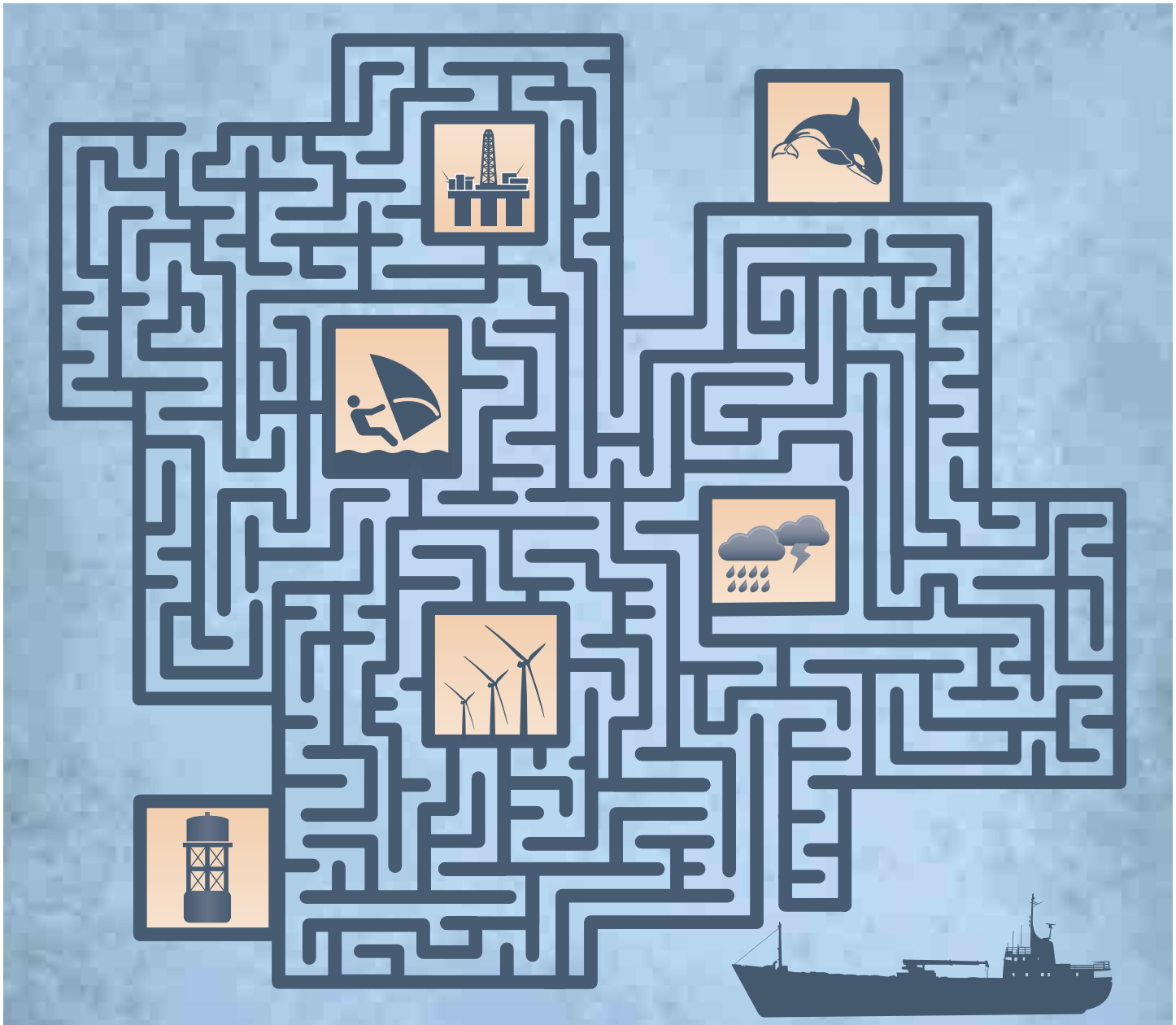
June 2013 Issue no. 03

THE NAVIGATOR

Inspiring professionalism in marine navigators



PASSAGE PLANNING

Thinking ahead for a successful voyage

A free publication by **The Nautical Institute** in association with the **Royal Institute of Navigation**

NAV BRIEF

David Patraiko FNI
Director of Projects, The Nautical Institute

Planning to succeed

Being a shipboard navigator often means making critical decisions while alone on the bridge – and every decision has to be the right one, every single time. Planning ahead can help keep you out of trouble, and reduce the risk involved in at least some of those decisions. In this issue of *The Navigator* we look at the traditional role of passage planning, how modern developments can be used to best effect, and how to use forward planning to stay safe.

Forewarned is forearmed

If you can predict or anticipate risk, you can prepare solutions for mitigating that risk and preventing accidents. Put simply, risk management is the essence of passage planning. That means planning ahead, predicting possible risks, and preparing to deal with them effectively. This may include anticipating where traffic might be heavy so that additional personnel can be on hand, or identifying clear 'no-go' zones to focus the navigator's attention. Passage planning should also take into account the notification of environmental areas or reporting points, so as to reduce undue distraction from the important task of navigation itself.

IT IS ESSENTIAL THAT THE NAVIGATION TEAM WORK TOGETHER TO ENSURE THAT THEIR PASSAGE PLAN IS 'FIT FOR PURPOSE'

There is guidance available as to good practices for passage planning and most companies will have their own guidelines as well. It is essential that when onboard ship, the navigation team work together to ensure that their passage plan is 'fit for purpose', is understood by all watch-keepers and is constantly updated to take account of new information.

A plan is a basis for change

Just because you have a plan, don't be afraid to change it; for example if you have new information, such as a safety notice or on pilots' advice. Any change should, however, be reviewed for new risks and, ideally, checked by at least two people, including the Master, to guard against that most common fault: single person error.

INSIDE THIS ISSUE

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Published by The Nautical Institute.

Printed in the UK by Newnorth Print Ltd, Kempston, Bedford, UK.

All at Sea

If you would like to send us your response, comments or ideas about anything in this issue, or the next, please contact the editor at navigator@nautinst.org

In the last edition of *The Navigator*, we looked at the Colregs and asked how navigators can use them to avoid collision at sea. Now, we turn our attention to the important role that passage planning plays and asked the wider marine community for views on what makes for good - and bad - planning at sea.

"It is important to think about what risks and situations are unacceptable in advance, rather than dealing with them when fatigued and unsure. Such planning may go some way to avoiding taking a chance in the first instance."

Richard Wild

"Our Corporation has recently reviewed how we do passage planning, and a uniform formalised approach has now been adopted. The final plan is quite thorough. As much as possible is listed in ECDIS, either on the chart or in the form of waypoint notes. Checks are electronic and manual, or visual. Whilst berth-to-berth planning is done by the ship's officers, the pilots may have their own views and ideas, and so it is of great advantage to incorporate this at the planning stage."

Christopher Rynd, FNI

"Passage planning should include the possibility of diversions from the planned track. While on the one hand VTS like to fine you for not using special routes or lanes, it also happens quite often that they call to say that we should use an alternative track or stay out of the main channel due to heavy traffic and the small size of our ship. It is very annoying if you first have to dive to the bookshelf for some sailing directions just to find out if this new route is possible, or if you would need extra personnel on the bridge."

Baerbel Beuse

"Vessel size should always be taken into account when planning passages. The sea is at times taken for granted on account of brute power or size of larger vessels, but it is the small vessels that call for a lot of deliberations, weather planning and reiterations of the fact that the passage may not go as planned."

Kamal Singh

"In my passage planning days, we started with the largest scale charts and worked down to the smallest - eventually identifying all the relevant hazards. As part of that process, myself, the Master and the other officers developed a 'feel' for the route, the hazards, the waypoints and all manner of relevant information. Thus, when we came to actually carry out the voyage, we had a fairly good idea of what might be expected already in our heads. If a change was needed, we already knew the planned sea-area, so could re-assess fairly quickly and make good, well informed decisions. Assessing passage planning effectiveness - and attempting to minimise risk - must always begin with the navigator, their knowledge and their attitude."

Peter J McArthur

The next issue of *The Navigator* will look at the use of **electronic navigational charts** and **ECDIS**. If you would like to send us your response, comments or ideas, please contact the editor, Emma Ward at navigator@nautinst.org, or watch out for the LinkedIn discussion. We look forward to hearing from you.

LinkedIn

Join the debate on LinkedIn http://www.linkedin.com/groups/Nautical-Institute-1107227 or follow us on Twitter https://twitter.com/NauticalInst.
You can read a digital version of *The Navigator*, or download it in PDF format, at www.nautinst.org/thenavigator

Charts courtesy of UKHO - not for navigational purposes

Mind that rig!

Daniel Wood looks back at what he has learnt from years of voyage planning at sea, in the navy and on cruise ships, and shares insights on voyage planning from the shore side from his current position as Vetting and Inspection Captain in the marine department for the world's largest oil and gas company.

I JOINED A SHIP AS FIRST TRIP NAVIGATOR WITH SOME NERVOUSNESS. SATISFACTION TOOK OVER AS I SUCCESSFULLY PLANNED AND EXECUTED MY FIRST VOYAGE. THIS WAS TRULY REWARDING.

To describe voyage planning as 'the planning for and efficient prosecution of the voyage from berth-to-berth' is perhaps something of an oversimplification. Voyage planning is a fundamental safety-critical function in the world of ships and seafaring. Without proper voyage planning, ships could not do what they are designed to do.

Why do we plan our voyages? Because we want to get from A to B safely. This fulfils our three main responsibilities as seafarers:

- Preserving the safety of life at sea
- Preserving the safety of the ship
- Protecting the marine environment from pollution.

If we do not plan properly, we are doomed to failure. In the 21st Century with instant media coverage and technology allowing unlimited access to any resource we can dream of, people are substantially more informed than they were in 1912, for example. The *Costa Concordia* incident threw voyage planning into the spotlight. Ask me who the first officer was on the *Titanic* and I could not tell you, but I do know who he was on the *Concordia*. Voyage planning is no less important now than it was in 1912, and it certainly is more publicised.

Learning to plan

As a cruise ship officer, I worked my way through the various ranks until I was promoted to first officer/navigator. I joined a ship several years ago as first trip navigator with some nervousness. This was to be my first time in the hot seat. I was going to be the officer responsible for voyage planning onboard. The nerves soon went, however, and satisfaction took over as I successfully planned and executed my first voyage.

I worked with the Captain on a one-to-one basis, absorbing every last intricate detail on navigation and voyage planning that he passed on to me. The bridge team followed the plan that I had crafted, deferring to me on many matters of navigation. This was truly rewarding.

I immersed myself in voyage planning for the next three years, navigating the different ships that I served on all over the world. It was a sad day when I was promoted. I would no longer hold the coveted title of navigator. They say that the two best ranks as a crew ship deck officer are the navigator and the Captain. I still worked closely with all of the first officers under me, passing on my own knowledge and experience.

Moving into gas and oil

After leaving the world of cruise ships, I took up my current position with an oil and gas company, with literally hundreds of vessels and thousands of officers working for us. We are responsible for ensuring the safe operation of our vessels at all times, and of course the protection of our marine assets.

When I speak of marine assets, I am referring to miles and miles of pipelines, well heads, offshore structures, platforms, jack-up barges, drilling rigs and the like. One of the key elements that we focus on to achieve marine asset protection is voyage planning. Our unit carries out our inspection and audit regime with an unbeatable attention to detail. It is one of the most important aspects of our job.

We do this by closely scrutinising voyage plans and ensuring officers' understanding of the identified risks in our area of operation. Our voyage plan checks are also closely aligned with our officer evaluations. This goes some way to help reduce the so-called 80% human factor attributable to marine incidents.

The preservation of marine assets

One thing I hardly ever considered when I was a navigator was other fixed marine assets. I focused on planning to keep my own ship safe, looking at hazards in relation to my ship only. I never gave much thought to assets belonging to someone else, or how a collision or grounding affecting an asset would be viewed by the owners; what their responses would be and how it would affect them. I suppose this is quite normal if you are not exposed to the various different elements that make up the wider world of shipping.

I have often heard people talk of voyage planning being similar to risk management. This is, in fact, precisely what it is and what we do. Our team incorporates a risk management strategy in our voyage planning checks. We:

- identify and characterise threats
- assess the vulnerability of our assets to specified threats
- determine the risk
- introduce control measures, in line with the ALARP principle
- utilise a strategy to prioritise risk reduction measures.

The system works very well for us and ensures that our assets are adequately protected.

Taking risk responsibly

My advice is to plan your voyages to eliminate or minimise any risks, just as you would conduct a risk assessment. First you need to identify the hazards, whether they be pipelines or offshore structures, as in the oil and gas industry or the shallow water, weather, and heavy traffic that all mariners need to take into account.

When you assess the risk to these consider what impact could be on your ship, commercial infrastructure and the environment and then identify appropriate actions. This should insure that your control measures will result in increased distance from navigational hazards and better Under Keel Clearance (UKC).

Tales of the unexpected

No matter how experienced a navigator you are, you are almost certain to come up against many passage planning issues during your career at sea. Risk management is the essence of passage planning – but that can mean being ready to manage unexpected risks, as well as those that could have been foreseen. *The Navigator* asked officers at all stages of their careers to talk about some of the foreseeable – and unforeseeable – issues that they have faced, and how passage planning could help.

Reef encounter

As a fairly experienced Chief Mate onboard a handy size product tanker, I was standing the 04:00 - 08:00 watch as she steamed eastward along the south coast of a large island chain. The morning watch was uneventful and, in fact, quite delightful, as the team were facing a tropical sunrise. We were monitoring our position on a regular basis as we ran about three miles from land and about two miles parallel to a hazardous reef. At 07:00 the Master arrived on the bridge and we chatted casually over coffee, discussing details of the forthcoming arrival and port call. As we chatted and enjoyed the sunrise, the ship continued along the coast in autopilot. For a half hour, as the AB prepared the bridge for the next watch, I failed to plot regular positions as visibility was fine. The AB could see the coast, and there was no reason to suspect that the ship might drift off course.

At about 07:30 the Master took the watch. Looking out through the crystal clear sea, he saw that we were in perilously shallow water. He immediately came hard right bringing the vessel again into safe water. Put simply, the bridge officers had not been paying due attention to risks and failed to realise that a strong current was flowing that induced sudden and strong set and drift. The current had not been included in the passage plan. Lesson learnt: natural phenomena such as reefs should always be anticipated by navigators, not just while standing watch, but also before the journey even gets underway. In other words, during that all-important passage planning process.

Reindeer ahead!

A cargoship in Norwegian waters came across a herd of reindeer as they swam the strait from one island to another. The vessel did not slow down, despite four men waving frantically from a boat to alert the officers on board. While the ship did not hit any of the reindeer, considerable damage was caused as the animals leading the herd turned and swam back into the others, resulting in chaos. Rescuers found dead reindeer both sides of the strait.

While the absence of a contingency strategy for swimming reindeer from an average passage plan can be excused, it clearly demonstrates the importance of taking nothing for granted. The cargoship had sailed the same route for the last 18 years and was well known by locals. Had the narrow passage, presence of ice and yearly herding ritual featured more prominently in the passage plan, the incident – and the reindeer - could have been avoided. Local knowledge can have just as important a role to play as what is printed on the chart.

Doubling back

As Chief Mate on a tanker, I went up on the bridge after loading had been completed to inform the Captain that the 'deck/pump room etc were all secured for sea'. The pilot had been dropped. Only then did I look at the chart, to find that the ship was headed out on exactly the same track by which she had gone in unladen - a channel depth of 10.7 metres. The vessel's draught after loading was 12 metres. Thankfully, there was still sufficient time to change course and head out the right channel. It seemed apparent that the second mate had simply reversed the courses and the Master had failed to recheck. So much for passage planning! Even if a passage plan has been made, it's always worth checking it.

Corrections and clarifications

A vessel in Chinese waters crossed through a fish farm/cultivation area, causing damage and resulting in compensation claims. The fish farm was not noted in the passage plan because it was not marked on the ship's charts – which had not been updated and corrected before the journey. There were no electronic means to receive corrections *en route* and the ship's NAVTEX had not been working for some time. A package of chart corrections was on its way to the load port when the incident occurred; but too late for the crew on the bridge.

Lessons learned from this error in the passage planning process include the benefit of asking local agents for local charts to be used as an accompanying aid to a ship's existing date. Scanned charts can be requested if physical copies cannot be delivered in time.

Editor's note: The London Club warns that there are an increasing number of unlicensed fish farms, which are not marked on charts. Even after passage planning is complete, a good lookout is vital.

Grounding leads to deep water

As Master of a loaded product tanker, I made a diversion after bunkering, during which I missed the instruction to follow the deep water route and failed to factor this into my passage planning. Local charts did not indicate that I should follow the deep water route, and the second officer did not consult sailing directions due to time being tight. These omissions in my passage planning led directly to a very large amount of administration and a costly fine! I am told many vessels have suffered a similar fate in the area – it is something of a routine.

WATCH-OUT

Never is the navigating officer more crucial than in ensuring the safety of a ship and its crew at sea. Responsible primarily for human lives, they also safeguard valuable cargo, plus the ship itself and environmental safety. In this series, we take a look at maritime accident reports and the lessons that can be learned.

How poor passage planning caused significant pollution when a container vessel ran aground

The Scenario

A container vessel carrying heavy fuel oil and various cargoes, including hazardous liquids, ran aground in a bay off the coast of an island. She was seeking calm waters to anchor and carry out repairs. Lack of delegation from her Master and poor passage planning led to the accident, which resulted in substantial localised pollution and damage to the hull and cargo. An attempted salvage operation was unsuccessful and the ship was declared a constructive total loss three weeks later.

What happened?

- The chief engineer discovered damage to an engine cylinder unit. He advised the Master, who took the decision to divert to a sheltered bay and carry out repairs
- Using limited data, the Master decided it was safe to bring the vessel close to an island's charted shoreline. He failed to utilise the rest of his bridge team to monitor her progress, or to take into account warning signs from the echo sounder
- A lack of formal briefings meant that everyone had their own ideas about what was going to happen. The Master failed to delegate properly, leaving himself overloaded at the time of the grounding. His Second Officer showed no initiative to take any of the load.
- Lack of local knowledge and a chart unsuitable for close-shore navigation brought the vessel too close to the coastline. No-one on the bridge team realised that she was still travelling at six knots when she ran aground causing substantial localised pollution.
- Although the bridge team had received training prior to the incident, this was not put into practice onboard and the Master acted, to all intents and purposes, alone.

Why did it happen?

Subsequent investigations found that sub-standard voyage planning was the cause of the accident. The Master had delivered only the most basic of pre-operation briefings, choosing instead to take on the majority of the task himself. He did not make use of his bridge team properly, not least in the monitoring stage of the process. As a result, communications were confused, and everyone had different ideas of what to do.

Any voyage planning the Master did carry out appeared to lack awareness of the vessel's position or speed. He was unfamiliar with the area and failed to take note of the available warning systems, such as the echo sounder. Instead, he seemed to navigate by eye, operating alone without engaging the support of his team. He did not allow sufficiently for the changing tides and winds and the anchorage he was attempting was difficult. Although he discussed the voyage plan with the ship managers, the chart he was using was small-scale and therefore not suitable for close-shore navigation. He did not consult the Mariners' Handbook, which advised that ships approaching the shore should take special precautions.

At the time the vessel ran aground, the Master was overloaded. His poor planning, lack of local knowledge and inability to delegate were found to be the direct cause of the accident, and at odds with the best practices he had learnt during his training prior to the voyage.

THE MASTER WAS UNFAMILIAR WITH THE AREA AND FAILED TO TAKE NOTE OF THE AVAILABLE WARNING SYSTEMS. INSTEAD, HE SEEMED TO NAVIGATE BY EYE

What changes have been made?

The shipowners have refreshed their bi-annual training content to ensure better onboard passage planning practice. A new fleet circular was also issued outlining revised anchorage procedures, including the recommendation that Masters should seek licenced pilotage when anchoring in unknown waters.

A 'real' way of life: enjoying the rewards and challenges of a career at sea

In this series, *The Navigator* speaks to current navigational personnel about their motivations, careers to date and thoughts for the future. Under the spotlight this issue is Officer Cadet **Thomas Chitseko**, who is currently undergoing final preparations for his orals examinations.

Name: Thomas Chitseko
Current position: Officer Cadet

What interested you in a career at sea?
Seafaring is a way of life: a vocation rather than a job. This appealed to me as, having tried a couple of 9-5 jobs, I realised that I wanted my work to be an integral part of my life, not something that I did in order to pay for my 'real' life at the weekends. The opportunities to travel and to spend my youth doing something other than looking at a computer screen were also strong motivators.

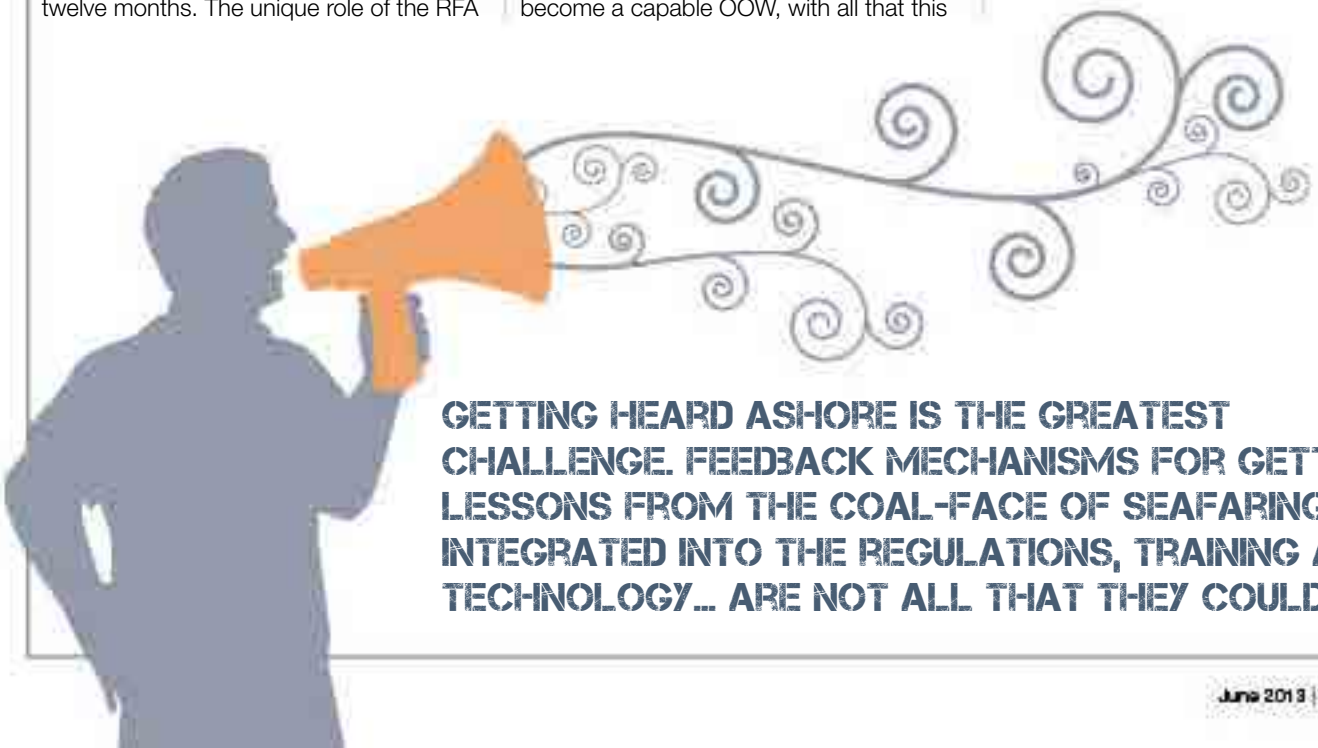
What career path has led to your current position?
I studied International Relations at the London School of Economics in the UK and worked in e-commerce and for a corporate communications consultancy for a while before coming to sea.

Where do you see your career going from here?
I hope to complete my training and take up an appointment as a Royal Fleet Auxiliary (RFA) deck officer over the next twelve months. The unique role of the RFA provides developmental opportunities that tally closely with what I want to get out of my career at this stage.

What's the most important aspect of being a watch-keeping officer?
It's crucial that watch-keeping officers are instilled with a sense of professionalism corresponding with the responsibilities that they hold. The mission of *The Navigator* to develop and promote the professional identity of the modern OOW, is a vital one.

What are the greatest rewards of your life at sea?
I have enjoyed the opportunity to get ashore in some exotic places and to develop my understanding of the world. I've also met some interesting and entertaining old (and younger) salts at college and aboard the ships on which I have sailed. This said, it is the expectation of taking responsibility for driving ships, and the motivation that this provides to become a capable OOW, with all that this entails which, has been the greatest reward of my time at sea so far.

What do you think are the greatest challenges for future navigators?
Getting heard ashore. We are living at a time where technological advancement should be making navigation more safe and effective than it has ever been. However, partly due to the fragmentation of the maritime sector and substantially due to the distance imposed by working at sea itself, the feedback mechanisms for getting lessons from the coal-face of seafaring integrated into the regulations, training and technology that will shape the future of the industry are not, in my opinion, all that they could be.



GETTING HEARD ASHORE IS THE GREATEST CHALLENGE. FEEDBACK MECHANISMS FOR GETTING LESSONS FROM THE COAL-FACE OF SEAFARING INTEGRATED INTO THE REGULATIONS, TRAINING AND TECHNOLOGY... ARE NOT ALL THAT THEY COULD BE

Royal Institute of Navigation
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WAYPOINT

Dr Andy Norris FNI FRIN

How far can you trust your data?

Dr Andy Norris, an active Fellow of *The Nautical Institute* and the *Royal Institute of Navigation*, looks at four key concepts of data integrity and its undoubted role in successful passage planning.

Passage planning is a necessary and demanding task, but it is obvious that a good plan both simplifies and lessens the risks of the associated watch-keeping duties. However, passage planning must take into account the reliability of all the data used for the task. In 'IT-speak' we tend to call this *data integrity*; a concept which is equally important when watch-keeping decisions are being made.

Intelligence from such sources as charts, sailing directions, maritime safety information, meteorological data and lists of radio signals all require just as much data integrity wariness by the user as the data coming from equipment such as the Global Navigation Satellite System (GNSS), radars, and gyros.

In short, data integrity incorporates four concepts: validity, plausibility, comparison and latency. These concepts are examined in fuller detail in the box on the right

eNavigation

eNavigation gives the possibility of all data being used for marine navigation to be electronically marked with integrity information, whatever the data source. This would ease both human instigated and automatic checks to help ensure its appropriate use. For instance, it could include such items as accuracy limitations, original source of data and time/date validity information. For any data it should be easy to select the option to view such information. Automatic indications could be given if user preset limits concerning data integrity were encountered. As a simple example, the user could perhaps set a visible indication on the chart display if the hydrographic survey of an area was particularly old.

Validity: trusted sources and expected accuracy

Many aspects come into play when assessing the validity of data. For instance, does it come from a competent source, such as a national hydrographic office or a type approved GPS? Is the use of the data valid for the actual dates and time plan of the voyage? What is the expected accuracy of the particular data? Is there a fault being indicated when data is being displayed on a screen, which may invalidate it?

Plausibility: the art of double checking

Data may appear to be valid, but is it plausible? For instance, the light is indicated as flashing once every 200 seconds but that is unlikely, so could it be an error? Any interpretation must be cautiously made, as should using any associated information. It may be an indication that the data from this particular object has escaped a proper check. Any data that appears to be outside normal limits should be subject to further inspection and caution.

Comparison: unearthing inconsistencies

By comparing data from different sources for compatibility, we can be far more sure of the validity of the data. We can confidently assert, for example, that the ENC data about a particular beacon is consistent with that contained within a particular international List of Lights. Therefore, the GNSS indicated position is consistent with the visual bearing measured to that particular mark. Any inconsistencies that are found highlight the need for further investigation and/or navigational care.

Latency: taking timing into account

Latency is the time interval between the instant the data was captured and when it is subsequently used; something that must be taken into account for all navigational tasks. Latencies of many years are normally quite safe for most hydrographic data, although precise positioning may require a maximum of just a few seconds of latency. Marine Safety Information (MSI) data may have taken some weeks to be promulgated and even NAVTEX information concerning a new situation may have taken a few hours to have been broadcast. An ARPA can take a minute or more to indicate that a tracked vessel has changed course.

Summary

To sum up, my advice would be to always treat data with appropriate caution, not least when passage planning. Apply the concepts of validity, plausibility, comparison and latency to help ensure that any risks are minimised.

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TAKE 10

This issue of *The Navigator* has looked at passage planning at sea. Here are ten points to take away from this issue to help ensure this important subject stays top of everyone's list of priorities.

1
Safety first
Passage planning is a fundamental safety-critical function; without it ships could not do what they were designed to do.

2
Controlling risks
Planning ahead identifies risks and allows the navigator to better control the safety of navigation.

3
Stay alert
Many risks can be anticipated; however many cannot. Keeping an alert lookout is always essential.

4
Feel factor
When passage planning or when using a passage plan, it is worth trying to 'get a feel' for the part of the voyage in question, in order to make better decisions.

5
Cover all bases
Local knowledge gained through pilots, sailing directions and marine safety information (MSI), should always be sought at the planning stage.

6
Adapting to change
A plan is the basis for change. A good passage plan is essential, but sometimes the plan will need to be adapted, based upon new information e.g. from pilots, Vessel Traffic Services (VTS), weather or commercial changes. Be adaptable and stay safe.

7
Plan your research
There are many good sources of good practice for passage planning, including commercial publications, training courses and company procedures.

8
Mentoring matters
Onboard mentoring is essential for developing good passage planning and monitoring skills; take just ten minutes and give it a go.

9
Shipshape
Passage plans should take into account the special characteristics of the vessel itself, including draft, manoeuvrability, squat, mechanical risks and manning levels.

10
Trust your data?
Always question the integrity of information used in passage planning and navigation, particularly with regards to calculating position and under keel clearance (UKC). Apply the concepts of validity, plausibility, comparison and latency to help ensure risks are minimised.

Available now from The Nautical Institute

The Nautical Institute produces a range of publications aimed at enhancing the standing and knowledge of maritime professionals, with discounts available for Institute members and bulk orders!

RADAR and AIS – Dr Andy Norris FNI FRIN

From 2008 all new radars were required to display AIS information, and this book looks at the implications of integrating these functions. It explains how radar and AIS systems can be better integrated with overlay and underlay displays, to assist with decision making on board.

Published: **2008** Price: **£30** Ref: **0307**

ECDIS and Positioning – Dr Andy Norris FNI FRIN

Written especially for mariners, this book will help improve your understanding and approach to the use of electronic charts, and provide guidance on how to develop the mindset needed to use ECDIS safely and effectively.

Published: **2010** Price: **£40** IRef: **0321**

Mentoring at Sea – The 10 minute challenge
Captain Andre L Le Goubin MA FNI

Anyone can be a mentor at sea and anyone can need mentoring - and it only takes 10 minutes to get started. This practical guide explains how knowledge gained through experience, and then reflected upon, can be passed on in an informal but purposeful way.

Published: 2012 Price: £30 Ref: 0346

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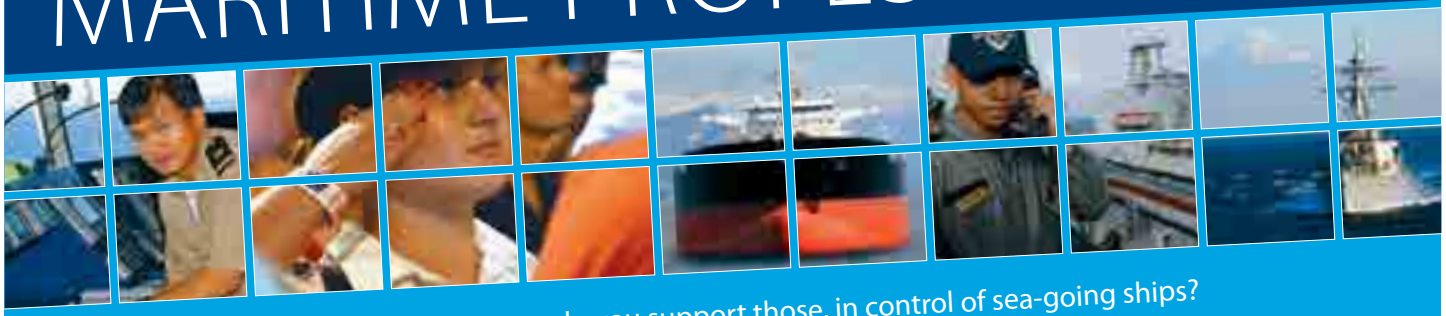

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Can you keep up with new technology & new regulations?
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Want professional recognition?
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