14TH IALA SYMPOSIUM

Enhanced Maritime Safety and Efficiency by Connectivity

12 – 16 April 2021 Rotterdam, The Netherlands

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CONTENTS

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Enhanced Maritime Safety and Efficiency by Connectivity

12 - 16 April 2021 Rotterdam | Netherlands

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MONDAY 12 APRIL, 12.15 – 12.55 (UTC)

SESSION 1
OPPORTUNITIES IN A DIGITAL WORLD

CHAIR: MR HIDEKI NOGUCHI

IALA

Title Abstract: 'Future VTS' – Embracing opportunities in a digital world

By: Mr Neil TRAINOR | Australian Maritime Safety Authority
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Neil Trainor is currently employed with the Australian Maritime Safety Authority as Principal Advisor, Vessel Traffic Services. His major areas of responsibility include:

- Managing AMSA's role as the competent authority for VTS, including oversight of the associated regulatory framework, the assessment and appointment of VTS Authorities and the accreditation of VTS Training Organisations.
- Providing strategic advice to AMSA with regard to meeting its responsibilities as the competent authority for VTS.

Neil is also Chairman of the Australian VTS Advisory Group. Prior to this position Neil was the manager for the Great Barrier Reef and Torres Strait Vessel Traffic Service (REEFVTS), a joint initiative by the Australian and Queensland Governments.

Abstract

VTS is a recognised, well-established, safety measure that contributes to safety of life at sea, safety and efficiency of navigation and protection of the marine environment from possible adverse effects of maritime traffic (SOLAS Chapter V Regulation 12 Vessel Traffic Services). Today's VTSs achieve this through sophisticated close track monitoring and traffic management capabilities and decision support tools.

However, we are witnessing a rapidly changing world in terms of technologies and business requirements that are driving new trends, such as the development, adoption and implementation of maritime digitalisation, digital Maritime Services. Future VTS's will need to embrace this changing world if they are to continue to serve as an effective internationally recognised measure. Noting they are already information rich, provide a communication hub, resourced and legal entities recognised by SOLAS, VTS is well positioned to achieve this.

This presentation focuses on the opportunities for VTS in a digital world, including maritime services in the context of e-navigation, through examining:

- Trends that will have a major impact on how "Future VTS" will contribute to enhancing safe, efficient and secure maritime logistics, improved data exchange between ports and ships, and raising global standards for safety, security and efficiency,
- Potential changes to the role, function and operation of VTS,
- Possible challenges to achieving this in a coordinated and structured manner.

Title abstract: Whenever e-navigation lost its holistic edge – the challenges for international organisations to deal with holistic concepts and a proposed way forward

By: Mr Jan-Hendrik OLTMANN | German Federal Waterways and Shipping Administration (WSV)
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Jan-Hendrik Oltmann is senior strategic adviser to the German Federal Waterways and Shipping Administration. He received a master degree in Electrical Engineering from Darmstadt Technical University, Germany, in 1992. Since he joined the Administration in 1993, he applied diverse technologies to the maritime domain, comprising terrestrial radio navigation, transponder technology, and ICT system architecture. He had an active role in the developments of the AIS, the overarching system architecture for IMO's e-Navigation strategy, and internationally harmonised data structures. He managed several domestic and international projects, chaired several international working groups, and is speaker at a variety of international conferences.

Abstract:

E-navigation is essentially holistic: It not only overarches, comprises and connects shipboard, shore, and link functions. A holistic view is also suggested by e-navigation when considering the flow of relevant maritime domain data from its ultimate data source to its final point of usage through many stages of transmission and/or processing.

However, when a holistic concept like e-navigation arrives at the international harmonisation and regulation domain, it seems to be in trouble: Each international organisation involved seems to focus only on their specific 'piece of the cake,' due to their specific remit and mandate. The same holds true even within a single organisation when holistic issues need to be resolved between different committees of that same organisation. The treatment of 'Automated Ship Reporting' serves as an example: This allegedly highly desired e-navigation application – it was prioritised at IMO and elsewhere - would comprise shipboard automated compilation of data reports on the reporting vessel by automatically pulling together data from different shipboard sources, automated transmission by a proper radio communications connectivity ship-shore, automated data distribution by receiving shore-based systems and (potentially) at least semi-automated evaluation of the data onshore at relevant bodies for their decision making. Considering the present state of work, this apparently 'straightforward' vision is not even near to realisation presently. Again, not a single organisation or committee is to be blamed, since they all operate according to their remits and mandates. It rather seems that there appears to be lack of co-ordination: a co-ordination that is inspired by the holistic vision of the e-navigation application under consideration.

Thus, a solution must be sought beyond and above the remits of individual international organisations, and this is the solution proposed here: Not by yet another international organisation, but rather by an agreement which would determine the specific contribution of each international organisation involved. Such a 'hyper-strategy' could be called Maritime Digital Package. The presentation introduces this notion and its features.

MONDAY 12 APRIL, 13.05 – 14.00 (UTC)

SESSION 2
DEVELOPING VTS

CHAIR: MS MONICA SUNDKLEV

IALA

Title Abstract: Introduction On China's VTS Management and Future Development

By: Mr Shengli JIN | China Maritime Safety Administration
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Shengli Jin has rich experience in navigation in major waters of the world and extensive research experience in ship safety management. He once worked as a senior surveyor at China Classification Society and joined the China Maritime Safety Administration in 1998 to engage in navigation safety, navigation assistance services and traffic safety management. He is also in charge of navigational environment management, ship routeing system, ship reporting system, Vessel Traffic Service and other tasks. Meanwhile, Mr JIN also has participated in IALA affairs since 1999 as the national member on ANM, ENG VTS E-Nav committees respectively.

Abstract:

Firstly, this paper introduces the distribution, construction and vessel traffic situation of the VTS in China, as well as the management of VTS personnel and the construction of VTS personnel training system which has been certificated by IALA. Secondly, by analyzing the roles of VTS has been playing in ensuring safety and efficiency of navigation, the paper sums up the experience and problems in China VTS operation management. Finally, the paper combines the development of E-NAV, and puts forward the basic principles and planning vision for the future development of China VTS, with a view to sharing with VTS and related experts from all over the world.

Title Abstract: Case study: VTS of Colombia

By: Mr Juan Carlos OSPINA ARIAS | Servicio Nacional de Aprendizaje (ENA)
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JUAN CARLOS OSPINA ARIAS (Colombia) PhD student in Marine Sciences (Uninorte). MBA from the Polytechnic University of Madrid, Agricultural Engineer from the National University of Colombia. Philosopher of the Bolivarian Pontifical. Specializations in Logistics, International Physical Distribution and Client-Server Application Development. Researcher and consultant in maritime, river, logistics and ports topics. Instructor of the National Learning Service (SENA) and professor at the Autonomous University of the Caribbean. Member of the CEDDET network. With studies and internships in the ports of Rotterdam and Valencia. Author of publications such as Management of the Maritime Traffic System in Colombia and Fundamentals of packaging, among others.

Abstract:

The first investigation in Colombia to know the maritime traffic management model, characterize the infrastructure and technology of the main port areas of the country, was carried out in 2015. The qualitative, descriptive method was used, making a benchmarking with the VTS of the ports from Hamburg and Bremen. Colombia has 14 maritime port captaincies to manage an average arrival of 33,647 motorboats per year, of which approximately 30% corresponds to international traffic.

It is concluded that the Maritime Traffic Control System in Colombia tends to its professionalization and standardization, with the implementation of modern technologies. The National Sub-Grade School "ARC Barranquilla" is the training center for the personnel that administers the VTS. A special model for evaluating areas and facilities designed for maritime traffic management is designed, in a City-Port context, which can serve as a reference for the construction of an IALA framework document. The study also considers a SWOT analysis to the DIMAR, as maritime authority, which aims to renew and update it. Auditing the State's investments is not only the task of DIMAR, as the executing agency, but also of all citizens and researchers interested in the professionalization and competitiveness of the country's maritime transport.

Title Abstract: Development of effective calculation formula for calculating adequate number of VTS operators

By: Mr Byung-Woo JEONG | Korea Coast Guard
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Position: Grade-VI Official
Academic degree: Master of business administration

- Graduation of the maritime university (2000. 3 ~ 2004. 2)
- Serving as a naval officer (2004. 3 ~ 2006. 2)
- Working as a VTS operator and administrative officer at Korea Coast Guard (2007. 11 ~ 2021. 4)
- Getting a master of business administration (2017. 9)

Abstract:

In most countries providing Vessel Traffic Service, VTSs are operated through shifts of VTS operator for 7/24. A VTS center should have a sufficient number of VTS operator to ensure that the VTS operations can be carried out efficiently and safely under all conditions, with due regard to the safety of navigation within the VTS area. It is not possible to monitor the vessel's movement and to provide proper information just in time in case of lack of VTS operator. Also Excessive overtime will result in fatigue and its consequent implications for human errors cause by difficulty concentrating. Fatigue in VTS disrupts cognitive ability and flexibility and impairs attention, decision making and overall performance. But the fact is it is hard to calculate adequate number of VTS operator objectively and quantitatively to reduce fatigue and excessive overtime for operating VTS area.

The IALA guideline 1045, 'STAFFING LEVELS AT VTS CENTRES', represent a formula which calculates the manpower required to operate 1 VTS operation console for 1 year. 'DORATASK' technique represents the number of airplane which can be controlled by Air traffic control center(ATC) considering workload and recovery time of ATC operator. A research conducted by Korea Coast Guard in 2018 presents effective calculation formula of calculating adequate number of VTS operator by referencing related IALA guideline and 'DORATASK' from ICAO. It is available to calculate adequate number of operation console for VTS area on consideration of VTS work load, the time required, recovery time for vessel traffic based on AIS.

This study introduces a detailed model for calculating adequate number of VTS operation console and VTS field application result and is proposed to adopt as a guideline to apply this for all IALA member for interacting with maritime traffic and responding to develop traffic situations in a way to increase performance of employer and decrease human errors.

TUESDAY 13 APRIL, 11.00 – 12.00 (UTC)

SESSION 3
MANAGING RISK

CHAIR: MR TROND SKI

Title Abstract: Analyses of AIS data for real time risk detection in maritime traffic

By: Mr Takeharu KATO | Japan Coast Guard
Contact e-mail: jcghkokugikaihatsu1-6r9i@mlit.go.jp

Section Chief, International Affairs and Engineering Development Office, Administration and Planning Division, Maritime Traffic Department Japan Coast Guard (JCG). Graduated from Department of Mechanical and Aerospace Engineering, School of Engineering, Tohoku University in March 2014. Scope of Activity: Development of Aids to Navigation system including VTS

Abstract:

This presentation gives overview of the development of technologies to automatically detect potential risks of maritime accidents in a timely manner from shore stations. This is based on AIS data that Japan Coast Guard (JCG) has accumulated in the last 10 years relating to collision and anchor dragging.

Of the two scopes of developments, the risk identification of dragging anchor is the main focus because frequent damages are caused by typhoons in Japan, with potentials to affect Japanese economy; an accident caused by the cargo ship's dragging anchor in October 2018, interrupted the operation of the sea-based airport for 14 days. The JCG has found that anchor dragging can be detected by the combination of vessel movement patterns, which are modelled by means of pattern recognition based on AIS data analyses. The result of the evaluation shows that the proposed method could detect the possible anchor dragging earlier than VTS operators with high accuracy.

Additionally, the JCG also found that the proposed collision prediction algorithm, which considers relative motions of two vessels, i.e. their distance, speed and direction could produce higher accuracy compared to the conventional CPA/TCPA methods; the proposed method could reduce false alerts in current VTS system(s).

Title Abstract: Artificial intelligence to predict long term collision risk

By: Mr Jordi DANIELS | Saab Technologies BV
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Jordi Daniëls has a Bachelor of Science and Master of Science in Business IT and Post-Master degrees with honours in AI research. He is active in the area of artificial intelligence and machine learning from the start of his career and he is always looking for new and exciting opportunities. At Saab Jordi Daniëls is an Analytics Translator for Data Science and Artificial Intelligence, aiming to contribute to a more sustainable future by improving the safety, efficiency, and environmental responsibility of the Maritime sector.

Abstract:

Maritime traffic is getting ever busier and consequently the risk of collisions is constantly rising. Vessel Traffic Service Operators play an essential role in increasing efficiency while maintaining safety. To ensure maximum safety, the operator should be assisted in times of increased traffic density. It is not a matter of whether collisions occur, but when and with what impact. Research is done to predict collision risk at a larger time horizon by using Machine Learning algorithms, part of a larger Artificial Intelligence theme. Advanced ETA calculations are performed by creating routes based on historical data and plotting vessels on these routes using the Known Nearest-Neighbour-algorithm. Using the speed and course of a vessel, the predictive model is able to know where vessels will be and at what time. Collisions can be detected pre-emptively by combining the individual predictions for multiple vessels and cross-checking the data of these vessels.

Title Abstract: Risk management in XiaZhiMen channel

By: Ms Ranxuan KE | Navigation Institute of Jimei University
Contact e-mail: keranxuan@126.com

First Author: Tang QingYou（唐庆友）
He is the Chief Supervisor of NingBo AtoN Department of DNSA of China MSA and engaged in Aids to Navigation management, visual AtoN development and e-Navigation study.

Corresponding Author: Ke Ranxuan (柯冉绚) with AtoN Research Centre of Jimei University
She is PhD on Management Science and Prof. with long term research on Technology application on AtoN. She is offered Lever-1 AtoN manager certificate from IALA in Aug. 2015 and after that, engaged in ARM committee.

Abstract:

XiaZhiMen gateway channel is an important access to Ningbo-Zhoushan port, whose throughput capacity has been No.1 worldwide for ten years (2009-2018).The traffic flow of this gateway channel is very complicated because there are East-West bound big vessels and North-South bound fishery ships.This paper takes a research on risk management of this channle, using IALA toolbox. One is IWRAP on AIS data, the other is PAWSA for detailed observation from experts with suggestions.

The data and report could provide VTS more support during daily work and when decision making needed, which improve vessel traffic service level and help for harmony relationship among stakeholders.After analysis, the paper would offer potential solutions to reduce the administrative burden ashore.

Keywords: XiaZhiMen gateway channel, IWRAP, PAWSA, VTS

TUESDAY 13 APRIL 12.10 – 13.10 (UTC)

SESSION 4
ANOMALY DETECTION AND DECISION SUPPORT

CHAIR: MR JORGE ARROYO

Title Abstract: VTS intelligent technology

Topic: Managing risk
By: Ms Lina LI | School of Navigation, Jimei University
Contact e-mail: lln@jmu.edu.cn

Lina Li is a Professor of Navigation Institute, Jimei University, Xiamen, China. She received her bachelor's degree from Dalian Maritime University with the specialized subject of ship automation in 1983. Her research interests include the theory and technique of the intelligence traffic system at sea and the ship auto anti-collision avoidance and auto control. The research results obtained by her team for more than 20 years have been successfully applied to the navigation collision avoidance auxiliary decision-making system of 400,000 ton ore sand ship and 300,000 ton crude oil tanker in China. The NDSS has been approved by DNV and CCS.

Abstract:

Due to the fact that the present method adopted for early warning of ship surveillance and risk assessment of collision avoidance within VTS is not so practicable with the real requirement of coast water in China Sea. The personnel on duty adopt the method of manual judgment to observe and judge whether there is collision risk between ships, which undoubtedly increases the working intensity and psychological pressure of the personnel on duty.

A novel method based on the PIDVCA (Personifying Intelligent Decision-making for Vessel Collision and Obstacle Avoidance) which can simulate the behavior of the experienced navigator and can monitor and assess the risk of collision for ships is given and the modeling of the threshold judgement as well as the case study of intelligent early warning ferry navigation system is also discussed. At the same time, this paper points out that MASS / or remote control ship should comply with COLREGs and local rules together with manned ships in the near future, in order to meet the requirements of VTS regulatory normalization and avoid threatening the navigation safety of manned ships. The research fruits will provide a theoretical basis and new ideas for promoting the development of VTS intelligent technology.

Key words: Busy water area Collision risk; Intelligent early warning; risk Assessment; VTS Intelligence

Title Abstract: Development and trials of the concept of new generation decision support system in VTS

Topic: Anomaly detection and decision support
By: Mr Dmitry ROSTOPHSIN | Wärtsilä
Contact e-mail: dmitry.rostopshin@wartsila.com

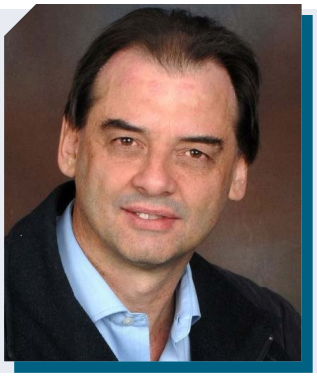
Dmitry Rostopshin has been working in Wärtsilä (formerly Transas) since 2000. He started his career from testing engineer in development department, worked several years as project installation engineer and get back to research and development as product manager. He was involved in many vessel traffic service as well as coastal and offshore surveillance projects around the world. Currently he is General Manager of Ship Traffic Control and Management Solutions and responsible for all VTS and coastal surveillance product lines. He is also VTS Instructor in Admiral Makarov State University of Maritime and Inland Shipping Training Center.

Abstract:

Decision support systems are essential part of modern VTS. But most of them are focused only on a warnings and alarms, highlighting to VTS operator dangerous situation and leaving corresponding decision on him and his bridge counterparts judgement. There is a demand to have new generation of active decision support system, analysing traffic, detecting dangerous situations, such as probable collision or grounding, COLREG violations etc and advicing the solutions for vessels. Presentation demonstrates the research performed in order to develop such kind of system and validation of the system in different traffic conditions and areas in simulation excercises and real environment. In addition discussed modern ways to deliver advisory services from shore to ship using e-Navigation approach.

Title Abstract: Analysis paralysis: breaking free from traditional decision making in the VTS environment

Topic: Embracing ENAV
By: Mr Ernest BATTY | IMIS Global Limited
Contact e-mail: ernie.b@imisglobal.com



Ernest Batty one of the founding members of IMIS Global that for the last 20 years has focused on Maritime Information Systems. Ernie serves as the Technical Director in IMIS and is the architect of MariWeb, their flag ship product.

After completing his technical training in Transnet in South Africa, Ernie completed an MDP at University of South Africa and a CIM with Oxford Brookes University in the United Kingdom. Ernie attended his first IALA meeting in 1995 as an employee of Marine Data Systems and now representing IMIS Global, is still an active member.

Abstract:

With the increase in digital communications bandwidth and deployment of Internet of Things sensors within the port environment, opportunities exist to take advantage of the large amounts of data provided. It is critical that the VTS environment does not get caught in the 'paralysis by analysis' trap.

The presentation will address three key elements – process, procedures and the people.

1. Process - What are the communication and sensor systems that can be implemented within a digitally connected environment? With proven systems in place, what might be the implications for port authorities and IALA members?
2. Procedures - What might be implications at the regulatory and operational levels?
3. People - Who will be implementing, maintaining and operating the equipment to support the service being provided? As the digital transformation progresses, what skills will personnel need?

What are the gaps between the current and future state, and what are the questions that we need to be looking at to bridge these gaps and maintain a safe, efficient and pollution free operational environment?

TUESDAY 13 APRIL, 13.20 – 14.25 (UTC)

SESSION 5
EMBRACING ENAV

CHAIR: MR MAHESH ALIMCHANDANI

Title Abstract: A lay-person's description of e-Navigation

By: Mr Axel HAHN | OFFIS e.V.
Contact e-mail: hahn@offis.de

Axel Hahn is full professor and leading the Working Group System Analysis and Optimization at the Carl von Ossietzky University Oldenburg. He his board member of the research institute OFFIS – Institute for Informatics and leading the department of transportation in transition to become an Institute of Systems Engineering for future Mobility of the Germany's Research Centre for Aeronautics and Space.
At OFFIS he is coordinating the research activities for maritime transportation systems. His research addresses design, simulation and analysis of safety critical social technical systems in maritime transportation.

Abstract:

e-Navigation is based on the same principles of data exchange as used in the apps that run on smart phones. For example, a weather app provides information to a user, this could be called a "Weather Service". This presentation uses this analogy to explain the concept of the maritime services in the context of e-Navigation to help even non-IT-personal to understand the main principles of the IMO, IALA etc. activities for implementation of e-Navigation. It provides an understandable explanation of the main concepts for Maritime Service, Technical Service and Data Models, which are all abstracts concepts used frequently with a fully different understanding.

This weather service satisfies the user's need for information about the weather. Similarly, a Maritime Service, in the context of e-Navigation, satisfies a user need for information concerning vessel navigation and other maritime considerations including safety, efficiency and the protection of the marine environment. Our weather service app has to communicate with a server that runs software that can provide weather information.

The interaction between the app and the server is defined by a technical service specification, which describes the exchange of standardised messages and the language that is used in the message contents. The language is described by a data model.

Title Abstract: Advances of the Maritime Connectivity Platform

By: Mr Thomas CHRISTENSEN | Maritime Connectivity Platform Consortium
Contact e-mail: thomas@dmc.international

Thomas has had a variety of managing roles in different areas such as head of department, technical director and QA manager. The fields have been ranging from Biotechnology to software development and medical equipment. In 2007 Thomas entered the maritime world as a project manager at the Danish Maritime Safety Administration, which later was merged with the Danish Maritime Authority.
From 2008, Thomass main involvement was with e-navigation, and from 2011 to 2016 he was leading DMAs e-navigation team. He has also been involved in a number of EU projects focusing on e-navigation; as work package leader in EfficienSea (2009-2012) and ACCSEAS (2012-2015) and project manager of EfficienSea2 (2015-2017).
In IMO and IALA, Thomas has been representing Denmark in e-navigation matters.
Furthermore, Thomas has been organising the international conference on e-navigation, "e-Navigation underway" under the auspice of DMA and IALA since its inauguration in 2011 to 2018.
In 2017, Thomas established the company Digital Maritime Consultancy, with the purpose of working with the Maritime Connectivity Platform (MCP).
From 2018, Thomas was working on the establishment of the Maritime Connectivity Platform Consortium as a governing body for MCP. This consortium was established in the beginning of 2019, and Thomas was elected as Secretary General of the consortium.

Abstract:

Mr Christensen will give a presentation of the Maritime Connectivity Platform (MCP) – in particular how such a platform is required in order to facilitate secure information exchange which is the basis for both future digital VTS services, e-navigation services and services in support of MASS. The presentation will explain how the MCP achieves this (through the establishment of trusted identities), and illuminate other benefits of the platform (a Maritime Service Registry and a Maritime Messaging Service). Furthermore, the presentation will explain the vendor independent nature of the governing body that have been established for the MCP – the Maritime Connectivity Platform Consortium.

Title Abstract: Canada's eNavigation architecture and the place for VTS

By: Mr Jean-François COUTU | Canadian Coast Guard
Contact e-mail: jean-francois.coutu@dfo-mpo.gc.ca

Mr Coutu has been a software engineer for the Canadian Coast Guard for 20 years and been representing Canada at IALA for the last 12 years. He is now manager of the Informatics departments at the Canadian Coast Guard and leads the e-navigation and VTMIS files.

Abstract:

Next generation VTS are an integral part of the shore-based eNavigation ecosystem. To enable shore authorities to leverage security, safety and efficiency benefits of next generation VTS, data exchanges between the different shore-based eNavigation components are critical. These data exchanges must be based on international standards being developed, especially the S-100 suite of standards. Shore authorities have to plan a migration of existing maritime information systems towards newer versions that will support these standards and enable data dissemination throughout the eNavigation ecosystem.

Eventually, by leveraging numerous data sources in standard formats, shore authorities will be able to perform advanced data analysis combining different sources of data and opening the door to business intelligence for the maritime world. The Canadian Coast Guard wishes to share the results of its work with other national authorities in order to stimulate dialogue, considering that many other authorities may have similar interests with regards to eNavigation and VTS.

WEDNESDAY 14 APRIL, 11.00 – 12.05 (UTC)

SESSION 6
CONNECTIVITY AND RESILIENT PNT

CHAIR: MR MICHAEL HOPPE

Title Abstract: VDES developments with a focus on R-Mode

By: Mr Jan SAFAR | General Ligthhouse Authorities of the UK and Ireland
Contact e-mail: jan.safar@gla-rad.org

Dr Jan Šafář is an R&D Engineer working for the Research and Development Directorate of the General Lighthouse Authorities of the United Kingdom and Ireland (GRAD). His areas of expertise include GNSS and alternative positioning, navigation and timing systems, such as eLoran and R-Mode. He has also been closely involved with the development and international standardization of the VHF Data Exchange System. Jan is a member of the Digital Communications Working Group of the IALA e-Navigation Committee, the AIS Working Group of IEC TC80, the Royal Institute of Navigation and US Institute of Navigation.

Abstract:

The VHF Data Exchange System (VDES) offers maritime administrations the potential to protect the existing Automatic Identification System (AIS) from overload, while at the same time, enabling them to provide new, robust and secure e-navigation services. This paper will introduce the current work on VDES, which is wide ranging. It will report on the development of the system through international collaboration, detailing the current status with regards to the international frequency allocations and explore the different areas of work being undertaken to develop VDES R-Mode.

VDES R-Mode is being explored by a number of IALA members, with several possible approaches under consideration. Reporting collectively in this paper, the current work of VDES R-Mode within the R-Mode Baltic Sea project is introduced, explained and future work presented. Progress from studies conducted by the German Aerospace Center (DLR), the National Institute of Telecommunications, Poland (NIT) and the General Lighthouse Authorities of the UK & Ireland (GLA) are provided, covering signal design, performance evaluation and coverage prediction.

Finally, this paper will report on the important work being conducted by the IALA ENG and ENAV Committees to standardise R-Mode, reporting on the outcome of the recent R-Mode Workshop and summarising the important work yet to be completed before this GNSS independent PNT solution can be realised.

Title Abstract: A demonstration experiment for the practical implementation of VDES

By: Mr Tomoya NAKAJIMA | Japan Coast Guard
Contact e-mail: jcghkokugikaihatsu1-6r9i@mlit.go.jp

Section Chief, International Affairs and Engineering Development Office, Administration and Planning Division, Maritime Traffic Department Japan Coast Guard. Graduated from JCG Academy in March 2011. Scope of Activity: Development of maritime digital system including VDES.

Abstract:

The presentation gives overview of Japan's contributions to the practical implementation of VHF Data Exchange System (VDES). The Japan Coast Guard (JCG) hosts a focus group on VDES in which maritime stakeholders can discuss possible use cases of VDES and other VDES related issues. Based on the stakeholders' needs for VDES that had been found through the focus group, the JCG and the Tokyo University of Marine Science and Technology jointly conducted a VDES demonstration experiment in Tokyo Bay in December 2018. The main purpose of the experiment was to demonstrate to the stakeholders how VDES could realize their needs.

There were 36 participants from academia, industries and government agencies in the demonstration experiment. The opinions from participants show that VDES has a strong potential in broadcasting safety related information from shore stations to ships; on the other hand, it was also found through the demonstration experiment that there are some concerns on VDES as a substitute for voice communications, especially those between ships, due to the lack of efficient input methods onboard.

The result of the demonstration experiment suggests that enhancement of the usage of formalized data, including Application Specific Messages (ASM) could be a key to overcome the challenge.

Title Abstract: R-Mode Baltic – Testbed for safe navigation at the Baltic Sea

By: Dr Stefan Gewies | German Aerospace Center
Contact e-mail: stefan.gewies@dlr.de

Stefan Gewies is a Scientist working for the German Aerospace Center in the Institute of Communications and Navigation. He is there Head of the Working Group Maritime Services of the Department of Nautical Systems and Project Manager of an international project that aims to build an R-Mode testbed in the Baltic Sea. His current research focus is on terrestrial maritime navigation systems using signals-of-opportunity. Stefan is a member of the Radionavigation Services Working Group of the IALA ENG Committee. He received his PhD degree in Physics from Heidelberg University in 2009.

Abstract:

The EU co-financed R-Mode Baltic project will setup the world's first large scale R(anging)-Mode testbed which will support the development and demonstration of R-Mode ranging signals transmitted from 6 maritime radio beacons and 4 AIS/VDES base stations at the same time. This testbed will enable the long term evaluation of this novel GNSS backup system and support the continuous development and testing of R-Mode equipment, R-Mode demonstrations and training. Furthermore, the testbed will support studies considering the benefits of a terrestrial backup system with respect to the increase of safety of navigation and challenging applications like unmanned and autonomous shipping.

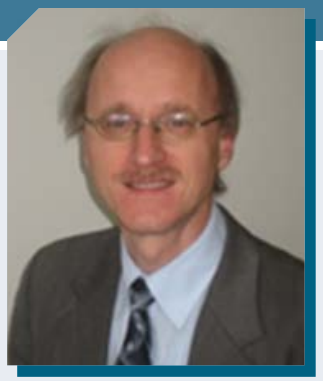
The present paper will report the current status of the R-Mode Baltic testbed development and implementation in the Southern Baltic Sea. It will focus on activities which lead to the selection of R-Mode testbed transmitter sides, the R-Mode Baltic testbed architecture, investigation of station compatibility, experiences of R-Mode equipment installation at the transmitter sides and first R Mode measurement results. The results will be limited to maritime radio beacons as VDES R-Mode is subject to a separate paper.

SESSION 7
DIGITAL COMMUNICATION

CHAIR: MR JIN PARK

Title Abstract: Developments in maritime radio communication - Outcome of the World Radiocommunication Conference 2019

Topic: Connectivity and resilient PNT
By: Mr Stefan BOBER | German Federal Waterways and Shipping Administration
Contact e-mail: stefan.bober@wsv.bund.de



Stefan Bober is a senior engineer within the Traffic Technologies Centre of the German Federal Waterways and Shipping Administration. Since 1987 he has been working on radio aids and transponder techniques. He has been involved in several projects concerning AIS and in the development of the German AIS Service for maritime and inland navigation. He is actively engaged in the AIS and VDES standardisation process. Stefan Bober is member of various national and international working groups dealing with development and standardisation of AIS and VDES. He is member of the Telecommunication WG within the IALA e-Navigation Committee, chair of IEC AIS WG and chair of the European expert group for Vessel Tracking and Tracing for Inland Navigation. He represents IALA at the International Telecommunication Union (ITU).

Abstract:

The availability of appropriate maritime radio communication systems is essential for the introduction of e-Navigation and the digitisation of the shipping. IALA has been always involved in the development and the introduction of digital maritime radio communication systems. Prominent examples are the introduction of AIS in the 2000's and the ongoing work on VDES, where IALA is the focal point of the process. IALA publishes the Maritime Radio Communication Plan (MRCP), which provides an overview of systems in the maritime mobile radio communication service and their mode of operation.

New developments in digital radio communication systems will bring more dynamic in the application of e-Navigation solutions and new digital applications for the maritime industry. Topics on the agenda of the World Radiocommunication Conference 2019 (WRC-19) include Satellite component of the VHF Date Exchange System (VDE-SAT), Autonomous Maritime Radio Device (AMRD), Navigational Data System on HF for broadcasting maritime safety and security related information (NAVDAT), digital voice service on maritime VHF and R-Mode applications in the marine VHF band.

The paper will present the outcome of the WRC-19 and its consequences for the work at IALA and other international standardisation bodies for the development of digital maritime radio communication systems.

Title Abstract: Camera-based location detection of non-AIS vessels

Topic: Navigation safety in a digital world
By: Mr Kazuhiko NAKAMURA | Japan Coast Guard
Contact e-mail: jcghkokugikaihatsu3-3u5j@mlit.go.jp

Special Assistant to the Director, International Affairs and Engineering Development Office, Administration and Planning Division, Maritime Traffic Department Japan Coast Guard. Graduated from JCG School in March 1993. Scope of Activity: Development of Aids to Navigation system including VTS

Abstract:

This presentation introduces camera-based location detection technology using artificial intelligence (AI). The maritime accidents involving non-AIS vessels account for about 80% of the total of maritime accidents in Japan. In order to decrease non-AIS vessels' accidents, Japan Coast Guard (JCG) is developing location detection technologies that do not rely on AIS signals. Recent progress of AI technologies has made it possible to automatically find and extract vessel(s) from pictures. In addition, recent computers have enabled to apply these technologies on a real-time basis. With this background, JCG, by extensive research, is focusing on the development of ship location detection by means of camera, which combines location detection with 3D-2D mapping by geometrical transformation.

The JCG has conducted a performance evaluation of the technology in February 2019. Its result shows that the technology could detect more than 85% of vessels in the video images. In addition, it was also found that the technology could estimate the vessels' positions with less than 50m of margin of error. Furthermore, the whole process of the technology was performed in real-time. Those results indicate the potential of the technology as a future substitute of AIS.

Title Abstract: Internet AIS of e-Navigation background

Topic: Navigation safety in a digital world
By: Mr Yalei REN | Yangshangang Maritime Safety Administration
Contact e-mail: renyalei@shmsa.gov.cn
Ms Sihui HU | Yangshangang Maritime Safety Administration
Contact e-mail: hshcarrot@outlook.com

Yalei REN (1988-), male, vice director of Yangshan VTS center, China. He obtained his master's degree in the discipline of Traffic Information Engineering and Control, especially in Intelligent Navigation in 2013. He joined Yangshangang Maritime Safety Administration in 2013 and now he has over 7 years of working experience in maritime traffic management. He has published 12 papers on intelligent navigation and maritime traffic management and joined 11 projects in the related topics.

Abstract:

Data is the core of e-Navigation, among which the dynamic and static data of ships play the most significant role, i.e. the collection and integration of the data is the foundation of e-Navigation. Currently, the collection of ship data for e-Navigation is mainly based on ship Automatic Identification System (AIS). Due to the limitation of ship-borne AIS equipment and the base stations, the widely existed blind spots and regions in the data have restricted the development and application of the functionalities of e-Navigation.

To solve the deficiencies of traditional AIS, e.g. lack of all ship and regions coverage, limitation of system capacity, etc., this paper proposes the concept of Internet AIS by collecting all the information from the ships that are not equipped with AIS or Beidou equipment using public resources, and integrate existing sources of ship dynamic and static information. Such a system has the advantages of large coverage, large system capacity, low cost-effect ratio, high extension, etc. It is of high value for widespread application.

WEDNESDAY 14 APRIL, 13.25 – 14.30 (UTC)

SESSION 8
NAVIGATION SAFETY

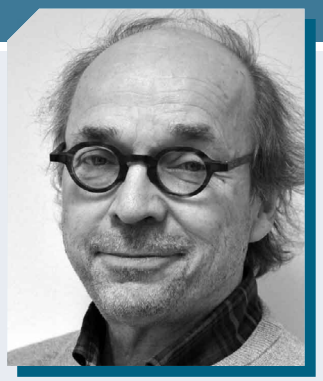
CHAIR: MR RICHARD AASE

Title Abstract: VTS and e-Navigation: Traffic organisation by moving haven

Topic: Navigation safety in a digital world

By: Mr Thomas PORATHE | Norwegian University of Science and Technology

Contact e-mail: thomas.porathe@ntnu.no



Dr Thomas Porathe is professor of interaction design at NTNU, the Norwegian University of Science and Technology in Trondheim, Norway. He is specialising in maritime human factors and design of maritime information systems. He has an Information Design PhD from Malardalen University in Sweden on the work "3-D Nautical Charts and Safe Navigation." After working with the Maritime Human Factors group at Chalmers University of Technology in Sweden he 2014 joined the Department of Design at NTNU. He has been working with e-Navigation since 2006 in EU-projects like BLAST, EfficienSea, MONALISA, ACCSEAS, SESAME II and the unmanned ship projects MUNIN, SAREPTA, LOAS and IMAT. He is presently heading the "Human Factors and Remote Operation Centre" work package of the nationally funded AutoShip Centre for innovation driven research at NTNU.

Abstract:

In November 2018 a Norwegian warship collided with a tanker leaving birth at a WestNorwegian oil terminal. The accident happened in an area surveyed by VTS. Luckily there was only material damage and no lives were spilled. However, the frigate involved became a total loss. This accident raises some interesting questions regarding VTS and whether innovations in resent e-Navigation testbeds can be used to enhance the traffic organization service (TOS) and make vessel movements in congested areas safer.

Route Exchange is a means by which voyage plans can be exchanged between ships and between ships and shore. In the recent e-Navigation projects EfficienSea, MONALISA and ACCSES route exchange was investigated and tested with end-users both at sea (in Korea) and in simulators (in Sweden and Germany). The methods allow for routes to be sent from pilots or VTS directly to a ship's ECDIS. As a result of tests in these projects the new route plan exchange format – RTZ - was published by the IEC in 2015. The format allows voyage planes to be time coordinated.

Such coordination can be done by Moving Havens which is a visualisation method used by submarines to ensure that they do not collide under water. This paper proposes to use an adapted version of Moving Havens to organize vessel traffic in an e-Navigation context.

Title Abstract: Smart shipping and the impact on port authority

By: Mr Harmen VAN DORSSER | Port of Rotterdam
Contact e-mail: ha.dorsser@portofrotterdam.com

Harmen van Dorsser is a true innovator and Intrapreneur in the Port of Rotterdam organization. He advises the Harbourmaster on nautical innovations and is involved as a mentor, coach and trainer in various innovation projects. He is program manager of the VTS innovation lab and co-author on the paper "Impact of MASS on VTS" approved by the 71th IALA council. Within the VTS innovation lab he would like to explore concepts of Full digital situational awareness, Interacting objects and Advanced decision support for future VTS services.

Abstract:

Technological developments in shipping giving opportunities and challenges to Port Authorities; research from an established vision to monitoring, data sharing and decision making.

Title Abstract: Technology Psychology – looking at the skill set for VTS Personnel in a changing maritime environment

Topic: VTS training and certification
By: Ms Jillian CARSON-JACKSON | The Nautical Institute
Contact e-mail: jillian@jcjconsulting.net

Jillian Carson-Jackson FNI FRIN commenced her career in the Canadian Coast Guard, graduating from the Canadian Coast Guard College as a navigation officer. With over three decades in the industry, Jillian has worked both afloat and ashore in the CCG, including 10 years as an instructor at the CCGC. Following an active role at IALA in the development of VTS Training, she moved to France to work with IALA as Technical Coordination Manager. She then moved to Australia to work with the Australian Maritime Safety Authority (AMSA) as Manager of Vessel Traffic and Pilotage Services.

In 2016 Jillian left AMSA to set up her own consultancy, focusing on maritime technical advice and education. In May 2020 Jillian was appointed a Director of GlobalMET. Jillian represents The Nautical Institute at IALA as chair of the Emerging Digital Technologies Working Group (ENAV Committee) and the Personnel and Training Working Group (VTS Committee).

Abstract:

Technology is changing at a breakneck pace, but what is the impact on the person working with the technology? As the technology in VTS evolves, what about the VTS Operator? There is opportunity to share and learn about the role of technology in VTS now, and in the future through analysis of existing skill sets within a 'future mindset'.

The presentation will review the impact of technology on different transport modes; analyse the current and evolving role of VTS in port operations; present possible future skill sets for VTS personnel; and identify options for a transition strategy to address this human aspect of digital transformation in the maritime environment.

THURSDAY 15 APRIL, 11.00 – 12.05 (UTC)

SESSION 9
TRANSPORT CHAIN EFFICIENCY

CHAIR: MR DIRK ECKHOFF

Title Abstract: The changing world of VTS - From analog binoculars to digital decisions, increasing capacity and accuracy

By: Mr Anders JOHANNESON | Swedish Maritime Administration
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Anders Johannesson, Master Mariner, working in the Swedish Maritime Administration since 1995. Former VTS Operator, former VTS Training Officer and now Senior Advisor at the Research and Innovation Department of SMA. Working in all sorts of projects that encompasses VTS or communication ship to shore in general. Mainly working in the STM Projects but also in different AI projects.

Abstract:

The world is changing rapidly and the demands for sustainability and control grows constantly. VTS, with its core values Efficiency, Safety and Environmental Protection is as relevant as ever and technique is being developed to meet today´s and tomorrow´s demands.

The big game changers are the possibilities brought by STM (and others) to have access to the vessels` Voyage Plans and to use advanced digital possibilities of support in monitoring, detecting risky situations and finding solutions for them. Given the opportunity to check the intentions of the vessels well in advance and being assisted in watch keeping by tireless computers will raise the efficiency of the VTS to a new level. The new much improved situational awareness brought by digitalization also enables fuel savings and reduced costs as port calls can be optimized to a lot higher degree than ever before.

The outcome of the new technology and new operational procedures will be that bigger areas can be surveilled from the VTS, that potentially dangerous situations can be detected earlier and averted swifter. The Efficiency, Safety and Environmental Protection brought by VTS in the VTS areas will increase further, and hopefully be expanded to larger waters.

Key words: route sharing, digitalization, decision making support, meeting demands

Title Abstract: The PortCDM (Port Collaborative Decision Making) concept

By: Mr Michael BERGMANN | International PortCDM Council, RISE
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With experience in software engineering, the aviation and maritime industry, Michael Bergmann owns the maritime consultancy company BM Bergmann-Marine and works for RISE (Research Institute Sweden), the Federal Ministry of Transport and Digital Infrastructure Germany, Safebridge GmbH, 7Cs GmbH and others.

Michael holds various positions:
Observer, participant and advisor at the IMO, IALA and IHO
Member of the German IMO delegation
Director at CIRM (President 2013-2018)
Fellow of the Royal Institute of Navigation
Associated Fellow of the Nautical Institute
Member of the council of the German Institute of Navigation.
Initiator and secretary of the "International PortCDM Council"
Author of various articles and publications

Abstract:

IALA is increasingly looking at a changing the maritime domain, where digital data sharing allows all different actors involved in maritime transport to gain better situational awareness and as such can optimize their activities. Besides the data sharing, collaboration is another essential cornerstone of global shipping in the digital world. IALA need to understand and contribute to this development, guiding its members how to act in this new paradigm of shipping 4.0.

The PortCDM (Port Collaborative Decision Making) concept is an important enabler in this process, procedural as well as technical, with main focus on Port related activities. It fosters fast turn-around times for vessels by standardized, safe, and secure communication. Data sharing improves the situational awareness and planning, especially for VTS and related services in the IALA domain. While PortCDM implementations are locally driven, it uses international standards and guidelines to meet the demands of international shipping. It enables port-to-port and ship-shore data exchange, reduces administrative workload and at the same time increases efficiency and safety. In fact, PortCDM and the S-211 Port Call Message format is depicted in the IMO Maritime Service 4 definition as discussed during IMO NCSR6.

The paper will explain this development and how IALA can participate and benefit.

Title Abstract: The progress and prospect on e-Navigation of China MSA

By: Mr Binsheng XU | China Maritime Safety Administration
Contact e-mail: xubinsheng@msa.gov.cn

Mr Xu Binsheng, graduated from Nanjing University in 1992, in the field of Earth & Ocean Science. He has served for China Maritime Safety Administration for almost 30 years, now as the Director of Aids to Navigation, Hydrography and Maritime Communication Division, with the responsibilty of organizing, promoting and implementing activities such as AIS basestions, E-Navigation engineering and etc.

Abstract:

China MSA has been committed to the practice of e-navigation concept in China since it was put forward in 2005. With the formulation of the relevant implementation strategy and the improvement of the technical standard system of IMO, IALA and other international organizations, China MSA has embarked on the formulation of a detailed plan for the implementation of e-navigation, and has planned the content of e-navigation promotion for a certain period, mainly including shore-based systems, communication systems, ship borne equipment, PNT, etc.

In accordance with the e-navigation framework of IMO and IALA, the construction of demonstration projects has been initiated since 2014, including the e-navigation demonstrations projects in the Compound Channel of Tianjin Port, the Yangshan Port, the Pearl River Estuary and the Yangtze River Estuary. This paper focuses on the overall framework of the relevant demonstration projects, and takes the e-navigation project in the Yangtze Estuary as an example to introduce in detail the implementation of e-navigation related concepts in the project.

With the development of smart shipping industry, e-navigation will play a more fundamental role. This paper prospects the popularization and implementation of e-Navigation in China, analyses the problems to be faced, and puts forward some solutions.

SESSION 10
SAFETY AND SECURITY IN A CONNECTED WORLD

CHAIR: MR NEIL TRAINOR

Title Abstract: Is '5G' for e-Navigation and VTS?

By: Mr Jan-Hendrik OLTMANN | Federal Waterways and Shipping Administration
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Jan-Hendrik Oltmann is senior strategic adviser to the German Federal Waterways and Shipping Administration. He received a master degree in Electrical Engineering from Darmstadt Technical University, Germany, in 1992. Since he joined the Administration in 1993, he applied diverse technologies to the maritime domain, comprising terrestrial radio navigation, transponder technology, and ICT system architecture. He had an active role in the developments of the AIS, the overarching system architecture for IMO's e-Navigation strategy, and internationally harmonised data structures. He managed several domestic and international projects, chaired several international working groups, and is speaker at a variety of international conferences.

Abstract:

'5G' is the buzz word presently in telecommunications creating the impression that with its advent all communication dreams will come true. But what is the real potential of '5G' for the maritime domain, including e-navigation and VTS, when considering all relevant aspects?

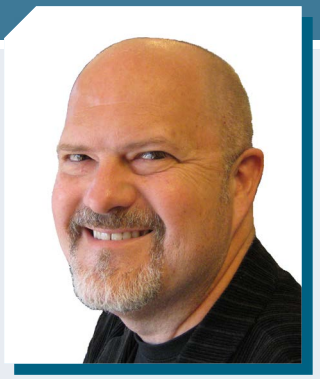
'5G' is not only sophisticated and bandwidth-wise cutting edge radio communications technology – thus incurring certain inherent physical limitations; but also cloud computing – thus incurring certain IT-related constraints, such as cyber-security and data privacy considerations. Also, it is not big industry consortia's playing ground alone but also highly internationally harmonized and regulated: At the ITU '5G' is called IMT-2020, and there exists an elaborate international regulation and standardization framework.

This latter aspect is of particular relevance for the topic under consideration: E-navigation and VTS are both demanding and also driving international harmonization and standardization in their respective, partially overlapping domains, too.

Having thus established the capabilities and limitations of '5G' somewhat more realistically than at buzz word level, potential applications in the maritime domains of e-navigation and VTS are addressed. Fields are pointed out where '5G' may add specific value to those domains and may thus contribute to the development of those fields in the future.

Title Abstract: A tale of 5 ships

By: Mr Todd SCHUETT | SESAME Solution II Project
Contact e-mail: todd.schuett@knc.kongsberg.com



Todd Schuett is the Innovation Projects Manager at Kongsberg Norcontrol. A graduate of the University of Chicago, he joined Kongsberg Norcontrol in 2000 and for several years managed the VTS training programs. In 2012 he began managing innovation projects, which have included the SESAME e-navigation projects in Norway and the Next Generation VTMS Lab in Singapore. He is an active member of the International Association of Aids to Navigation and Lighthouse Authorities (IALA) e-navigation committee and has served on the IALA e-Learning Workgroup as well as the IALA V-103 Workshops.

Abstract:

This presentation tells the tale of five ships in the SESAME Solution II testbed, each equipped with technology developed in the project, operating in a VTS area, and using e-navigation services provided by the VTS in varying ways to achieve their objectives. While all vessels have the same e-navigation-enabled equipment, namely a Planning Station and ECDIS, some vessels will subscribe to only MSI data, others to ship reporting services, and still others will use the technology to plan all aspects of their voyage, subscribing to several e-navigation services along their route (MSI alerts, route optimization, pilot route, and others), receiving a slot for a just-in-time arrival service, and electronically report to a maritime single window as well as mandatory reporting points, such as BAREP and CALDOVREP. The goal of the presentation is to communicate to the VTS and e-navigation community the preliminary results of the SESAME II testbed, but more importantly describe in very practical terms how VTS centers (and vessels) can exploit e-navigation services and technologies in different ways to achieve their safety objectives.

SESAME Solution II is an innovation project partly funded by the Research Council of Norway. Partners include Kongsberg Norcontrol, Kongsberg Maritime, Kongsberg Seatex, Navtor, the University of South East Norway, the Western Norway University of Applied Sciences, the Norwegian University of Science and Technology, SINTEF Ocean, and supported by the Norwegian Coastal Administration, the Norwegian Maritime Authority, and the Maritime and Port Authority of Singapore.

Title Abstract: Cyber-security in VTS

By: Mr Martijn EBBEN | Port of Rotterdam
Contact e-mail: m.ebben@portofrotterdam.com

Martin Ebben is Cyber Security and Risk officer, working (here) in the Port of Rotterdam. He is part of a team of Security Officers that all have a specific business focus and Martin's is the mission-critical infrastructure like Radar, VHF and sensors. He is responsible for policy, enforcement and implementation of the cyber security strategy and is involved in all projects and day-to-day operational management of the VTS systems. Martin has a background in system and security engineering and networking and has been working in the port for four years after holding several positions in a network security service company. He is also a contributing member in several IALA committees.

Abstract:

Cybercrime is a growing issue in today's world and it's getting more advanced by the day. This applies as much to systems used in the maritime community as it does for IT systems. VTS systems and vessels are more and more connected to utilize Maritime Services in the Context of e-Navigation. This causes major cyber security risks as many of these systems were never designed to be connected to external services and to the internet.

One of today's greatest risks is awareness. Users often don't realize that a ship can be hacked as well and that VTS systems are not intended to browse the internet with. On the other hand, VTS systems have always been designed for functionality, not for cyber resiliency. This has only started to change in the recent years.
What if a VTS is compromised or held ransom for bitcoins? What does this mean for the maritime safety and the continuity of the dependent logistics chains?

Which technical measures can be applied and how can your users help in preventing cyber incidents? I hope to increase cyber security awareness and resiliency in the maritime world and especially VTS systems with a presentation on this matter during the 14th IALA Conference, as a VTS Security Officer in the Port of Rotterdam and as a contributing IALA E-navigation member.

THURSDAY 15 APRIL, 13.20 – 14.05 (UTC)

SESSION 11
VTS TRAINING AND CERTIFICATION

CHAIR: MS ELS BOGAERT

IALA

Title Abstract: Making the Grade? An overview of [experience gained in auditing] VTS training

By: Ms Jillian CARSON-JACKSON | The Nautical Institute
Contact e-mail: jillian@jcjconsulting.net

Jillian Carson-Jackson FNI FRIN commenced her career in the Canadian Coast Guard, graduating from the Canadian Coast Guard College as a navigation officer. With over three decades in the industry, Jillian has worked both afloat and ashore in the CCG, including 10 years as an instructor at the CCGC. Following an active role at IALA in the development of VTS Training, she moved to France to work with IALA as Technical Coordination Manager. She then moved to Australia to work with the Australian Maritime Safety Authority (AMSA) as Manager of Vessel Traffic and Pilotage Services.

In 2016 Jillian left AMSA to set up her own consultancy, focusing on maritime technical advice and education. In May 2020 Jillian was appointed a Director of GlobalMET. Jillian represents The Nautical Institute at IALA as chair of the Emerging Digital Technologies Working Group (ENAV Committee) and the Personnel and Training Working Group (VTS Committee).

Abstract:

In 2017 the Nautical Institute carried out a survey of its membership on the effectiveness of aids to navigation, include VTS. The results were presented at the IALA Conference in Incheon, South Korea in 2018. The results highlight significant concern regarding the standardisation of training of VTS personnel, leading to concern on the consistency of service provision. Of particular interest from the survey was that despite all the work of IALA and its member authorities, 40% of mariners claimed that they were 'not confident' in the services provided. In the leadup to the 2020 Symposium the NI will carry out a follow up survey with a focus on VTS.

In Q2 of 2019 the Nautical Institute implemented an audit process to assist Competent Authorities in accrediting VTS Training Facilities and approving VTS training courses. Results of the survey will be presented along with results of VTS training audits completed. The presentation will include lessons learned and proposed next steps to continue to promote professional, consistent and effective VTS on a global basis.

Title Abstract: Designing simulation exercises for recruitment of future VTS operators

By: Mr Juan Carlos FERNÁNDEZ SALINAS | Spanish Maritime Safety and Rescue Agency
Contact e-mail: jcarlosfs@centrojovellanos.es

Juan Carlos Fernández Salinas. Professional seaman. In 1993 he joined the Spanish Safety and Rescue Agency as VTS operator and later supervisor. He has been appointed Head of VTS Area and responsible for VTS training in 2013. That year he started to assist the IALA VTS Committee. Author of the book "Collisions at Sea" and co- author of the book "Vessel Traffic Services". He has written more than seventy articles published in professional and informative magazines, included "Seaways" and for three times "The Journal of Navigation". He also has written a wide number of technical publications: manuals, presentations and proceedings.

Abstract:

During the last three years, the Spanish Maritime Safety and Rescue Agency, in its procedure for recruitment of new VTS operators has been using a VTS simulator in an innovative way. In previous recruitment processes it was detected that some candidates were suitable from a theoretical point of view. However, despite having a good knowledge of the legal framework, high command in English, and even having passed a psychological assessment, when facing real VTS operations some of them were unable to carry out their tasks efficiently. We are making reference to lack of specific skills such as combining auditory and visual information, being proactive or carrying out several tasks simultaneously, among others. For this reason, in our new recruitment procedure it was included an individual assessment where the candidate has to deal with a simulated situation.

The session lasts approximately twenty minutes and has ten different variations. Along the session, two assessors and one psychologist analyse the behaviour of the candidate following a rubric designed for this purpose. VTS Competent authority and unions are quite satisfied with the results, and so far no candidate has risen an official complaint. We can consider this new recruitment procedure as one of the most relevant innovations in Spanish vessel traffic service.

SESSION 12
MASS CHALLENGE
CHAIR: MR RENÉ HOGENDOORN

Title Abstract: VTS and MASS - Responsibilities and consequences

By: Ms Pia MELING | Massterly AS
Contact e-mail: Pia.Meling@Massterly.com

Pia holds an MBA and has broad management experience from shipping and the maritime industry from companies such as Klaveness, Radio Holland, Clean Marine and Wilhelmsen Ships Service. Pia is also the President of WISTA (Women's International Shipping & Trading Association) Norway.
Lene holds an MSc in Industrial Engineering and Management and has, for several years, led international e-navigation projects. Before moving into maritime surveillance and VTS systems, Lene has had several years of experience with strategy work and international product management within the telecom industry.

Abstract:

In a just a few years from now, vessels with varying degree of autonomous operations will be sailing with either reduced manning or with no crew onboard. Unmanned vessels will need continuous monitoring and control from certified Shore Control Centers (SCC), and there are various communication tasks that must be solved, both between the unmanned vessel and other manned vessels, as well as between the unmanned vessel and shore-based entities and authorities.

The VTS is the link between ship and shore, for communication, situational awareness, information management, decision support, approvals and local regulations. Hence, the role of the VTS will become even more important when MASS are introduced and will operate in mixed traffic with conventional vessels. VTS authorities should already start planning for what added services and extended roles they can offer:

- The VTS could have a back-up capability for the SCC that is controlling the unmanned vessel, in case the primary SCC experiences system or communication failure
- Providing proactive traffic management through traffic forecasting will become more important as well as more efficient in tomorrow's MASS scenario
- Remote pilotage is now allowed by law in countries like Finland and Norway. The VTS could be the best physical location for pilots to perform their duties
- Communication and cybersecurity are imperative for a safe operation of MASS, and the VTS can be the trusted party who offers unified and safe information sharing. Innovative solutions, including blockchain, are under consideration

In conclusion, the VTS will play an important role in the safe operation of MASS and should start preparing for additional services and certifications in close cooperation with MASS owners and operators.

Title Abstract: MASS for aids to navigation needs - TheChilean approach

By: Mr James CRAWFORD | Chilean Navy – DIRECTEMAR
Contact e-mail: jcrawford@directemar.cl

James Crawford, is a Navy Captain (ret.) with a specialization in Coast Guard and Aids to Navigation matters. During 11 years he held the position of Head of the Chilean Aids to Navigation Service National, and currently serves as IALA advisor for the national maritime administration of Chile.
During his carreer he has led the most important projects regarding renovation and upgrade of capacities of Chilean aids to navigation network, has participated actively in many IALA workshops and symposiums and assisted as technical advisor for a World Wide Academy mission.

Abstract:

Over the past few years, the development of autonomous ships has been driven by the evolution of the application of this concept on board airplanes and land vehicles that may have a positive impact on the safety and efficiency of sea shipping.

This scenario has led to private companies in the maritime field to develop and test autonomous and unmanned vessels, mainly in Europe. One of these initiatives took place in 2007, with the creation of a collaborative project known as "MUNIN" (Maritime Unmanned Navigation through Intelligence in Networks), with the aim of developing a feasible concept of unmanned merchant ships. This research included areas as autonomous navigation, propulsion and automated machinery, communications and coastal connectivity, redundancy and efficiency systems, as well as the analysis of the legal framework. Some years later, the project concluded the road to the application of the concept of unmanned ships.

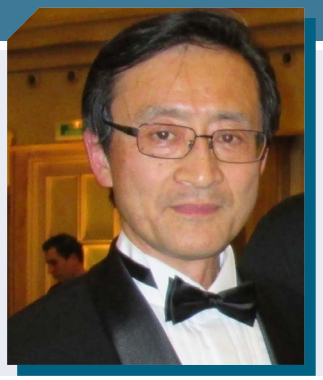
It should also be noted that this concept has begun to be addressed under IMO Maritime Safety Committee sessions, where it has been decided to set up a working group. In the past few months, the Chilean Navy through the Aids to Navigation Service has been exploring the feasibility of developing remote-controlled vessels and others with certain levels of autonomy useful in the development of aids to navigation tasks.

Some of the uses that could have these Maritime Autonomous Surface Ships, are the verification of aids to navigation technical status via AIS or Bluetooth, to hold aids to navigation sensors in areas exposed to high probabilities of being damaged by ships or in places of complex installation.

This presentation will bring up the experiences obtained by the Chilean Aids to Navigation Service and the way it is addressing this concept.

Title Abstract: A decision support tool based on the collision avoidance algorithm for autonomous ships

By: Mr Koichi NISHIMURA | TST Corporation
Contact e-mail: knishimura@toyoshingo.co.jp



He graduated from Tokyo University of Mercantile Marine in the faculty of navigation in 1981. After graduating university, he joined TOKYO KEIKI INC. which is one of the leading manufacturers of navigational equipment in Japan. He involved in a wide range of product developments not only navigational equipment but VTS system integration. In 2018, he joined TST Corporation which provides information services for the purpose of safety of navigation and contributes a lot to the efficiency of port operation in major ports in Japan. He holds a CTO position in TST Corporation.

Abstract:

According to IMO Resolution A.857(20) Vessel Traffic Services are implemented to improve the safety and efficiency of vessel traffic and to protect the marine environment. The service should have the capability to interact with the traffic and to respond to traffic situations developing in the VTS area. Decision support is a way to help VTS personnel make decisions in routine or non routine situations. It is especially useful for VTS personnel facing decisions about developing situations or emergency situations. Decision Support Tools (DST) are used in VTS centres to enhance situation awareness by assisting VTS personnel. These tools can assist VTS personnel decision making activities at operational, tactical and strategic levels.

Research on an autonomous ship has been actively conducted in recent years. This subject is obtained by a direct application of the automatic collision avoidance algorithm for the purpose of autonomous, unmanned or remotely controlled ships. The DST constantly calculate optimal maneuvering way from the risk and economic preference in the ship maneuvering space where the course change and deceleration are performed. The DST notifies the traffic situations including the risk of collision to a VTSO operational, tactical and strategic levels in order to take proper action . Practical effectiveness of the DST was tested using a full mission simulator and implemented at real VTS site.

Title Abstract: Innovations needed for autonomous and sustainable shipping technology

By: Mr Harmen VAN DORSSER | Port of Rotterdam
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Harmen van Dorsser is a true innovator and Intrapreneur in the Port of Rotterdam organization. He advises the Harbourmaster on nautical innovations and is involved as a mentor, coach and trainer in various innovation projects. He is program manager of the VTS innovation lab and co-author on the paper "Impact of MASS on VTS" approved by the 71th IALA council. Within the VTS innovation lab he would like to explore concepts of Full digital situational awareness, Interacting objects and Advanced decision support for future VTS services.

Abstract:

Lots of research on autonomous and sustainable shipping technology has been done in the last years. The first steps on autonomy are foreseen on harbour crafts, fixed route services and on demand service like tugboats. The port area will be the place where everything comes together and port service providers, with many traffic movements within busy ports, most likely will be the first movers. However, R&D on VTS - vessel traffic service has not been a main topic of the discussion on autonomous shipping yet. The changes for a safer port approach and port stay with a more digital and interactive traffic management system are big.

Port of Rotterdam would like to support the development of a traffic management system and actively works towards a system that is future-proof for traditional and digital controlled ships. The basis must be a solid ánd state of the art system. Port of Rotterdam has the ambition to have a VTS system further developed towards adaptive, silent and smarter (more monitoring) with decision support. It has to have an positive effect on the interpretation of the VTS operator's profession and supports an international standardized approach on digital supportive VTS.

Port of Rotterdam has pre-launched a working space for innovation, experimentation and interaction on VTS development between different partners in the network. In collaboration with Saab (current supplier PoR) and other stakeholders we are creating a test environment and we have placed this in a broader program of a VTS Innovation Lab. Other partners who are interested in being part of the development are welcome to join.

I hope to motivate an increase the awareness for innovations needed in the maritime world and especially VTS systems with a presentation on this matter during the 14th IALA Conference, as a Senior advisor in the Port of Rotterdam.

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Thank you to all!