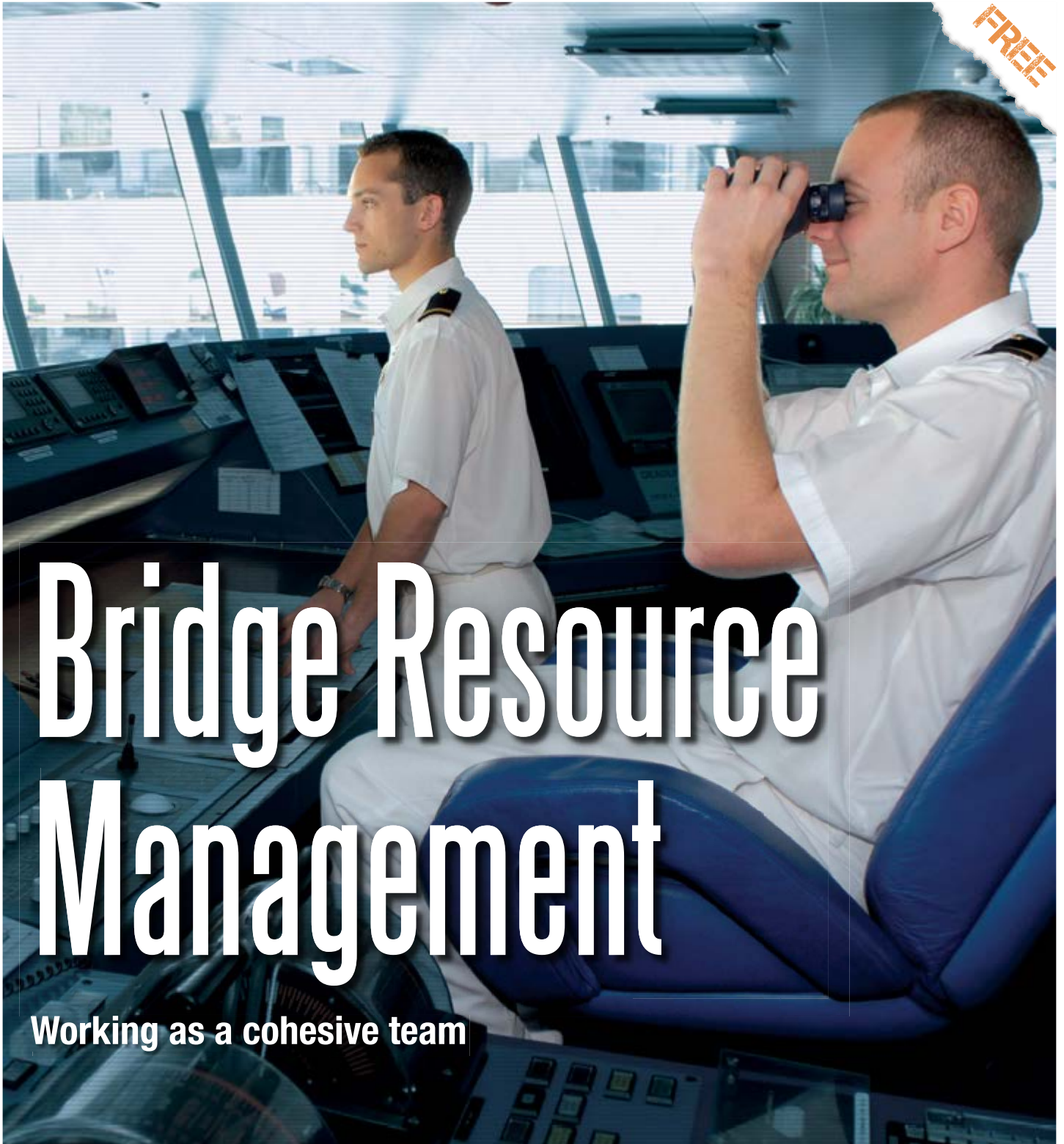


NAVIGATOR

THE

Inspiring professionalism in marine navigators

FREE



Bridge Resource Management

Working as a cohesive team



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



Managing expectations

We are all human, and we all make mistakes. These mistakes can lead to major catastrophes. Or, if caught in time, they could lead to nothing more than a lesson learned.

Many navigators stand bridge watches alone or as the sole watch-keeper. In these times, they alone are responsible for all decisions pertaining to safe navigation and collision avoidance, and the world expects perfect performance: no mistakes, ever.

We should also recognise that shipping is one of the safest methods of transport around, and that it is likely that most navigators will have long careers at sea without major incidents. This will be the result of competence, preparation and good teamwork.

In the early 1990s, the maritime industry adopted a formal approach to teamwork, derived from the aviation industry and defined by the IMO as Bridge

Resource Management (BRM). BRM is the effective management and utilisation of all resources, human and technical, available to the bridge team, to ensure the safe completion of the vessel's voyage.

In essence, BRM is the process and practice of using all available information and assistance to ensure that navigators make the best possible decisions, and that those inevitable human mistakes are captured and mitigated before they can cause any harm. There are many resources to assist the navigator. From an information perspective, these include charts, publications, the passage plan and electronic aids like radar, radio, GPS etc. From a human point of view, there are look-outs, additional officers, the Master and often a pilot, VTS and even onboard engineers. This is why all Masters' standing orders require the Master to be called at the earliest indication of a problem, to

strengthen the team.

To get the best out of these resources, it is essential to train regularly, practise using them together and always reflect on how improvements can be made, whether things go right or wrong. Good BRM is a culture that needs to be embraced, both at sea and ashore. The IMO requires BRM to be taught, usually as a shore-based course. Then, companies ensure that it is implemented and continually improved at sea. Good BRM must be a core concept for all ranks at sea and ideally evaluated through regular navigation audits.

In this issue, we explore BRM and focus on best practices of teaching it (ashore) and implementing it (at sea). Good teamwork doesn't stop on the bridge, but also extends to professional bodies, such as The Nautical Institute, where professionals of all ranks work together to foster Continuing Professional Development. So please help us to share this magazine amongst all navigators. It's free, and available from www.nautinst.org/navigator.

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In this issue of *The Navigator*, we look at the complex subject of how proper Bridge Resource Management can make the most of the people and equipment on the bridge. Here, members of The Nautical Institute's LinkedIn group share their thoughts on how good communication is key to a successful bridge

We are always interested in hearing your views on the important topics discussed in this publication. If you would like to send us your response, comments or ideas, please contact the editor, Emma Ward at navigator@nautinst.org, or look out for the LinkedIn discussion. We look forward to hearing from you.

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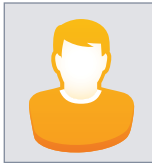
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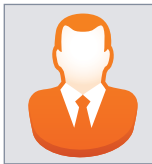
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“ To truly change a team, or organisation, training/mentoring/facilitation must start at the top. ”

Kevin Sorbello



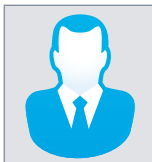
“ It is very important to have bridge meetings to reiterate information and decision flow channels. Despite emphasising it frequently, I have never had my decisions challenged by an officer. However, I was pleasantly surprised and saved by one helmsman who detected a mistake by the OOW operating the Engine Order Telegraph and spoke up. ”

Manjit Handa



“ My background is in the Navy, and though we didn't call it Bridge Resource Management, that's certainly what all the training and drills were refining: our ability to work together to produce a result greater than anything any one of us could do individually. ”

Jeff Joyce



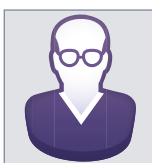
“ Team members each have their own different tasks, training and culture that can make speaking up an extremely challenging task. ”

Captain Peter Dann, MNI



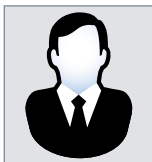
“ One key aspect of Bridge Resource Management is to catch and correct human errors before they lead to casualties. To oblige all team members to SPEAK UP if they are uncertain of the situation, or of another's actions. I have observed the progress of Bridge Resource Management to be a slow cultural change, that has been evolving for 20+ years. We still have a long way to go. ”

Captain William Skahan



“ Bridge Resource Management is an attitude and behaviour tool, which adds to basic competency. It is not a substitute for competency, but assists in the better management and development of teamwork. ”

Yashwant Chhabra, Capt. AFNI, Fellow CMMI



“ The more people talk about these issues, the closer we will get to effectively creating an environment that allows ship's crews to fulfil the roles required of them. With each comment, the puzzle moves a little closer to completion. ”

Captain Robert Nelson, DTech(Nav), BMS, MBA

Bridge Resource Management (BRM) is a course originally developed for the airline industry's Crew Resource Management. Its main focus is to change attitudes by establishing a safer and more efficient teamwork onboard ship. It aims to create good team leaders and team members by addressing issues related to leadership, management styles, culture, communication, automation, stress and fatigue, etc. (Source: INTERTANKO)

Bridging the gap in training

The bridge **TEAM** is the place where **T**ogether **E**veryone **A**chieves **M**ore, and an effective team onboard a ship is the most valuable resource of shipping today. So investing in the right Bridge Resource Management training is crucial to keep it working cohesively. **Capt. J Dakic, Capt. D Milinic and Capt. S Tripovic** of the BRM team at Azalea Maritime LLC discuss the value of effective shore-based training and look at what such a course should cover

Bridge Resource Management (BRM) is a team approach, where all available materials and human resources are used to achieve safe operation. Bridge team members are trained to be aware of their responsibility, prepared to recognise workload demands and other risk factors, and able to handle any situation. Weakness in bridge organisation and management has been cited as a major cause of marine casualties around the world. BRM reduces that risk by helping a ship's crew anticipate and correctly respond to the changing situation of their ship.

When BRM is practised correctly onboard, the result should be a bridge team that:

- > Maintains its situational awareness
- > Continually monitors the progress of the vessel, making proper adjustments and corrections as necessary, to maintain a safe passage
- > Acquires relevant information early
- > Appropriately delegates workload and authority
- > Anticipates dangerous situations
- > Avoids becoming pre-occupied with minor technical problems and losing sight of the big picture
- > Undertakes appropriate contingency plans when called for
- > Recognises the development of an error chain
- > Takes appropriate action to break the error-chain sequence. (Source: Dept. of Ecology, WA)

BRM training in a training centre/institute ashore addresses all the challenges faced by the bridge team onboard ship on a daily basis. The way these subjects are addressed is the key element to effective BRM training, resulting not only in a successful "lesson learned" at the end of the course, but, more importantly, that these lessons are put into practice in real life onboard ship.

The best way of addressing these topics may be summarised by an old Chinese proverb:

"Tell me and I will forget, **show me** and I may remember, but **involve me** and I will understand."

The key issue in BRM training is to involve the trainees. This allows them not just to be spectators in the theoretical part of the training and mere participants in the simulator training, but to actively promote discussion during the workshops (rather than lectures) and in the active discussion, experience and opinion sharing after each simulator exercise. This helps them to point at the lesson learned.

Been there, done that?

Navigation has not been a one-man show for a long time now, and the idea of the BRM training is to create a defence mechanism against the one-person-error type of incidents and accidents.

Sometimes, course participants have an issue with the fact that the trainees have already "been there, done that". Even in those cases, good workshops, well facilitated by the instructors, are an excellent place to exchange experiences, thoughts and ideas.

Unfortunately, there have been a lot of incidents, accidents and near misses reported. Discussing them as a part of the BRM training is an excellent tool for involving all the trainees in the operation, from the experienced Master to a future officer that has just completed his cadetship onboard ship. A well-facilitated discussion covering BRM topics can sometimes continue after hours during breaks or over dinner, with everybody taking an interest and becoming involved. Good exchange of information and experience is essential. Unreported near misses experienced by the trainees themselves often emerge during the workshops too, and can be efficiently used for improvement.

The vast experience of the senior officers participating in the training has proven to be a major resource when discussing subject topics. Conversely, junior officers, even those reluctant to do so in the beginning,

often "open up". They begin to interact with the senior ones, thus promoting good communication, which is essential for a well-functioning team. Junior officers refreshing their BRM skills stated that the experience during their first round of training helped them gain confidence when they first joined the ship as junior officers. They were more willing to feed information, put forward opinions and "challenge" their superior officers. Senior officers, in turn, confirmed the need for feedback from all team members, in order to delegate and distribute workloads.

Screen tests

Another important issue addressed during training is the integration of the pilot into a bridge team, both in workshops and simulator exercises.

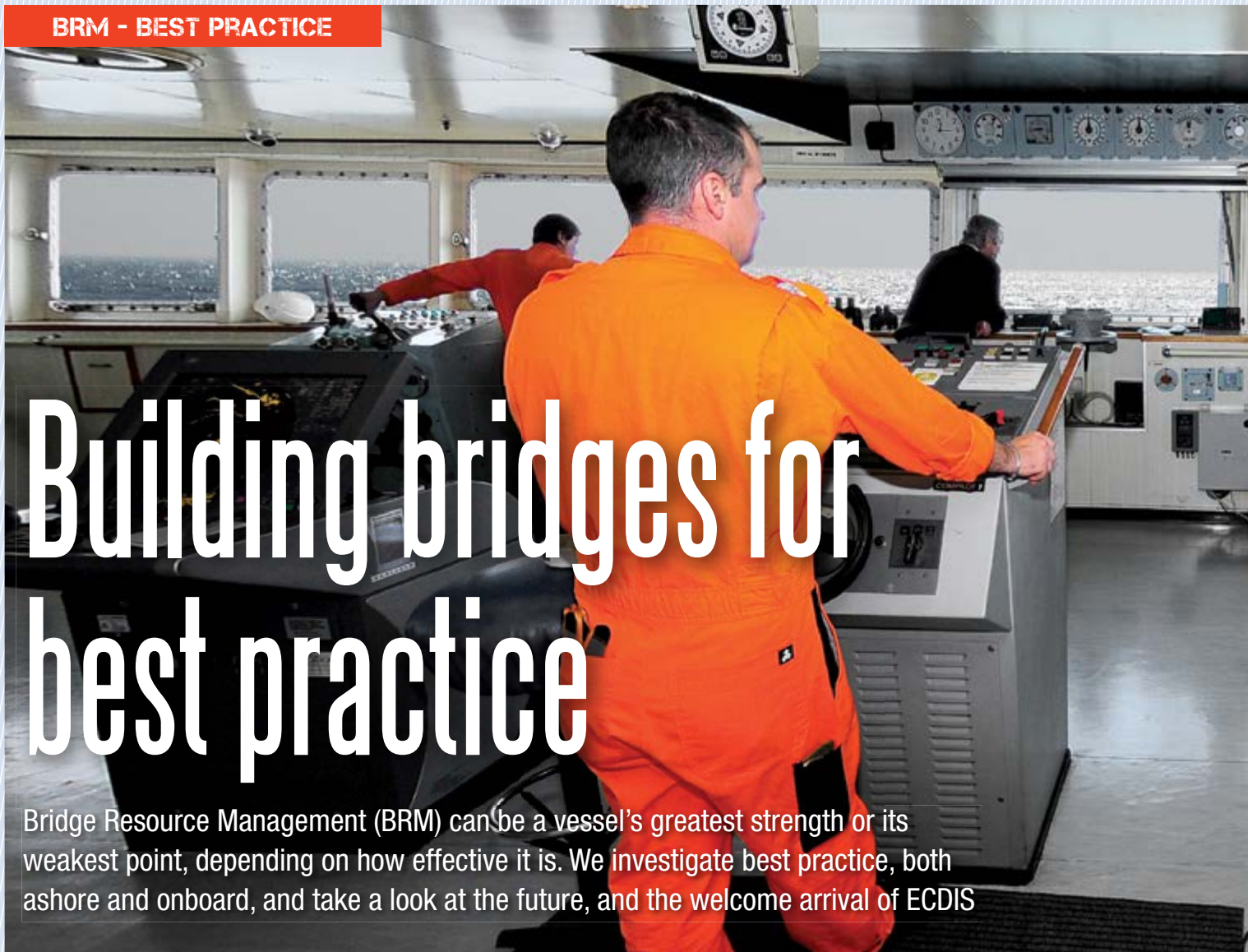
One of the biggest challenges of modern navigation is the quantity of resources that require management on a daily basis. These include sophisticated electronic equipment, charts and publications, environmental factors, Vessel Traffic Services (VTS), passage plan, internal and external communication equipment, persons with local knowledge (pilot) and bridge team.

The 21st-century seafarer is faced with a large quantity of information to process, most of which is shown on various screens on the bridge. The seafarer must be able to filter the relevant ones and use those that are actually needed, using good, old-fashioned common sense, always keeping in mind that the most important screen onboard a ship is THE WINDOW!

A well-trained bridge team is essential to meet these challenges. Communication is the principal thing to be improved and must be worked on continually, as this leads to everything else working better.

Unfortunately, there are too many examples of things not functioning properly. One example is the *Tricolor* case, where poor standards of watch-keeping, too few watchkeepers, heavy workloads, poor bridge organisation, partial processing of nautical safety and reduced awareness of what was happening outside the bridge windows in a highly frequented and well-regulated sailing area led to two collisions and over 100 near misses before the wreck was dispersed.

Regular BRM refresher courses are an important, valuable tool for enhancing skills, from both the trainer's and trainee's perspectives. As one senior officer said, "It does not matter how many times I attend Bridge Resource Management training, there is always something new to learn."



Building bridges for best practice

Bridge Resource Management (BRM) can be a vessel's greatest strength or its weakest point, depending on how effective it is. We investigate best practice, both ashore and onboard, and take a look at the future, and the welcome arrival of ECDIS

Effective BRM helps a bridge team anticipate and respond correctly to their vessel's changing situation. Successful management and utilisation of all available resources, human and technical, ensures the safe completion of the voyage. By contrast, poor Bridge Resource Management can lead to loss of situational awareness. Common errors include:

- > Preoccupation with minor technical problems
- > Inadequate monitoring
- > Failure to delegate tasks and assign responsibilities
- > Failure to recognise and handle minor deficiencies in skills
- > Failure to utilise available data
- > Failure to set priorities
- > Failure to detect deviations from Standard Operating procedures
- > Failure to communicate intent and plans
- > Inadequate challenge and response skills.

Successful BRM focuses on team building, responsible challenge and response, closed loop communication,

leadership and decision-making skills to help avoid these errors. Together, these allow effective management of operational risks and the human machine interface [see page 10]. In addition, BRM should take into account organisational, operational and regulatory factors, as well as the capability and limitations of the navigational equipment available.

Shore-based BRM training aims to help navigators spot the common errors mentioned above and avoid them. The course concentrates on interpersonal relationships, and encourages participants to reflect on their own interpersonal skills in a bridge team environment through a series of case studies. Over the length of the course, it should bring about a change in behaviour and attitude, which course participants will be able to take back with them onboard.

Best practice onboard

BRM starts with receiving voyage instructions and identifying the resources that will be necessary for the journey.

The passage plan follows, which is then implemented through to the end of the voyage, before the passage debrief concludes the entire process. The right kind of management will allow sufficient leeway for the inevitable variations from the passage plan, should unexpected situations develop.

The ship's Master forms an integral part of the bridge team, but also has a larger role to play as a facilitator. Masters must build confidence in their team and show that, although they are team players, final decisions rest with them when they have the con of the ship. They must instil the concept of 'responsible challenge and response' and develop good team communications. In effect, Masters must take on a similar role at sea as the facilitator does in shore-based training, to mould the bridge team and become part of it.

Some of the most important aspects of BRM are:

Passage planning – covering ocean, coastal and pilotage waters, planning berth to berth. Particular attention should be paid

The arrival of ECDIS

The advent of ECDIS has enabled BRM to move to the next level for efficient navigation. The navigational principles remain the same; however the navigator now has decision support tools for berth-to-berth navigation. ECDIS helps optimise routes, reduces fuel consumption and greatly enhances decision making and analyses of the developing situation.

On-shore BRM training should therefore include ECDIS as the primary means of navigation. Incorporating error in sensors inputs, especially GNSS, will train navigators to sharpen up their decision making and prepare them for emergencies. Bridge watch-keeping practices using ECDIS should be regularly reviewed.

Even ECDIS is subject to human error. The most advanced ECDIS is only as good as its user. Masters, navigators and pilots must recognise the potential for such error and always remain vigilant. When mistakes happen, the bridge team must respond in a timely manner to create a “failsafe” system. This is, in a true sense, the way forward in understanding and enjoying human-ECDIS co-operation, and promoting safety at sea and on the bridge.



to high traffic areas, shallow water and pilotage waters. The plan should incorporate margins of safety and contingency plans for unexpected incidents.

Passage plan briefing – all bridge team members, including the Chief Engineer, should be briefed on the passage plan to ensure that they understand the intended route and transit procedures.

Bridge manning – the Master should use the passage plan to anticipate areas of high workload and/or risk and set manning levels appropriately.

Bridge team training (ashore and on-the-job) – given to all bridge team members to ensure they understand their roles and responsibilities, both for routine duties and in the event of an incident/emergency.

Master's standing orders – read and signed before the voyage begins. These orders must be clear on the chain of command, how decisions and instructions

are given and responded to on the bridge and how bridge team members can bring safety concerns to the attention of the Master.

Master/pilot exchange – the passage plan is discussed by the Master and the pilot and necessary changes are made. Any new information must be communicated to the rest of the bridge team. When the pilot is onboard, he/she automatically fits into the bridge team.

End of voyage debriefing – allows the bridge team to review the passage plan's strengths and weaknesses, suggest improvements to safety, communications and problem-solving skills. Lessons learnt will help the team tighten up subsequent voyage planning.

Communication issues

Good communication between the members of the bridge team is the key to successful BRM. Some features of good communication include:

Closed-loop communication – when repeating orders to ensure that they are well understood, always assess the order to make sure that it makes sense, and then observe to reassure yourself that it is completed. A common mistake is to say 'right' or 'left' and mean the opposite.

Who has the con? – the officer of the watch has the con, regardless of whether the Master is on the bridge. Should the Master want the con, he should clearly state that he is taking it, and the officer of the watch should repeat that, giving the Master the con. This sounds very basic, but is a key communication issue.

Challenge and response – be ready to accept and consider reasonable challenges from other members of the bridge team. Equally, be alert to what is going on, and be prepared to speak up if you spot an error.

Author: Captain Srirang Manjeshwar,
Director, Training, Wallem Maritime Training Centre, Mumbai, India

WATCHOUT

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

'Too little, too late' results in a grounded tanker

What happened?

A fully laden tanker was transporting a cargo of unleaded petrol when she ran aground on a sandy shoal. Prior to this, passage had progressed normally from leaving port, and a coastal pilot had boarded the vessel as scheduled. A 25-knot wind caused the tanker to move one mile off her planned track. Despite the pilot making some adjustments to the heading, this anomaly could not be corrected in time and the ship moved inexorably towards the reef.

The tanker's bow ran aground. The hull remained intact and there was no pollution, however, some damage was later discovered on the bow. Water ballast taken onboard prevented the vessel from being pushed further onto the reef before she was refloated on the flooding tide and manoeuvred clear.

Why did it happen?

The tanker's bridge team did not monitor the vessel's position and progress effectively, and so did not spot the wrong course early enough. The course alteration was 'too little, too late'.

Safety issues were also discovered in the passage planning procedures. If the bridge resources available had been used effectively to follow the passage plan, the crew could have taken adequate and timely action to correct the course, and the grounding could have been avoided.

The issues

- > Inadequate monitoring of vessel's position and progress
- > Failure to correct course in time
- > Failure to define off-track limits
- > Poor bridge resource management
- > Safety concerns revealed in passage planning and other bridge team procedures

What changes have been made?

- > The tanker's company has revised its shipboard safety management system procedures to ensure off-track limits are specified for each leg of the passage plan
- > A safety alert was issued to all managed ships, highlighting the importance of effective BRM
- > Training to support these measures has been extended to include modules on 'navigational safety'

**IF THE BRIDGE RESOURCES AVAILABLE
HAD BEEN USED EFFECTIVELY...
THE CREW COULD HAVE TAKEN
ADEQUATE AND TIMELY ACTION
TO CORRECT THE COURSE**

Walking in and out of the ship in style

For the first time in this series, *The Navigator* speaks to not just one, but three navigational officers currently serving onboard a livestock carrier. They tell us about their careers, ambitions and thoughts on effective communication on the bridge

What interested you in building a professional career at sea?

IH: When I was 17, I used to hear stories of Merchant Navy officers who travelled around the world. This fascinated me, so I joined Pakistan Marine Academy to become a mariner myself.

YA: Travelling and wages both interested me in building a professional career at sea. So I, too, joined Pakistan Marine Academy.

How did you end up in your current position?

JB: I started my career as an ordinary seaman in 2008 onboard a livestock vessel. It was a great opportunity to experience how international shipping operates.

IH: It took a lot of hard work and dedication. First I had to pass my training at Pakistan Marine Academy. Then I spent 24 months as a cadet before successfully passing my Class 3 exams. I am currently serving as

second officer on a livestock carrier, with previous experience onboard tankers and cargo ships.

Where do you see yourself in five years time?

YA: I plan to obtain my Master's foreign-going Certificate of Competence and pursue higher education in the maritime field.

JB: I hope to gain more experience by sailing and meeting people from different backgrounds. Experience at sea is an invaluable tool for maritime professionals. I would like to also pursue further training, which will potentially help me take my career ashore.

How is working on a livestock carrier different to other vessels?

IH: We are responsible for hundreds and thousands of lives. Plus, ours is the only cargo that walks in and out of the ship in style.

YA: The difference is that it's a large vessel. We must look after the livestock 24 hours a day.

What do you think are the personal attributes a navigational officer on the bridge needs to have?

YA: They should be an active member of the bridge team and never hesitate to



Names

Ibrar Hussain (IH) Second Officer

Yasir Ameen (YA) Second Officer

Juncar Batasin-in (JB) Third Officer

Ship: Awassi Express (livestock carrier)

ask about anything when they feel in doubt. Also, they should have the right attitude to learn from anyone and be able to pass that attitude on to their juniors.

JB: As a navigational watch-keeping officer, I must prove my knowledge and competence on a daily basis and remain vigilant at all times.

How can we encourage good communication on the bridge?

JB: To be open and share ideas with team mates. Good teamwork is important. I like discussing various situations with my senior officers, as I benefit from their knowledge and experience.

IH: Greeting each other whenever we meet makes everyone feel better. Exchanging views, irrespective of rank, will help junior officers increase in confidence, while seniors will gain both respect and valuable feedback that will make the bridge safer.

GOOD TEAMWORK IS IMPORTANT. I LIKE DISCUSSING VARIOUS SITUATIONS WITH MY SENIOR OFFICERS, AS I BENEFIT FROM THEIR KNOWLEDGE AND EXPERIENCE

Juncar Batasin-in (pictured left)



WAYPOINT

Dr Andy Norris FRIN FNI

Making equipment part of the team

Dr Andy Norris, an active Fellow of the Royal Institute of Navigation and the Nautical Institute, discusses the human-machine interface and the role that equipment plays in day-to-day operations on the bridge

In many ways, bridge equipment also acts as part of the bridge team. The way in which users interact with the equipment is known as the human machine interface (HMI). The HMI covers such things as displays, menus, switches, controls and audio signals.

An expert user can set the menus, controls and switches to allow the equipment to perform its tasks in the way best suited to the user's immediate needs. The information that the equipment feeds back to the user will greatly improve their overall situation awareness, and will usually encourage further interaction with other equipment – and the view from the bridge windows. This continuous interaction between human and machine leads to the vessel being navigated in a safe and efficient manner.

Anomaly awareness

In fact, knowledgeable interaction between a user and the many items of equipment on the bridge creates an excellent team that can identify suspect information being provided by any particular piece of equipment. For example, if the range and bearing of the radar returns from charted objects do not tie up with that shown on the ECDIS, then the user immediately becomes aware that there is an anomaly that must be resolved quickly. Extra caution therefore needs to be applied, not least in alerting other bridge staff.

On track?

On many vessels, unfortunately, the OOW is often the only person on the bridge. This makes effective teamworking with the equipment absolutely vital. On seemingly straight-forward passages, especially at

night, it is easy to be wrongly convinced that everything is OK if the user has only minimal interaction with the equipment.

All might seem well. There are no other vessels in sight or on the radar, and the electronic chart shows that we are on track. But are we really OK? For example, on many installations, any positional errors in the GNSS will affect both the track-keeping autopilot and the vessel's position on the electronic chart. It would, therefore, always look as if you were on track, even if the reality was a 100NM error in the positional information!

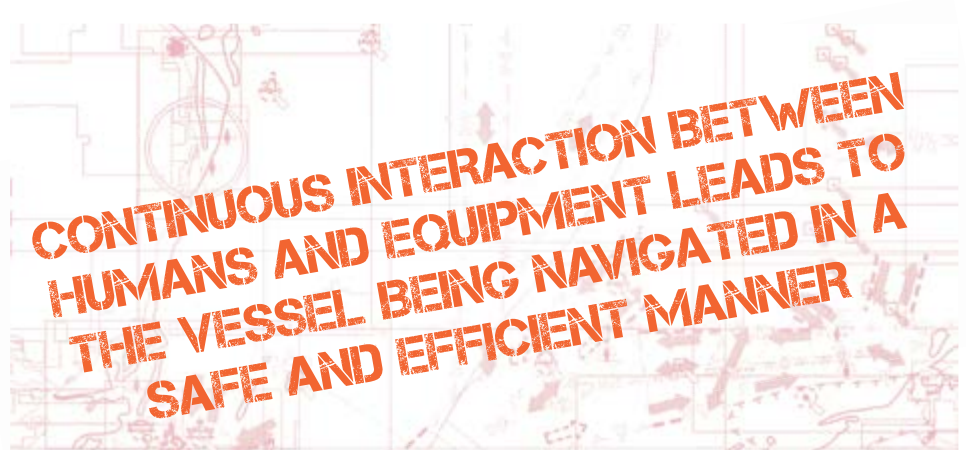
A reasonably significant offset in the track would have been evident over some time in the gyro readings – have you been taking these into account? In coastal regions the radar can also act as a pretty good positional check. Away from the coast, have you ever tried using the auto DR/EP facility that is available on all modern ECDIS equipment? Over, say, 30-minute intervals, does it indicate that the GNSS position remains believable, taking into account the expected range of natural errors in the log and gyro?

Minimising human error

All this is real teamwork with the equipment and, together with the essential need to match everything up with the view from the bridge windows, it contributes enormously to situational awareness and greatly reduces the risk of accidents. Just as significantly, good teamwork with the equipment will also quickly correct any mistaken assumptions by the user.

Better interaction?

Equipment is becoming more intelligent, which should allow for better interaction with the human bridge team. Unfortunately, even on modern equipment, unnecessary alarms and alerts often upset the teamwork between users and equipment. This is particularly problematic on ECDIS and radar equipment. However, many of the issues are caused by the human user selecting inappropriate settings on the equipment. It is therefore vital that the user selects settings that are suitable for each particular phase of the voyage, and makes sure that they are correctly input. But this is just another example of good teamwork...



TAKE 10

This issue of *The Navigator* has looked at Bridge Resource Management (BRM). Here are ten points to take away from this issue to bear in mind next time you're on duty on the bridge

1

Only human

Individuals make mistakes. Through teamwork and effective use of resources, these mistakes can become lessons learned, rather than catastrophes

2

Strength or weakness?

BRM is an essential defence mechanism against the 'single person error'. It can be a vessel's greatest strength – or its weakest point

3

Working both ways

The Master is an integral part of the bridge team, but also has a larger role to play to facilitate effective BRM and challenge and response

4

No 'I' in 'TEAM'

Both in training and in operation, it is essential to involve all team members. 'Tell me and I will forget, show me and I may remember, but involve me and I will understand'

5

Happy talk

Team discussions are essential for learning and refining BRM. Accident and near-miss reports are excellent material for starting a discussion

6

Pilot scheme

Good passage plans are essential for ensuring the bridge team, including the pilot, are focused, share a common understanding and can jointly monitor the voyage

7

Good decisions

Using information technology effectively, and ensuring good teamwork with the equipment, can aid good decisions and avoid mistakes

8

Screen time

The navigator must be able to filter relevant information, use good old-fashioned common sense, and keep in mind the most important screen onboard – the window!

9

Audits matter

Effective and routine navigation audits during passage are essential to ensure that what is learnt ashore is practised onboard

10

Never done

BRM is never 'over'. It must be part of a continuous improvement process underpinned by mentoring, open discussion and debriefing at the end of the voyage



MEET STEPHEN..



Stephen Achurch
NAVIGATOR CHAMPION

Last issue we asked you to send us an image of you reading *The Navigator* to be in with a chance of winning an iPad mini. Stephen Anchurch did, and has a brand new iPad mini to prove it. Here's a little more about our Navigator Champion...

I work as a second mate on one of CSL's (Canada Steamship Lines) newest self-unloaders. Launched in 2012, the Baie St. Paul is a 225.5m by 23m seaway max bulk cargo self unloader.

Depending on the cargo, we can be in and out of port in about five hours. It's a odd little trade that's for sure, but a interesting one.

The Navigator is a great resource and always an interesting read. We are always pleased to see them come aboard with the mail.

Win an iPad

We want to see as many people as possible reading *The Navigator*! Just post a picture of you with your *Navigator* on Twitter, including the hashtag #NAVsnap, or tag us in your post on Facebook (www.facebook.com/thenauticalinstitute) and tell us the name of your ship or your college, if you have one. Or send us the information in an email! One reader per issue will win an iPad mini as a thank you.



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