Making Critical Decisions At Sea
Practical advice for the operational mariner

by CHIRP Maritime with University College London
Every stage in a ship’s journey depends on the decisions made. To make sure each voyage is as safe and efficient as possible, we call upon all our training and experience. The process of learning at sea is never-ending and gives us the knowledge and skills to perform tasks to the best of our abilities.

When at sea, the environment can rapidly change, and we can find ourselves in unfamiliar and unpredictable situations. We often work alongside other seafarers we don’t know very well, who may have a different culture and may work differently from us. For all of these reasons, we must develop our skills in critical decision making. If we do this properly then we learn to evaluate decisions that we and others make to deal with situations effectively. Good decision making is the foundation for the continued safety of the ship and everyone on board.

This booklet complements and expands upon the CHIRP/UCL Booklet “Perception, Decision Making and Fatigue at Sea” published in 2018. It draws upon scientific research to give readers the knowledge and tools to improve their critical decision making. It will cover the following key points:

- making critical decisions as an individual
- making critical decisions as a group
- communicating in challenging conditions
- creating a positive error culture around mistakes and responsibility
- understanding the role of intuitive decisions, and how to develop critical decision-making abilities through training

The booklet provides a guide for seafarers and introduces new techniques and skills that we can develop to enhance our job performance. Its goal is to help us become more effective decision makers, in every situation. These situations may be “routine”, with which we may become over-familiar and thus perhaps let down our guard, or high-pressure events. All decisions at sea are important, and severe consequences can be created by seemingly small factors that, independently, do not appear to be significant. This contributes to the pressure which is inherent to our job.

Case Studies

To help understand critical decision making better, it may be useful to see where decision making mistakes have been made in the past. A recent, well-known example is the ‘Costa Concordia’ disaster.

This incident happened in 2012, when the cruise ship hit a rock near an island off the coast of Tuscany, causing the vessel to capsize and resulting in the tragic death of 32 passengers and crew. In the following investigation, the captain was declared responsible for the accident, and was imprisoned after being charged with manslaughter. Notwithstanding any critical decision making by the company, or lack thereof, the captain made several decision-making errors that could have been avoided. Reportedly, he:
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- required no concrete handover by the chief mate, despite arriving on the bridge later than planned and without time for his eyes to adapt to the dark conditions on the bridge (see “Perception, Decision Making and Fatigue at Sea” study 2018).
- had turned off the alarm for the navigation system, having confidence in himself to guide the ship.
- misjudged the distance of the ship to the reef and realised his mistake too late.
- had not ensured the correct scale of paper chart for close water navigation was onboard which would have provided a more accurate assessment of the hazards to navigation.
- had forgotten his reading glasses, so the officer had to interpret the radar for him.
- brought onto the bridge a partner, along with the manager of the ship’s restaurant.
- maintained an inappropriate speed of approach in darkness.

Each of these mistakes would have distracted the captain’s focus and, although each individual element may seem understandable (and even familiar to experienced seafarers), added together they led to the disaster. The total cost of the accident, alongside the loss of 32 lives, was $2 billion, including passenger compensation, the rescue operation, and towing and disposal of the wreck.

Another example is the 2014 ‘Sewol’ ferry disaster in South Korea. ‘Sewol’ was heading from Incheon to Jeju when it capsized, resulting in over 300 deaths. The reported cause of this incident was the low quantity of ballast water remaining onboard the ship to facilitate more cargo. In addition, the cargo was poorly stowed which led to cargo shift and listing, (the root cause goes back to modifications based upon an illegal redesign of the ship 2012-13). The company also ignored warnings from the regular captain with respect to stability and steering gear issues. On the day of the incident, the ships’ cargo was overloaded to about three times its permitted limit. When a sudden turn was made, the cargo shifted and caused the ship to list uncontrollably, leading to the capsizing. NB: No formal investigation report has been issued to date.

These two incidents demonstrate the potentially serious consequences of poor decision-making at sea, both before sailing and during the voyage. These incidents were caused by numerous, significant errors. Our day to day sailing is full of similar decisions that need to be made. In isolation they may not have serious consequences but can still affect the smooth and effective running of the ship. It is important to remember that a normal situation can quickly develop into something more serious if care is not taken with the small decisions.

Let’s consider a common situation we have all experienced. When navigating in a narrow/restricted channel where there is dense traffic, decisions on corrections of course must be made. It is easy for us to forget just how many decisions we make, and the following aspects should be considered during the decision-making process:
- what are the speeds and courses of the other vessels as well as our own?
- what are the environmental factors, eg. current, wind, visibility?
- what may the crew on other vessels do?
- which of you is required by the Collison
Regulations to take avoiding action by an alteration or course and/or speed?

- are sound signal warnings to indicate close proximity needed?
- what do my bridge team think?
- what local knowledge do we have about the channel?
- are there some “local customs” to consider?

A proficient bridge team may be able to guide the ship to safety, but doing this without large diversions, which increases fuel consumption, or without significantly affecting the safe passage of ships in the vicinity, requires a lot of skill. All together this is a lot of information to consider. As highlighted in the “Perception, Decision Making and Fatigue at Sea” booklet, our brains have limits, and seafaring constantly makes demands beyond those limits. **Given that we are only capable of having in mind around four pieces of information at any time, if we consider all the things we attend to on the bridge at sea, it’s hard to think of any decision that does not immediately put us at or beyond our limits. In all circumstances, then, effective decision-making is vital.**

By taking the time to reconsider the complexity and seriousness of what we do, we can avoid the adverse consequences listed in the case studies above and prevent them.

The following sections and examples aim to equip the crew of any ship with the knowledge to perform all operations on board smoothly. You will be able to trust both your own decisions and those of your crewmates, and also be able to work more effectively together to make decisions as a team. By understanding how decision-making processes work, and how to use this knowledge to your advantage, you will become a more well-rounded mariner, and in any unexpected situations you will be more prepared.

**Group Decisions**

There has been plenty of academic research for many years now which shows that working in a team brings many advantages such as spare capacity, diverse perspectives and safety (ref BRM/ERM). Effective teamwork can go even further and provide synergy, meaning the product of the team is more than the sum of its members combined. But we know that sometimes working in a team brings challenges, which can impair the decision-making process. Therefore, it is important to be aware of the different components of our team to ensure the best performance.

At sea a crew may often be a new or temporary team. Officers may have never met before, and there is no time for any team development before starting a voyage. Despite internationally agreed standards including the STCW Convention (The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers), crew members, who are often from different cultural backgrounds, will probably have different levels of experience, different levels of education, and will have undergone different training. All this can affect social conduct and communication. It is therefore important that we all know about the basics of group behaviour and how to make the best of the team we are in.

We all know people act and behave differently in groups compared to when they
are on their own. People take on different roles in their social, family and professional environment. Taking on a role is a subtle and temporary change in our identity. Roles can be informal (e.g. friendship groups, family) or formal. Formal roles are usually tied to positions and job descriptions. Each role is associated with internal and external expectations that predict a person’s behaviour, speech, and so on. We all recognize that we would behave differently if sailing with a group of people from our training days than with a group of strangers. But should we?

Roles are especially valuable in a professional context, because they give newcomers a reference point from which to model their behaviour. In addition, these roles can create hierarchical structures within the crew. Of course, in one sense roles are established by the ranking hierarchy on board the vessel but it is the efficient interaction between the hierarchy that needs to be established. If, as a crew, we confirm and agree upon our roles and standards before we leave port, we will be making a sound decision that will improve all subsequent ones on the voyage.

There are some dynamics in decision making that create biases and errors that are unique to groups.

One of the most significant biases is “groupthink”, which prevents members of a group from challenging the decision of a group (or its leader), asking questions, or raising controversial issues, even when they do not agree. Everyone has been in a situation in which they think differently from the group but are unable to voice their opinion. The reasons for this phenomenon are numerous: in many cases people want to maintain their own position in the group (e.g. being favoured by the leader) or preserve good group relationships and unanimity. When decision making is affected by groupthink it can focus too narrowly and ignore the risks identified by individuals. Groupthink prevents us from seeking out alternative information. Every crew member
needs to be comfortable asking the question, “are WE wrong?”

Given our knowledge about role taking and the special challenges that crews at sea are faced with, how can these biases be mitigated?

Know your Crew.
Research has also shown that the composition of a group plays an important role in mitigating errors such as groupthink. Well integrated, diverse groups are known to outperform homogenous groups at decision-making. This diversity can be role-related, e.g. occupation, rank and specialised knowledge, or inherent to the person, e.g. age, gender, nationality and experience. Role-related diversity is very important for decision making at sea, since we all have very different sets of expertise and information available. We also need to allow for the human element as we have different ways of thinking about things, based on our training, experience, and personality. These differences are a strength and give us more ways of viewing a situation and therefore more options for getting the right solution and avoiding groupthink. In terms of size, teams of four to five people are most effective because we can only process information coming from two or three people at a time. There is a reason that the world’s elite military units operate in teams of four.

Set the right tone.
Because the crew may not have a lot of time to get to know each other, it is important that crewmembers set the right tone straight away (to take on appropriate roles) otherwise small relationship problems can become ingrained and reinforced. A key ingredient of this is ‘first impressions’, which are important for establishing the right “authority gradient” between leader and follower roles and help to build trust and confidence among fellow crew members. To avoid biases, open commun-
 nicotine should be encouraged from the beginning. This is partly the responsibility of the captain but also good practice for all team members. The captain should encourage deck and engineering officers to raise questions and concerns regarding a decision: officers should not feel afraid or embarrassed to speak up even if information turns out to be not relevant or the original decision proves to be correct. This behaviour should also be encouraged as part of the role of a good crew member, because if it is perceived as part of the professional role, then it will happen with less effort for most officers. The buck has to stop somewhere, the captain maintains the final responsibility for all critical decisions and will act independently as the leader if a situation demands it. In offering alternatives and asking questions, however, every crew member is more likely to help the captain become a better leader. It is the captain’s duty to encourage these roles, and every crew member’s responsibility to fulfil them. This can be achieved by the captain detailing the decision-making process aloud to his team while making it, so that he can still leave room for a challenge by team members.

To avoid groupthink and to encourage independent decision making within the crew, captains are advised to avoid leading or suggestive questions and instead use open questions.

Leading question: “He said five miles didn’t he?”
Suggestive question: “Did he say five miles?”
Open question: “What distance did he tell us is remaining?”

Have standard practices
With shipping being an international industry, it is not uncommon to find yourself working in a diverse cultural team. This can be challenging at the beginning as we get to grips with what others know and are best at. Following standard practices and procedures can help increase familiarity and ease, as these are the accepted norms we all know. This then helps build confidence, trust, and forms the basis for a cohesive and effective team.

Communication
Communication arguably has the biggest impact on group decision making. In general, complexity, unfamiliarity and unnecessary length of messages lead to communication failures. Crew members are therefore advised to use familiar phrases, sequencing and standard operational terms, to restrict the used vocabulary and to use different types of messaging: sometimes a message is best delivered visually, and at other times verbally, for example.

To encourage lower ranked crew members to speak up when they see things differently from their officers, it is helpful to use simple and approved protocols for communication in challenging situations. One method that is used in aviation is the PACE system, which provides a four-step procedure to raise concerns. PACE stands for Probe, Alert, Challenge, Emergency. Here is a possible scenario, using PACE:

Probe -‘‘Captain, what other options are you considering if we can’t stop the ship fast enough?’
Alert – ‘Captain, the speed is 16 knots and hasn’t dropped in the last 7 minutes, what about making a turn?’

Challenge – ‘Captain, we need to make a turn now or we will collide with the other ship’

Emergency – ‘I’m alerting the Engine Control Room and going to manual steering to carry out a turn’

The process suggests questions that are graded according to the seriousness of the consequences. The language is clear and should be recognised by all captains and crew. This is no more difficult for us to adopt than a traffic-light system. The Probe is green, the Alert is amber, and the Challenge is red. The Emergency is beyond challenge and demands action. (ref: IMO Standard Marine Communication Phrases).
To increase cohesiveness and inclusivity within the group it is important to emphasise shared goals. This can happen early on, for instance by taking opportunities to stress joint tasks and even simply by using the first-person plural for shared tasks and goals (we will/let’s do this and that first).

We can conclude that the following elements are at the core of good decision-making in groups:

- constructing a shared view of our operations, our methods, and our situation
- gathering and sharing information openly and effectively
- creating an inclusive atmosphere that encourages different viewpoints

Putting a Stop to Mistakes.
Mistakes are normal and happen in everyday life. According to a study by Allianz, human error in the shipping industry was estimated
to make up 75% of insurance losses, equating to around $1.6 billion, in 2018 alone. Most tragic were those mistakes which led to the loss of human life. Creating the right culture to support risk and error is an effective way of making shipping safer.

Creating a Positive Error Culture?
We all know the saying “you learn from your mistakes,” but we often do that learning in private, and prefer not to reveal our near misses. By adopting a positive error culture, we can learn from and support each other in the pursuit of better seamanship. A positive error culture is one which encourages the transparency of both decision-making processes and errors. In other words, crew members are not inhibited by the threat of embarrassment, or to career progression if they discuss their own mistakes or take responsibility for other people’s errors. Instead, they are supported to openly discuss mistakes that are made and work towards preventing future errors. None of us is perfect and we need to find ways of sharing our difficult decisions. Simply changing our language from “did anyone make any screw ups today?” to “is there
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anything anyone thinks we could have done better today?” will encourage openness and reduce threat. Improving ourselves as seafarers should be made into an ongoing challenge, not an ever-present threat.

Positive error culture in other industries

Lessons from the medical industry

To bring a positive error culture to the shipping industry, it is helpful to look at how it has been done elsewhere. The medical industry is one where defensive decisions have sometimes resulted in repeated mistakes. This has resulted in economic losses, health issues and loss of life. In the US, an estimated 44,000 to 98,000 patients are killed each year because of preventable medical errors. Doctors fear legal action and can be guarded about reporting mistakes. The hierarchical separation between doctors and nurses also makes it difficult to challenge decisions and so the same mistakes persist. The Johns Hopkins Hospital tackled their high number of errors in one area through a very simple initiative; introducing checklists where currently none exist. These were inexpensive but promoted a positive error culture between all medical staff. If doctors missed a step from the list, nurses were now able to point it out to them via the checklist. Over one year, this simple move to a positive error culture saved 8 lives, stopped 43 infections and saved $2 million. For seafarers and captains, a similar approach would help build a positive error culture onboard by promoting safety...
above hierarchy and give all crew members the confidence to spot and highlight things that have been missed, or a better way of doing something.

**Lessons from the aviation industry**

One reason that aviation accidents always make news is because they happen so rarely. In fact, the likelihood of an aeroplane falling from the sky is 1 in 10 million flights. But another reason for their incredibly low catastrophe rate is the industry’s positive error culture. This is a combination of safety measures e.g. carrying extra fuel onboard in case of an emergency, and free reporting of errors. The aviation industry is open about how probable it is that a crash will occur. This transparency is very important and filters throughout the industry to include the individuals taking decisions. While it is a company’s responsibility to report information on errors to the entire community, it is also the duty of the individual to document their own serious mistakes. This is then taken back to a higher body of people from across the industry which discusses how they can learn from this mistake to make flying safer. This level of openness at every level of the business allows pilots and crew to feel confident in admitting to mistakes, knowing they are a common, shared experience and something everybody else can learn from.
Understanding behaviour onboard
Shipping can be a difficult, stressful, and sometimes traumatic industry. Under severe pressures we all make decisions differently. We can be under the physical pressure of tiredness because of watchkeeping, the mental pressure of having to deal with too many factors, the time pressure of needing to make decisions quickly, or the emotional pressure of fearing consequences. If an accident happens unexpectedly, the shock of the event can lead us to freeze due to the effect of stress which makes it much harder to make decisions. Onboard, it is important to be aware of, and honest with ourselves about the pressures we are under. We also need to be aware of the pressures on our fellow crew members. The positive error culture allows us to discuss such pressures. You will find that everyone recognises them but have probably never felt comfortable admitting to them. Sometimes the response to pressures and situations results in a change in behaviour that requires someone to take over decision making.

A follow-up report into the ‘Costa Concordia’ highlighted how the captain’s behaviour quickly changed after he realised that they had run aground. Although it was the series of bad decisions which led to the accident, the captain’s change in behaviour after the grounding meant further important decisions were delayed, for example, giving the general emergency signal. Video footage showed how he froze and was incapable of making important decisions quickly.

Promoting openness in these high-pressure situations could once more help to reduce mistakes and save lives, for example by letting others know if you feel yourself becoming distressed so that someone else can take those critical decisions, or telling the captain or officer of the watch if you notice a fellow crew member go into this state.

The ‘Costa Concordia’ report looked at several signals which might help us identify whether we or a fellow seafarer are suffering from shock. These were:

- disbelief or denial
- emotional numbing
- nightmares / other sleep disturbances
- anger
- moodiness
- irritability
- forgetfulness

Encouraging us to be transparent about our own reactions under pressure and training seafarers to spot how these affect the behaviour and choices of others, is another way of reducing the likelihood and the cost of accidents at sea.

Building a positive error culture
If shipping is to reduce the cost of bad decisions made at sea, it needs to create a positive error culture, similar to that in aviation. The 2014 ‘Sewol’ disaster was blamed on continuously overloading cargo and illegal changes to the ship’s structure which decreased its stability. No one reported these huge errors and eventually the ferry capsized killing 304 passengers. The official inquiry into the 2011 grounding of the container vessel ‘Rena’ in New Zealand determined that the grounding was a result in part of not following standard good practices during planning, execution, navigation and watchkeeping. In addition, shortcuts were taken to reach port early. The result was
long term damage to the local environment despite spending $108 million on clean-up and $700 million ship salvage operations. Again, no one challenged these bad decisions. And this isn’t the only time this type of choice was made. For example, the grounding of ‘Hoegh Osaka’ in Southampton waters was due to instability as a result of shortcuts being taken in the interest of expediency in getting the ship to sea.

Currently, there is reluctance across the industry to discuss and learn from our mistakes, we hope this booklet will help to change that mentality.

Moving towards a positive error culture need not be difficult. Emphasis should be placed on error transparency and challenging bad decisions. This is in order to help us all get better at discussing our own and others mistakes, see them as points to learn from and resist pressures which might force us to bend standard procedure e.g. industry pressure to arrive at a port as quickly as possible.

This could be done through:
- encouraging seafarers and captains to report and discuss their own mistakes and taking responsibility for the mistakes of those in their charge (ref: Just Culture/Reporting Culture).
- rewarding those who participate in creating this culture and are transparent about the mistakes they have made (ref: Just Culture/Reporting Culture).
- taking away the fear of punishment if an error is reported so that more people come forward.
- holding regular conferences or workshops with people from all roles in the shipping industry with the specific aim of discussing mistakes and how to stop them from happening.
- requiring Flag State shipping accident reports to be released for general public viewing as soon as possible and ideally within 12 months, as in the aviation industry. This is over and above the information released to the IMO Global Information System (GISIS).
- making better use of safety checklists so that standard good practices are not skipped. ISM has given the industry checklists but in far too many cases these are simply a tick the box exercise. It is thus essential that checklists should be meaningful and be regularly reviewed in order that they are fit for purpose.
- building a non-hierarchical error culture, in which every crew member is able to challenge a decision.
- ensuring all crew members are trained in recognising patterns of behaviour which might indicate that a person’s decision-making capabilities are impaired.
- taking pride in constantly improving as a seafarer.

It should be noted that much of the above equally applies to the attitude of the company towards to the personnel on board and the interaction between the ship and shore.

Training for intuitive decision-making
Expert knowledge is often associated with years of studying and knowing more than others, but the difference between experts and beginners is not simply how much they know. Instead, that knowledge combined with years of experience makes experts more sensi-
tive to patterns of meaningful information. This allows them to assess situations more quickly without needing to compare multiple options. This skill is developed through years of experience and is called tacit knowledge - knowledge that is learnt through experience, insights, observation, emotion and intuition, as opposed to learning facts and rules.

The fact that it takes years to master intuitive decision making might seem obvious, but researchers are trying to find methods which speed-up how we teach tacit knowledge. But since it is gained from real world incidents, it is difficult to train. Each event a person comes across is unique, and factors outside our control often greatly affect the decisions taken in the moment.

However, experts have been able to come up with a framework to explain how experts use their experience to make their decisions in real-world scenarios. There are three main characteristics of these scenarios:

**Dynamics** – Every decision made has consequences for the decision made after.

**Uncertainty** – Information is never perfect in real world environments.

**Task sharing** – Real world situations are often too complex for one individual to make all the decisions, so decisions must be distributed amongst team members.

The good news is there are ways to improve how we become experts, which we would encourage trainees and trainers to consider. These include:

- **Tactical Decision Games (TDGs)** – short paper-and-pencil exercises that describe a situation, a goal and the resources available. TDGs are often presented in small groups, under the supervision of an organiser. At one point, he adds an unexpected and challenging twist that requires a quick decision. After announcing the unexpected twist, the organiser typically calls on a group member to make a decision with little time to think or analyse, just as they will have to in a real-life situation. It aims to prepare for uncertainty and time pressure, as well as improving communication skills. It also shows individual trainees how other crew members make decisions, which allows for easier exchange of knowledge.

- **Protocol** – this represents good practices, which everyone on the team needs to know. An effective way of learning protocol is through TDGs. In cases of a wrong decision, the organiser “punishes” the group by introducing variations that reflect the consequences of mistakes made in real-life. This allows the decision-makers to understand the reasons for the methods described in the protocol.

- **On-the-job learning** – this is effectively mirroring skilled decision makers as they perform difficult tasks and test out different strategies. A session of on-the-job learning should be followed by a review of the reasons for successes and failures to maximise the learning. In this case, the expert seafarer takes up the role of a mentor for a student. A junior officer seeing first-hand how the job should be done, sharing our experience is a great way to learn from each other.

**On the job learning**

- **Learning through discussion.** This is similar to the review following on-the-job
learning but can be carried out in a group of seafarers. This is best illustrated with an example: a class of 15-20 Navy pilots gathers for a debrief. An experienced pilot describes a night flight in which he lost all electrical power shortly after take-off but managed to navigate back to the aircraft carrier and land his plane safely. The class asks him questions about possible solutions to the problem. By the end of the discussion, it becomes apparent what sort of knowledge the pilot needed to safely operate the plane. The trainees agreed that they learned more about the system than when they were shown a wiring diagram and asked to memorize it.

- ShadowBox method – This was originally developed by the New York Fire Department. It is similar to Tactical Decision Games, but no organiser is required for this exercise. It also resembles on-the-job learning but does not require being on site. In this case, a group of experts read through a scenario, explain what they would do and why. The beginners are given the same scenarios and are asked to give their responses and reasons why, without knowing the experts’ answers. Once they are finished, they are presented with the experts’ answers and asked to compare their own to pick up any differences in decision making. They learn by seeing the situation through the eyes of the experts. A recent assessment of the method showed that the beginners significantly increased their match to experts after only a few hours. These training methods have been used
extensively by trainers in aviation, firefighting, the US Marine Corps, the Navy, and in medical fields. The Marine Corps went a step further when it came to Tactical Decision Games and incorporated virtual reality technologies to further improve the learning experience. During their 2017 Spartan Week organised with the Office of Naval Research to train decision making, they created something called the Interactive Tactical Decision Game - a web technology-based application that serves the same purpose as the paper-and-pencil exercises in TDGs, but is more realistic, thanks to an augmented-reality headset. It inserts virtual objects (e.g. vehicles) or effects (e.g. extreme weather conditions, or explosions in the case of the Marines) into a real environment to create situations that truly resemble real-life. One of the lieutenants taking part in the training stated that the simulation was a good simulation of past field exercises and a tool for giving valuable debrief on what they did wrong and what could be improved. He called it a real “a-ha” moment.

The advantage of using virtual reality in training is that it gives a sense of presence to the learner, it eliminates the boundary between a theoretical, imagined simulation and its correspondent, real-life situation.

Summary:

In this booklet we discussed how we can improve our decision making as individuals and in groups, in various circumstances, and how to create an environment where the best decisions can be made. The following points summarise the key information that we hope can help you to improve yourself as a seafarer.

- We understand that diversity of thinking in a team gives greater perspective and helps to improve the quality of the decisions made
- We can improve the decisions we make as groups by communicating relevant information clearly.
- We can improve our decisions as groups by creating a comfortable and open atmosphere, which helps us to work at our best.
- We can avoid accidents by creating an environment where reporting mistakes and discussing them is welcomed and leads to better understanding of processes, avoiding the same mistakes in the future.
- We can help avoid mistakes by being open and informing others if we cannot perform at our best due to fatigue or any other personal circumstances, to reduce the chances of making a poor decision.
- We can improve the decisions we make as groups by establishing standard practices (the PACE method) and knowing our individual roles and those of our crewmates.
- There are several tools that we can use to train our intuitive decision making, make learning easier, and improve our understanding of our training.
Further Reading:


CHIRP Maritime is grateful to our sponsors for supporting this project.

We aim to improve the safety of all individuals employed in or associated with maritime operations.

We manage an independent confidential reporting programme for the reception and handling of human factors and hazardous safety-related issues associated with the international maritime communities.

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