation projects in Malaysia i.e. International Sea Traffic Management and National E-Navigation.



#### 4.3.1 The key points made were:

1. Summary of the two e-navigation projects underway in Malaysia.
2. Importance of e-navigation.
3. Issues to be considered for the implementation of e-navigation in Malaysia.

#### 4.4 Presentation: Implementation of e-Navigation in the Republic of Korea

Mr Sunbae Hong, Head of e-Navigation Development, Ministry of Oceans and Fisheries presented information on the e-navigation project (termed SMART Navigation) in the Republic of Korea.



He stated that the main cause of marine accidents is human error, especially for non-SOLAS vessels. SMART navigation aims to reduce accidents, and increase efficiency. Mr. Hong then described the complexity of the maritime industry (e.g. wide variety of stakeholders, global economic pressures, the large amount of information to be exchanged between ship and shore).

He then defined a 'fourth industrial revolution' and said that in relation to shipping, it means enhanced safety, efficiency, usability, convenience and happiness. Mr Hong also outlined the main services of the SMART e-navigation project including its concept of operations. He concluded by outlining the time line of the project, from testbed to implementation, with a focus on the timing of establishing the communications links.

#### 4.4.1 The key points made were:

1. The aims of SMART navigation are to decrease marine accidents and increase efficiency.
2. SMART navigation will provide more and better services to the industry.
3. SMART navigation is meant primarily for non-SOLAS ships.

#### 4.5 Presentation: E-Navigation – an Australian Perspective

Mr. Mahesh Alimchandani, Head of Nautical, Systems Safety, Standards, Australian Maritime Safety Authority, began by outlining the origins of e-navigation, including its aims. He then provided details of the work taking place at IMO and IALA to progress e-navigation.



Mr. Alimchandani focussed on some of the work that Australia was leading with. These were:

- Leading an informal group that is developing a guideline on the Standardised (or S-Mode) of operation of navigational equipment.
- The completion (in 2015) of an IMO Guideline on human centred design and software quality assurance.
- Leading an international project team that aims to develop a S-100 based product specification for under keel clearance management information (S-129).

As regards the future, Mr. Alimchandani provided information on the quest for resilient PNT (he provided information on some SBAS trials that will take place in Australia from 2017-19), marine spatial planning and the maritime cloud.

#### 4.5.1 The key points made were:

1. Much work is taking place at IMO and IALA to progress e-navigation.
2. Australia is leading with some tasks to progress e-navigation.
3. Resilient PNT, marine spatial planning and implementing global (rather than regional) solutions are important for e-navigation to succeed.

## 5. SESSION 2: E-NAVIGATION - TEST BEDDING PROJECTS

Mr. Sunbae HONG, Ministry of Oceans and Fisheries, Republic of Korea, chaired this session.

### 5.1 Presentation: Demonstration of Sesame Straits Project

Mr. Todd Schuett, SESAME Straits Project Manager, Kongsberg NorControl AS presented information on the recently-concluded SEASAME Straits Project. He stated that it was an industry-led project which focussed on the implementation of new technology.



The project grew out of the Marine Electronic Highway (MEH) project of 2006-10. The objective of SEASAME Straits was to develop and test a shared situational awareness and collaborative decision-making model and tool. The project consisted of 10 work packages and had a number of industry partners. Mr. Schuett highlighted some elements of each package. The concept of operations involved a ship sending its route (developed using a planning station and ECDIS) to the VTS ashore. Communication was via VDES transponders. The VTS checked the route for conflicts, congestion and hot spots and then advised the vessel. Once a route was agreed and established, a 'just-in-time' arrival or departure slot was agreed with the vessel.

The sea-trials (conducted on board 3 ships) proved that the technology works. Routes were exchanged (via both VDES and cloud computing) and the decision-support tools worked well. Valuable lessons were learnt w.r.t data exchange and VDES technology.

Mr. Schuett concluded with an overview of the project by way of a short video.

#### 5.1.1 The key points made were:

1. The SEASAME project was a success and the project's goals were achieved.
2. There were valuable lessons learnt, especially w.r.t communication mediums used.
3. There are a number of tasks that need to be carried over to another, follow-on project.

### 5.2 Presentation: Demonstration of IMO Test on Automatic Ship Reporting

Mr. Jarle Hauge, Principal Engineer, Norwegian Coastal Administration presented information on tests conducted on automatic ship reporting.

Mr. Hauge stated that the driver for these tests was Solution 2 (means for standardized and automated reporting) in the IMO's E-Navigation Strategy Implementation Plan. Singapore, Norway and Brazil established a testbed for automatic and standardised ship reporting. Associated tasks included the use of aggregated on board data collected in navigation equipment for reporting and the use of e-mail, AIS and the VDES for no (or low) cost automated or semi-automated reporting.



Mr. Hauge then described the Maritime Single Window concept in Norway (SafeSeaNet Norway or SSNN). He also described elements of the tests used in the first generation (2016) and second generation (2017) hardware and software.

The trials using e-mail were a 100% success. Some interference issues were identified with the use of VDES, which will play an important role in communication of automated reporting. However, the interference issue will need to be investigated.

#### 5.2.1 The key points made were:

1. Automated reporting is feasible and part of the future.
2. Some technical issues and operational aspects need to be further developed.
3. Internationally agreed standards, harmonisation and security issues have to be resolved.

### 5.3 Presentation: STM Validation Project

Mr. Fredrik Karlsson, Coordinator Innovation and Development, Swedish Maritime Administration presented information on the Sea Traffic Management (STM) validation project.



Mr. Karlsson provided a short history of the Mona Lisa, Mona Lisa 2.0 and Sea Traffic Management projects, including information on each of their durations, budgets and organisations involved.

He stated that the STM validation project is all about demonstrating the STM concept (in particular, voyage management) in a large-scale test bed. It will encompass some 300 vessels, 13 ports and 6 shore-based service centres in Europe.

One of the main tests (out of four) is to prove the concept of a voyage information service, which enables a standardized way to exchange voyage plans. The prospect of seamlessly communicating voyage and schedule information creates the possibility to offer different services such as port call synchronisation and route optimisation.

Mr. Karlsson also presented a short video that provided an overview of the project. The video underscored two key points:

- Coordinating the movement of ships with ports and shipping companies will need effective communications, and
- The STM project is a digital infrastructure for shipping and a new paradigm for information exchange.

#### 5.3.1 The key points made were:

1. The project had good momentum, because it built on previously related projects.
2. STM is all about interaction between authorised stakeholders (like social media).
3. If implemented, STM can offer significant safety and efficiency benefits.

### 5.4 Presentation: VDES Solution for Future e-Navigation

Dr. Peng Xiaoming, Senior Scientist, Institute for Infocomm Research, A\*STAR, presented information on A\*STAR (a publicly-funded research organisation). His aim was to share his views on the use of the VHF Data Exchange System (VDES) for e-navigation. He addressed terrestrial, satellite and integrated VDES.



Dr. Xiaoming said that VDES has been developed because AIS will be unable to support future e-navigation needs. He then defined its concept of operations. He also discussed the outcome of the World Radio Conference 2015 (WRC-15) and the plans for WRC-19. He stated that there will be some VDES trials in the Singapore in 2017. Although satellite VDES has not yet been agreed by ITU, Singapore was examining the interface between terrestrial and satellite, to avoid interference between the two means. Dr. Xiaoming then outlined some options that can be considered in this regard. He also outlined a potential integrated VDES architecture and some associated activities taking place in Singapore.

#### 5.4.1 The key points made were:

1. VDES is vital for e-navigation communications.
2. Success of VDES requires collaboration and partnerships.
3. There are some early indications of interference between satellite and terrestrial VDES.

## 5.5 Presentation: Demonstration of the Port by CDM

Mr. Mikael Lind, Associate Professor, Research Institutes of Sweden, RISE Viktoria presented information on Port Collaborative Decision Making (CDM). He outlined the importance of shipping and said that digitalisation of information exchange is an important enabler. There are large fuel savings to be had when ships travel at economical speeds. Therefore, it is clear that ships and ports need to share information regularly. The concept of Port CDM is that there are communications between ships and ports during a sea passage. The ship's ETA is to be regularly shared and the ship asked to adjust its time of arrival, if required.



Mr. Lind stated that the objectives of Port CDM are efficient port calls (quick turnarounds), just in time operations and fuel savings. He then explained the working of the Port CDM, including its analytical tools. He concluded by stating that an international Port CDM has been established.

### 5.5.1 The key points made were:

1. Digitalisation of information exchange is inevitable and has many benefits for the maritime industry.
2. Regular information exchange between ship and shore can result in many benefits.
3. Port CDM aims to save bunkers, improve port efficiency and optimise fleet utilisation.

## 6. SESSION 3: INDUSTRY NEED FOR E-NAVIGATION

Mr. Michael Bergmann, Comité International Radio-Maritime (CIRM), chaired this session.

### 6.1 Presentation: Key elements for implementation successes

Mr. Peter Hinchliffe, Secretary-General, International Chamber of Shipping (ICS), stated that ICS has supported the development of e-Navigation since its inception - on the premise that it improves the availability of digital maritime information. A significant enhancement to the safety of navigation should be that watch-keepers are largely released from gathering routine data, thereby allowing more time to make effective, safety-related decisions, supported by automatically collated data.



It was both a surprise and concern to him that the most recent e-Navigation Underway conference concluded that e-Navigation was not about implementation, but concepts. Somewhat confusingly, the same underway conference also concluded that e-Navigation was already implemented. From ICS' perspective, this is demonstrably not the case. While ships today can access some digital maritime services (e.g. ENC updates), they do not have seamless access to all the services they need.

He said ICS is viewed, rather unfairly, as the critical voice in the e-navigation debate. ICS is loyal to what it believes were the originally intended benefits. Years of discussion on e-navigation has drawn together individuals and organizations with varied expertise. However, the net result of the many vested interests has been an ever-broadening scope. Contrary to the belief of a loud minority, international shipping is not in need of a plethora of new services. ICS wonders whether the development of bespoke standards will ever be able to keep pace with innovations we may see in future digital maritime information.

Some of the key indicators of success, as seen by ICS, were:

- There should be no change to the fundamental requirements for mandatory equipment. More effective use should be made of existing equipment, with the potential to use non-type approved equipment to access non-safety related digital information
- There should be the least possible change to training requirements, information to support safer berth to berth navigation and more effective decision making by already competent and qualified personnel
- Shipmasters and bridge teams must experience a reduction in the administrative burden, even in the face of increasing demands for information by shore-based authorities, and



- Industry must have a framework of flexible and appropriate international standards including, but not limited to, S-100, which can enable swift harmonization and flexibility in service delivery.

#### 6.1.1 The key points made were:

1. The scope of the wide variety of work being done to develop e-navigation so far, should be contained.
2. Many implementation tasks still need to be done at sea and complementary tasks need to be completed ashore.
3. There is risk that the standards which we now need now to underpin the implementation of e-navigation could fall behind requirements and actually inhibit innovation.

### 6.2 Presentation: E-Solutions for automated information exchange between ship and port

Mr. Jepp Skovbakke Juhl, Manager, Maritime Technology & Regulation, BIMCO provided a brief history of BIMCO and outlined some of its core services. He stated that good nautical and commercial information are the foundation of efficient and safe port calls. Improving the exchange of information with all stakeholders by enhancing the automatic flow of information will benefit safety of navigation and reduce the administrative burden.



The European funded research project, Efficiensea2, is developing fundamental changes in today's way of exchanging information, by establishing an easy accessible machine-to-machine platform for digital communication.

The information exchange e-solution will be tested using automated transmission of information (pre-arrival reporting) as well as general port information from the port to the ship and other maritime stakeholders using standardized templates and reporting forms. The aim is to ensure an efficient and secure exchange of data between ship and shore.

Mr Juhl also described the results found so far, as they are half way through the project.

#### 6.2.1 The key points made were:

1. Harmonisation is critical. The use of international standards is key and leads to interoperability.
2. Any e-solution should be technology neutral and provide the ability to adapt to new technologies (backwards and forwards compatible).
3. Machine to machine solutions should not need additional systems or equipment.

### 6.3 Presentation: S100 and the impacts of digital data in commercial shipping

Ms Emma Fowler, Managing Director, ChartWorld Asia Pacific Pte Ltd., provided overview information on the S-100 Geospatial Information Registry and outlined its benefits to e-navigation. She then described the "new navigational tools" available today (official ENC's, ECDIS, IHO's presentation library). She highlighted some concerns such as 'alarm fatigue', poor official data and the fear of unofficial data. By way of an example, she also pointed out some differences in zones of confidence between paper and electronic charts.



Ms Fowler then discussed the use of Bathymetric ENC's and the sources of enhanced bathymetric data.

Ms Fowler concluded by playing a short video (by The Nippon Foundation's Forum for Future Ocean Floor Mapping), which made the point that the vast majority (88-90%) of our planet's waters were unmapped. A range of people spoke, stressing the reasons (of which there were many) and importance of carrying out mapping of hitherto unexplored areas. Countries need to work together however, IHO, IOC and Jepco (the organisation leading the project) will facilitate data gathering and exchange.

#### 6.3.1 The key points made were:

1. The S-100 Geospatial Information Registry is ideally suited to support e-navigation.
2. The benefits of bathymetric ENC's.

3. The importance of mapping the entire world's oceans.

#### 6.4 Presentation: Future e-Navigation in Furuno

The presentation was made by Mr. Takuo Kashiwa, Department General Manager, Technology Development & Researching Laboratory, Furuno.

Mr. Kashiwa listed many navigation and communication aids that are now considered part of the e-navigation suite. He stated that ECDIS is the central element.



As regards Furuno's activities w.r.t e-navigation, he discussed in some detail its involvement with the Sea Traffic Management validation project, focussing on the hardware and communications tools used. Furuno is developing a STM system consisting of enhanced ECDIS and STM module. He also provided details of the messages exchanged.

Mr. Kashiwa then described Furuno's involvement in the VDES trials, including use of a VDES simulator.

He also provided information on the demonstration of e-Radar/e-Racon Positioning System that took place in the south-west part of Singapore.

In general, the test results demonstrated that when using one e-Racon, the errors were of the order of 60m. However, when using two e-Racons, error values are greatly improved to 14 m (for the static trial, somewhat more for the dynamic trial).

##### 6.4.1 The key points made were:

1. ECDIS is used as the centre-piece for the STM validation project.
2. E-radar/e-Racon positioning has been successfully demonstrated to realize a PNT service (independent from GNSS).
3. Collaboration with VTS services and service providers is necessary to develop on board e-navigation products.

## 7. CLOSE OF FORUM

This session was chaired by Mr. Jon Leon Ervik of the Norwegian Coastal Administration. Together with Mr. Mahesh Alimchandani of the Australian Maritime Safety Authority, they presented four draft forum conclusions to the delegates. These were accepted with minor editorial changes.

Mr. Ervik stated that the forum was a success. He concluded that the programme and the presenters met the expectations and goal of the forum. These were to focus on the practical implementation of e-navigation, hear views of the maritime industry, learn of practical examples of implementation from different countries and hear the all-important views of the user.

### 7.1 Conclusions

The four conclusions agreed by the forum were:

1. E-Navigation solutions and services have developed rapidly over the past few years (and continue to emerge), with contributions by industry and authorities. The gap between what is now available and desirable, can be bridged. However, for stakeholders to adopt these solutions and services, they must address user needs and be supported by clearly defined business cases.
2. Some countries have developed and tested advanced e-navigation solutions (e.g. single window reporting). This will enhance safety and reduce the workload on board and ashore, both now and when more automation is introduced in the future.
3. Any e-navigation solutions or services implemented should be harmonised globally. Implementing regional solutions will lead to non-uniformity. This can be detrimental to maritime safety and introduce implementation barriers. IMO, IALA and IHO efforts to harmonise maritime services are important and must be supported.

4. Vessel Traffic Services (VTS) is a central, shore-based element of e-navigation. There is merit in IALA progressing work on the “next generation of VTS”; this can enhance the safety of navigation and increase port efficiency.

## **7.2 Forum report**

Mr. Ervik stated that the forum report and its conclusions, would be forwarded to IALA and used in the further work on the practical implementation on e-navigation. He expressed his gratitude to MPA for hosting the event and congratulated them for a successful conference.



## ANNEX C

## LIST OF DELEGATES

Title	First name	Last Name	Company name	Job title	Country	Email
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Time	Topics
08.00-09.00	Registration
<b>Opening of Forum</b>	
09.00-09.10	Opening Address by Ms Dilek Ayhan, State Secretary, Norwegian Ministry of Trade, Industry and Fisheries
09.10-09.30	1 <sup>st</sup> Keynote Address by Mr John Erik Hagen, Regional Director, Norwegian Coastal Administration
09.30-09.50	2 <sup>nd</sup> Keynote Address by Capt M Segar, Assistance Chief Executive (Operations), Maritime and Port Authority of Singapore
09.50-10.20	Networking Coffee Break
<b>Session 1: Practical insight on e-Navigation and Its Future Concept</b>	
10.20-10.40	Digitalization and Efficiency in Maritime Transport, by Mrs Kirsti Lovise Slotsvik, Director General, Norwegian Coastal Administration
10.40-11.00	E-Navigation – the GAP from Vision to Reality, by Mr Michael Bergmann, President, CIRM
11.00-11.20	Malaysia e-Navigation The Way Forward, by Mr Arumugam V S Subramaniam, Senior Assistant Director, Malaysia Marine Department
11.20-11.40	Implementation of e-Navigation in the Republic of Korea, by Mr SunBae HONG, Head of e-Navigation Development, Ministry of Oceans and Fisheries
11.40-12.00	e-Navigation – an Australian Perspective, by Mr Mahesh Alimchandani, Head of Nautical Systems Safety Standards Division, Australia Maritime Safety Authority
12.00-12.20	Questions and Answers for Session 1
12.20-13.30	Networking Lunch Break
<b>Session 2: e-Navigation - Test Bedding Projects</b>	
13.30-14.00	Demonstration of Sesame Straits Project by Mr Todd Schuett, SESAME Straits Project Manager, Kongsberg NorControl AS
14.00-14.20	Demonstration of IMO Test on Automatic Ship Reporting, by Mr Jarle Hauge, Principal Engineer, Norwegian Coastal Administration
14.20-14.40	STM Validation Project, by Mr Fredrik Karlsson, Coordinator Innovation & Development, Swedish Maritime Administration

14:40-15.00	VDES Solution for Future e-Navigation, by Dr Peng Xiaoming, Senior Scientist, Institute for Infocomm Research, A*STAR
15.00-15.20	Demonstration of the Port by CDM, by Mr Mikael Lind, Associate Professor, Research Institutes of Sweden, RISE Viktoria
15.20-15.40	Q&A of Session 2
15:40-16.10	Networking Coffee Break
<b>Session 3: Industry Need for e-Navigation</b>	
16.10-16.30	Key elements for implementation successes, by Mr Peter Hinchliffe, Secretary-General, International Chamber of Shipping
16.30-16.50	E-Solutions for automated information exchange between ship and port by Mr Jepp Skovbakke Juhl, Manager, Maritime Technology & Regulation, BIMCO
16.50-17.10	“S100” and the impacts of digital data in commercial shipping by Ms Emma Fowler, Managing Director, ChartWorld Asia Pacific Pte Ltd
17.10-17.30	Future e-Navigation in Furuno, by Mr Takuo Kashiwa, Department General Manager, Technology Development & Researching Laboratory, Furuno
17.30-17.50	Q&A of Session 3
17.50-18.00	Close of e-Navigation Forum
18.30-20.30	Dinner Reception

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