

Seaways

March 2020 www.nautinst.org

The International Journal of The Nautical Institute

Autonomous technology

What seafarers really think **p08**

Deep sea pilotage

A rare but important role **p13**

Making tech work

Human Centred Design seminar **p26**

Cleaning up the ocean

Getting started on a key task **p32**

Inside IALA

Working to update AtoNs – traditional and modern **p06**

Royal Fleet Auxiliary Service



Opportunities exist for

Marine Engineering Officers

Officer of the Watch, Second Engineer or Chief Engineer CoC with HND/Foundation Degree in Marine Engineering

Systems Engineering Officers/ Electro-Technical Officers

You'll need a Degree or HND in Electrical and Electronic Engineering or an STCW A-III/6 ETO Certificate of Competency with recent seagoing experience.

All candidates must hold STCW 2010 Manila Amendments Update Training and a current ENG1 certificate.

Benefits include

- Competitive Annual Salaries
- Paid Voyage Leave
- Competitive Civil Service Pension Scheme
- Industry-leading fully funded Study Leave Programme
- World Class Comprehensive Training Programme
- 100% UK Registered Seafarers
- Diverse and Inclusive employer
- IMarEst accredited training provider



royalnavy.mod.uk/careers/rfa
navycnr-rfagroupmailbox@mod.gov.uk
02392 725960





Contents

March 2020

■ Comment & Opinion

- 03 Focus**
Chief Executive John Lloyd FNI

■ Features

- 04 Pilot's Column**
Handling techniques for the latest generation of container ships
- 06 The NI and IALA**
Keeping up with changes in Aids to Navigation
- 08 Embracing autonomous technology**
Mariners are pragmatic about changes – but warn on training needs

- 11 Leadership for an automated world**
What skills will be required?
- 13 Deep sea pilotage**
A day on board
- 21 Port development in West Africa**
What's driving growth in the region?

■ MARS

- 17 MARS reports**
Mooring fatality; SOx scrubber discharge incidents; fan blade injury; passenger ship mooring issues; fatal ladder fall

■ Reporting back

- 23 NI courses**
- 24 Nautalex**
News affecting the maritime professional
- 26 Conferences**
The NI HCD seminar – full conference report and papers

■ Members & Branches

- 30 Branch activities**
Reports on branch activity and events
- 33 Letters**
- 35 The Nautical Institute Out and about**
- 36 New members**

Cover image: navigation buoy

Seaways
The International Journal of The Nautical Institute

The Nautical Institute
202 Lambeth Road
London SE1 7LQ
Tel: +44 (0)20 7928 1351
Fax: +44 (0)20 7401 2817
Website: www.nautinst.org

ISSN 01 44 1019
© 2020 The Nautical Institute

Editor: Lucy Budd
E-mail: editor@nautinst.org
Advertising manager:
John Payten
E-mail: jpayten@jpmediaservices.com
Tel: + 44 (0) 1737 852135

Nautical Institute Chief Executive:
John Lloyd FNI
Email: John.Lloyd@nautinst.org

The Nautical Institute President:
Captain N Nash FNI

Vice Presidents:
Captain Trevor Bailey FNI
Captain G H Livingstone FNI
Captain D A P McKelvie FNI
Jillian Carson-Jackson FNI
Captain A Le Goubin FNI
Captain Steve Pelecanos FNI
Mr W Vervloesem FNI
Treasurer: Captain D Telfer FNI
Publications sales: pubs@nautinst.org
Membership enquiries:
member@nautinst.org

DP Certification & Training email:
DP@nautinst.org

Seaways is posted to all Institute members. The subscription rate to others is £115.

The Nautical Institute is a company limited by guarantee No. 2570030 and a registered charity in the UK No 1004265.

Printed in the UK by
Stephens & George, Merthyr Tydfil

Diary

What's on?

Seafarer wellness: are the signals being read?

Ireland Branch

26 March

0900 - 1700, National Maritime College of Ireland, Ringaskiddy, Co. Cork

For more information, email nautinst.ireland@gmail.com

A joint event with the Irish Institute of Master Mariners and the National Maritime College of Ireland.

To take advantage of the discounts available for events listed in the Diary section, please log in to www.nautinst.org using your membership details and click on 'Event Discounts'

04 March

MARS debate

Belgium Branch
2000, Det Kerschip, Antwerp

05 March

Scrubber Technologies

North East England Branch
1730 for 1815, Armstrong Building, Newcastle University
David.byrne@flag-c.com

05 March

Humber Keel Preservation Society Humber Branch

1830, Hallmark Hotel, North Ferriby
j.simpson@master-mariner.co.uk

06 March

Annual Dinner Dance North East England Branch

11-12 March

Arctic Shipping Summit Montreal, Canada

Discount for NI members
Email: mahsan@acieu.net

Maritime HR & Crew Management

Singapore
Discount for NI members
Email: pkale@acieu.net

Shipping Transformation Summit

Copenhagen
20% discount for NI members

Green Ship Technology

Copenhagen
20% discount for NI members

17 -19 March

World Ports Conference

Antwerp
Discount for NI members

17 March

Improving standards North of Scotland Branch

1730 for 1800, Woodbank House,
ni.northofscotland@yahoo.co.uk

DP drilling

NW England & N Wales Branch
2000, LJMU, Room 506
sec@ninw.org.uk

18 March

Engineering in/on/ under the waves

North East England Branch
1730 for 1815, Armstrong Building, Newcastle University
David.byrne@flag-c.com

24 March

Quality Standards in Maritime Education Solent Branch

1800, Solent University
Palmerston Theatre

25 March

Iberia Branch AGM

Details TBC

31 March - 2 April

CMA Shipping Connecticut, USA

15% discount for NI members

For information on NI short courses, please see page 23



LNG Operational Practice

2nd Edition

This second edition is updated for 2020 to reflect the substantial changes and new designs in the technical and operational aspects of LNG shipping and the transportation of LNG by sea, since this book was first published in 2006. It is prepared as a practical handbook for the operation of LNG carriers.



✉ info@witherbys.com

☎ +44 (0)1506 463 227

🌐 witherbys.com

📍 Navigation House,
3 Almondvale Business Park,
Almondvale Way,
Livingston EH54 6GA,
Scotland, UK

OUT NOW

£195



Captain John Lloyd FNI Chief Executive

Focus

Training and technology

“

The need for additional training to deal with modern technology is very clear, and we continue to support discussions and initiatives to establish the best way of providing this

”

Let me start by sending the best wishes from me and from all at The Nautical Institute to all of the mariners caught up in temporary quarantine arrangements due to the coronavirus. There is a great deal in the world press and media about the impact on passengers and how keen they must be to get home. Yet there is scarcely a mention of the Masters and crew also caught up in the same circumstances. For many there will be a loss of income as gratuities from passengers are reduced, while others will have lost their livelihood altogether as trade slows and ships are taken out of service – and still more have been inconvenienced by changes in crew transfer arrangements and contract lengths as ports are closed. Many of our colleagues are working hard to maintain the services and operations required to keep passengers as safe and as happy as possible. We recognise and applaud your efforts in these difficult times. Our thoughts and support are with you and we hope for a speedy resolution of this contagion.

Supporting human decisions

A key focus this month is technology and how it can help make ship operations safer and more efficient. At the same time, the need for additional training is very clear and we continue to support these discussions and initiatives. Many people are talking about automated ships and yet it seems to me there is a key point for development along the way. In developing autonomous technology, developers would do well to place an increased emphasis on decision support tools for the mariner. When enhanced technology is developed and adapted for the workplace to support seafarers' decisions on collision avoidance, stability and ballast control, engine room management and cargo operations in a way that is really helpful and easy to use, then we can be better prepared for the next stage in our development. Missing this step will only leave

systems unproven and the wary mariner suspicious of who is driving the change and whether the results will truly lead to safer ships and a cleaner environment.

The seminar accompanying our Annual General Meeting engages directly with this topic. Held in Plymouth on 1st, 2nd and 3rd of July, the event will have a selection of wonderful speakers on the conference theme of: *Towards Another World – Seafarer Training in the Age of Autonomy*. We have some great sponsors and supporters. This is an important and sometimes controversial topic. Take the opportunity to be part of the discussion and help shape arguments for future developments!

NI around the world

During March I will be representing The Nautical Institute at the congress of the International Harbour Masters Association in Hobart. While in Australia I will be visiting some of our branches and hope to see many of our members in Australia as well as catching up with the national regulator the Australian Maritime Safety Authority.

I hope you will enjoy reading this edition of *Seaways* and as ever we welcome your feedback or letters. Do get in touch at any time on my email address: sec@nautinst.org

For those who are members I hope you will continue to utilise our range of benefits including your own personal copy of *Seaways*, access to the free on-line training delivered in collaboration with Videotel, our legal defence cover and special discounts on our publications. All this as well as the *recognition* you deserve as a leading professional in our maritime community.



p04



p13



p30



p35

Pilot's column

Haven Ports and the piloting of large vessels

It's 03.00 when the telephone rings. The only person in the house who is glad to hear the phone ring is the dog, who knows this is the signal for him to occupy my warm side of the bed. The pilot co-ordinator is calling to let me know that a large container vessel has given its estimated time of arrival (ETA) at the pilot station at the seaboard area. I get myself ready and head out of the house, where I get the first indication of the weather to expect. Most of my neighbours probably have no idea what I do or where I am heading when my car lights head up the road as I turn out of the drive.

It's a 30-minute drive to the Vessel Traffic Service centre, which allows me to contemplate the nature of the pilotage I am about to undertake. I arrive at the pilot station, which is the Vessel Traffic Services and operations centre. Here, I check my personal protective equipment and begin planning the pilotage. I have access to real time meteorological sensors for wind strengths and tide heights. I am also able to see past trends and the forecasts. As I am doing all of this, I discuss with the port duty officer the berth location and planned side-to and traffic forecast. The main terminal at Felixstowe handles the most modern ultra-large container vessels, now exceeding 400 metres in length and 23,000teu, so manoeuvring space can be tight.

Part of the risk assessment carried out by the port in the passage plan was whether vessels require 'clear runs' at certain parts of the route by regulation or whether adopting risk assessment and methodology is sufficient to manage that risk. I also discuss the towage I anticipate will be needed and whether there is a tidal window to maintain minimum under-keel clearance. All of this starts the integrated port system; the key players understand what the plan is.

I note essential elements and calculations on the Master/Pilot exchange form for discussion once I'm aboard the ship. Harwich Haven Authority has gone beyond the MPX by putting together a passage plan support document, which can be freely downloaded. This gives Masters more information and guidance on planning the port passage. Pilots are equipped with portable pilot units, which allow us to develop individual passage plans and take them on board. An electronic tablet can carry more information than I could bring aboard in a suitcase.

Arriving at my work station

As the pilot launch approaches the ship, I am already assessing the exposed hull form. Where can the tugs connect speedily with the shape of the hull and what will the flare on the bow and stern be like for berthing? Will extra towage be required?

Once on the bridge I meet with the Master. A lot has been written in *Seaways* about the Master/Pilot relationship and pictures with bridge seating plans and who goes where. I have always found that a good



handshake, a warm 'Hello captain' and a joke about the English weather get things off the right way.

On the bridge the Master and I will go through an exchange of information starting with two documents: my MPX and the ship's pilot card. At this stage it is important that the route is agreed and understood, as it will be the bridge team that monitors me. Depending on the size of the ship and risk this can be a straightforward exchange of information. On larger ships, I might outline route, berth and towage followed by a steady feed of information to keep the Master briefed.

From the pilot boarding area, the ship is steadied on her first course. Track error is minimised as the ship nears the approach channels to the port. My first report to the VTS is that the route has been agreed and that I have taken the conduct and agreed towage. The vessel is given permission to enter the regulated traffic system. VTS monitor the passage and use 'trigger' messages should they see the vessel deviate from the generic port passage plan.

With the ever-increasing size of ships, the greater displacement and reduction of UKC requires a larger swept path. Large alterations need to be planned, then monitored as they are executed. The purpose-built channel gives bank effect, increasing hydrodynamic forces on the ship. A lot of the skill of the pilot comes in judging whether shorter course alterations should be done by generating a rate of turn, rather than through rapid course and helm orders. In addition, any meeting of opposing traffic may need to be planned. Orders regarding helm and engine speed need to be clear and short and closed off at the end. I remember that not everyone's first language on the bridge is English.

Escort and harbour assistance towage

Towage is an important part of handling large ships. Not only is it used for manoeuvring, but it also forms part of the risk assessment and is an important tool for emergency handling and keeping the ship and port area safe.

Traditionally, tugs are connected over the stern to pull and push ships. Different designs of tug were used for coastal or salvage towage and harbour towage. Over the years, tug design has evolved and we now have some very efficient and powerful tugs that can be used in different tow modes. The most modern type is the azimuth stern drive (ASD) tug, which is common across Europe. Other designs, such as Voith Schneider and pod, have their own specific qualities.

The ASD offers the pilots in the Haven Ports a design that enables effective harbour assistance when berthing and unberthing. Coupled with new techniques in towage and handling, this gives a medium-range escort tug for the harbour and approach channel. Large ships need both escort and harbour assistance

to manage the risks posed by their size and handling characteristics.

During the pilotage the tug is connected at the outer area of the harbour to provide assistance for the large turns at speed. This is made possible by the tug towing over its bow and by the tug's safety, stability and seakeeping qualities. The technique works without power in an indirect mode, utilising the underwater shape and area of the tug to act as second rudder for the ship. If power is needed the tug can apply this in the same way that the ship does.

As the vessel comes through the turn, she is slowed by the tug in transverse arrest mode, where the tug uses its azipods to create a 'wall' of water to brake the ship. As the ship approaches the swing, she can then perform a dynamic swing ('handbrake turn') assisted by the tug operating on a semi-circle radius. The tug has not had to alter its tow line or the connection with the vessel, giving a fast and safe response time.

The tug continues to operate in these radiuses while the ship manoeuvres at slow speed backwards through the harbour. At a slow speed the ship is affected by the wind and tide in the narrow harbour, meaning tug response time is particularly important.

It is difficult for the tug to come in and push a mega ship as it approaches the berth because of the lack of flat area available on the vessel. Instead, the tug shortens



the line and pulls towards the quay before flipping around quickly to provide the check. This provides safety redundancy if the ship's engines fail. Each tug is able to work on the fore and aft lines to manoeuvre the ship into a safe position. If external elements are strong the tug can be applied to work against these forces. In fact, this improves performance, as it can tow in clear water rather than having to keep position against a hull.

Blunt end first

A ship is designed to go forwards rather than backwards, given the shape of its hull. Even so, room is tight when we manoeuvre and sometimes we are required to turn the ship around and go backwards up a river to the berth.

This means we first have to ensure slow speed for the 180-degree turn, then counteract the elements before we can go backwards. This time the blunt end rather than the pointy end has to go first, and the ship will behave differently.

The flare of the bow means we have to be extremely accurate as we approach. We have to park these vessels as if they were flat-sided, minimising any risk of flare from the bow or stern quarter, displacing something in the region of 200,000 tonnes of water, counteracting any wind or tide, and holding the vessel in position in a tidal way with only 50 metres either end until all mooring lines are fast. 🚢

A former chairman of the Harwich Haven Authority Board once observed: 'The Harwich Haven is one of the most beautiful harbours and has been turned into something completely useful.' The harbour has numerous seaward approach channels. Inside, the harbour is connected to the interior by two rivers, the Orwell and the Stour. The area and the terminals are known as the Haven Ports. The main complex at the harbour is the Port of Felixstowe container terminal, owned by Hutchison Whampoa. The Port of Felixstowe handles nearly 40% of the UK's containers and is the UK's largest container facility. The River Stour has the passenger terminal, handling ro-ros and large cruise ships, and petroleum tankers call at the local refinery. The River

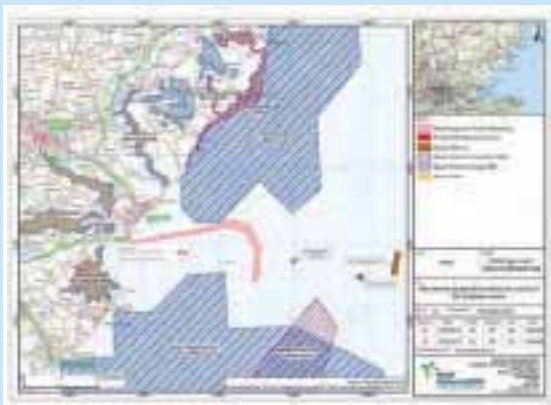
Orwell terminal, operated by ABP Ipswich, handles dry bulk vessels with cargoes arriving from Europe and worldwide.

The Harwich Haven Authority (HHA) is the statutory authority for the harbour area and seaward approaches to Haven Ports. Harwich Haven Authority is a trust port and does not own any of the terminals in the harbour, but derives its income from the tariffs levied for conservancy and pilotage services. The authority was established under an Act of Parliament in 1863 and has powers to regulate navigation. It provides pilotage service for the Haven Ports and seaward area and a local lighthouse authority providing navigation marks in its area.

All of the seaward approaches are

encompassed by marine conservation zones. In addition, the rivers used for navigation are sites of special scientific interest (SSSIs), with all the associated protections. This requires a high level of environmental compliance and is one of the reasons for regulated navigation.

Harwich Haven Authority continuously monitors the ecology and wildlife in the Haven and has found no adverse effects as a result of commercial operations in the area. This has encouraged substantial investment in marine operations, including pilotage, surveying, dredging and public awareness of what the authority does – and is something we are extremely proud of.



Pilotage training

Harwich Haven Authority is deemed a competent harbour authority under the Pilotage Act of 1987. The definition of a pilot is a 'person not belonging to the ship who has the conduct thereof'. I often get asked what this means. To be brief; passage planning, navigating, ship handling in confined waters, manoeuvring and ensuring that whilst under navigation all port byelaws and regulations are complied with. It involves looking after everything until the ship is safe alongside her berth or safely put to sea. It is a responsible job that gives legal powers for navigation and has penalties for misconduct.

Harwich Haven Authority installs responsibility on pilots. It recruits pilots from a senior marine career - the bench mark is currently set as a Master's certificate of competency coupled with Master's experience or senior officer with pilotage/port experience - into a continuous training program.

Keeping abreast of developments – the NI at IALA

New technologies and user needs are changing AtoNs and the surrounding legislation – and the NI is helping shape them



Jillian Carson-Jackson FNI, FRIN
Senior Vice President, The Nautical Institute

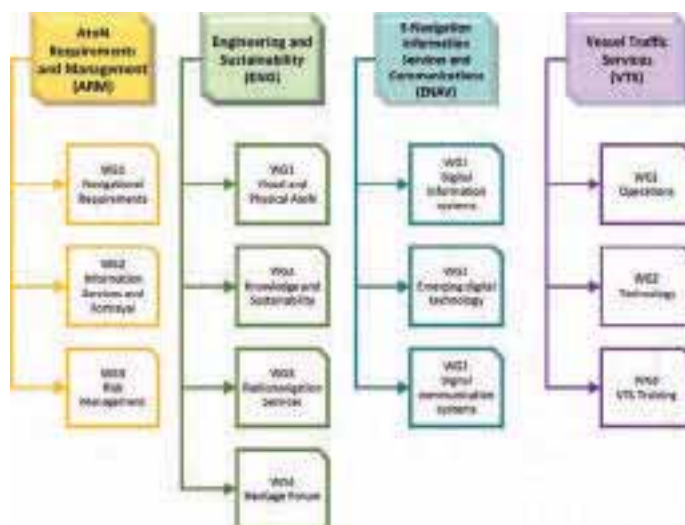
Even in the age of GPS and ECDIS, mariners continue to rely on external aids to navigation – ranging from traditional lights and buoys to terrestrial and satellite systems such as Vessel Traffic Services (VTS) and the Automatic Identification System (AIS). Implementation of these AtoNs is overseen by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), a non-profit, international association that works to promote the harmonisation and effective implementation of marine aids to navigation.

The NI and IALA have worked together over many decades. Capt John Murray, the fourth President of the NI who held office from 1981-1984, was vocal on the importance of ‘fruitful work for and with IALA’. The close cooperation between NI and IALA was formalised in a Memorandum of Understanding (MoU) in 2007. As times change, the MoU has evolved, keeping at its core the elements of sharing expertise, support for related activities and ongoing cooperation to promote safe, efficient, pollution-free transits of ships.

Working with IALA’s committees

IALA’s workload is shared between four main committees, each of which has several working groups looking at key issues (see diagram, right). The Nautical Institute is involved with the work of these committees in a number of ways. When IALA started to look at providing a structured approach to the training and certification of Vessel Traffic Services (VTS) personnel, the NI supported Capt Geoffrey Eades as the chair of the working group. The NI has remained active in IALA working groups, workshops, symposiums and conferences ever since.

David Patraiko FNI was the chair of the ENAV Committee’s User Needs working group from 2006 to 2014, and the NI is again sponsoring a chair of an IALA Committee working group during 2018-2022. Through this close cooperation I now have the honour of representing the NI as chair of ENAV Committee Working Group 2 – Emerging Digital Technology. From 2020 – 2022 I will be representing the NI as chair of the VTS Committee Working Group 3 – VTS training.



IALA VTS Committee

The VTS Committee looks at three main areas of activity – operations, technology and training.

Over the decades IALA has steered VTS development, providing international best practice on all aspects of the provision and training for VTS. A key activity over the past year has been the drafting of a revised IMO Resolution on VTS. The NI was active in all aspects of this work, including supporting the relevant documents when submitted to the IMO.

Revision of IMO Resolution A.857(20)

The current IMO Resolution on VTS came into effect in 1997. In the intervening decades, various organisational, operational and technological developments have taken place globally in a rapidly changing maritime domain. Over a period of two years IALA has led the revision of this Resolution with sessions at IALA VTS Committees, correspondence group meetings and workshops/seminars. The resulting document, the ‘Revised Guidelines for Vessel Traffic Services’, was reviewed at the IMO NCSR7 (Navigation, Communication and Search and Rescue) sub-committee in January 2020. NCSR7 made slight revisions to the document, and then approved the revised document which will be forwarded to MSC 102 (Maritime Safety

Committee). If agreed, it will then be forwarded to the IMO Assembly, with anticipated adoption in 2021.

Training on VTS for ships officers

Effective implementation of VTS improves the safety and efficiency of navigation, the safety of life at sea and the protection of the marine environment.

However, there is little guidance for maritime trainers on VTS, which can make it difficult to develop training for deck officers in working with VTS as per the Manila amendments. IALA has developed a Guideline to support maritime training organisations in this area. G-1149 'VTS Training for Deck Officers' also includes activities that could be used to facilitate effective communications and the exchange of information between the bridge team and the VTSO.

The Guideline is available on the IALA website at <https://www.iala-aism.org/product/g1149-vts-training-for-deck-officers/>

Work plan – now until 2022

In addition to updating the IMO VTS Resolution, IALA's VTS Committee is looking at the technical aspects of VTS, including:

- Product specifications and descriptions;
- VTS operations, including the use of consistent VTS VHF voice communication phrases;
- A review of the VTS training approach based on the original IALA Recommendation V-103 (now termed R0103) and associated model courses.

IALA ENAV Committee

The ENAV Committee has evolved over the years, with some responsibilities moving to other committees. Radionavigation services, including satellite positioning and timing, now fall under the remit of the ENG Committee. Work on terminology, symbology and portrayal has moved to the ARM committee.



IALA ENAV committee

Developments in digital communication technology are changing most aspects of our daily lives – texting, voice over internet protocol, and the ever-increasing need for bandwidth to support the activities. The maritime industry is making use of these developments to support almost all aspects of shipping.

AIS / VDES and WRC-19

Since I wrote 'Introducing the VHF Data Exchange System (VDES)' (*Seaways*, April 2016) quite a lot has happened with VDES, AIS and frequency allocation. In 2016, we had just completed the 2015 International Telecommunications Union (ITU) World Radio Conference (WRC-15) and were looking at the options for use of the allocated VDE and ASM frequencies. The key point at that time was that the terrestrial frequencies had been allocated, satellite uplink was agreed, but satellite downlink frequencies were not agreed. In November 2019 the International Telecommunications Union (ITU)

agreed the satellite downlink as a secondary frequency allocation. The IALA ENAV Committee is now looking at what that will mean for the further development of VDES, with the option to make effective use of the system beyond the range of terrestrial base stations – noting the successful outcomes of VDES trials in polar regions.

In addition, with the burgeoning use of AIS-like technologies to mark objects such as fishing nets, the ITU has agreed to the use of a new transmission frequency for what is now termed 'Autonomous Marine Radio Devices' or AMRDs.

3GPP (5G), Digital Radio and more

We are all used to developments in mobile communications – from 3G to 4G and now the move to 5G. But what does this mean for the maritime industry? The increasing bandwidth available on our phones is available in other areas. 3GPP – the 3rd Generation Partnership Project (<https://www.3gpp.org/about-3gpp/about-3gpp>) – unites seven different telecommunications standard development organisations. It works to develop cellular communications technologies, including radio access, core network and service capability, and provide a complete system description for mobile telecommunications.

3GPP gave a presentation to the IALA Symposium in 2018, and since then the link between maritime and 3GPP has grown. Within the development of 5G there are now specific maritime use cases, and the industry is coming to grips with what this could mean for operations.

Beyond 5G developments, there are many other adaptable technologies that support communications and data exchange, including digital VHF radio, NAVDAT (a digital file broadcasting system for ships at sea) and the possible use of the lights on aids to navigation for 'LiFi' (a wireless communication technology that uses the infrared and visible light spectrum for high speed data communication).

The IALA ENAV Committee WG2 is looking critically at existing and developing technologies to identify those that may be effective in the maritime environment worldwide.

IALA VTS/ENAV Symposium

The 14th IALA Symposium, 'Enhanced maritime safety and efficiency by connectivity,' will be held in Rotterdam, The Netherlands, from 25-29 May 2020. IALA's Symposiums have traditionally focused on VTS, the development of digital communications, links between ship and shore and the human element. Themes for this conference include:

- Safety and security in a connected world,
- Connectivity and Resilient PNT,
- Navigation Safety,
- Training and certification,
- Challenges of Maritime Autonomous Surface Ships (MASS).

I will attend the Symposium as Senior VP of The Nautical Institute, along with David Patraiko, Director of Projects. The NI will give a presentation on VTS Operator Training. 📺



IALA VTS committee

The UK-based industry group Maritime UK Autonomous Systems Regulatory Working Group (MASRWG) works to co-ordinate and promote issues to do with autonomous vessels (other industry groups exist). One of their activities is the publication of the *Industry Code of Practice for Autonomous Vessels*, which has been adopted by stakeholders on an international basis. The most recent version of this code can be downloaded free at <http://bit.ly/MASRWG>. The group also hosts an international conference. The most recent conference was held in London from 15–16 January. The NI was invited to make a presentation on the use of autonomous systems on manned vessels.

Living with autonomous systems

Autonomous systems on manned vessels are already reality. The Nautical Institute asked the mariner's opinion.

David Patraiko
FNI, Director of Projects

Autonomous systems are commonplace on modern ships. Most of them are intended to make the mariner's job easier and more effective. We have ARPA, AIS, ECDIS, ship monitoring systems for fire and for water ingress, cargo monitoring and unmanned engine rooms, to mention just a few. Further autonomous systems are being developed and installed, not least for navigation, collision avoidance, engineering maintenance and ship efficiency.

There are also thousands of 'autonomous vessels' in use every day. Despite the (genuine) news stories about the ongoing development of autonomous commercial cargo ships, the vast majority of today's autonomous vessels are small (less than 24 metres) and used in controlled waters. These are mostly used for military purposes or for environmental monitoring. This is changing slowly as business cases for larger vessels are becoming increasingly viable.

Whatever the future looks like, the fact is that more than 60,000 SOLAS ships are sailing today that were designed to be manned, and it would be prohibitively expensive to adapt them to be fully autonomous, even assuming this were possible. The lifecycle of a SOLAS ship is at least 20 years and it is improbable that all the world's tonnage will be replaced prematurely, so it looks likely that onboard autonomous systems and people will need to co-exist for a few more decades.

Mariners' impressions

This need for human/machine co-operation will obviously have a substantial effect on professional development needs. The Nautical Institute has interviewed a range of members through its SeaGoing Correspondence Group (SGCG), committees, social media and personal interviews to understand members' thoughts and to help shape NI's future strategy for professional development.

It is not surprising that most NI members are

fairly pragmatic and accept the inevitable increase of technology on their ships as they do in their everyday lives. They can foresee some real potential improvements but also the potential risks, some of which only a mariner can appreciate.

The big issue is trust. For an autonomous system to be useful there needs to be a high degree of trust – either trust that the system won't fail, or trust that if there is failure there will be a 'graceful degradation' in the system giving the people on board time and ability to take over control safely. One Master stated: 'For all of us who have been called out of our bunks at night (and it's always at night) to come to the bridge due to a risk, the thought of that call-out being an alarm saying that a computer has gone offline is very frightening.'

Many mariners praised technology and how much better it had made life on board. Some examples were:

- Automatic positioning systems (ECDIS) improving manoeuvring in tight areas
 - Automatic monitoring of cargo and unmanned spaces increasing confidence in vessel integrity
 - Emergency response systems that will start fighting a fire before an emergency can get out of control.
- Many survey participants referenced dynamic





“ Advanced technology giving autonomous operational capability actually requires a higher degree of training and competency than the closest manual equivalent ”

positioning (DP), which is an autonomous system by definition. Trust in DP is a result of the high degree of redundancy in the system and the graceful degradation made possible through early alerts and specialist training. It is worth noting that this advanced technology giving autonomous operational capability actually requires a *higher* degree of training and competency than the closest manual equivalent. Should this be the model for other autonomous systems?

Seamanship

Another area of concern is around seamanship. Good seamanship can prevent incidents by relying on experience that may be difficult for a computer to master, at least in the short term. This tends to relate to the importance of whole-ship situational awareness. Examples given included:

- Anticipating weather and its effect on shipboard operations
- Anticipating that a course change will mean that the ship may roll more, so perhaps the catering and engineering departments should be alerted to prevent incidents
- Early detection of cargo lashings working loose (and how to deal with them)
- The use of smell or feel for early detection that something may be amiss.

Wish list

There are areas where mariners (mostly deck officers) thought that technology and autonomous systems could make a big improvement on board. However, the overriding caveat for any of these tools was that they must be completely reliable and trustworthy.

ALARM MANAGEMENT

Both deck and engineering officers thought that automation could usefully be applied to creating a system of alarm management, for example automatically distinguishing between alerts, warnings and alarms. Deck officers said this would be helpful in dealing with alarms pertaining not only to navigation but also GMDSS, cargo, engineering, fire etc.

LOOKOUT, TARGET ACQUISITION AND TRACKING

Some ships are experimenting with the use of infrared or low-light optics, forward looking sonar or systems like LIDAR to provide an improved chance of detecting targets such as ships, fishing boats, leisure craft, or even mammals. It was stressed that all these sensors, including radar and AIS, must be 'co-ordinated by an autonomous system' to give a single augmented solution to the mariner so that the navigator does not become distracted from their task by being a human integrator of technology.

AUTOMATED LOGGING AND AUTONOMOUS ADMINISTRATION

It was strongly felt that autonomous systems could remove a significant portion of the onboard administrative burden. There were also numerous questions about why paper based logs were still in use when significant milestones were certainly being captured by technology as well.

MAINTENANCE SUPPORT

A vessel might use hundreds of cargo sensors that degrade over time. As each sensor degraded past a certain point, it would automatically alert the company ashore, who would order a replacement and log it into the planned maintenance system without involving the crew. The crew would only know when the part arrived with instructions for replacement. This would remove the monitoring, alerting and administration burden of ordering a replacement part.

EMERGENCY RESPONSE

As ships become larger and more complex, but crewing remains at a minimum, most mariners thought that the growing use of emergency response systems was a positive move. These systems range from detection to response, which may include triggering extinguishing agents, ventilation control or providing stability advice in the case of water ingress.

DECISION SUPPORT SYSTEMS

Humans make mistakes, and decision support tools could become part of a 'safety net' for mariners if used in the right way with the right training. Decision support systems for avoiding collisions are becoming widely available. Given that decision-making is often in the hands of a single person (who is therefore at risk of being a single point of failure), a system of checking might be useful. However, if the human puts excessive reliance on the system, then the technology could itself become a single point of failure. Other examples of decision support included cargo systems on tankers, where the wrong alignment of valves can cause major problems.

Being involved

Looking at other industries it is clear that autonomy can be used in a variety of ways. A key question is whether any given system is intended to *replace* the human (ie automatic plotting rather than manual) or to *augment* the human (ie improve target detection). Mariners are eager to be involved in the design and development of autonomous systems that will affect their work, particularly in the early stage where their

input can be most effective. Many young mariners are technologically savvy and would see being involved in the application of autonomy on board as a career benefit and even part of their career path.

Regardless of the application of autonomy, the NI is committed to the practice of human-centred design. HCD ensures that all designs, whether physical or technological, support the human operator (see page 28).

Most mariners are concerned about the risk of autonomous systems causing problems if they are not implemented correctly. Issues raised included not understanding the expressed use, the quality of the algorithms and data, and who bears the ultimate responsibility if the system is either followed or overridden. Nippin Anand has written on how safety trends based on 'big data' can overlook some underlying human element issues resulting in 'algorithmic injustice' (*Seaways*, Oct 2018).

Cyber-security and recovery have also been flagged as a serious issue by mariners, who find themselves relying heavily on systems that were designed long ago to be safe but not necessarily secure.

Artificial intelligence (AI)

Mariners are starting to think about artificial intelligence and having 'smart' systems that run more than just simple algorithms and are perhaps capable of 'learning'. The internet is full of stories about how AI has made huge progress in certain fields – for example, it is becoming better at diagnosing some diseases than its human counterparts. But the internet is *also* full of stories about how AI has not lived up to expectations.

Probably the most common use of AI in shipping has been in target identification and tracking. This technology is essential to the successful operation of autonomous vessels, which need to assess their environments in order to avoid collisions. It has been seen as a natural step to implement this technology on manned vessels to either augment or replace the navigator.

One concern is that AI can take thousands or hundreds of thousands of hours to 'train'. For instance, if an AI system incorrectly identifies an object and suggests that it is something that it's not, a human will have to correct the system so that it stands a better chance of getting it right the next time. This 'teaching' should not be done by mariners who are busy navigating. It will distract them and add to their workload. Any AI should be fully tested before being introduced on board.

While other industries have suggested that advanced AI could have social implications – often seen in science fiction movies where humans can bond with technology – this is not something seen in shipping, so far as I have heard.

Training

Seafarers recognise that they will need additional training if they are to feel competent and confident in the use of new technology. They are also cautious about skill-fade in areas where technology reduces the time spent practising their existing skills, which they



may need to fall back on. These include navigation and plotting, shiphandling and general seamanship. New skills will include IT and the understanding of software and algorithms. For example, mariners might need to evaluate:

- The decisions the machine makes in routing advice and the reasons for those decisions
- The quality of the MET data
- The formulas used to determine safe under-keel clearance (UKC) and their risk tolerances.

The way forward

Mariners recognise that some technical and automated processes have the potential to improve safety and efficiency and reduce fatigue. However, while they are pragmatic about the need to adopt new technology, they remain cautious. In the past, implementation of technology has not always been handled well, particularly when cost is an issue. All too often users have not been fully consulted.

It is important for ship and shore to have a shared understanding of the purpose of any automation technology. Is it intended to replace an existing task (perhaps automatic reporting), support mariners in their current role (such as providing better lookout and decision support), or are the mariner and the system working in tandem?

Mariners need to be consulted at the design stage to ensure that new systems are fit for purpose and support the human rather than undermine them. Dependability and trust are key issues for successful implementation and operations. Without trust the system actually becomes a greater burden. This can increase the risk of it not being used or used in unanticipated ways.

Developing best practice

It will be essential to have independent observation of how mariners use current and future systems in practice. These observations can then drive real change, if change is needed. The aviation industry, for example, uses a practice called Line Operations Safety Assessments (LOSA) in which independent, trained assessors observe not only competence but also procedures and design to identify what works well and what needs to change.

The Nautical Institute is currently working with industry leaders to train assessors to be better at observing human behaviour on board. These trained assessors will encourage feedback on competency, procedures and design for the shipping industry, in autonomous systems and beyond. User-led design of autonomous systems is an excellent start, but only once we see how these systems are being used in practice can we hope to get the best possible results. 🌐

Maritime Autonomous Systems – The Tide has Turned

Change is inevitable – and we need highly effective leadership of highly trained people to make the most of it

Sarah Kenny OBE

Chief Executive - BMT / Vice Chair - Maritime UK

In the past I have spoken about whether autonomy is a good thing for business and society, setting out potential scenarios for the future driven by autonomy and technology. Last year, I spoke about the wider implications of autonomy and advanced technology. I also highlighted the need to look at the potential impact on jobs and the need to develop the skills for the future.

I would now like to look forwards, as we enter the new decade, and explore how the pace of technological change will create challenges that industry, governments and regulators will encounter as we move deeper into the fourth industrial revolution. I will place particular emphasis on the role and future challenges faced by regulators.

Development of smart and autonomous ships, smart ports, and smart trading systems, exploiting advanced technologies such as satellite communications, sensors, smart data acquisition and analytical capabilities, and intelligent systems, potentially offers significant benefits, which will be critical to enable the full realisation of an efficient and dynamic maritime trading ecosystem.

Adapting to change

The realisation of these technologies of the fourth industrial revolution is happening at pace. We only need to look back over the last decade to see how much things have changed – the development of the smart phone, 4G (and now emerging 5G) mobile network technologies, internet banking and shopping and the proliferation of social media have radically altered the way we live and work.

We now need to recognise that we cannot stand still, we cannot hold back this tide of progress. However, as this technology-driven disruption impacts the maritime sector, we are faced with the reality of maintaining productive, continuous, safe, efficient maritime operations as part of a truly global industry where others may not adopt at pace or at all.

We need to recognise that not all nations and operators have the wherewithal or desire to travel at the same pace. It is against this backdrop that we need to consider the future of regulation and how we lead it.

I suggest, that with the unprecedented rate of change of both technology, and business and workforce trends, coupled with ever increasing levels of sociological and geopolitical complexity, our regulatory systems must not just respond to these challenges, but also be proactive in addressing this future world, building a future regulatory environment that enables businesses to be competitive and

exploit technologies as they emerge.

I should also add that we are not alone in facing these challenges. Other sectors such as automotive, aerospace and healthcare face the same issues.

Regulating the maritime enterprise

So, let's dive a bit deeper into what this could mean in regulating the maritime enterprise:

- Rapid technological progress – will require us to constantly adapt regulations to ensure technologies are developed, deployed, and used effectively. As a result, regulatory authorities will need to be more agile and adaptable to support the safe exploitation of technologies as they emerge and disappear!
- The convergence of technologies – across land, sea, air, space and cyber domains will necessitate a more collaborative multi-front approach to regulation, challenging traditional silos, requiring regulators to be more innovative and creative in developing future regulatory environments, and looking for solutions from other sectors.
- Businesses operating globally rather than within national boundaries – working with huge volumes of information and increasingly complex systems. Speed of response will be critical, and if our regulators do not respond quickly enough, they will be potentially ignored or side-lined.
- A changing workforce – with far more complex and diverse notions of culture, identity, loyalty and expectations of meaningful and purposeful work, we will need to be more flexible, adapting approaches appropriate for the differing audiences.
- The adoption of artificial intelligence (AI) related technologies – requiring us to consider how to develop a regulatory system that enables us to cope with systems that continue to develop 'at sea' as learning progresses.
- Changes to the way that humans and systems work together – we will need to address both human and technology elements together in future regulations.

The value of data

In addition, we will have to come to terms with the value, and use, of the totality of an unprecedented volume of combined data. Decisions made under pressure will be analysed calmly with hindsight by others. Today's information will be there forever and may be assessed in a future with different value systems – recent air accidents are a case in point. This has a major impact on the need for awareness and forward thinking and is an issue we will need to have front of mind.

To identify how to meet the demands of modern – and future – regulation, we also need to consider the skills we will need in our workforce. Understanding the expectations of the next generation is key to designing an environment that will attract the right people and skills that allow employees to thrive within it over the coming decades.

This leads to a number of questions:

- How does the enterprise respond, and create a regulatory workforce of the future?
- How does it create a public and private sector regulatory environment where new processes, leadership and management create new ways of thinking, and allow new ideas and technologies to be exploited?
- How does regulation become more agile and data driven?
- How does regulation attract and support the right people?

The answer will lie in our leadership. There will be a need for potentially different future leadership skills, organisational paradigms and innovative support systems to nurture them.

We need to curate thought leadership in order to ensure the regulatory environment and business it supports is both ready and fit for purpose. We need to evolve organisational leadership and skills structures that are ready for the disruption these trends will bring.

We should over the next few years expect to be confronted by skills shortfalls, particularly in high-skilled areas where we are competing with higher paying roles in finance and tech. We will need to do more to demonstrate why regulation and this sector are exciting and important.

Leaders will need to recognise that their team's core skillsets will be different. The role of regulators will increasingly be highly technically competent, with skills in engineering, data science and cyber security, which must be combined with an understanding of the maritime environment and operations. There is already a massive shortfall of

such people, and if we don't act, we will face challenges recruiting them. The future regulatory workforce will need to be ready to process complex varied new sources of information and reach informed and ethical decisions that address multiple stakeholders needs. So, it's not just a challenge to attract them, we also need to develop and retain them. The training approach therefore needs to shift from 'we'll train you' to 'we'll help you learn'. It should instil critical thinking skills and ethical decision making, that allow people to develop and evolve in a constantly changing environment. We will likely have younger leaders in a generation. We need to nurture the adaptive critical thinking skills that leaders need, not just teach them how to follow the rules and processes.

In the future we should expect to see further challenges: cyber security, disruption to trade routes, developments in international law, relationships, trading patterns and the impacts and implications of climate change. This changing ecosystem poses a significant challenge to the resilience of our maritime sector, and the way we continue to regulate it.

In addressing these regulatory challenges, the ethos of collaboration and cooperation that underpins the enterprise is significant. But it needs highly effective leadership from highly trained people to deliver it successfully.

Only with a dynamic and future-focused leadership approach can we transform the sector and its regulation. We must be ready to harness this change to global benefit, developing and deploying innovative methods and techniques to continue to ensure a safe and secure maritime arena.

This speech was given as the keynote presentation at the MARSWG conference in January, and appears with permission.

RECRUITING? INSIST ON THE BEST

Nautical Institute members make great employees

NI members...

- are committed to professional development
- truly understand the importance of safety and best practice
- have a professional mindset that underpins every aspect of their working life

Don't leave your organisation's future to chance. Why not include the following in your next recruitment advertisement...

"Membership of a professional body such as The Nautical Institute will be seen as an advantage"



Expert guides to challenging channels

We've all heard of deepsea pilots, but with many operators declining to pay for their services, we may not have encountered one in person. What does the role look like, and why does it matter?

Andrew Linington

As one of fewer than 100 deepsea pilots working in the UK and North West Europe, Captain Paul Lanaghan is one of an extremely rare breed.

Today, he's starting what is set to be a two-week rotation aboard the 61,775gt car carrier *Cygnus Leader*. Boarding the vessel in the port of Bristol, he's helping the Indian Master and navigating officers through the increasing number of Channel 'hotspots' in some typically testing autumnal conditions.

Carriage of a deepsea pilot has, since 1981, been recommended by the International Maritime Organization (IMO) on ships transiting the North Sea, English Channel and Skagerrak. However, it's estimated that barely 2.5% of the 80,000 vessels that run through the Dover Strait each year utilise the pilots' services.

'The truth is, there are many owners and seafarers who don't even know the service exists – and then there is the challenge of convincing them of its value when the commercial aspects do not jump out first and foremost,' says Chris Brooks, from Gravesend-based Deep Sea & Coastal Pilots (DSCP), which has been running since 1947 and is one of the largest agencies in Europe.

Capt Lanaghan – who is one of 30 Trinity House-licensed pilots working through DSCP – says there are strong economic arguments in their favour. 'We can more than pay for ourselves, as we can prevent or minimise delays to the vessel through prudent and economical routing,' he notes. 'On a typical voyage we can cut up to 12 hours of sailing time, saving time and bunker fuel costs.'

The presence of a deepsea pilot can reduce the costs of a voyage in the area by as much as US\$13,000, but it's the safety case that should stand out, he stresses. 'In much of this area, Masters are having to deal with long and intense periods of navigation with the very strong possibility of adverse weather in complicated traffic situations.'

'Then you add into the mix the density of the traffic, fishing vessels and pleasure craft, traffic separation schemes and crossing traffic, tides and currents, sandbanks and sandwaves, windfarms and migrant boats, and if you don't know the area you can very quickly run into trouble.'

The Channel and the North Sea aren't very old in geological terms, Capt Lanaghan points out, and seafarers need to be very aware of factors like squat when they pass through the very variable depths in the area. 'Meteorological phenomena like low pressures can delay the tide and reduce the height,' he adds. 'This is a place where you can't relax and always need to be very aware and alert.'

'There are also long periods of river pilotage in many European ports – sometimes upwards of six hours – and we can really help to relieve the resulting stress and fatigue faced by Masters and officers,' Capt Lanaghan says.



Capt Lanaghan consults his personal pilot unit as the car carrier *Cygnus Leader* transits the Channel traffic separation scheme

'For a Master who is unfamiliar with this area, it can be a daunting task and when combined with any bad weather, reporting procedures, paperwork, port pilotage, cargo and port paperwork commitments, it is easy to see how fatigue can set in and working hour limits potentially breached,' adds Chris Brooks.

'We're familiar with all the various port requirements and pre-arrival paperwork,' Capt Lanaghan says, 'and we can therefore make sure that all the pre-arrival information and communications are correctly dealt with – or advise the Master, for instance, that it might be an idea to have a tug to help push them alongside in a port like Zeebrugge during adverse weather.'

In the week before he joins a ship, Capt Lanaghan will research the vessel and the route, noting potential problem areas along the way and looking at the likely weather conditions. 'You start to build up a layered picture, so you know what to expect,' he explains. 'You always need to have a good, viable Plan B.'

On this voyage, Capt Lanaghan joined *Cygnus Leader* in port but he often boards ships from a launch off Brixham or Cherbourg. Once on the vessel, he will carry out a master-pilot exchange of around 20 minutes and get a feel for the ship and crew.



The 61,775gt vehicle carrier *Cygnus Leader* operates a regular service between the Far East and Europe with a capacity of up to 5,415 cars and 162 trucks

‘Sometimes you can sense a sigh of relief as soon as you arrive,’ he says. ‘You are often on a ship for a reasonable period of time and can establish a decent working relationship and build a good level of teamwork.’

‘I’ll talk through decisions with the watchkeeping officer and will tell them they are in charge, that I’m here to help them and that they should immediately say if I am doing anything they don’t like,’ he adds. ‘Some cultures don’t like to challenge you, but it’s all about breaking down these barriers to get effective bridge management.’

Taking the pressure off

The Master and officers on board *Cygnus Leader* tell me how much they appreciate Capt Lanaghan’s presence – in particular in helping to ease the stresses of paperwork and intense concentration while visiting so many ports in such a short space of time. ‘I am very pleased to have a deepsea pilot on board,’ says Captain Subra Arumugam. ‘Knowing there is someone with so much knowledge and experience of the area makes us all feel more comfortable and takes a lot of pressure off everyone.’

Capt Lanaghan points out that naturally he cannot be on the bridge continuously during most of his pilotage trips and he does not like to go much beyond six hours at a time. But in preparing for the voyage he identifies the most challenging points – in this case, going around Land’s End, entering the traffic separation scheme and approaching the Casquets and the Wandelaar – and will go to the wheelhouse well before the ship reaches them. He’s available any time the bridge team need his help and will handle much of the communication with VTS and coastguards, which helps seafarers with limited English language skills.

‘You have to adapt to the environment on board each ship, and it can be tiring and stressful at times,’ he admits. ‘You learn from experience when you need to be up, and the decision is primarily based on traffic choke points and reporting requirements, and on where the fishing boats, ferries and local traffic will be.’

‘You are thinking ahead all the time,’ he adds. ‘But you also need to watch out behind you – it’s like a game of 3D chess, as you are trying to maintain a proactive picture of what’s happening around you. At the same time, you are trying to pull lots of moving parts together – rules of the road, complex traffic situations, weather and schedules. It

can be very challenging and it’s not for the faint-hearted, but I enjoy a challenge and being tested so I can draw on my skills and experience.’

Training and preparation

DSCP only uses pilots who have been certified by Trinity House, and it requires a minimum of three years of command experience from candidates holding a current Class 1 Master’s certificate and experience of sailing in Europe. Once selected, they will undertake a number of training trips with senior pilots before a final training voyage conducting the pilotage under the supervision and assessment of a licensed pilot. If all that goes well, candidates will then take a two-hour oral examination at Trinity House before being awarded their licence.

Capt Lanaghan has been a deepsea pilot since 2016, coming to the job with almost 40 years of seagoing experience. ‘In the North East, traditionally, you either went down the mines or into industry,’ he says. ‘I didn’t fancy going down the mines and in South Shields there were two people you aspired to be – a Tyne pilot or a ship’s captain.’

Capt Lanaghan joined Bank Line as a 17-year-old cadet. ‘I thought that going to sea would be a romantic lifestyle, seeing all these far-off places. I had a ball for the first two years on the South Pacific, starting off in Tahiti and working through all the islands before returning to the



Deepsea pilot Captain Paul Lanaghan discusses the *Cygnus Leader*’s passage with the Master and some of the navigating officers
All images: Andrew Linington



Cygnus Leader's chief and second officers check progress on the ship's ECDIS

UK six months later.'

Early in his career, he was on a ship that rescued nearly 300 refugees in the South China Sea – some of whom he is still in touch with. He also served in the Falklands conflict on the Bank Line vessel *Cedarbank*, shortly before the company sold its ships, and went on to work for Jardine Matheson.

Joining Saudi tanker company Vela in 1994, Capt Lanaghan gained his first command at the age of 37 and served on vessels of up to 420m and 428,000dwt before going on to work for Chevron as a mooring master in West Africa and freelance operations in Mozambique and Uruguay. 'I didn't care for a job in the office and a friend at Trinity House in Newcastle who was a deepsea pilot suggested I should give it a try,' he says. 'Because of my time coming from the Middle East to Rotterdam on Vela ships, I had gained a good familiarity with the geographical area.'

Capt Lanaghan's licence covers an area stretching from Gibraltar to Archangel, Russia, up to the entrance to the Skagerrak, and to 14 degrees west. It has to be renewed every year. There is a revalidation interview and Trinity House checks of charts, paperwork and nautical publications. 'It's like a law degree,' he says. 'Things are constantly changing, and you need to keep up to speed with all the changes to North Sea buoyage, navigation lanes and reporting procedures.'

Each deepsea pilot carries their own ARCS charts, corrected and up to date, as well as relevant nautical publications in an electronic format. They can use the pilot plug linkage to the vessel's AIS and an independent GPS to give their own real-time display of the ship's track and surrounding conditions.

A varied role

DSCP trains its pilots on a variety of vessel types and they can be called upon to sail on anything from car carriers to container ships, bulk carriers and tankers, gas carriers and occasional passenger ships, even US Sealift Command vessels.

The role of the deepsea pilot can also extend to navigational safety audits and bridge resource management training, sea traffic services on board seismic survey vessels or assisting with rig moves.

Capt Lanaghan says he enjoys the variety and doesn't have a favourite vessel type to serve on. 'Because of my past experience, going on to a very large crude carrier (VLCC) is like putting on a pair of old slippers,' he admits. 'But every ship has its own specific characteristics and challenges, and now that many container ships have become behemoths it is like being on a VLCC.'

Most deepsea pilots will typically do around 20 rotations a year and the nature of these varies from vessel to vessel. A VLCC may simply require a passage from Brixham to Rotterdam, while a car carrier

visiting as many as eight or nine ports within 15 or 16 days in NW European waters may need a deepsea pilot on board the whole time.

Although the practice of deepsea pilotage can be traced back to the 16th century, its modern form owes much to the period after the Second World War when expert local knowledge was required to navigate ships through a handful of narrow swept routes past minefields that had been laid in the North Sea. Originally intended as a temporary measure, the service expanded as operators recognised its safety and economic benefits.

Changing traffic patterns

Capt Lanaghan argues that the need for deepsea pilotage services has never been greater. 'It's not just the amount of traffic out there, but also because of things like the huge increase in windfarms and offshore developments which have restricted navigational areas in the southern North Sea and the Channel,' he points out.

'The boom in windfarm traffic has created a lot of additional traffic and the scale of some of the sites means that some of the shortcuts that we used to use in the North Sea have been lost,' he explains. 'This is only going to get worse, and in some parts of the southern North Sea we stand to lose up to two-thirds of the sea area because of the projected windfarm developments.'

Traffic separation schemes have done much to improve safety in the area, he notes, but they do have the effect of funnelling vessels into concentrated areas and hubs. 'This is exacerbated by what we call 'red line fever', with a lot of conduct dictated by ECDIS and AIS, ships going for the same point on the chart and being reluctant to use the full width of the lane,' Capt Lanaghan says. 'Red line fever with stupidity and ignorance is not a good combination.'

Illustrating his point, Capt Lanaghan makes good use of the available space to pass a group of ships bunched up on the same track towards the Sandettie light vessel and to put *Cygnus Leader* into a good position for the approach to Wandelaar, where a local pilot will come aboard.

On an average day there are around 400 vessel movements in the Channel. Looking today at the significantly reduced visibility outside and at the almost convoy-like patterns of ships on the radar, as well as the numbers seeking to cross lanes or radiate off on to different routes after passing waypoints, it's not hard to appreciate the scale of the challenge facing navigators unfamiliar with these waters.

Capt Lanaghan – who recently used his experience to contribute to the new edition of Witherby Seamanship's Passage Planning Guide to the English Channel, Dover Strait and Southern North Sea – says he also sees an increasing new challenge being posed by the growing size and reduced manoeuvrability of many ships at a time when environmental pressure is curbing their power.



Cygnus Leader pictured in the port of Zeebrugge at the end of its passage from Bristol

Where next?

Deepsea pilotage isn't confined to the Channel and the North Sea – it's in use in the Baltic Sea, the Malacca Strait and the Bosphorus Strait, and it's mandatory for vessels transiting the Great Barrier Reef and Torres Strait in Australia. IMO recommends use of a deepsea pilot in the North Sea, English Channel and Skagerrak, but companies like NYK that regularly use their services are in a very small minority.

Pressure for compulsory carriage was stepped up in 2002, when car carrier *Tricolor* sank in the Channel after a collision with a container ship. The wreck was struck by two other ships in the next fortnight, despite the presence of guard vessels, navigational warnings, and buoys and Racon transponders.

However, international shipowners rejected moves to beef up the IMO recommendation, arguing that 'no compelling need' had been established for stricter requirements and that 'the function and perceived benefit' of carrying a deepsea pilot in adverse conditions was unclear. 'The pilot cannot be a member of the ship's crew and his or her presence will not relieve the Master of the responsibility for safe navigation,' the owners argued.

Mr Brooks says he finds such resistance 'quite staggering' and a reflection of the way the industry often tends to take a reactive rather than proactive approach to safety. Nevertheless, demand has been growing, largely fuelled by the tanker sector. 'There is a lot more focus on charterers taking deepsea pilots now, and especially if a Master has not transited the area in the last six months,' he says.

Capt Lanaghan says he loves the job and would recommend it as a career choice for fellow seafarers. But he worries about where the next generation will come from. 'I'm passionate about training and



Cygnus Leader's Master, Capt Subra Arumugam, with deepsea pilot Capt Paul Lanaghan

education and it's sad to see the big reduction in cadet numbers since I came to sea. I think demand for our services will increase because of the growing complexities of navigation in this area, but it will be a struggle to find the people to follow in our footsteps. We've already got many deepsea pilots who are approaching the end of their careers, and the demographics of the industry are not good. Something has got to give soon.' 💰

This article was first published in *Telegraph*, the magazine of Nautilus International, and appears here with permission



Part of Capital Marine Group

A Remote Navigation Audit can help prevent a major incident

Conventional navigation audits can be logistically difficult and unpredictable in time and travel costs. Surenav remote navigation audits could be the answer.

We provide a confidential service to ship operators using bespoke software, via a VDR data download and supporting evidence. A review of bridge team procedures, passage plan and voyage documentation will be conducted using audio and video of radars and ECDIS to verify compliance with Company SMS and industry best practice.

The RNA is not new. We have worked with renowned shipping companies and industry bodies over 5 years. RNAs were approved in 2018 by OCIMF and are used in its TMSA programme. Similarly, the remote concept and software are used to deliver quick and efficient Root Cause Analysis after navigational incidents, including near misses or fixed & floating infrastructure damage.

Where relevant, each audit report will include a video clip. Just send us the VDR data to review, with copies of relevant voyage documents and paper charts if used and we will send you a report within 10 days.

Additional services include:

- Conventional navigation audits
- Bespoke simulator training
- Near miss & incident investigation
- Independent 'Pilot Peer' review
- Safety management system review

For more information:

Please call: +44 (0)1983 866922
or Email: support@surenav.com



Mariners' Alerting and Reporting Scheme

MARS Report No 329 March 2020

MARS 202012

Mooring fatality

As edited from official SHK (Sweden) report S-238/18

➔ A cargo vessel was about to depart. The Master held a short briefing with the duty officer and a seaman. He informed them that they would depart without assistance from outside linesmen because the weather was good and the light winds would hold the vessel on the berth.

The deck crew for the departure consisted of an officer and two crew, as was usual on this vessel. Since no outside linesmen had been called, one of the crew was on the dock to let go the lines. No additional crew members were called on deck. The officer went forward and one crew member went aft.

The order was given to release two of the three stern lines. Both aft lines were on the same winch, so the crew member on the poop deck slacked them both at the same time. Once the lines were off the shore bollards he started winching them to the poop deck.

During this time the vessel moved slightly forward, so there was no tension on the aft spring bollard. The crew member on the dock took the aft spring line off the bollard as he went forward. He released the lines at the bow and came back on board just aft of the forecastle.

About this time, the Master noted that the aft spring line was still lying on the quay and had not been winched in. He called the crew member at the stern over VHF radio but received no response. He ordered the third officer to send the recently boarded crew member to the stern to check the situation.

The crew member found his colleague pinned to the mooring winch by one of the lines that he had been winching inboard, unresponsive and bleeding heavily from several places. The control lever for the winch was held down by a weight to keep it in the position for maximum winch speed. He immediately called for help and engaged the emergency stop on the winch.

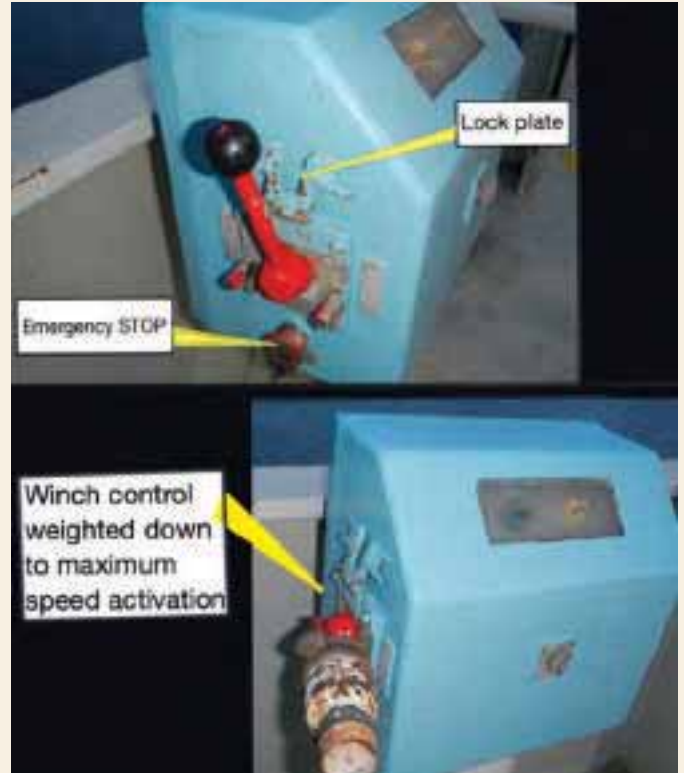
The crew member who found the victim had to cut the mooring rope to free him. By the time the officer arrived the victim had been freed and first aid was administered. Using a stretcher, they moved the victim inside the vessel. An ambulance arrived and the victim was taken to hospital where his condition was stabilised. Unfortunately, due to the serious internal injuries he had sustained, he died two months later.

The official investigation found, among other things, that:

- The crew member working the lines on the poop deck was working alone on a slippery deck.
- The two aft lines were winched home simultaneously with the winch control lever locked to high speed, probably because the victim wished to stow them at the same time as winching in.

Lessons learned

- Ensure sufficient crew are present during mooring operations to guarantee safe working conditions. This will usually require more than one person at each mooring station.
- The winch operator must have full control of all activity as ropes are taken in on the winch drum. When using a winch drum with a loose rope, one person must be at the end of the drum and another person must be standing at least one metre behind to manage the slack. With the winch operator, this makes three.



- Deck surfaces where mooring activities are carried out must be slip-resistant.

■ **Editor's note:** Using a weight to keep the winch control in operation while the lone crew member handled the lines was apparently a common practice on this vessel. This type of work-around is typical of human nature; we all want to accomplish the task required of us. If you are bypassing safety mechanisms while trying to do your work, STOP and ask yourself, 'Is this really safe?' In almost every case the answer will be no.

MARS 202013

SOx scrubber overboard discharge incidents

DNV-GL Technical and Regulatory News No. 20/2019

➔ SOx scrubbers are one of the compliance options for ships to meet the IMO global sulphur cap for 2020. But we are still on a learning curve for ship-based applications of this technology. On one vessel, a hole in the piece of piping between the SOx scrubber overboard valve and the ship's hull (the spool piece) led to a large quantity of seawater entering the engine room. With considerable difficulty the crew eventually managed to stop the water ingress and limit the consequences.

During the damage survey, the spool piece was found to be severely corroded. The diffuser necessary to dilute the acidic outflow of the

scrubber wash water and ensure compliance with the emission regulations was also found to be heavily corroded.

Even though the spool piece was made to an approved design (steel piping with epoxy coating), the acidic wash water managed to make



Corroded diffuser

contact with the steel pipe and react with it. This was probably due to a flaw in the application of the epoxy coating or the coating being damaged during installation. There have been several other instances of overboard piping connected to SOx scrubbers experiencing leaks.

Lessons learned

- These incidents highlight the need to select both a suitably durable material for scrubber parts and a robust design.
- Until the industry converges on reliable design(s) and material(s) for the overboard piece, a yearly inspection of the spool piece is recommended. Particular attention should be paid to the bottom part of the pipe closest to the valve flange, since many incidents indicate that this is the area most affected by corrosion.
- An alternative to yearly inspections is to install a leakage indicator to the spool piece.

MARS 202014

Fan blade finger injury

➔ A tanker was moored and waiting to load cargo. An engineer and the electrician were tasked with the scheduled maintenance of the electric motor of one of the engine room supply fans.

After a briefing by senior staff on the work to be done, the two men isolated the motor's electric circuit and did a lock-out. The fan-motor unit was located in a small deck house and was accessed through a cover built into the ventilation ducting. As they pulled the cover off, part of the gasket became detached. The engineer instinctively tried to grab the gasket but in doing so his right hand struck the edge of the immobile fan blades inside the ducting.

Even though he was wearing gloves, the impact caused a deep wound on his second finger. After first aid, he was sent ashore for further medical examinations. He received three stitches and was declared unfit for duties for 20 days.



Lessons learned

- Working in cramped and difficult areas brings its own risks. Be aware of these possibilities and adjust your work style accordingly.
- Even seemingly minor injuries can have repercussions that last for some time. In this case the victim was unfit for duty for 20 days.

MARS 202015

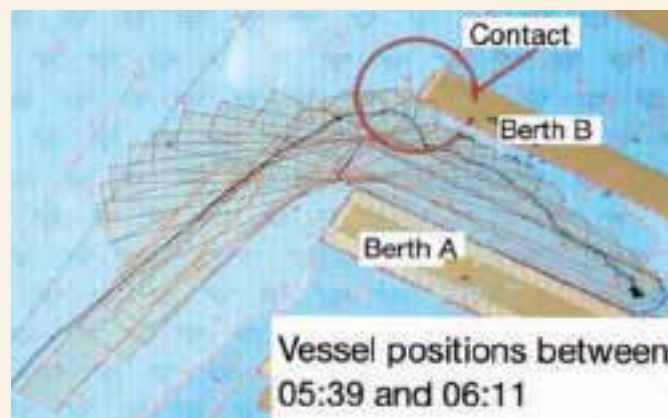
Passenger ship parking problems

As edited from NTSB (USA) official accident brief DCA18FM036

➔ In the early morning hours a passenger vessel was inbound for the port with an arrival pilot at the con. There was a significant ebb tide setting at about 2.3 knots, so a docking pilot and assisting tug had been ordered. The docking pilot boarded and had a discussion with the Master about the docking manoeuvre. Shortly after this, the docking pilot took the con from the arrival pilot.

The bridge team included the Master, Staff Captain, an officer, a cadet, lookout and helmsman. Additionally, an officer was stationed at the forward mooring platforms, port and starboard, to relay distances to berths A and B (see diagram below). About 15 metres separated the two platforms and the officer alternated from one to the other as needed.

The tug was positioned on the starboard side, without lines, to act as a pivot point for the starboard turn into berth A. The pilot gave helm and thruster orders and the Master complied using a controller. With the vessel's speed at about 1.4 knots, the bow began approaching berth B. The officer forward gave a warning. The bow soon made contact with berth B, causing significant damage to two levels of the shoreside vehicle parking area.



The official investigation found, among other things, that:

- Minimum safe distances had not been set out during the docking discussions, so there was no shared mental model of where the threshold was.
- There was little evidence of the bridge team practising the technique of 'thinking aloud' that would have allowed for verbally sharing the mental model of the current and future situations.
- Members of the ship's bridge team were not engaged effectively in helping the pilot and Master execute the manoeuvre.
- The officer at the forward mooring platforms had no view of the tip of the bow, which made contact with the parking structure. Also, he was doing double duty alternating from port to starboard, which reduced his effectiveness.

■ **Editor's comment:** The marine industry is unusual in that, as in this example, up to five people have to co-ordinate their movements and actions in order to manoeuvre a massive floating object safely to berth. Since human error is understood to be the most prevalent contributory factor to accidents, these situations call for strict protocols and procedural integrity; working as a true team is paramount. Working as individuals, each in their own bubble, is a recipe for failure.

MARS 202016

One metre fall proves fatal

As edited from IMO Committee III 5 – Lessons Learned from Marine Casualties

➔ Hold-cleaning operations were being conducted during a ballast voyage in favourable weather. The crew were using a ladder and a high-pressure water jet to remove cargo residue from the sloping upper hopper bulkhead. The ladder was secured at the top by a rope and was stabilised by a crew member at the bottom. Another crew member climbed the ladder and directed the water-jet on to the bulkhead to remove cargo residue.

The crew member on the ladder was wearing a safety harness attached to a line that was passed through a pad-eye on the bulkhead above and back down to a third crew member on the tank top. This person gave or retrieved slack on the safety line as necessary. Hold cleaning in this manner was a well-established practice on this vessel.

After cleaning one section, the crew member on the ladder was climbing down in order to reposition the ladder for the next section. When he was about one metre above the tank top he stopped and disconnected the safety line. He immediately lost his balance and fell backwards on to the tank top, striking his head. The victim was unconscious and was evacuated by helicopter. Despite all efforts he was declared deceased on arrival at the hospital.

The investigation found, among other things, that the victim's safety helmet was not secured by the chin strap and was dislodged during the fall. Had the helmet remained attached to his head it could have provided sufficient protection to reduce his injuries from a fall from such a relatively low height.

Lessons learned

- Even falls from low or moderate heights can result in serious injury or death. Do not become complacent about the dangers of working at height.
- Do not remove safety devices, such as a safety line, until you are truly safe.
- A hard helmet will provide a greater level of protection if it is secured by a chin strap. For another incident where an attached chin strap might have reduced the consequences, see MARS 201547.
- While ladders are necessary for providing access, it is not best practice to use them as work platforms.

MARS 202017

Anchors prevent grounding

➔ A tanker in ballast left its berth in a river estuary under pilotage. After leaving the berth, speed was gradually increased and then adjusted until a speed of nearly 10 knots was achieved. Some 18 minutes after departure a power blackout occurred. Power could not be regained and the vessel's speed began to slow so much that steerage became difficult. The port anchor was dropped (vessel speed 5.3 knots) and about two minutes later the starboard anchor was also let go (vessel speed 3.8 knots). The vessel stopped safely within a few minutes.

Soundings were taken around the bulbous bow and confirmed the vessel had not grounded. No changes were observed in the vessel's tank soundings and no spill or leakage was observed.



Lessons learned

- Have your anchors at the ready when navigating restricted waters.
- Be aware that anchors can be pulled from the ship if the speed is too high.
- If emergency anchoring is necessary, ensure the crew are well clear of the chain as it pays out.

Thank you to all our Nautical Affiliates for their continued support



ABB
<http://new.abb.com>



ABC Maritime
www.abcmaritime.ch



A. R. Brink & Associates
www.arbrink.com



AMCOL
www.amcol.ac.th



BMT Surveys
www.bmtsveys.com



Britannia P&I Club
www.britanniapandi.com



Caledonian MacBrayne
www.calmac.co.uk



City of Glasgow College
www.cityofglasgowcollege.ac.uk



Carnival Corporation
www.carnivalcorp.com



Chevron Shipping
www.chevron.com



Commissioners of Irish Lights
www.cil.ie



Constanta Maritime University
www.cmu-edu.eu



Constellation Marine Services
<http://constellationms.com>



Epsco Cyprus
www.epscocy.com



Everard



Exmar
www.exmar.be



Gard
www.gard.no



GigaMare
<https://www.gigamare.com/>



The Gdynia Maritime School
<http://morska.edu.pl/en>



GNS
www.globalnavigationsolutions.com



HC Maritime Consulting Pty Ltd
www.hcmaritime.com



IAMI
<http://iami.info>



IMAT



IMCS
www.imcs-group.com



Inmarsat
<https://www.inmarsat.com>



International Salvage Union
www.marine-salvage.com



KASI GROUP
www.kasimailaysia.com



K. C. Lyrantzis Group



Lodestar
www.lodestar-marine.com



LOC Group
<http://loc-group.com>



Louis Dreyfus Armateurs
www.lida.fr



Marine Society & Sea Cadets
www.ms-sc.org



Marlins
<https://marlins.co.uk/>



Martech Polar
<http://martechpolar.com/>



Menezes & Associates
www.menezesandassociates.com



MES
www.myanmarexcellentstars.com



MOL Marine Co., Ltd.
www.molmc.co.jp



MSI
www.msiships.com



North of England P&I Club
www.nepia.com



NorthLink Ferries
www.northlinkferries.co.uk



Norwegian Hull Club
www.nordclub.no



Pacific Basin



PHRS
www.phrs.gr



The Port of London Authority
www.pla.co.uk



The PTC Group
<http://ptc.com.ph/>



IHS Safety at Sea
<http://magazines.ihs.com>



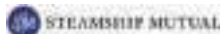
Seagull Maritime AS
www.seagull.no



SDT
www.sdtultrasound.com



The Standard Club
www.standard-club.com



Steamship Mutual
www.steamshipmutual.com



STARGATE
www.stargate-crewing.ro



Stolt Tankers
www.stolt-nielsen.com



The Swedish Club
www.swedishclub.com



Seavie
<http://seavie.com>



Swire Pacific Offshore
www.swire.com.sg



Tsakos Columbia Shipmanagement



Thalpis



TMC Marine
<http://tmcmarine.com/>



UK P&I Club
www.ukpandi.com



UK Chamber of Shipping
www.ukchamberofshipping.com



Vertex Oil Spill Supply
www.vertexoilspill.com.br



Videotel
www.videotel.com



West of England P&I Club
www.westpandi.com



WAVES GROUP
www.waves-group.co.uk

Our Nautical Affiliates help us make a difference to the shipping community by ensuring that our MARS Scheme is available to the industry for free. Find out more at: www.nautinst.org/affiliate

Port development in West Africa

As trade routes develop and new hubs emerge, new ports will open to serve them. We look at one of the fastest developing areas – West Africa

Caitlin Kelly

Some of shipping's most influential companies are rushing to stake a claim in West Africa, with ambitious development plans that promise to transform the coastline. But in an area with a difficult history, it's not without its challenges.

According to the Africa Union, the global population will grow by 2.4 billion by 2070. More than half of that growth will take place in Africa. This increase comes at a time when the working age population in most developed countries, including China, is set to stagnate or decline.

Along with the population, container volumes and overseas trade flows are growing too. This means that up to date and efficient ports are now more vital than ever. Meeting this demand is the renewed presence of private investment in West Africa's port sector. A long list of international companies, are shaping shoreline operations through the construction of deeper harbour drafts, larger terminals and gantry cranes, the implementation of digitalisation and automation, and the exchange of foreign knowledge and expertise.

But there are many issues stunting further growth. In 2019, One Earth Future named West Africa the world's piracy hotspot, with more incidents than anywhere else on the planet. The cost of energy is high, intra-regional trade low and much of the hinterland remains disconnected.

Investment from China

China's emerging role in African development is well documented. China is now Africa's main trading partner with an annual trade value worth over \$200 billion across the continent. Investment in West Africa forms part of China's Belt and Road Initiative (BRI), which gives the superpower access to new markets and expands its political influence. It will provide increased connection with Africa's growing middle class before China's own population begins to decline from 2030.

In 2007, China Merchants Port Holdings group took over control of Tin Can Island Container Terminal in Nigeria, and now has stakes in the ports at Lomé and Djibouti. More recently, Singapore-based company, Tolaram (known more commonly for their noodles), won Chinese backing for major developments in Lekki Deep Sea Port, located on the east side of Lagos. Port construction involves \$630 million from the China Development Bank, and \$470 million in equity from China Harbour Engineering Company. When completed, it will accommodate fifth-generation container ships with a maximum capacity of 18,000 TEU.

While Chinese finance attracts a good deal of attention, the even larger role of European companies, especially those from France, Belgium and the UK is less well known. This includes shipping lines MSC and Maersk, and Bolloré Ports. In Benin, the Port of Cotonou,

which serves as an access point to Niger, Mali and Burkina Faso, has been under the management of the Port of Antwerp since 2018.

This type of port development follows a build-operate-transfer model, whereby private companies invest in the construction and running of a port before eventually handing it back to the host nation. Private companies take on the financial cost of port construction, while West African governments hold the important yet less costly role of a landlord. It offers a way for the region to meet the demands of a growing market even with limited financial resources.

Which ports are leading the way for West Africa?

In Togo, a country characterised by low GDP and subsistence agriculture, the Port of Lomé's development marks an ambitious point in the nation's history. As the only port in West Africa with naturally deep water, it has a significant advantage in the region. It is currently undergoing modernisation by Bolloré Ports, who expect to create 300 new jobs for Togolese nationals and a training scheme for local personnel.

Once a small fishing village, the Port of Tema in Ghana has since evolved to become one of West Africa's leading ports. Projected to be finished in 2020, it has undergone one of the most ambitious port construction projects in the history of Sub-Saharan Africa. Aiming to triple its handling capacity and accommodate larger vessels, the expansion includes the addition of a 3.85 km breakwater facility with a 19 metre deep port access channel, a third and fourth new berth and the installation of 20 RTG gantry cranes.

The construction of Lekki Deep Sea Port is hoped to energise the Nigerian port sector with much needed revenue and jobs. The multi-purpose facility and its adjacent free trade zone project is strategically positioned 60km east of the business districts of Lagos Island and Victoria Island, and fitted with an optimised layout. On completion, the port will have two container berths stretching 680m long and 16.5 metres in depth, giving the capacity to berth fifth-generation container ships. The project is projected to create 200,000 jobs, many of which are hoped to go to local Lagos residents.

The Port of Abidjan in Ivory Coast is fast becoming a maritime hotspot. According to majority shareholders Bolloré Ports, Abidjan Terminal ended the 2019 export season with an 'outstanding' performance. Waiting times at anchorage were reduced to less than a day, allowing for Ivory Coast farmers to export goods to Europe and Asia in optimum condition. The Vridi Channel expansion allowed access for the largest two vessels in its history.

Facing challenges

Despite considerable investment in infrastructure, ports in the region still face major challenges. Many West African ports continue to be defined by long delays, congestion, the smuggling and dumping of illicit goods and a lack of harmonisation between standards, practises and documentation. Intra-regional trade sits at only around 12% of the region's total annual trade volume, limited by the lack of infrastructure and overly bureaucratic customs procedures.

At the Port of Apapa in Lagos, chronic congestion has become a major problem. Hundreds of vehicles sit in queues stretching back as far as 10km on a daily basis. This sees some cargo waiting weeks to get clearance, which in turn increases the cost for companies to trade with the country. It is hoped that Lekki Deep Sea Port will reduce some of this pressure.

If surrounding port and hinterland infrastructure is not improved, West Africa will remain limited. The region needs to invest in adequate rail and road in order to facilitate greater productivity and trade flow. But infrastructure projects are huge tasks involving dozens of stakeholders with competing interests. And, even though multiple projects are underway, several have either stalled or are stuck in the early stages. The time from a project being announced to final completion is slow and uncertain, and this increases the risk for companies looking to invest.

The security issue

Perhaps an even bigger hurdle than potholed roads and slow moving traffic is the issue of security. A 2019 report by the International Maritime Bureau (IMB) found that 75 seafarers were either taken hostage on board or kidnapped for ransom by November 2019. Of these incidents, 62 occurred in West Africa, and eight of the nine vessels fired upon were in Nigeria. In December alone, 57 seafarers were seized by pirates in the Gulf of Guinea. These stories dominate global discourse on the region.

The struggle with piracy, especially hijacking and kidnapping of crews in the Gulf of Guinea, as well as drugs trafficking, unregulated fishing and toxic waste dumping, is shaping development opportunities in the region. The problems form a complex web of issues. For example, illegal fishing strips away the livelihoods of ordinary fisherman, which in turn pushes them into piracy or work in the informal sector. Although authorities are trying to deal with the issues through the training of specialised personnel and the acquisition of

assets such as helicopters and vessels, progress has been slow and fragmented.

Habib Ibrahim, a member of The Nautical Institute's Younger Members' Council from Nigeria, says: "Security is a big challenge to maritime development in the West African region. The Gulf of Guinea is continually plagued with incidences of piracy, theft and kidnappings. After the Yaoundé Convention, the region set up the Maritime Awareness for Trade in the Gulf of Guinea (MDAT GOG) as a voluntary reporting system to combat and respond to security incidences in the region. This has not had much impact on the increasing criminal activities continually perpetrated in the region. This results in reduced patronage to the region's ports with shipping companies charging high premiums or seeking alternative ports."

Further to this, India has now issued a restriction banning its seafarers from working on ships in the Gulf of Guinea as a response to the increasing number of hijackings in the area, while the shipping line MSC halted its ro-ro service between Le Havre, Antwerp and West Africa in June 2019, citing low freight rates and safety concerns relating to undeclared goods as the cause.

Solving the issue isn't a simple matter either. According to the World Economic Forum, the discovery of offshore hydrocarbons in the Niger Delta in the Gulf of Guinea has not created wealth, but instead poverty, social tension and pollution. Benefactors of oil production have been the central government, oil companies and local elites, while the marginalised have turned to 'petro piracy' which involves stealing crude oil from tankers and pipelines, and then processing this in illegal refineries.

Offshore Client Representative Gordon Foot AFNI, who has experienced piracy in the region himself, says: 'Nigerian waters and those waters that border Nigeria and Cameroon still present risks. To some extent these risks are less in frequency and ferocity than 20 years ago, but nonetheless are equally abhorrent and can have grave consequences. The introduction of the ISPS code and AIS has helped, but the maritime domain awareness, surveillance and control by the West African littoral states still lacks robustness. The by-product being an impact on trading vessels and the challenges of operating in the region, the increase in security assets and infrastructure in the region's offshore energy sector and continued illegal, unreported and unregulated fishing. 🌐



Digital evolution

Ghana is embracing the digital era with the Ghana Trade Hub app which allows importers to check the status of their consignments and pay duties online, as well as a television programme called Eye On Port which promotes transparency in the country's ports by allowing both the general public and customers to engage in live discussion on industry issues with prominent stakeholders.

In Nigeria, digitalisation is helping to boost port efficiency. Freight logistics start-up, Kobo360, connect cargo and truck owners with drivers and companies via their online app. In previous years, drivers have had to travel to ports to physically find trucks. The app allows logistics personnel to schedule and monitor trips online, helping to reduce congestion.

The Nautical Institute's

Professional short courses

Take your career to the next level

The Nautical Institute's short courses are an intensive guide to professional topics that will help ensure your organisation is operating at the highest level. Courses are taught in small groups and take place at locations around the world.

Courses currently available include:

Navigation Assessor

- Improving navigational safety and best practice on board
- A systematic approach to conducting navigation assessments
- Preparing an effective report

24–25 March Cork, Ireland

Improving Performance Through the Human Element

- Understanding human capabilities and limitations
- The ship and its environment
- Cultural and organisational issues

Rethinking Accident Investigation – Towards Prevention and Learning

- Enhancing self-awareness and critical thinking
- Advanced frameworks for investigation and analysis
- Concepts and methods to encourage learning and prevent accidents

23–24 April London, UK
25–26 May Piraeus, Greece

Introduction to Shipping

17 September London, UK

**Special rates available for members of
The Nautical Institute**

**For more information or to book your
place, visit www.nautinst.org/courses**

or email courses@nautinst.org

Onboard Competency Assessment

- Identify if training has been successful
- Organising, administering and carrying out onboard assessment of competence
- Evaluating the process and debriefing

Blockchain for Maritime Decision-makers

- Blockchain fundamentals
- Maritime blockchain applications
- Digital strategy overview

16–17 April Singapore
12–13 May Piraeus, Greece





David Patraiko FNI rounds up the latest news, releases and events affecting the maritime professional throughout the world

Seafarer happiness

➔ The Mission to Seafarers has published the latest issue of its Seafarers Happiness Index (SHI). Key points include improvements in connectivity - but also concern over workloads.

Across all vessel types, the key issues that emerged from the survey responses over the three month period were workload stress caused by changes in regulations, a drop in satisfaction with access to welfare facilities ashore and an increase in racism experienced at sea.

With the introduction of the Global Sulphur Cap, it is not surprising to see a rise in concern among seafarers over changes in workload and responsibilities resulting from the new regulations.

The survey also showed that seafarers are not able to reap the benefits of welfare facilities ashore. The Mission to Seafarers calls for an industry-wide drive to ensure

correct visas are acquired so that seafarers can enjoy the benefits of welfare facilities whilst in ports and terminals.

There has been a slump in happiness concerning interaction with other crew this quarter – coming in at 6.67 out of 10, down from 7.28. Troubling accounts of racism were raised, with reports that victims do not feel they have anywhere to formally complain or ask for support – a concern which mirrors earlier reports of sexism. The industry has a responsibility to recognise these concerns and respond to the calls for an independent complaint line or procedure to support seafarers.

More positively, seafarer's happiness with their ability to keep in contact with loved ones whilst at sea increased this quarter. Data shows that crews who have good quality, low-cost access to the internet and communication with

their families are far happier than those who do not.

While this report shows a drop in satisfaction towards the end of 2019, it should be noted that the festive period – when the data was gathered – is a difficult time for most seafarers who are away from family, which may have contributed to the decline. Regardless of the dip, crews felt that they were seeing an improvement in connectivity.

Industry-wide changes are driving progress in seafarer satisfaction and the impact of further improvements in the industry cannot be underestimated.

To read the full report visit: <https://www.missiontoseafarers.org/>

IMO 2020

➔ Since 1 January 2020, the global upper limit on the sulphur content of ship fuel oil has been reduced to 0.5% from 3.5% under the IMO 2020 regulation. This is significantly reducing the amount of sulphur oxide coming from ships and will have major health and environmental benefits, particularly for those living near ports and coasts.

Data suggests the transition to the 0.50% Sulphur Cap has been relatively smooth. Prices for compliant fuels – very low sulphur fuel oil (VLSFO) and marine gas oil (MGO) – rose quickly initially but now appear to be stabilising. From 20 January, 10 cases of compliant fuel being unavailable had been reported in IMO's Global Integrated Shipping Information System (GISIS) and no specific implementation issues had been received by the IMO Secretariat.

IMO Secretary-General Kitack Lim said: 'I believe it is testimony to the diligence and dedication of IMO, its Member States, the shipping industry, the fuel supply industry and other relevant industries that such a major rule change is being implemented successfully without significant disruption to maritime transport and those that depend on it.'

He added: 'The next important target is fast approaching, when carrying non-compliant fuel oil on board ships becomes prohibited on 1 March 2020. I urge all shipowners, operators and masters to comply with the carriage ban, where applicable, when it comes into effect.'

Cyber code

➔ The International Association for Marine Electronics Companies (CIRM) has published two major documents on cyber risk management:

The *CIRM Cyber Risk Code of Practice for Vendors of Marine Electronic Equipment and Services* and *CIRM Guideline GL-002 – Implementing the CIRM Cyber Risk Code of Practice* were developed over two years by the CIRM

Cyber Risk Working Group and approved by the Technical Steering Committee.

The Code consists of six guiding principles and is intended to be used by vendors of marine electronic equipment and services, including producers of shipboard information technology and operational technology equipment, system integrators, service suppliers and

communications service providers in the marine electronics industry. The Code aims to help vendors to establish their role in the chain of trust, promoting a secure digital maritime environment through cyber security best practice.

Both documents are available on the Publications section of the CIRM website: <http://cirm.org/publications/index.html>

Scrubbers and fire systems

➔ Shipowners looking to retrofit marine exhaust gas cleaning systems as a way of complying with new sulphur emissions rules should verify the capacity of their fixed firefighting systems before undertaking any projects, warns Survitec Fire Solutions.

While amendments to MARPOL Annex VI do not specifically require additional firefighting capability, any increase in machinery space size will require an increase in fire-extinguishing capacity.

Dagfinn Aas, Technical Director at Survitec Fire Solutions, said: 'A scrubber installation often requires extending the engine room in the casing area and when the engine room's volume is increased the capacity of the extinguishing agent – in most cases CO₂ – must also be increased.'

'If a scrubber is installed in a totally separate space, with a bulkhead facing towards the engine room, then there is no need for an additional

firefighting system. In other cases, additional nozzles will have to be connected to the existing pipework covering the scrubber area, or additional CO₂ cylinders may be required. However, we have seen scrubber retrofits that have required completely new firefighting systems. It all depends on the calculations and the CO₂ concentration.'



The Nautical Institute 2020 AGM & International Seminar

Seafarer training in the age of autonomy

Developments in autonomous technology are enhancing safety and operational efficiency – but that brings issues around crew competency and training. Join the NI and high level speakers from across the industry to look at how training needs to change to ensure this technology is used to best advantage.



AGM: 2nd July | Seminar: 2nd & 3rd July | Venue: University of Plymouth

For more details: www.nautinst.org



Reporting back from conferences, seminars and discussions across the maritime world. Join the discussion on LinkedIn, or email editor@nautinst.org

HUMAN-CENTRED DESIGN IN SHIP NAVIGATION

A Nautical Institute focus group aimed to encourage HCD

takeup in the maritime industry

David Patraiko FNI and Viet Dung Vu

➔ Badly designed equipment, confusing processes and design that is not fit for purpose are common problems in the maritime industry. Human-centred design is an approach that seeks to minimise these issues by making sure design decisions are based on explicit knowledge of the tasks being performed, the people who will be doing them and the conditions under which they are working. Design decisions are repeatedly tested and modified in an iterative process to ensure the best possible outcome. The main aim of HCD is to improve system usability, allowing users to perform their tasks with high effectiveness, less effort and high satisfaction.

Projects such as the design and construction of the pure car and truck carrier (PCTC) *Harvest Leader* or the development of NACOS Platinum bridge systems by Wärtsilä have demonstrated the successful outcomes when HCD has been adopted. Nevertheless, HCD practice in the maritime industry remains uncommon and unsystematic compared with similar industries such as aviation or rail.

There are several reasons why take-up of HCD has been so poor in the maritime industry, including:

- Lack of awareness of HCD principles
- The complexity of applying HCD methods and techniques
- Lack of supporting guidelines.

In November last year, The Nautical Institute and the CIRM, which represents [bridge equipment] manufacturers, organised a focus group to look at ways of addressing these issues and encouraging the wider adoption of HCD principles in maritime. Seventy-eight participants representing various industry stakeholders – including designers, equipment manufacturers, researchers and seafarers – worked in multidisciplinary groups to try to come up with ways of promoting HCD in the design of ships and shipboard equipment.

The proposed solutions fell into four categories:

Promoting awareness

Maritime designers tend to be technologically focused, and students of naval architecture are not usually provided with information on human factors and human-centred design.

One proposed solution is to make sure that seafarers and shipping companies – including the end-users themselves – are aware of the

possibilities of HCD and the role that end-users play in the HCD process. This could be done by incorporating human factors knowledge into general training programmes for both seafarers and managers. Training programmes could use, by way of illustration, cases where design issues have resulted in maritime accidents.

Associations of seafarers such as The Nautical Institute should take the initiative to target other stakeholders by reaffirming and amplifying seafarers' requests for usable equipment. Meetings between stakeholders should be held regularly to promote industry-wide awareness of human factors and to promote mutual understanding between users, managers, purchasers and designers.

Regulatory measures

Increased awareness of HCD can be complemented by top-down strategies using regulatory measures to improve HCD practice. The proposed solutions originated from measures in the aviation and rail industries:

HCD has been widely adopted in the railway industry. Regulatory documents require manufacturers to demonstrate that human factors have been properly considered in a system or product. It was proposed that a similar regime should be introduced in the maritime industry, requiring shipyards and equipment manufacturers to demonstrate that human factors aspects have been considered at each stage of design.

The post-manufacturing step in the life-cycle of a product or service – that is, what happens to it once it is in use – is also an important part of the HCD cycle. The Line Operation Safety Audit (LOSA) process used in the aviation industry is one possible model that could be considered. Independent observers would observe the crew at work, paying attention to competency and procedures, but also to any design issues with shipboard equipment that appear to inhibit usability. These issues would be reported to designated organisations, which would bring them to the attention of manufacturers, leading to improvements in the next iteration of the design.

Additional guidance to support HCD practice

The complexity of HCD can be offputting. Providing additional resources to support designers and manufacturers, making it simpler to adopt HCD principles, would be another important step in encouraging uptake.

Databases of user feedback and reported usability issues with existing maritime systems would be a valuable resource for designers. Seafarers would be encouraged to provide

inputs to build up such databases, which would be accessible to all manufacturers. The database would serve as a communication channel between users and equipment manufacturers, providing manufacturers with a better understanding of user needs and the conditions in which their products and services are used. At the same time, manufacturers should be encouraged to share design recommendations with each other, possibly through periodic meetings.

Participants also proposed providing manufacturers with ready-to-use tools to include in their designs. One example is the OpenBridge project, which introduces several 'standard' graphical user interface (GUI) components for navigation systems, such as toggle buttons, control panels, symbols and digits. These components are developed with usability in mind, making use of seafarer input. Manufacturers can adopt these components in their own systems without the needing to conduct extensive (and expensive) research to construct these features from scratch.

A sector-based approach

Despite the proven success of HCD, there is currently no systematic application of HCD in the maritime domain. The large scope and fragmented structure of the maritime industry make it difficult to start any initiative at the industry-wide level.

Given the fragmented structure of the industry, participants proposed not pursuing a large-scale adoption of human-centred design. Participants argued that design, construction, operation and safety requirements differ between ship types and suggested promoting HCD adoption on a sector basis, starting with sectors with higher safety requirements such as passenger cruise.

Viet Dung Vu

Conclusions from NI/CIRM HCD event

The HCD event was a great success and a good platform for bringing together mariners, manufacturers, regulators, trainers and other stakeholders for navigation systems. Following the presentations, round-table exercises and general discussion, a number of goals for the future were concluded on which the NI and CIRM could work together in tandem with the industry.

Awareness of benefits

It was generally agreed that there is a lack of awareness about the process of HCD and the benefits it can bring to the practice of safe navigation. It was resolved that the NI and CIRM should work with key stakeholders to develop some training tools to highlight how HCD can reduce risks and increase effectiveness for mariners and how HCD should be addressed as part of a purchasing strategy.

Reporting of HCD issues

Delegates concluded that, following on from a campaign of awareness, the NI and CIRM should encourage reports from mariners and trainers on those aspects of design that work particularly well and on those that create challenges. Such reports can be assessed and brought to the attention of specific manufacturers, all CIRM members or regulatory bodies, as appropriate.

Network of academic work

The NI and CIRM will consider how best to create a library of maritime HCD literature and academic networks, probably in association with an existing resource such as the Ergonomic Society.

Ship visits

It was universally felt that non-mariner stakeholders such as designers, manufacturers and regulators would benefit from shipboard visits to observe navigation systems in use and to engage with users on issues of design effectiveness and efficiency. Several shipping companies indicated that they might be in a position to offer ship visits, and the NI and CIRM will work together to establish how to best organise such visits.

Future HCD events

Based on the success of the November focus group, delegates indicated that further events of this type would be useful, particularly if all stakeholders were encouraged to participate and the events were designed to optimise co-operation. Activities of this kind require considerable resource, and the NI and CIRM will discuss with interested stakeholders and sponsors how future events can be best managed.

Sponsorship

The NI and CIRM would like to thank Inmarsat for hosting this event at its London headquarters and also the Inmarsat staff who ensured that the event was produced with utmost professionalism.

Any organisations interested in sponsoring future events should contact the NI or CIRM to discuss opportunities.

David Patraiko FNI



mars Mariner's Alerting and Reporting Scheme

Experienced a marine accident or near miss?

Help keep others safe by sharing what you learnt from the incident

CONFIDENTIALITY GUARANTEED

Contact us in confidence at
mars@nautinst.org



SOLASOLV®

Anti-glare, heat rejecting sunscreens for navigation bridge windows

Reject up to 93% of glare to ensure clear visibility for safer navigation

Reduce heat by up to 87% for a more comfortable working environment

Reduce demand on AC systems to save fuel, save money and reduce CO₂

DNV-GL LR ANAB

www.solasolv.com

SOLAR SOLVE MARINE

T: +44 (0) 191 454 8595 info@solasolv.com

BRINGING THE BRIDGE INTO THE 21ST CENTURY

Papers and conclusions from the NI's HCD seminar

➔ In the age of digitalisation and automation, human-machine interaction is more important than ever. The name itself implies that Human Centred Design refers to machines and systems that are specifically designed to be used by human. A straightforward concept; but how does it apply in the real world?

According to the International Standard Organization the main goal of HCD is to improve system usability, allowing users to perform their tasks with high effectiveness, less effort, and high satisfaction. What does that look like in maritime?

Operational challenges

Captain Rajiv Kapoor (Anglo Eastern) presented the results of a survey requesting user feedback on ECDIS. One of the features of ECDIS is that it can serve as an anti-grounding tool by the means of the safety contour setting. However, in situations where the specific safety contour requested is not available, ECDIS defaults to the next deepest contour available. This artificially reduces the amount of safe water on chart; unnecessarily restricting manoeuvrability.

Another example where on board systems hinder the bridge team, rather than supporting them, is the correction of electronic nautical charts (ENCs). It was expected that ECDIS would reduce the workload of the navigation team by providing automatic updates. Instead, limiting temporary and preliminary (T&P) corrections and other important corrections to manual updates only has unintentionally increased the strain on the already over-worked bridge team, and potentially increased the risk of errors in navigation information.

Captain Colin Pratt said that the lack of an industrial standard for ECDIS has introduced extra workload and strain on the pilot side. 'Pilots have the additional challenge of having to familiarise themselves with the bridge equipment and set-up every time they board a different vessel.' In addition, a number of vessels have suffered from badly implemented retrofitting of equipment. In many cases, the ECS display has been installed between the original radar screens, taking up window space intended for lookout.

By contrast, Portable Pilot Units (PPU), featuring local ENCs, guidance notes and perhaps most importantly a familiar data display, are a great example of innovation driven by the need for a better product.

While this session focused on ECDIS, this is far from being the only technology intended to reduce the workload on the bridge team that has brought along its own set of additional challenges.

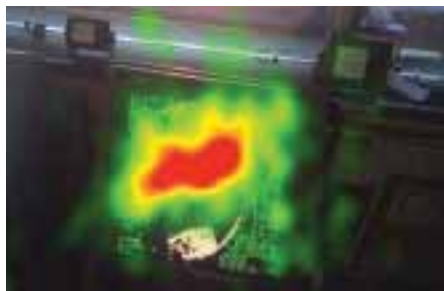
Quantifying the challenges:

In the next session, Professor Seojeong Lee presented results from the user tests conducted by her team for the development of S-Mode guidelines, intended to identify and rectify many of the issues highlighted. The tests were:

Case A: Navigational watchkeeping on a ro-ro ferry sailing between Busan and Osaka. Actions were monitored using eye-tracking software (see image below).

Case B: A 20 minute planned scenario on ship handling simulators, including route monitoring, course change and action to avoid collision.

Case C: 22 set navigational tasks on shiphandling simulators.



The results from test A showed that seafarers spent the most time observing the following areas:

1. Other vessels (49.2%).
2. Radar and ECDIS (44.6%).
3. Outside (of own vessel), VHF radio, Instrument panel (4.1% +0.4% +0.1%). (See table right for detailed results.)

These results were used to inform the scenario and tasks designed for the simulator, each of which had a specific goal in mind.

Tests for Case B were designed to identify specific areas of interest (AOI) on the radar/ECDIS. (See table right). Participants were tasked with crossing the Dover Traffic Separation Scheme (TSS).

Case C was designed to measure the time taken for seafarers to carry out specific tasks under different workloads – while voyage planning, route monitoring and taking action to avoid collision (see table below).

Area of interest (Case B)			Percentage of time spent on area
RADAR	Target Ships	COG	5.4%
		SPD	4.7%
		CPA	5.4%
		TCPA	5.4%
	Own-ship	Heading	5.4%
		Speed	0.8%
		Heading Line	5.4%
	EBL		3.9%
	VRM		2.3%
ECDIS	Own-ship	Position on display	11.6%
		Heading	6.2%
		COG & SOG	2.3%
		Speed	4.7%
	AIS	Ship name, speed	2.3%
		Target ships on display	3.1%
	ARPA	CPA	1.6%
		TCPA	1.6%
	Route info	Route on display	11.6%
		Distance to Waypoint	10.1%
		XTD	1.6%
		GPS position	1.6%
	EBL		1.6%
	VRM		1.6%

	Time taken to complete task (seconds) (Case C)				
	Modify existing route (Delete waypoint)	Fix ship's position using the LOP (line of position)	Modify the time label of ship's position	Changing the CPA alarm limit on ARPA	Use the trial manoeuvring function on RADAR
Voyage Planning	71.9	54.4	62.3	20.3	37.6
Route Monitoring	45.4	101.6	16.5	52	35.8
Collision Avoidance	25.1	77.2	21.7	89.1	98.8

Eye-tracking software was used to track the AOI and time spent on each area. Results showed that there was a considerable discrepancy between time taken to complete the same task under different conditions. The results have been submitted to the IMO Sub-Committee on Navigation, Communications and Search and Rescue (NCSR 6/ INF. 13).

Outcome of experiment:

The outcome of all three tests has been passed to manufacturers of relevant equipment for evaluation. It is hoped this will allow new developments that will reduce equipment familiarisation time.

This test clearly shows that the bridge team's activities and attention are constantly evolving in the face of the constantly changing onboard environment. In an ideal world, technological implementation should also be fluid and easily adaptable to the changing needs of the user, including but not limited to the implementation of S-mode.

HCD- Small efforts for great rewards:

As Dr Vu puts it, the HCD approach stems from "a realisation of the need to fit the equipment to people, not the other way around." Following this school of thought, a relatively minimal amount of effort in designing the technology to fit the human need can dramatically improve the experience of the user. To date, however, bridge design has generally been technically and economically focused. As technologies evolved, the complexity of the equipment has exceeded the human capability to operate it.

Professor Margareta Lützhöft FNI and Dr Erik Styhr Petersen AFNI, suggested the following eight-point checklist for successful implementation of HCD in bridge design:

- Talk and teach your (internal and external) market usability.
- Keep it simple when choosing your usability method: ANY usability activity is better than none!
- Observe your users in their environment to establish their real needs.
- Form a professional, multidisciplinary design team – and teach them about usability (all stake holders).
- Include extensive iterative user testing in your design plan.
- Question design limitations (real or alleged).
- Ensure sufficient resources.
- Avoid complacency.

One example of HCD effectiveness was the re-design of a traditional bridge layout (diagram 1 below).

In a traditional bridge design, placement of helm, navigational equipment, communication equipment etc restricts the view of the bridge team. This results in unnecessary strain on the crew to maintain good lookout and communication.

After actively communicating with and observing the bridge team, the HCD team redesigned the bridge to take into account ergonomic principles such as continuous operation comfort, field of vision, ergonomic reach, equipment usage, operation requirements, etc.

The new design allows for the bridge team to maintain bow facing positions while operating bridge equipment, improving watch keeping while underway (diagram 2).

Freely rotating (lockable) chairs mounted on a horizontal rail in front of the split control panel allow for continuous operation without inducing fatigue.

Last but not least, a split control panel and

careful placement of shelves maintains clear line of sight to the deck.

While this bridge design may not be applicable to any particular vessel, it shows how a relatively small effort (two working days) can have great impact on usability.

What to look forward to in HCD?

Due to the wide array of stake holders, it is difficult to implement an industry-wide adoption of HCD despite success in previous implementations. Summing up, Dr Vu said: "Noting the fragmented structure of the industry, participants proposed not pursuing a large-scale HCD adoption. Participants argued that the design, construction, operation and safety requirements differ between ship types and suggested promoting HCD adoption on a sector-based basis, starting with sectors with higher safety requirements such as passenger cruise."

The Nautical Institute and CIRM will consider how best to create a library of maritime HCD literature and develop academic networks, probably in association with an existing resource such as the Ergonomic Society.

Ericsson Kwan

All presentations from this seminar can be viewed free of charge at <https://www.nautinst.org/resource-library/technical-library/e-nav/human-centered-design.html>

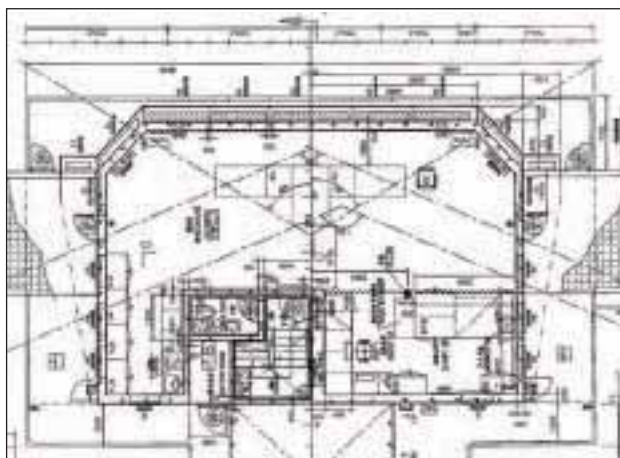


Diagram 1 - traditional bridge layout

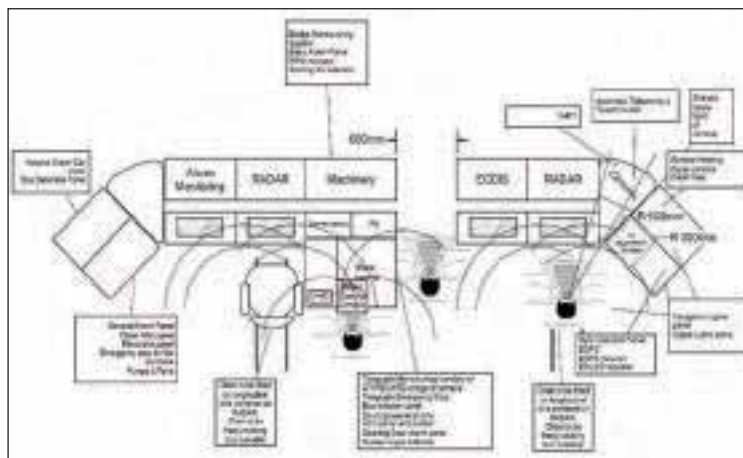


Diagram 2 - layout with HCD input



A round-up of news and events from NI branches across the world.
Send your updates to branches@nautinst.org

BELGIUM BRANCH

Decarbonising the maritime industry

→ The first MARS debate of the 2019/20 working year was held in December at our usual venue of Het Kerkschip, looking at the timely topic of decarbonising shipping. Decarbonisation is high on the agenda of the IMO and the UN in the pursuit of measures to put a brake on global warming.

Nathan De Bruyn, naval architect and Fleet Performance Analyst of CMB Technologies (CMB.TECH) delivered a presentation about the potential of hydrogen (H₂) in shipping's energy transition. CMB.TECH is the innovation and development division of Belgian shipowners CMB Group (Bocimar), focusing on fleet performance monitoring, energy saving and H₂ technology, among other things. In 2019 CMB.TECH acquired Revolve Technologies, a company at the forefront of dual-fuel hydrogen diesel combustion technology.

Hydrogen and the road to decarbonisation

In Nathan's view, hydrogen technologies will play a major role in accomplishing the IMO's decarbonisation goals, even though the exact route to this point is yet to be mapped out.

There are several options that potentially could reduce shipping's carbon footprint, though not all of them are ideal for the specific situation of seagoing vessels:

- Batteries are usually not an option because of high power demand, particularly on larger vessels. Conventional batteries are likely to be too cumbersome and usually there is a lack of recharging facilities.
- Photovoltaic (solar) panels and wind energy (sails, rotors) are unsuitable for certain types of vessel and unlikely to provide enough power to drive vessels unassisted.
- Natural gas (LNG) is viable as a fuel, but the inevitable methane slip (escape to air) means the benefit in terms of GHG reduction is negligible.
- Nuclear power is ideal in terms of cutting GHG emissions but has other inconveniences (expensive, safety/security risks, radioactive waste etc).
- So-called e-fuels using hydrogen as a basis, such as ammonia and methanol.

Following the increase in 'green' electrical power produced through wind turbines and photovoltaic panels, the need to store such energy is increasing as well. It would be more advantageous to use such power in hydrogen electrolyzers than to use batteries – in other words, to store renewable energy as hydrogen molecules (either under pressure or in liquid

form) instead of battery electrons.

There are still some hurdles to overcome before H₂ can be used on a large scale in the shipping industry. Despite the decrease in price, hydrogen remains rather expensive compared with diesel or fuel oil. Availability is another issue. With a global daily liquid hydrogen production capacity of 350 tonnes, of which just 25 tonnes are produced in Europe, there are few options for hydrogen-powered vessels to refuel, particularly those that run on fuel cells, which require very pure hydrogen. Furthermore, very little, if any, practical experience exists in handling this type of equipment afloat, or even ashore. This could lead to problems and delays to the vessel in case of breakdowns or other operating issues.

A gradual transition from low to zero emission technology is the way forward. In this context, CMB.TECH has decided to introduce dual-fuel (hydrogen-diesel) internal combustion engines as a first step towards total decarbonisation. The ultimate goal is an almost zero emission mono-fuel hydrogen combustion engine. Using combustion engines rather than fuel cells has the added advantage that marine engineers are familiar with the operation of such engines. Moreover, combustion engines are considerably cheaper than fuel cells for the same level of power generation and are better adapted to the marine environment, which implies a longer lifespan. Unlike fuel cells, the larger the combustion engine, the more efficiently it performs. They are also less sensitive to impurities in the hydrogen.

A number of engine manufacturers are currently designing H₂-fuelled engines. ABC Engines is working with CMB.TECH (under the name of BeHydro) to develop medium-speed engines with a power output of up to 2.66MW (about 3,570hp), which should be available in both dual-fuel and mono-fuel versions.

Achievements and projects

CMB.TECH's first achievement in H₂ propulsion was the *Hydroville*, a relatively small passenger ferry operating on the River Scheldt (see *Seaways*, October 2018), which won the Port of Antwerp sustainability award in 2018. The ship consumes hydrogen produced as a waste product from other chemical processes. The price is comparable to that of diesel oil.

Current projects include:

- *Hydrocat*, an offshore windpark crew transfer vessel powered by two dual-fuel hydrogen-diesel engines of 1,000hp
- *Hydrobingo*, a coastal ferry with a capacity of up to 80 passengers, scheduled to be launched in Japan in the course of 2020
- *Hydrotug*, a harbour tug powered by a

medium-speed ABC engine, which will be operating in the port of Antwerp by the middle of 2021.

Other projects under consideration include the development of portable power packs in 40ft containers running on either H₂ mono fuel or dual fuel. These could be used as shore power for vessels in port (cold ironing) or to supply reefer containers stowed on deck.

Long term possibilities

Running large vessels such as Capesize bulkers on pure hydrogen, or even dual-fuel, presents a considerable challenge in terms of supply and storage. H₂ requires a large storage volume when in gaseous (compressed) state. Liquid H₂ needs less space but demands a complex chilling system, given that it has a boiling point of -253°C. One solution might be to use a liquid organic hydrogen carrier (LOHC) such as dibenzyltoluene, which can store and release H₂ up to 6.2% of its weight. The liquid can be stored in strengthened bunker tanks but requires no major structural modifications to the vessel. The use of LOHC in combination with a dual-fuel hydrogen-diesel engine appears to be one of the best options available for decarbonisation.

Q&A

Some members of the audience were concerned about the dangers of pressurised hydrogen, which after all is a highly flammable gas. Nathan reassured them that, as with many other flammable gases being carried by ships, the risk is manageable. Despite the high pressure (220 bar) there have been no issues with leakage on board *Hydroville*. All hydrogen storage tanks are protected by a secondary barrier whereby ventilation in the space prevents the build-up of explosive concentrations.

One of the students was interested to know whether similar steps could be taken to reduce GHG emissions in the aviation industry. In practice, this does not seem to be possible in view of the need to install heavy hydrogen storage tanks.

The potential of ammonia as a 'green' alternative to fossil fuels was questioned by a student on the basis of the huge amount of energy needed to produce the gas. Nathan clarified that there are possibilities to produce NH₃ in a more environment-friendly manner, although they can be difficult to achieve.

Walter Vervloessem thanked the speaker and closed the debate, concluding that decarbonisation is inevitable in the shipping industry as elsewhere, even though there is no perfect solution to the problem. As they

progress through their maritime careers, the students attending will no doubt experience how things will develop at first hand.

The bar was open to all following the presentation, allowing discussions to continue over a good NIB₃ beer.

W Justers AFNI and W Vervloesem FNI

As always, the event was organised by the NIBB for the benefit of the students of the Antwerp Maritime Academy. The subjects are invariably chosen by the students themselves, while the NIBB arranges for the most suitable speakers from the industry to deal with the matter. Branch members are invited to attend to enhance networking between members and students.

After his customary introduction of the NI and the benefits of membership to the new students, NIBB chair Walter Vervloesem asked the audience whether this inspired them to become (student) members. Out of a total of around 60 students present, about 10 raised their hands. However, that number more than tripled when Walter suggested that NIBB membership may be helpful to students in finding seagoing experience after completion of their studies.

SOLENT BRANCH

→ Solent Branch members came together on a chilly January evening to attend a presentation on Seafarer Criminalisation in the 21st Century by Therese Canning, covering her PhD research work.

Therese began by explaining the concept of criminalisation. From this, she went on to look at a variety of case studies that form the core of her research. She has been carrying out trend analysis, identifying patterns of penalties and appeals based on locations of incidents, flag states, port states and the demographics of involved parties. She has developed a seafarer-centric stakeholder model specifically for this analysis.

Therese is also working on a cross-industry comparison, particularly looking at the professional status of doctors and the medical profession compared with that of a Master aboard ship.

An interesting evening was brought to a conclusion by an engaged audience, who were afforded the opportunity both to question Therese on her work and to contribute informed opinion and thought-provoking debate.

The Members of the Solent Branch thank Therese for her presentation and wish her well with her continuing research programme.

Donald Donaldson AFNI



HELLENIC BRANCH

Professional development

→ The Hellenic Branch organised a workshop on 'Professional Development in the Marine Technology Era – A Holistic Approach'. Although the event was held at the Athens War Museum, this was very much an event by and for the merchant navy.

The main focus of the conference was the conviction that nautical education and vocational training in Greece should be both formally upgraded and substantially expanded. The ever-increasing specialisation needed from seafarers makes this upgrade imperative. Greece is one of the few exceptions in the world where studying at Merchant Marine Academies does not amount to a Level 6 qualification – that is, the equivalent of a degree. To this end,

the Hellenic Branch has conducted quantitative and qualitative research, the results of which will be announced shortly. A short presentation on this research was given by Branch Secretary Dr Emm. Nicolaides.

Steven Schootbrugge, CEO of Chartworld International, outlined the technological developments that are expected to shape the business environment of commercial shipping in the coming years.

The conference also featured presentations on vocational training by Ms P Lyrantzis of K C Lyrantzis Group, as well as views on the impact of soft skills on the organisational and learning culture of seafarers by Spyros Kottoris and Chrysoula Patrikiou of Potentia.

The workshop was attended by The Nautical Institute's Training & Accreditation Development Manager, Capt Maneesh Varma AFNI. Maneesh emphasised the need for ongoing specialisation. George Xiradakis XRTC Ltd also addressed the need for further training.

The event was opened and summed up by Capt N Aslanis AFNI, Hon. Chairman of the Hellenic Branch. Presentations were followed by a cocktail and a chance to continue discussions, thanks to our main event sponsor Chartworld International.



SOUTH WEST OF ENGLAND BRANCH

Cleaning up the Great Pacific Garbage Patch

→ Gordon Foot AFNI spoke to our January meeting about his time as client's representative with the charity The Ocean Cleanup on board the offshore supply vessel (OSV) *Maersk Transporter*, operated by Maersk Supply Services. The vessel was taking part in a mission to capture and remove plastic debris from what has become known as the Great Pacific Garbage Patch.

Gordon went to sea at the age of 17 with the Royal Navy, where he became a submariner with specific expertise in navigation and underwater weapons engineering management. On leaving the Royal Navy, he became a consultant, working in the sectors of offshore oil and gas, renewables and environmental projects. His tasks took him from the Ascension Islands to the Aleutian Islands and many continents in between. He is currently working as a consultant with Atlas Professionals.

Gordon's role with The Ocean Cleanup took him well away from his background in the energy supply sector. The charity was founded in 2013 by 16 year old Dutch entrepreneur Boyan Slat. His vision was to rid the world of plastics in the ocean. Today the organisation, which is located in Rotterdam, develops and deploys advanced technologies to capture and retrieve waste plastic found in the world's oceans.

The operational strategy of 'The Ocean Cleanup' can be summed up as:

- Capture;
- Retention;
- Retrieval;
- Recycle.

The ideal system is one which is totally sustainable, so recycling forms an important part of the overall project. Part of The Ocean Cleanup project concerns the evaluation of the different types of plastic recovered and which can be offered for reuse through recycling.

The first task of The Ocean Cleanup was to undertake a feasibility study on how to reduce the amount of plastics in the ocean. The study was followed by a crowdfunding campaign that raised \$2.2 million, providing the finance to undertake the first ocean clean up in 2015.

Gordon was involved in the project to clean up the 'Great Pacific Garbage Patch', a gyre of marine debris in the North Pacific Ocean. The debris is essentially plastic matter originating from countries of the Pacific Rim. The process and understanding of how the gyre is formed and its visibility is more complex than is often stated in the press. For example, plastic can often float at depth (up to six metres), only rising to the surface as the result of the calm after turbulent weather.

Plastic is a little easier to retrieve when larger pieces of it are concentrated in contaminated areas. Once broken down by wave action, the retrieval of plastic debris is more difficult. Wave action and duration in the water creates microplastics which are more difficult to retrieve and can enter the food chain.

The clean up operation was achieved using a purpose designed support frame and mesh on the surface, assisted by the OSV *Maersk Launcher*. Plastic garbage was retained and captured in the net, then lifted on board the vessel by crane. Once on board, the plastic garbage was cleaned and sorted by size and type. At the time the project represented the 'largest clean up of the ocean in history'.

An aerial survey in 2016 aimed to determine the different forms of plastic debris in the ocean over a wide area. It was noted that the amount of plastic debris at the edge of the gyre was similar to that expected in the centre. In the same year a prototype 200-metre supported mesh, designed to be more effective in capturing and retaining plastic debris, was deployed in the North Sea before the 2018 expedition to the Pacific.

In 2019 a capture system known as 001/B was built and deployed in the Pacific Ocean. During the deployment a 'ghost' net – that is, an abandoned fishing net – was recovered every second day. Ghost nets present a hazard to marine life as well as to vessels transiting the area.

As well as cleaning the oceans, there is an urgent need to clean up rivers, and to provide education to riverine populations to prevent further pollution. The Ocean Cleanup has recognised that 80% of plastic pollution in the oceans is caused by the outflow of plastic debris

from 1,000 of the world's rivers. Efforts to stop pollution of the ocean could be substantially aided by ensuring plastic debris does not enter a river system, or if it does it is removed before it reaches the oceans.

Ocean Cleanup's first specialised river technology, Interceptor, was unveiled in 2019. At present, two Interceptors are in use, in Malaysia on the Klang River and in Jakarta, Indonesia. It is anticipated that more technology of a similar type will be built and deployed in collaboration with governments and other operators. The Interceptors will substantially reduce the quantity of plastic entering the oceans – currently estimated at between 0.8 million and 2.7 million tonnes per year.

The plastic pollution of the rivers and oceans of the world can ultimately be prevented through educating the world's citizens to recognise the impact of plastic on marine life, ocean cleanliness and the food chain itself.

Gordon said he felt 'very privileged to have been given such an opportunity – it was the cream on the cake of a lifetime at sea'.

For further information about 'The Ocean Cleanup' please go to <https://theoceancleanup.com/about/>

Paul G Wright MNM FNI

In January 2020 a new syllabus known as the Ocean Curriculum was launched at the National Marine Aquarium, Plymouth. The curriculum will be followed by five junior schools involving 2,500 children, belonging to the 'Connect Multi Academy Trust' of Plymouth. It is intended that the new lesson plan will be in place by September. The Trust is working with the Ocean Conservation Trust, the Marine Biological Association, Plymouth Marine Laboratories and the National Marine Aquarium. Volunteers who have specific knowledge of the marine environment are needed to help the development of the project. It is hoped that the local initiative will roll forward and be taken up by other schools.



Maersk Transporter
© The Ocean Cleanup



Horseshoe shaped support frame for capturing plastics
© The Ocean Cleanup



System 001/B in the Great Pacific Garbage Patch
© The Ocean Cleanup



Crew sorting plastic into size and type classes onboard the support vessel during the System 001/B mission
© The Ocean Cleanup



Letters

JOIN THE CONVERSATION

Send your views and opinions to us at editor@nautinst.org, write to us at **202 Lambeth Road, London SE1 7LQ, UK** or become part of our online community:



www.linkedin.com/groups/Nautical-Institute-1107227

www.twitter.com/NauticalInst

www.facebook.com/thenauticalinstitute

www.youtube.com/TheNauticalInstitute



Responsibility and duty of care

➔ Masters will sometimes hear pilots declare that they have a higher calling than just the vessel in relation to a duty of care towards ports and third parties while at the same time serving the public interest. The expression of such views by pilots can have a deleterious effect on the Master/pilot relationship. It is therefore imperative that we all understand both the origin and the facts surrounding such views.

These views have their origin in a 19th-century case where a judge was trying to illuminate the differences between voluntary and compulsory pilotage.

The judge pointed out that under voluntary pilotage the pilot primarily has a responsibility towards the vessel but that under compulsory pilotage has additional responsibilities. The point here is that otherwise

there would be no purpose to compulsory pilotage.

With this in mind the following points are relevant:

i) It is a common law principle that each individual has a duty of care towards other individuals as well as property within society, in relation to a given individual's actions or lack thereof (in countries without common law such principles have been developed by statute).

ii) A duty of care and the law generally are in place to serve the public interest. As such, a duty of care and the public interest are not responsibilities peculiar to pilots.

iii) The judge did not say, in relation to a duty of care, that under compulsory pilotage a pilot has no responsibility towards the vessel being piloted, nor that under voluntary pilotage a pilot does not have a responsibility towards third parties.

iv) These views are addressed in part by the UK Pilotage Act 1987 Sect. 121 Pilot Misdemeanours: 'negligent navigation', and legislation of the same ilk. It should be noted, however, that pilot negligence is not a statutory offence in all countries.

v) As many pilotage services are now private organisations and the pilot is acting as a contractor to the vessel, it is considered that the pilot has responsibilities and obligations towards the vessel under contract law.

vi) The Master of a vessel has the same duties of care as a pilot, with much enshrined in legislation. One only has to look at the increased criminalisation of the Master, particularly in relation to oil pollution.

vii) The judge may well have considered 'other responsibilities' as including the responsibility to contribute to the safety and efficiency of port operations.

viii) The Master as an employee and representative of the owner has an obligation to uphold the reputation of the owner. As such the Master must consider the public interest, therein serving the public interest by default.

ix) Responsibilities to third parties are those of the Master, as the vessel is held liable in rem.

There is a view that the marine pilot occupies a similar position to an airport control tower. While there are superficial similarities, comparisons between the maritime and aviation industries are inappropriate, given the at least 2,000-year difference in legislative history. It is perhaps more appropriate to view the harbour master – being in charge of the direction of vessels within the port – not the marine pilot, as the equivalent of a control tower.

Captain Mike Ashby
Member no 1722017

Onboard communication

➔ I have been teaching my students, mainly cadets, the correct sequence for giving helm and telegraph orders, that is:

- Command
- Acknowledgement by command recipient (repeat command verbatim)
- Take action
- Report action taken
- Acknowledgement by person giving command (repeat report verbatim)
- Result of action is reported by person taking action
- Acknowledgement by person giving command.

I insist on this procedure being followed during my sessions on the simulator. This procedure permits detection and correction of any mistake in giving, receiving or executing commands.

Unfortunately, I find that ships' officers tend to take short cuts by using expressions like 'Roger that' or just 'Roger'. Young cadets get wrong role models on board when they start sailing.

It is up to us, the teachers, to inculcate correct command/execution culture among our young mariners.

Capt Vinode K Mohindra FNI

Criminalisation of seafarers

➔ The examples raised in Captain Kapoor's article on the criminalisation of seafarers (*Seaways*, February 2020) are, in a word, horrific. Seafarers are right to be concerned about this worrying mistreatment, but there has been little offered with regard to a way forward.

Flag and coastal states can be under immense political pressure to hold someone responsible when people are killed or pollution occurs as a result of the operation of a ship. Administrations need to investigate such incidents thoroughly and then weigh up what to do next based on the facts of the case and the compliance tools available to them.

Decisions need to be fair,

consistent and transparent and the best way to do this is through the application of a published compliance intervention strategy, with multiple decision factors used to weigh up the appropriate response on the established facts of the case. Several administrations are doing this, but a standardised approach is needed to give seafarers confidence that they will be treated fairly.

Maritime administrations and operators alike would do well to read up on the research of John Braithwaite on effective regulation and start the conversation on how to make regulation work and avoid the mistreatment of seafarers in the criminal justice system.

Nick Dowden

MASS and the human element

➔ At a quick look, one would feel water transport has some way to go to catch up with other modes when it comes to autonomous technology. But there is no doubt that autonomous ships will be a reality in the coming future. Already, there are rockets shooting into the sky, trains running on tracks, cranes lifting up goods, etc which are all operated elsewhere.

Shipping isn't completely new to this 'elsewhere' concept. Much of the equipment on the navigation bridge and other machinery, including the main engine of the ship, is being operated automatically and remotely – but when it comes to remotely operating ships without humans from shore based stations, this certainly is new.

So are there going to be ships controlled from elsewhere in the future? Yes. Ships at sea but operated from land sounds weird but interesting. The aim of autonomous ships is to make shipping more efficient and safer with fewer human errors and less human machine interface by automating most of the functions. At the core of an autonomous ship will be automation and artificial intelligence, with major control provided from shore based ground stations and little to no human control on board.

Who will operate those ships, and whether there will be humans on the ship at all are questions that need to be looked into. Humans

may find no space on board ships, but they will be required for various land based operations. People will require a different set of skills to operate these ground stations to the seafarers of today, with different functions, and the manpower industry needs to gear up for the paradigm shift.

Software development is going to be the foremost skill that must be acquired, given the need to develop software that links ship and shore. But with this increased dependency on software, troubleshooting will be another skill set required upfront. Continuously updated software will demand continuously updated training to ensure employees keep pace.

Manufacturing the new set of hardware will require people trained in the latest technologies and electronics as they are developed. Even hardware developers will require knowledge of artificial intelligence and robotics.

Block chain technology will certainly be used considering the different stations (nodes) and the integrity of data that needs to be exchanged between stations.

The humans manning the ground station should have a thorough knowledge of the equipment both on the ground station and on board ship. Learning about Colregs and its application will continue to be important in case of collision

avoidance situations which require human interface from ashore. Certain aspects of navigation skills will be required to keep the vessel on track to the destination, although track monitoring will be managed through ECDIS and auto pilot.

Shiphandling skills for vessel berthing and unberthing will be another skill required by the shore station. Again, this will be a completely automatic operation, but human interface may be required.

There will be a shift in decision making from ship to shore based on data received from ships. This will require data analysing and interpretation skills.

Communication will still play a major role but there will be a shift in emphasis from human to human communication to human to machine communication.

Weather plays a major role in efficient ship operations. Learning about different weather patterns and their impact on automated navigation will be an added skill set.

The shipping industry, mainly the universities, needs to gear up with a new syllabus to meet the new requirements for humans working on ground stations and operating ships at sea. We need to start looking at those competencies in the right way so that the human element is geared up to meet technological advances.

Many other skills and characteristics currently possessed by humans will go out of the window. A new skill set will be required to operate autonomous equipment remotely, but the human element in itself cannot be eliminated, as humans will continue to play a significant role in the safe operation of ships.

Capt Vinod Naveen AFNI
Associate Professor – Indian
Maritime University

Relative positioning

➔ I read Richard Leedham's article 'Position fixing or position verification' (*Seaways*, Dec 19) with great interest and have some observations:

1) My ship's owners announced their intention to remove paper charts with about 18 months notice of execution. In that time I made a concerted effort to come to grips with the means to plot manual lines of position on our ECDIS system. Over time and working with

several junior officers with strong skills in the ship's ECDIS system, I determined that plotting manual lines of position in a reasonable time frame on the ECDIS was impractical. Without paper charts I therefore had no means to fix the ship's position. The best we could do was, as Mr Leedham suggests, to observe beam lines of position (LOPs).

2) I suppose verification by use of radar parallel indexing and/or clearing ranges serves on a rocky

coast like the British Isles, but it is impractical in those parts of the world that don't stand quite so proud. I don't know how mariners found their way to the channels of Mumbai or the other vast coastal plains ports in the world before GPS. (Well, actually, I do: radio bearing and sun line did get us to Jeddah, Saudi Arabia, on one voyage. Not an option today!)

3) Mr Leedham concludes his article with 'If positions are not considered sufficiently coincident,

it will be necessary to carry out manual plots by other means...' I would welcome suggestions as to how to achieve this where paper charts are no longer found on board!

Captain Kevin Coulombe MNI
USA

➔ Representing The Nautical Institute to the maritime industry and beyond

DP conference

Members of the NI HQ attended the European Dynamic Positioning Conference 2020 at the Novotel London West in Hammersmith. The Nautical Institute took the opportunity to launch the *DP Operator's Handbook: Third Edition* by Captain David Bray FNI.



Excellence awards

Bridget Hogan, Director of Publishing and Membership, (left) attended the AMBA & BGA Excellence Awards and Gala Dinner where Monika Lemajic, Project Manager at Thales Maritime in Sydney was shortlisted for the MBA student of the year award. Monika studied for a shipping and logistics MBA, also known as the Blue MBA, at the Copenhagen Business School.



Fellowship award

Captain Yves Vandenberghe FNI, Director of Loss Prevention at The Standard Club and Chairman of the NI's Singapore branch (left) was presented with his fellowship certificate by Chief Executive Captain John Lloyd FNI at The Nautical Institute HQ in London. Congratulations!



Bridget also addressed an audience at IMO on the benefits of professional association membership. The gathering, organised by the IMO, coincided with the signing of an MoU between the IMO and WISTA International, the Women's International Shipping & Trading Association. Some 80 representatives of staff and delegates from the IMO attended.



Sea pie supper

Captain John Lloyd FNI attended the Sea Pie Supper of the Cachalots at St Mary's Stadium in Southampton alongside representatives from the Honourable Company of Master Mariners (HCMM) and Trinity House.



BOOK OF THE MONTH:

Navigation Accidents and Their Causes

Navigation Accidents and Their Causes looks at major casualties to illustrate the lessons that can be learned from them and sets out practical ways for those on the bridge to consider risks, plan for them and then take action to avoid them.

"This timely publication from The Nautical Institute should provide a crucial guide for every mariner serving at sea and serve to assist in reducing collisions and groundings." – Mr Koji Sekimizu, former Secretary-General IMO



Order from: pubs.admin@nautinst.org by the end of March

Welcome to our new members

The Nominations Committee has nominated the following for election by Council:

Associate Fellow

Chaudhary, Y Mr/Marine Superintendent (Singapore)
Hasan, M M Captain/Manager (Bangladesh (Dhaka))
Hossain, M M Captain/Nautical Instructor (Bangladesh (Dhaka))
Hossain, M M Captain/Senior Superintendent (Singapore)
Hyde, A Ms/Master (Ireland)
Iliopoulos, V Mr/Captain (Greece)
Ivanov, S G Mr/Captain (UK/London)
Jaamour, A Captain/Safety Consultant (UK/Central Scotland)
Mallon, C P Mr/Captain (UK/Central Scotland)
Nath, A Captain/Incident Investigator (India (North))
Rainio, I H Mr/Ice Navigator (Finland)
Sen, S Captain/Manager & Principal Surveyor (India (North))
Siddique, M A R Captain/Port Captain (Bangladesh (Chittagong))
Somerville, C T Captain/Mariner (UK/North Scotland)
Stage, J Mr/Superintendent (UK/Solent)
Su Win, T Captain/Master (Malaysia)
Tanwar, R Captain/Master (India (North))

Upgrade to Associate Fellow

Anderson, I H Mr/Master (Australia - QLD)
Bhuiyan, I H Captain/Manager (UK/North Scotland)

Cuk, T Mr/Master/ SDPO (Croatia)
Davidson, P W R Mr/Consultant/ Manager (UK/Bristol Channel)
Dikshit, N V Mr/Master (India (West))
Gardezi, H H Captain/Senior Pilot (UAE)
Holt, A Mr/Captain (UK/North Scotland)
Louch, A R Mr/HSE Manager (UK/Solent)
Westerlund, M Captain/Captain (Finland)
Zaid, M Captain/Master (Maldives)

Member

Abubakari, I A Mr/Engineer (Ghana)
Adeoye, A A Captain/Master (Nigeria)
Al Falasi, S Captain/Director (UK/London)
Arrindell, R S Mr/Managing Director (Trinidad & Tobago)
Ayres, A J C Mr/Manning & Training Coordinator (UK/London)
Bartkowiak, M J Mr/Chief Officer / SDPO (Poland)
Benson, E Miss/3rd Officer (UK/London)
Bin Mohamed Noor, A A Mr/Chief Officer/DPO (Malaysia)
Blair, L D Mr/2nd Officer (Ireland)
Braga, I B Mr/Master (Philippines)
Chronopoulos, F Captain/ Superintendent (Greece)
Clarke, H Mr/Second Officer (UK/London)
Davies, C W Mr/3rd Officer Deck (UK/Bristol Channel)

Deegan, M R Mr/3rd Officer (New Zealand)
Donchenko, K Mr/Master (Ukraine)
Eager, G A Captain/Captain / OIM (Ireland)
Edwards, K A Mr/2nd Mate/DPO (Trinidad & Tobago)
El Shobokshy, M K Captain/Chief Officer (Egypt)
Erdyneev, E A Captain/Captain (Russia (St Petersburg))
Espinoza, L R Miss/2nd Officer (Trinidad & Tobago)
Jakhmola, S Captain/HSEQ Manager (Singapore)
Kennedy, T Mr/Deputy Manager (Can/British Columbia)
Kusuma, H Mr/Master (Indonesia)
Larkin, P Captain/Master (Ireland)
Limlaya, J R B Mr/DPO (Philippines)
Magro, R Mr (Malta)
Paneer Selvam, S Captain/Assistant superintendent (Singapore)
Parveen, K Ms/Executive Director (Bangladesh (Chittagong))
Pichevskyi, V Mr/Chief Officer / SDPO (Ukraine)
Pierre, N Mr/2nd Officer (Belgium)
Re Ferreira Correia, L M M Mr/ Bridge Officer (Iberia)
Rekart, G A Captain/Master (US West Coast)
Riccardi, D Mr/1st Officer (US North East Coast)
Rosidi, M F B Mr/2nd Officer (Malaysia)
Ruhullah, T A Mr/Director (Bangladesh (Dhaka))

Sanzini, N Mr/2nd Mate (Iberia)
Smith, S J Mr/Chief Officer (UK/NW England & N Wales)
Sorenes, T Mr/Oil Installation Manager (Norway)
Stashevskyi, V L Mr/Seafarer (Ukraine)
Taylor, S Mr/Director (UK/Humber)
Tomczyk, M H Mr/Captain (Poland)
Valevetil, G K S Mr/2nd Officer (UAE)
Vaniotis, A Captain/Manager (Greece)
Vishwakarma, M K K Mr/Chief Officer (India (West))
Waage, J M Mr/Control Room Operator (Norway)
Zin Thant, K Mr/Chief Officer (Singapore)

Associate Member

Attard, C J Mr/Deck Cadet (Malta)
Bendall, A E Mr/Cadet (UK/Shetland Islands)
Boyce, R Mr/Deck Cadet (UK/Humber)
Cox-Palmer-White, F C D Mr/Deck Cadet (UK/London)
Kolodziej, M A Miss/Administrator (UK/London)

*Signifies members who have rejoined

Branch Secretaries and development contacts

AUSTRALIA

Queensland

www.niaqld.net
Capt Richard Johnson MNI
Tel: (+61) 419 600 261
rich_tiss@bigpond.com

SE Australia

www.nisea.org
Kendall Carter FNI
Tel: +61 458 310 803
sec@nisea.org

SE Australia (NSW)

SE Australia – NSW
Patrick Walsh AFNI
Tel: +61 437 681 277
pawalshe@hotmail.com

SE Australia (ACT)

Captain Joshua Smith MNI
Tel: +61 427 332 690
joshua.smith@amsa.gov.au

Southern Australia

www.nisea.org
Captain Robin Bourne FNI
Tel: +61 438 591 420
themastermariner@mac.com

Southern Australia – VIC

Captain Robin Bourne FNI
Tel: +61 438 591 420
themastermariner@mac.com

Southern Australia – SA

Captain Nada Ganesan MNI
Tel: +61 392 541 631
carmarine@bigpond.com

Southern Australia – TAS

Captain Peter Martin FNI
Tel: +61 408 077 522
pinch@bigpond.com

Western Australia

Zubin Bhada, AFNI
Tel: +61 8 9348 5837
Mobile: +61 0 408 165 306
zubin.bhada@woodside.com.au

BALTIC STATES

Capt. Boris Dunaevsky FNI
Tel: +372 56 12 27 57 (Mobile)
chairmanbsmsa@gmail.com

BANGLADESH

Chittagong

Capt. Sheikh Md. Jalal Uddin Gazi, AFNI
Mobile : +880 1713 450252
nautinst.chittagong@gmail.com

Dhaka

Capt Anisur Rahman Khan, AFNI, MICS
Mobile : +880 1727 618242
nautinst.dhaka@gmail.com

BELGIUM

www.nautinst.org/belgium
Mr Frans Doomen MNI
info@nibb.be

BRAZIL

Capt. Vinicius Madruga Santos, FNI
Tel: +55 11 3515-5873
Mob: +55 11 964650066
madruga@flumar.com.br

BULGARIA

Capt. Andriyan Evtimov, FNI
Tel: 359 52 631 464 (o)
aevtimov@abv.bg

CANADA

British Columbia

nibcbranch.ca
Ryan Andresen MNI
ahoynibc@gmail.com

Maritime Provinces

Capt. Alan Knight FNI
knighta@eastlink.ca

CHINA

Hong Kong SAR

www.nautinsthk.com
Capt Aalok Sharma, AFNI
Mobile : +852-6130 1377
secretary@nautinsthk.com

Shanghai

Sandy Lin, MNI
Tel: 86 21 68868389
sandylin@fcaremarine.com.cn

CROATIA

Mrs Zaloe Sanchez Varela MNI
nauticalinstitute.croatia@gmail.com

CYPRUS

<http://www.nautinst-cyprus.org>
secretary@nautinst-cyprus.org

DENMARK

Capt Peter Rasmussen AFNI
Tel: +45 44 366851
plr@bimco.org

EGYPT

Capt Eslam Zeid, AFNI
Tel: +201288850654
eslamzeid@gmail.com

FRANCE

Capt Guillaume Bourgeois de Boynes MNI
Tel: +33 (0)2 3292 9175 (o)
guillaume.deboynes@helvetia.fr

GEORGIA

Capt Mamuka Akhaladze AFNI
Tel: +995 555 965050
Mob: +995 577 221677
m.akhaldaze@gmail.com

GERMANY

www.linkedin.com/groups?gid=3451665?
Jens Hansen MNI
Tel: +49 40 334 282 76
nautinst.germany@googlegmail.com

GHANA

Capt William Amanhyia, AFNI
Tel: 233 2 4406 2438
w_amanhyia@msn.com

GREECE (HELLENIC)

Capt. Nikos Aslanis AFNI
Tel: +30 6944 370 023
hellenic.branch@nautinst.org

IBERIA

Capt. Mark Bull FNI
Tel: +350 5404 6600 (Mob)
lberia.branch@nautinst.org

INDIA

North (New Delhi)

Capt Pawan K. Mittal, MNI
Mobile 91 98 1016 0883
Tel/Fax: 91 11 2508 6500
pkmittal@ariworld.com

North West (Chandigarh)

Capt P Ahluwalia MNI
cdgnauticalinst@gmail.com

South (Chennai)

Capt Y D Misra MNI
Tel: 91 98401 15064 (Mob)
mail@nisi.org.in

South West (Kochi)

Capt Vinod Naveen AFNI
nauticalinstituteindiasw@gmail.com

West (Mumbai)

Capt. Amol Deshmukh MNI
Tel: +91-98331 22343 (mob)
ad@amoladeshmukh.net

INDONESIA

Captain Akhmad Subaidi AFNI
Tel: +62 24 7628676 (H)
Tel: +62 21 30050000 (Ext 204)(O)
capt.akhmad@gmail.com

IRELAND

www.linkedin.com/pub/nauticalinstitute-ireland-branch/29/953/561
Capt Steve Malone AFNI
Mobile: +353 86 2297127
nautinst.ireland@gmail.com

ITALY

North

Tiziano Menconi MNI
Tel: +39 3397540138
menconitiziano@gmail.com

South

Capt Modestino Manfredi AFNI
Tel: +39 339 1291042 (Mobile)
dariomanfredi@libero.it

JAPAN

Prof. Masao Furusho, MNI
Tel: 81 78 431 6246
Mobile 81 90 5362 2858
furusho@maritime.kobe-u.ac.jp

MALAYSIA

Dr. Capt. Manivannan Subramaniam FNI
Tel: + (60)-012 3582 485
(60)-06- 388 2280
manivannan@alam.edu.my

MALDIVES

Capt. Adhil Rasheed MSC MNI
Tel: + 960 331 2014
Fax: + 960 331 2015
Mob: + 960 999 8700
arasheed@mamaldives.edu.mv

MALTA

Mr. Brendon Paul Cassar Saguna
Tel: +356 7933 0820
nauticalinstitute.mt@gmail.com

MEXICO

Capt. Ricardo E. Jiménez AFNI
Office: + 52 55 75 868274
Mob: +52 1 55 4712 8244
Ricardo.Jimenez@bs-shipmanagement.com

MYANMAR

Capt Ba Nyan MNI
Tel: 95 9 511 0982 (Mobile)
banyan@kcksrps.com

MONTENEGRO

Capt. Boro Lucic, AFNI
Tel: +382 (0)69 597 766 (Viber)
+382 (0)68 068 766
boro.lucic@gmail.com

NETHERLANDS

www.nautinst.nl
Netherlands.branch@nautinst.org

NEW ZEALAND

Capt. Kees Buckens, FNI
Tel: +64 9 579 4429
nznisec@extra.co.nz

NIGERIA

Capt. Jerome Angyunwe AFNI
Tel: 234 1896 9401
Mobile 234 80 2831 6537
Jerome107@hotmail.com

NORWAY

Mr Viet Dung Vu MNI
Tel: +4798545022
dvv@hvl.no

PAKISTAN

Capt. S M A Mahmoodi, FNI
Tel: 92 21 285 8050-3 (o)
mahmoodi@mintship.com

PANAMA

Nitzeira Watson AFNI
zeira_11@hotmail.com

PHILIPPINES

Angelica Baylon AFNI
Tel: 63472373355
ambaylon_maap11@yahoo.com

POLAND

Capt. Adam Weintrit, FNI
Tel: +48 6 0410 8017
weintrit@am.gdynia.pl

QATAR

Capt. Joe Coutinho, FNI
Tel: +974 4315 792
Mobile +974 5537 293
coutinho@qship.com

ROMANIA

Capt. Cristian E. Ciortan, AFNI
Mobile: +40 722 393 464
ceciortan@me.com

RUSSIA

St. Petersburg
Captain Alexandr B Nosko MNI
Tel: +7 812 3859933
Mobile +7 911 9224151
abnosko@gmail.com
a.nosko@scf-group.ru

SINGAPORE

www.nautinst.org/singapore
Capt Ken Ellam AFNI
Tel: +65 9879 8606
singapore.branch@nautinst.org

SOUTHERN AFRICA

www.nautinst.co.za
Ms Yvette de Klerk AMNI
Tel: +27 84 482 4444
Yvettedeklerk@icloud.com

SOUTH KOREA

Capt Chason Kang AFNI
Chasonk@nate.com

SRI LANKA

Capt Nish Wijayakulathilaka, FNI
Mob: +94773034142
wijayakulathilaka@gmail.com

SURINAME

Mr Ruurdt Jukema MNI
Tel: +597- 485594
Mob: +597-869 3876
ruurdt.jukema@firstmeridian.nl

SWEDEN

www.nautinst.org/swe-den
Capt Helle Andsbjerg AFNI
helle@captainhelle.com

TRINIDAD & TOBAGO

Yusuf Buckmire AMNI
Tel: +18687699429
yubuck14@gmail.com

TURKEY

Capt. Mehmet Albayrak, MNI
Tel: +90 216 474 6793
alia@topazmarine.com

UAE

www.niuae.ae
Capt Sirpreet Kahlon AFNI
nauticalinstitute.uae@gmail.com

UKRAINE

www.nautinst.com.ua
Professor Vladimir Torskiy, FNI
Tel/Fax: +38 (048) 733-48-36
Mobile: +38 (050) 390-12-87
torskiy@te.net.ua

U.S.A.

Gulf – Florida

Capt Ken Wahl MNI
Tel: 727 580-4576 (Mob)
kwahl@seaschool.com

Gulf – Houston

Fr Sinclair Oubre AFNI
Tel: 409 749 0171 (Mob)
nigulfbranch@gmail.com

North East US Coast

Capt Craig Dalton AFNI
Tel: 508-830-5000
cdalton@maritime.edu

West Coast

Dr Colin Dewey AFNI
Tel: 707-654-1065
uswestcoast.branch@nautinst.org

UNITED KINGDOM

Bristol Channel

Capt John Rudd, AFNI
Tel: 01179 772173
Mobile 07976 611547
johnrudduk@hotmail.com

Central Scotland

<http://nacentralscotland.org.uk>
Capt Andy O'Brian AFNI
Mobile 07833671427
Secretary@nacentralscotland.org.uk

Humber

Capt Jamie Simpson AFNI
j.simpson@master-mariner.co.uk
London

www.nautinst.org/uk-london
Andrew Bell FNI
Tel: 07785586317
Andrew.Bell@shlegal.com

North East England

Mr David Byrne FNI
Tel: +44 (0)191 285 2013
Mob: +44 (0)7703 49 00 63
david.byrne@flag-c.com

North of Scotland

John Reid AFNI
northofscotland@yahoo.co.uk

NW England and N Wales

www.ninw.org.uk
Mr Derek Gallagher MNI
Tel: 07477535255 (Mob)
sec@ninw.org.uk

Shetland

<https://www.facebook.com/ShetlandNI>
Laura Burden MNI
Tel: 07935919886 (Mob)
laura.burden1@hotmail.com

Solent

www.nautinst.org/uk-solent
Richard Brooks, FNI
Tel: 07815 104419 (Mob)
nisolentbranch.secretary@gmail.com

South West England

Capt Robert Hone FNI
Tel: 01752 862050 (h)
Tel: 01752 586163 (w)
robert.hone@plymouth.ac.uk
<http://glang.me.uk/nisw.html>

VENEZUELA

Capt Oscar Rodriguez AFNI
Tel: +584242177766
Mobile +582127935701
orodriguez@consemargroup.com.ve

As many of these email addresses are private accounts, please refrain from sending multiple messages with attachments

CREW XPRESS

The easy way to connect your crew

Boost morale and retain crew by making internet access easily available. Crew Xpress gives you the power to separate your operational connection from crew internet use. This allows you to offer your crew the freedom to access a dedicated Fleet Hotspot Wi-Fi portal and manage internet access on their own devices and effectively cope with their lives back home.



Crew Xpress, the gold standard in crew connectivity.
Easy to upgrade to full Fleet Xpress.

Contact maritime@inmarsat.com for Crew Xpress or Fleet Hotspot.

Powering global connectivity

www2.inmarsat.com/CrewXpress_FleetHotspot


inmarsat