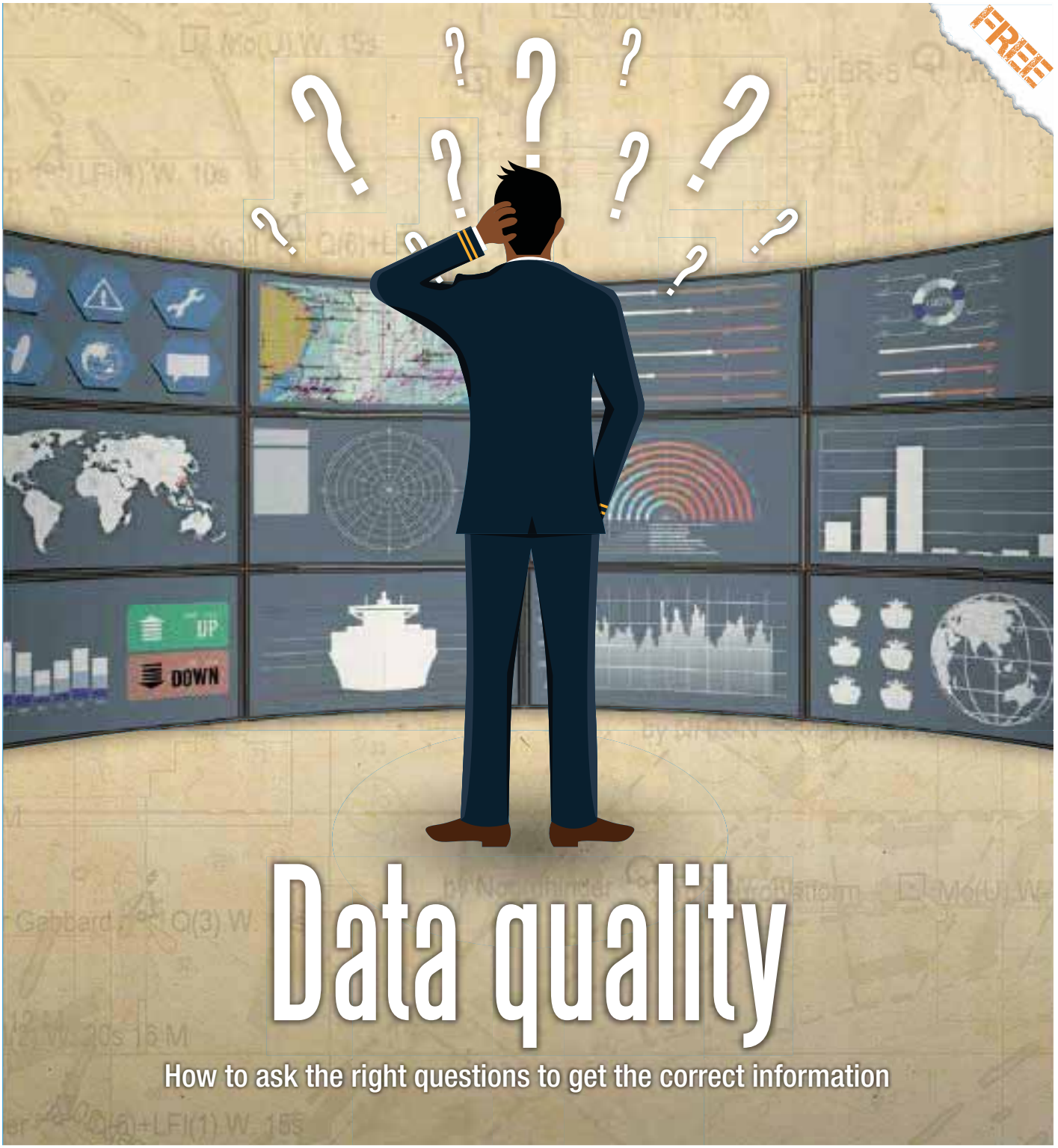
October 2021 Issue no. 28

THE NAVIGATOR

Inspiring professionalism in marine navigators



Data quality

How to ask the right questions to get the correct information

The Nautical Institute

ROYAL INSTITUTE OF NAVIGATION

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

sponsored by

IFAN

NAV BRIEF

David Patraiko FNI
Director of Projects, The Nautical Institute

Dealing with data

Throughout history, mariners have been asked to make decisions using data that may not be quite good enough. Although great strides have been made by the industry to improve the quality of information available, it's still not perfect. Professional navigators must still understand the limitations of data and information (there is a difference!) and how to manage them, particularly in the digital age.

A perfect example is hydrographic data. An ECDIS may look impressive and modern on the bridge, but the data it is presenting is only as good as the last hydrographic survey – which might be very old indeed. Even where data input is accurate and up-to-date, the process of interpreting that data and turning it into useful information can be flawed. You might receive very accurate meteorological data (temperature, wind speed, humidity…) at any one point, but the same data can result in different weather forecasts, depending on the methods used.

ALWAYS TRY TO OBTAIN THE BEST QUALITY OF DATA AND INFORMATION YOU CAN. USE REPUTABLE SOURCES... ASSESS THE RISKS OF POTENTIAL ERRORS

Always try to obtain the best quality of data and information you can. Use reputable sources (such as official hydrographic offices), assess the risks of potential errors and find ways of corroborating data accuracy wherever possible. The navigator's 'golden rule' has always been to never trust a position obtained by only one means. Even in the age of integrated navigation systems, it remains good practice to always double or triple check a position, perhaps by using LoPs or overlays (see *The Navigator* issue 27). Such strategies may even be identified in your SMS and Passage Plan.

The articles in this issue illustrate some of the data a navigator must use and how that data might be checked for accuracy. You might well assume that the most reliable source is what you see; however, as any lover of magic will tell you, the eye can be fooled and, more seriously, vision is prone to degradation by bright lights and fog.

Of course, some ships will have far more complex sources of data than those covered within these pages, and more sophisticated ways of displaying and transmitting them to the user. Sheer quantity of information is another challenge that needs to be carefully managed. Just because a system *can* display target tracking for over 100 vessels at once, that does not mean that doing so is the best choice.

As always in *The Navigator,* we ask you to think about these issues, do your own research and share your thoughts with others so that we can all make better decisions.

INSIDE THIS ISSUE

A Nautical Institute project sponsored by IFAN & Trinity House

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

The Royal Institute of Navigation
With support from: 1 Kensington Gore, London, SW7 2AT, UK
Tel: +44 (0)20 7591 3134 Fax: +44 (0)20 7591 3131
www.rin.org.uk

Editorial committee:
Editor Emma Ward
Design Phil McAllister
For The Nautical Institute
Bridget Hogan, Lucy Budd, David Patraiko FNI
For the RIN Dr Andy Norris FRIN FNI

Published by
The Nautical Institute
The Navigator (Print) – ISSN 2058-6043
The Navigator (Online) – ISSN 2058-6051
Printed in the UK by
Stephens & George, Merthyr Tydfil, UK

ALL AT SEA

Emma Ward

We welcome your news, comments and opinions on the topics covered in *The Navigator*

If you would like to get in touch with us, please contact the editor, Emma Ward at navigator@nautinst.org, or look out for the LinkedIn discussion. We look forward to hearing from you.

Get the app

Google play | Download on the App Store | amazon apps Available on kindle fire

Join the debate on LinkedIn
https://www.linkedin.com/groups/1107227/

Follow us on Twitter
https://twitter.com/NauticalInst

We are active on Facebook
https://www.facebook.com/thenauticalinstitute

Watch our videos on You Tube
https://www.youtube.com/NauticalInstitute

You can read a digital version of *The Navigator*, or download it in PDF format at
http://www.nautinst.org/publications

We welcome your news, comments and opinions on the topics covered in *The Navigator*. We reserve the right to edit letters for space reasons if necessary. Views expressed by letter contributors do not necessarily reflect those held by The Nautical Institute

'Think Viking'

A recent edition of *The Navigator* discussed the aspects of chart layers. This set me thinking of how, over thousands of years, there have been so many 'layers' added to the science of marine navigation, in terms of equipment used to navigate and the guidance as how best to do so.

When preparing students for oral exams, I suggest the maxim: 'Think Viking', to remind them of their priorities when departing for sea – the same priorities that the earliest sea voyagers worked to when navigating uncharted waters for the !rst time in relatively simple craft.

Priority No.1 – Floating
If a vessel can't float it can't move (navigate). In order to float, a vessel needs sufficient water underneath it. Therefore, the most important piece of navigation equipment is *a means of depth sounding*. To continue floating in all conditions likely to be encountered while navigating requires stability and watertight integrity.

Priority No.2 – Propulsion and steering
To control navigation once under way, (as opposed to drifting), a vessel needs some form of propulsion, e.g. oars (and oarsmen), sails and engines (and fuel), some form of steering (and helmsman), and a means of stopping drifting with tide or wind when required, e.g. moorings/anchors.

Priority No.3 – Direction and progress
While in sight of land, in daylight and clear visibility, the human eye provides direction and some idea of position and progress. Without visible land or astral marks to navigate by, direction needs to be provided by some form of 'compass', (for the Vikings, this was a piece of magnetic lodestone), and to progress by some form of 'log' and timekeeper that can be recorded (charted) for future use.

Priority No.4 – Crew
To sound depths, control propulsion and steering, and to monitor navigation progress the Viking vessel required crew, who needed to be fit and able to carry out these functions, before they could even think about pillage and plunder, when and if they reached a foreign shore!

Priority No.5 – Monitoring and maintaining watertight integrity
Damage to a vessel's hull from contact with the ground or other floating objects, or due to fire or poor maintenance, risks breaching the watertight integrity required to continue floating. Minimising this risk while navigating requires continuous lookout and what we now refer to as situational awareness.

Increasing sophistication of navigation equipment over thousands of years has enabled us to navigate more efficiently. However, we could, if required, still safely navigate in the same way as the Vikings did. Food for thought?

John Simpson, AFNI

With thanks to our supporters

If you are interested in becoming an Affiliate Partner and joining an elite group of companies supporting maritime safety worldwide, visit https://bit.ly/2XJl85z for more information.

The DTC Group | UKP&I | OCEAN Technologies Group

Asking the right questions

David Patraiko, Director of Projects at The Nautical Institute looks at the difference between data and information and examines which data sources you should be checking, and how to assess their reliability

There is a subtle difference between data and information. Data generally refers to known, collected and measured facts. These are not always useful, in and of themselves. Just knowing the depth of water stated on the chart might not be useful on its own. But once that data is enhanced by knowing the state of tide and draft of the vessel, it becomes very useful indeed.

Information is derived from data, but the way that data is interpreted, or the algorithms that are applied to it, can make it very valuable – or introduce errors which can be misleading.

If data is inaccurate, all the information derived from it will be unreliable. For example, if the speed input is wrong, the vectors and closest point of approach (CPA) / time to closest point of approach (TCPA) that are generated from it will be unreliable, too. Even if the data is accurate, it may not show the whole truth. For example, if you take a pair of hydrographic measurements, you might assume that points between those measurements will be around the average of those two – but that may not take into account anomalies of geology (peaks and troughs). This is something that might be assessed by the quality (or not) of the hydrographic survey.

Here are some pointers on how to identify where navigation data and information might be suspect. A good navigator will always seek to confirm the quality of their information and assess the risks of any decisions they may have to make using it.

Position

Data from Global Navigation Satellite Systems (GNSS), such as GPS, is the primary position input into an integrated navigation system. When it works, it is extremely accurate, but the data can be subject to both intentional and unintentional jamming and spoofing. These events are reportedly happening more frequently in recent years. If you have more than one GNSS system available, you can check the validity of GNSS inputs against other fitted GNSS systems (e.g. Glonass, Galileo, BeiDou etc). However, even multiple satellite systems can still be in error as they can be jammed or spoofed the same way.

Remember; non GNSS input, such as visual and radar bearings and depth contours, offers more resiliency due to its independence from satellites. Make sure you practise using these even when GNSS is available – not just so that you can spot errors, but so you are confident using them when it is not.

Radar

Radar is an excellent tool for situational awareness, both in terms of navigation and collision avoidance. It can be independent of any external inputs, but it does need skill in interpretation.

Remember that radar images can be affected by physical obstructions, weather, sea state and high-density traffic. You can check the validity of radar data against AIS, visual observation and even advice from VTS – and likewise, you can use radar to check and confirm information from these sources.

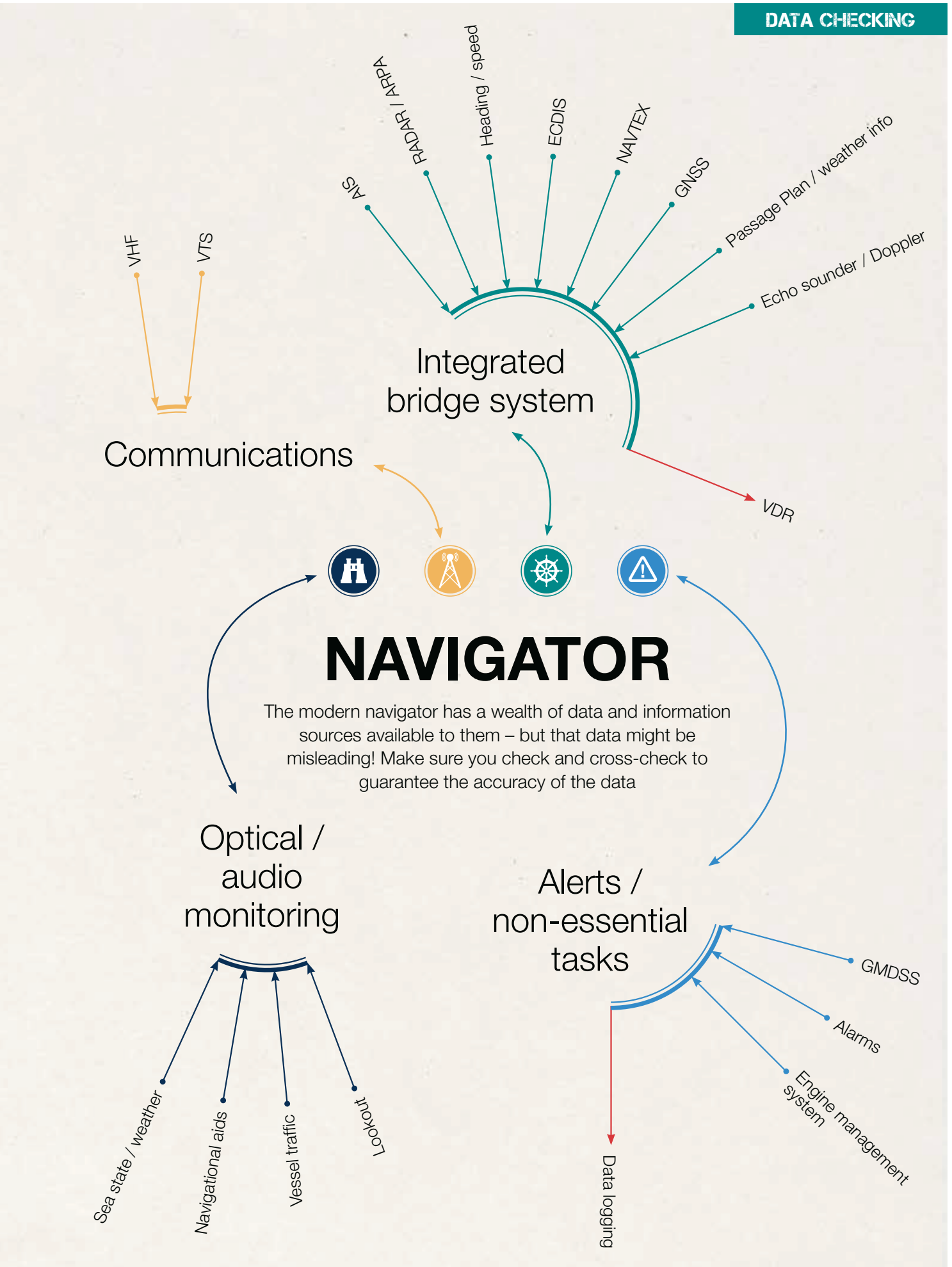
Depth/Under Keel Clearance

Under Keel Clearance (UKC) is crucially important. If you have no water, you cannot move! Being sure of your UKC depends on a number of inputs. The accuracy of charted data should always be questioned. Check the date of the last survey and the category zone of confidence (CATZOC), which will tell you whether the data meets certain minimum standards. CATZOC ranges from A1/six stars (best/most reliable), to D/two stars (worst).

Tide states and squat both need to be taken into account. Echo sounder readings should always be monitored visually and with appropriate alarm settings. Use visual observation, too. A change in the colour of the water, or breaking waves ahead have often alerted navigators in good time to trouble ahead.

Speed

It is very important to know your speed – both over ground and through the water. Speed


AIS
RADAR / ARPA
Heading / speed
ECDIS
NAVTEX
GNSS
Passage Plan / weather info
Echo sounder / Doppler
VHF
VTS
Integrated bridge system
Communications
VDR
NAVIGATOR
The modern navigator has a wealth of data and information sources available to them – but that data might be misleading! Make sure you check and cross-check to guarantee the accuracy of the data
Optical / audio monitoring
Sea state / weather
Navigational aids
Vessel traffic
Lookout
Alerts / non-essential tasks
GMDSS
Alarms
Engine management system
Data logging

over ground is best measured between fixes (of multiple types; don't just rely on GNSS!) Speed through the water can be assessed by a speed log, or calculated from speed over ground if you know set and drift.

Direction

Establishing the direction of travel sounds simple enough, but it can be surprisingly complex. You need to take into account heading (true/magnetic), vector over ground or through the water. Heading is important not just for navigation but also for judging a ship's aspect for application of the Colregs.

Again, ask where your heading input is coming from. Is it being supplied by GNSS or Gyro? If so, is the GNSS accurate and have your gyros been checked? Comparing your heading with the course shown on the chart is not a useful check if both inputs are coming from the same source, but checking against leading marks is. If you are using a magnetic compass, when was it last swung?

Target tracking

Identifying targets is also essential information for navigators. The primary tools for this are visual observation, radar, AIS and VTS, all of which have their strengths and weaknesses.

A GOOD NAVIGATOR WILL ALWAYS SEEK TO CONFIRM THE QUALITY OF INFORMATION AND ASSESS THE RISKS OF ANY DECISIONS THEY MAY HAVE TO MAKE USING IT

Visual input is excellent, if visibility is good, but it is subject to conditions of visibility and optical illusions. Radar is very reliable too, but can be subject to interference and misinterpretation. Finally, AIS is prone to inaccurate inputs, both manual and GNSS – and not all vessels or hazards have AIS.

Passage planning and publications

When you are passage planning or using publications to make navigation decisions, you must ensure that the publications are from a reputable source and are maintained up-to-date. Corrections and version numbers are generally available online. Critical data can also be obtained from agents, pilots and VTS. Weather routing advice must always be checked against your own observations and experience as well. If in doubt, consult another source of advice.

Optical

Human vision is an excellent source of data and information to assist with situational awareness and decision-making. However, even this is not without its challenges and seeing is not always believing! Obvious problems include poor visibility, e.g. in darkness, rain, fog, etc. A bridge that is too bright can result in poor night vision. Bright deck lights are another problem. Even shore lights can cause poor visibility or provide misleading input (is that red light a navigation mark or a building onshore?). Visual observations should be checked against radar, charts and objects identified in the passage plan. Your own vision can be improved with binoculars, but in the near future the 'optical scene' may be

further enhanced with cameras, lowlight optics and Augmented Reality (AR).

Think twice

Safe navigation relies on good decisions that are not just based on 'presented information', but on skills, experience, risk assessment and even gut feeling. Today's mariners are provided with a wealth of data and information. Some is very useful and reliable, and some is less so. Before any critical decisions are made, think twice (or more than twice). How trustworthy is your information and how critical is that information to safety? What actions can you take to mitigate that risk? Has the bridge team been involved, so that you can benefit from collective experience and knowledge? What are the contingency plans or abort points?

As we enter a period of increased digitalisation, navigators must inform themselves about the quality of data and information presented to them and how to assess it. Navigators also need to think about how a digital world and an analogue world can coincide and the best practice of good seamanship going forward.

Marine Superintendent Sajith Babu AFNI shares some thoughts on maintaining data quality

Read more about his experiences on page 8

How do you ensure that you are using data that is of the best quality?

Comparing data with multiple resources and confirming that everything is the same is the only way. On board a vessel, it is important to know the errors / limitations of the equipment we are using, along with the operational procedures. This is especially true of navigational equipment. Comparing GPS positions with radar fixes or visual fixes; comparing echo sounder depths with soundings present on the chart / ECDIS and comparing the CPA/TCPA of the same target on both available radars are all crucial procedures for all OOWs to complete, even when not in congested waters.

Regular testing of all available equipment is equally important. Check the equipment is operating efficiently and according to the maker's instructions and company guidelines. Data should always be suspected for errors and the best way we can do that is by keeping the equipment in good shape and checking or comparing all of the data we receive.

What have been some of your experiences with unreliable data at sea?

Even though GPS / ECDIS / AIS / ARPA have all helped navigators in receiving information readily, errors associated with it are also on the rise. Reports of loss of GPS signals / jamming / spoofing have risen over the last couple of years, especially on exiting Suez Canal and entering the Mediterranean Sea.

Vessels that we manage have also reported loss of GPS signals near Port Said. In one vessel, the problem persisted over three days. It is very tough when GPS signals are being lost every five minutes. Alarms tend to distract the OOW and might lead to an accident. A few vessels have also reported loss of GPS signals inside the Persian Gulf.

Lack of high-quality data in ECDIS for the South China Sea is another example where the bridge team can face a great challenge. Overlapping ENC cells, coupled with the small-scale charts that are available in these areas, is a common issue. Personally, I used to keep paper charts of these areas open and readily available for the OOW (of course not all ships might have paper charts anymore).

DATA SHOULD ALWAYS BE SUSPECTED FOR ERRORS AND THE BEST WAY WE CAN DO THAT IS BY KEEPING THE EQUIPMENT IN GOOD SHAPE AND CHECKING OR COMPARING ALL OF THE DATA WE RECEIVE

How do you think data quality can be improved by the maritime industry in general?

Now that we have collectively moved to the era of digitalised equipment, there is no going back. The solution to improving the data quality will be an ongoing process.

Recognising how to use each piece of equipment correctly and understanding their limitations is key for any OOW. A fair outlook on the dangers associated with over-reliance on a single item of equipment will also motivate navigators in comparing data for its accuracy most of the time.

We should also encourage feedback from Masters and OOWs on significant navigational information, including suspected dangers and changes to navigational aids. Hydrographic notes, or even the H-Note app, can be used for this task.

As end users of equipment made for seafaring, we have a social responsibility to give constructive feedback to help improve the system, rather than simply criticising it.

WATCH-OUT

In this series, we take a look at maritime accident reports and the lessons that can be learned

Even if the data is correct, make sure you use it in the right way!

What happened?

One night, shortly after midnight, a cutter grounded on Henry Reef in the Great Barrier Reef, Queensland. It sustained substantial damage to the keel, stabiliser fins and propellers, as well as several hull breaches.

During the vessel's passage planning process, its route plan had been amended. This inadvertently resulted in the new route being plotted across the reef. Although the cutter's ECDIS identified the reef as a hazard, it is likely that the system's look-ahead function did not encounter the correct chart symbol that would have generated a warning alarm prior to the grounding.

It is likely that the ship's officers' visual checks were influenced by misinterpreting the chart symbology, where a single symbol represents a much larger geographical feature – and that they believed that the ECDIS would not have saved a route plotted across a chart danger.

Enhanced safety features which could have potentially alerted the officers to the danger posed by the reef were not available.

There were no injuries or instances of pollution reported. Once the grounded vessel was towed off the reef and stabilised, it was taken away for repair.

Why did it happen?

- Changes to the passage plan inadvertently resulted in the vessel being rerouted to cross a dangerous reef
- While the hazard was identified by the onboard ECDIS, the look-ahead function did not encounter the correct chart symbol and did not trigger the warning alarm
- The officers conducting the visual checks are thought to have misinterpreted the chart symbols, as well as failing to spot the hazard in time to prevent the grounding
- The vessel's ECDIS had not been updated to the latest IHO standards, compromising the data produced

What changes have been made?

- There is an increased focus on passage planning, watchkeeping and use of ECDIS. Annual audits now include enhanced training and information sessions and watchkeeper assessments
- The training package and requirements for ECDIS annual familiarisation training has been updated. Task books have implemented for each role to reduce the effects of incorrect information being passed on by trickle-down training
- Specific training documentation for the navigation officer's role has also been improved

IT IS LIKELY THAT VISUAL CHECKS WERE INFLUENCED BY MISINTERPRETING THE CHART SYMBOLOGY

Read the full report here: https://bit.ly/3jGElNp or watch a short video at https://bit.ly/3zHUzvr

The Nautical Institute's Mariners' Alerting and Reporting Scheme (MARS) - *https://www.nautinst.org/resource-library/mars.html* - comprises a fully searchable database of incident reports and lessons, updated every month. If you have witnessed an accident or seen a problem, email Captain Paul Drouin at mars@nautinst.org and help others learn from your experience. All reports are confidential – we will never identify you or your ship.

Think ahead: behaving like a 'future Captain'

Sajith Babu AFNI went to sea due to a love of travel and crossing oceans. Here, he talks about what motivated him in the early days of his career and how navigators can encourage those following in their footsteps

What interests you about a career at sea?

I never planned to have a career at sea, but I never had to look back and repent once I was in. My initial reason for pursuing it was my interest in travel and crossing the oceans; visiting various countries and seeing their cultures. I also wanted to go for something different from what others were doing. During the early stages of my career at sea, I learned that the reality was sometimes different. However, thanks to a few of my Masters/ Chief Mates who mentored and guided me along the way, I discovered many of the great avenues and possibilities that a shipping career can offer.

What career path has led you to your current role?

I started off as a Deck Cadet and am now a Marine Superintendent. It has been a wonderful journey. Learning is a continuous process and it is the same when you are at sea. What matters most is how well and how fast you learn. I still remember the first day in my company before joining my first ship, standing in front of my Training Superintendent. "I see you all as future Captains, and I want you to behave like them too", were his opening words. Golden words which were highly motivational for a starter like me.

Completing each and every contract at sea safely and reaching home was always a great achievement. Whenever I came home for vacations for just a couple of weeks, I used to get bored and want to get back onboard. Rules and regulations keep changing and keeping ourselves abreast of these changes is a big task. The Nautical Institute's immense collection of publications is a great source of reliable information and has been a great help in keeping me updated.

Name: Sajith Babu AFNI

Current Position: Marine Superintendent

IN CONGESTED AREAS, IT IS VERY IMPORTANT WHAT COULD HAPPEN OVER THE NEXT HOUR OR SO OF YOUR NAVIGATIONAL LEG

How can experienced navigators help those coming up behind them to improve on their knowledge and skills?

Navigational experience can be broadly classified into two categories. These are ability to use navigational equipment seamlessly and experience in transiting certain congested areas, such as the Singapore Strait, Dover Strait etc., where it is very important to know what could happen over the next hour or so your navigational leg.

We should have a proper mix of both to execute a passage safely. Personally, I would suggest that all navigators should be experts on the equipment available to them along with their limitations. Experience in transiting through congested waters is a matter of time.

Mentoring junior officers should be positively done through healthy discussions and feedback. Practically implementing what we have learned in college is not that easy, but can be achieved with ample guidance and support. It's not always necessary to hold formal training sessions, but it is very important to have ice-breaking sessions with the entire bridge team on a regular basis to help build trust.

Royal Institute of Navigation
Science Technology Practice

WAYPOINT

Dr Andy Norris FRIN FNI

Making the most of multiple data sources

Dr Andy Norris, an active Fellow of The Nautical Institute and the Royal Institute of Navigation, discusses the importance of considering *all* available data when navigating and repeatedly comparing and analysing it to gain as full a picture as possible

The navigation of ships remains one of the most difficult transport tasks to perform safely, even when compared with civil aviation. A particular difficulty is that the highly important underwater scene is almost always totally invisible to direct sight. This means that navigators must constantly assess the available clearance by comparing the relevant data from many different sources.

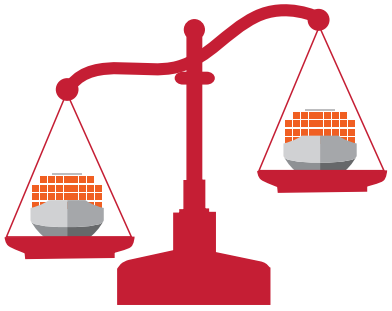
These sources include charts, tidal information, onboard depth sensors, radar/AIS data from buoyage, position sensors, radioed information, etc, not to mention maintaining skilled human optical views of the situation. In shallower waters, the human view especially includes looking out for all relevant physical markers and for areas that have differences in their sea-state.

Of course, safe navigation in *any* situation requires the navigation team to repeatedly compare and correlate all available relevant information. This must be performed at a rate that ensures safety in the particular situation. Significantly, even lower accuracy sources of data, when intelligently used, can provide crucial indications of potential problems from sources that are generally more accurate.

A consistent picture

Reviewing and evolving a best estimate of the actual situation is essential for safe navigation. The team can only assume that they really have a good knowledge of the immediate circumstances when all data sources give a consistent 'picture' of the situation.

In reasonable viewing conditions, the optical scene ('the view out of the window') provides considerable assistance in understanding of the total situation. However, a full 360-degree view is not readily available from the bridge on many vessels. Also, there are difficulties in optically viewing hazards that are very low in the water, particularly if they are very close to own vessel. Unfortunately, on many vessels it is still not a particularly quick and easy task to transfer sight-derived information onto navigational displays. Even using an ePelorus is not as common as perhaps should be the case in this modern age.



SAFE NAVIGATION IN ANY SITUATION REQUIRES THE NAVIGATION TEAM TO REPEATEDLY COMPARE AND CORRELATE ALL AVAILABLE RELEVANT INFORMATION

Data from both radar and AIS-detected targets can vary from being incredibly accurate to being highly inaccurate or even totally missing. However, the inconsistencies between radar and AIS are rarely linked. If they match up, this greatly increases the probability that the positional information of that particular target is correct. False tie-ups can also randomly occur, so never completely rely on this information without confirmation from other sources of data, such as the visual scene.

All available data

Of course, the actual navigational situation greatly influences the amount of effort required to fully maintain safety. Even in deep-water oceanic areas, it must never be assumed that any single source of data is correct and available, such as the vessel's current position from installed GNSS. Fortunately, any temporary issues with absolute positional accuracy in such areas should not decrease the vessel's safety – so long as radar data and visual data are well monitored and correlating appropriately.

When the visual scene is heavily influenced by poor weather, such as dense fog, you have to rely totally on all other available data, including the acoustic scene (what you can hear). Of course, this greatly affects the basic parameters that must be chosen to ensure the safe navigation of own vessel, such as the vessel's track and speed through the water.

The mental skills and energy needed by navigators for continually collecting and assimilating all necessary data in busy situations are demanding. Never assume that you have a 100% correct understanding of an evolving situation and keep looking out for consistencies and inconsistencies at a rate that adequately meets your current circumstances.

Contact RIN at: www.rin.org.uk | 1 Kensington Gore, London, SW7 2AT | Tel: +44 (0)20 7591 3134

TAKE 10

Assessing data quality is key to safe navigation. Here are ten points to help you ask the right questions

1
Garbage in / garbage out
Navigators need to make critical decisions based on the best data and information they can get. Poor data or information can lead to bad decisions. Validate whenever you can!

2
Validate
There are various ways to validate data and information – not least by using common sense and good seamanship. Don't forget to validate what you see by eye by electronic means if possible – nothing is infallible.

3
Data and information are different
Data tends to be facts and information is usually assumptions or estimates based on many facts. For example, the temperature and wind direction can be measured but forecasts have to be predicted. If it is interpreted wrongly, even accurate data can lead to inaccurate information.

4
Golden rule
Never trust a position gained by only one means. Good navigators are always looking for ways to validate their position. This does not change in the age of GNSS.

5
Under Keel Clearance
Again, multiple forms of data all need to be accurate; depth gained from hydrographic survey, vessel draft, state of tide, position, prevalence of shifting sand/mud, vessel's roll and pitch, etc… Always validate when you can.

6
Manage risks
When data or information can't be validated, try to manage your risks. Give yourself greater searoom, change routes, reduce speed, ask advice or even abort a manoeuvre until risks can be reduced.

7
Know your source
Knowing the source of information can be useful. Information gained by hearsay or non-official internet sites should raise a healthy level of questioning.

8
Latency
Is the time lag between when something is measured or confirmed and when it is used. Accurate data and information sometimes changes over time and a good navigator will always check the dates and times to judge if it can still be trusted.

9
Share
As always, share your knowledge about information quality, discuss with your fellow professionals how verification can best be made, mentor others and allow them to mentor you.

10
Feedback
If you find a fault in data or information, it is important to report it if appropriate. Few people provide bad information on purpose and most will be very thankful for feedback – and then they will try to validate as well.

LIKE OUR TOP 10 TIPS?

Find more in your own language at www.nautinst.org/NavInspire

#NavInspire