



SAFEMODE

Strengthening synergies between Aviation and Maritime
in the area of Human Factors towards achieving more
efficient and resilient MODES of transportation.



Towards a Safety Learning Culture for the Shipping Industry

A White Paper

*"It's said that a wise person learns from his mistakes, a wiser one learns from others' mistakes,
but the wisest person of all learns from others' successes."*

— John C Maxwell



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A White Paper

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Executive Summary

Within the framework of the EU-funded SAFEMODE project, a series of confidential, in-depth interviews of seafarers and investigators was carried out to ascertain the current status of Safety Culture in the shipping industry, and to recommend possible avenues for improvement. The interview script covered practices in incident and accident investigation and reporting, the Human Element, the factors that keep the ship safe, the role of the Safety Management System, Just Culture and Safety Learning. The seafarers' and investigators' interviews were complemented by small focus groups with unions, education and safety bodies. Participants were open and genuine in providing their opinions, as anonymity was preserved. The general consensus among interviewees was that seafarers are the ones who keep ships safe at sea, which is a good omen for Safety Culture in the shipping industry. The originally intended 'destination' for the shipping industry was to be Just Culture, but the interviews quickly revealed that Safety Learning, already evident in some parts of the industry, appeared a more pragmatic and attainable destination, one that could add safety improvements and shore up Safety Culture.



To this end, ten best practices in Safety Learning judged to be a good fit for the shipping industry are proposed, along with outline explanations of how they work, and indications of where corporate-level leadership and engagement is required. Individually, any one of these approaches can lead to safety improvement, but together they can lead to a Safety Learning Culture that will yield significant safety dividends. This White Paper presents its premises, findings and recommended ways forward as follows:

Chapter 1 sets the scene for the study and details the practical aspects, and considers the potential destinations for shipping, including Just Culture, Reporting Culture, Culture of Care, Safety Culture and Learning Culture.

Chapter 2 presents the detailed insights gathered during the interviews, supported by direct quotes from participants.

Chapter 3 focuses on best practices in Safety Learning, introducing the Safety Learning Cycle and the ten proposed Safety Learning approaches. This chapter offers practical tools to improve safety by capitalizing on lessons learned from safety-related incidents, accidents, near misses and successes.

Chapter 4 focuses on the voyage from first application of Safety Learning approaches to achieving a Safety Learning Culture, and highlights some of the hurdles identified during the interviews, while providing a roadmap for actors willing to embark on the journey.

The Annex presents six use cases from maritime industry stakeholders who have already begun the journey towards a Safety Learning Culture.

1 The Shipping Industry Is the Tide Turning in Favour of Safety?

The shipping industry outdates all other transport domains by millennia, and in terms of the transport of goods still far outstrips rail, automotive and aviation by a significant degree, with ships transporting 90% of global trade. Yet most of this is unseen by the public, as vessels are often far offshore, and most ports have progressively migrated outside cities and security requirements hinder public access. Similarly to rail and aviation domains, major accidents involving passengers are relatively few, and cargo ships involved in collisions or groundings do not tend to gain press unless they lead to major loss of life, environmental damage, or substantial blockages of major shipping routes.

Arguably, however, shipping accidents are edging more into the public consciousness, with high profile disasters such as the *Costa Concordia*, and the sustained coverage of the *Ever Given* ultra-large container ship blocking the Suez Canal. But there is also a growing push for more safety, and for Safety Culture, coming from within the industry itself. This may be because certain sectors such as passenger ships are well aware that even minor accidents can lead to major reputation damage. Similarly, some cargo sectors hail from the Chemical and Oil & Gas industries, which themselves have stringent Safety Management Systems (SMS) and Safety Culture approaches, so a migration of these processes and practices towards the relevant shipping sector is to be expected. More generally, better safety is business common sense, as it focuses on loss prevention and business continuity: safety is good for business.

If the tide is indeed turning in favour of safety, both from external scrutiny and internal motivation, it is timely to ask where improvements can be made system-wide across the industry. One such potential approach is to enhance overall Safety Culture by moving towards what is known as a Safety Learning Culture.

With this aim in mind, as part of a three-year European Union funded project called SAFEMODE, EUROCONTROL, the

organisation for the safety of European air navigation, was tasked with exploring the 'state of play' in safety reporting and learning in the shipping industry. EUROCONTROL was chosen as it has led a European-wide Safety Culture programme for the past two decades, and aviation is seen as having a strong Learning Culture. The idea was simple – to have someone look at shipping from the outside.

The approach taken was equally straightforward, namely to interview a number of seafarers and investigators (national and company), to gather their perspectives on Safety Learning in the shipping industry. These interviews were carried out by SAFEMODE partners from the aviation industry so as to ensure an objective and unbiased assessment, while also ensuring interviewee confidentiality.

Each of the 19 video interviews¹, which took place between October 2020 and January 2021, lasted around ninety minutes. The interviews, led by three Human Factors and Safety Culture experts, were hence carried out during the pandemic. Each interviewee had the option of seeing the transcript of their interview and amending answers if they so desired. This happened in several cases, mainly to add supplementary information. No substantive changes were made by any of the participants. All interviews were thus held in good faith, with interviewees giving honest and frank answers to the questions asked.

The seafarers (both officers and ratings) came from several segments of the shipping industry, namely cargo/container, chemical tanker, and passenger/cruise ships. Investigators were mostly from their respective national authorities but some of them worked for shipping companies. In total, the respondent set came from the following thirteen countries: Denmark, France, Italy, India, Malta, Mexico, the Netherlands, Portugal, Romania, Spain, Sweden, the United Kingdom, and the United States of America.

The interview questions were generally open in nature, and the interview structure followed the same 'journey' with each participant, beginning with investigation and reporting, moving on to near miss reporting, then to the consideration of the Human Element and safety at sea. Next followed a discussion of the role of the SMS at sea, the applicability of Just Culture in the shipping context, and finally how Safety Learning works in practice. At the end of each interview, the interviewee was asked about the best way forward and the so-called magic wand question, namely: *If you could change one thing, what would you change?*

¹ Applying the saturation principle commonly used in qualitative research, this sample size was sufficient to gain a robust and valid understanding of the study issues.



The responses from all the interviews were collated by the team of interviewers, and common themes and insights extracted separately for both seafarers and investigators.

In **Chapter 2**, which presents the insights gained from these interviews, direct quotes are used, as these capture what the interviewees were trying to say. In almost all cases, several interviewees effectively said the same thing, using slightly different words and contexts. It should be noted that many of the investigators went out of their way to praise seafarers for carrying out their jobs to the best of their ability in sometimes difficult and challenging conditions.

This bodes well for Safety Culture in the shipping industry, and echoes what is said in aviation, that *people make safety*.

Following these interviews, four further sessions were held, one with unions representatives, one with the European Maritime Safety Agency (EMSA), one with a maritime training organisation, and one with representatives from the International Maritime Organization (IMO). These were not interviews as such, rather they were to present the initial findings and gain informal reactions and feedback from these bodies' representatives, and also to help identify the best way forward for the industry. Subsequently, the interim results from the interviews were presented at several forums, notably MCA's Human Element Advisory Group (HEAG), OCIMF's Human Factors Committee (HFC) and IMarEST's Human Element Working Group (HEWG) in the UK, as well as the Stability and Safety at Sea (STAB&S) conference in Scotland, during which valuable feedback was received from experts in the shipping industry.



The Interview approach

- I. Investigation
- II. Reporting
- III. Near miss reporting
- IV. Understanding the Human Element
- V. What keeps ships safe?
- VI. Safety Management Systems (SMS)
- VII. Just Culture
- VIII. Safety Learning

Possible Destinations for the Shipping Industry

Safety Culture is the over-arching concept that embodies Just Culture, Reporting Culture, Learning Culture, and the relatively new Culture of Care arising in the shipping industry. Safety Culture is essentially the priority given to safety, and is hence the motivation for safety at all levels in an organisation, encapsulating *'the way we do things safely around here,'* even when no one is looking.

Just Culture, in which people are not punished for honest mistakes, is seen in many industries as a driver and enabler for honest reporting in accidents, incidents and near misses, and hence underpinning a healthy Reporting Culture.

Learning Culture arises from Reporting Culture, and focuses on how people, organisations and entire industries learn from past incidents, accidents and near misses, as well as successes, to become safer. The simple argument is that if you have Just Culture you get good reporting, and if you have good reporting you can learn to be safer, thus leading to a better Safety Culture.

Culture of Care concerns looking after the wellbeing of seafarers and all who work in the industry, founded on respect and empathy for one's colleagues, and again can be a major enabler for safety and Safety Culture, and reflects the growing global trend in focus on wellbeing of people at work in all industries.

At the outset of this study, the intention was to see whether Just Culture, considered a pre-requisite for Safety Learning in aviation and now enshrined in European aviation law, would be a good fit for the shipping industry. However, fairly early on in the interviews it became apparent that this might not be such a straightforward journey for shipping, and that other destinations might better suit the shipping industry at this time, and deliver more added value in terms of safety at sea.

Hence for this White Paper, and almost since the first interviews, it became clear that the

destination that can be reached relatively quickly, and which could possibly deliver a step-change improvement in safety in a relatively short timeframe, is that of Learning Culture. Therefore, following the insights from the interviews, **Chapter 3** focuses on best practices in Safety Learning, some of which are already evident in parts of the shipping industry.



- Safety Culture
- Just Culture
- Reporting Culture
- Learning Culture
- Culture of Care

Chapter 4 recounts some of the more enduring structural elements identified during the interviews that can impede safety progress. The resolution of such issues is likely to require more sustained effort in areas such as Safety Culture and possibly Culture of Care. The remainder of the chapter is forward-looking, including a roadmap for moving towards a Safety Learning Culture. Shipping clearly has the potential to plough ahead in Safety Learning practices, which, once realised, will enhance safety industry-wide.

The **Annex** comprises six use cases showing Safety Learning in practice in today's shipping industry.

Insights from Investigator and Seafarer Interviews

The following eight sections each show representative examples of verbatim comments received during the interviews.

- I. Investigation
- II. Reporting
- III. Near miss reporting
- IV. Understanding the Human Element
- V. What keeps ships safe?
- VI. Safety Management Systems (SMS)
- VII. Just Culture
- VIII. Safety Learning

This chapter gives a snapshot of Safety Learning and Safety Culture in the shipping industry, and is the basis for Chapters 3 & 4 to propose the best ways forward.

I. Investigation

Investigators made it clear they are not there to apportion blame, though they do need to verify compliance with procedures. Their principal aim is to determine the incident or accident's causes and contributory factors. They contrasted their focus on the creation of a *narrative* of what happened and the rationale behind the sequence of events, with the judiciary perspective, which focuses on direct causality, and also has a sense that *justice must be served*. This conflict between investigatory bodies and judiciaries is well known in other industries, and unfortunately can be counter-productive to Safety Learning. Some investigators pointed out that their reports were sometimes used by judiciaries to apportion blame, even when they tried to persuade such judiciaries not to do so. This can lead to some seafarers requesting their lawyer be present when they are being questioned, and saying as little as possible.

The seafarer's perspective on investigation is therefore somewhat different to that of the investigator, and generally seafarers are wary of investigation.

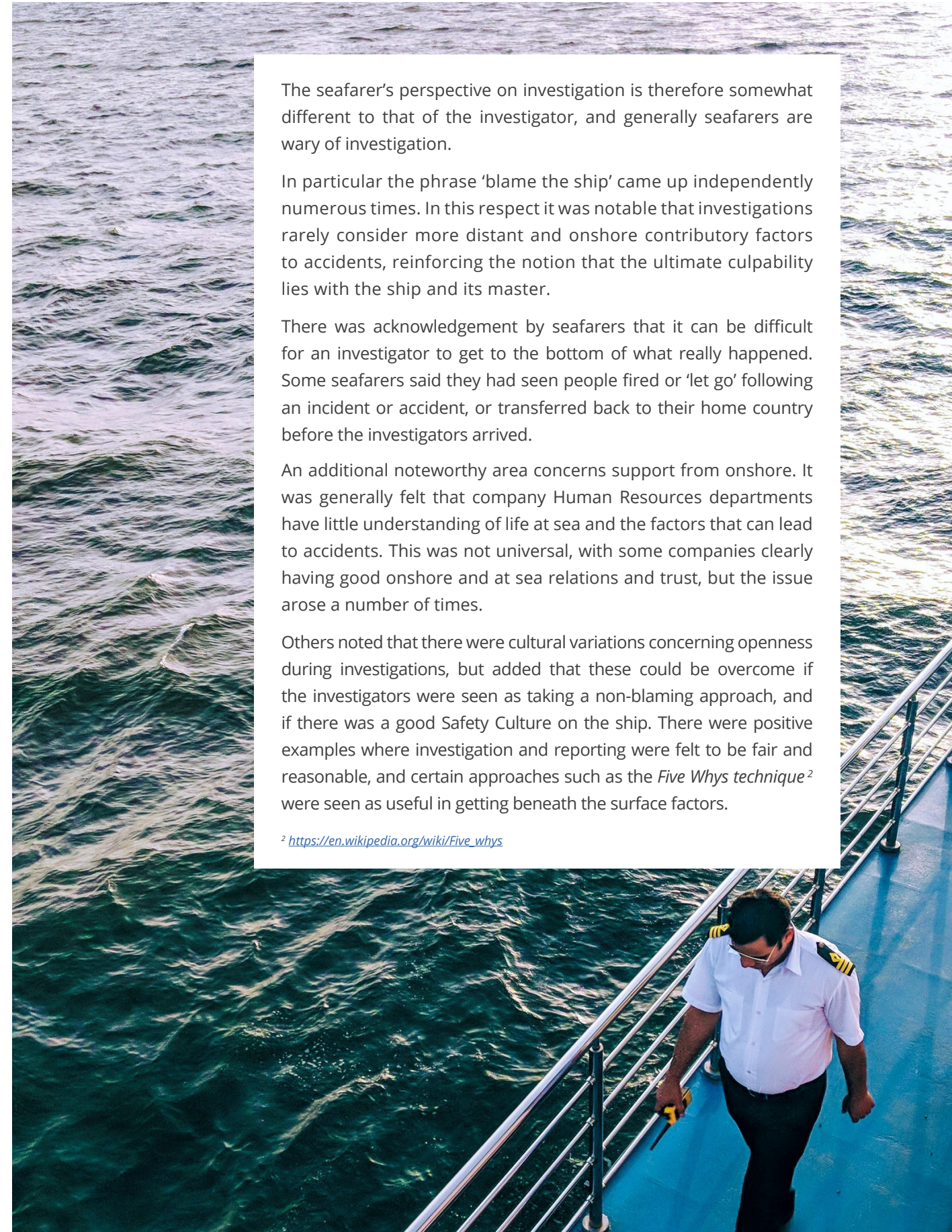
In particular the phrase 'blame the ship' came up independently numerous times. In this respect it was notable that investigations rarely consider more distant and onshore contributory factors to accidents, reinforcing the notion that the ultimate culpability lies with the ship and its master.

There was acknowledgement by seafarers that it can be difficult for an investigator to get to the bottom of what really happened. Some seafarers said they had seen people fired or 'let go' following an incident or accident, or transferred back to their home country before the investigators arrived.

An additional noteworthy area concerns support from onshore. It was generally felt that company Human Resources departments have little understanding of life at sea and the factors that can lead to accidents. This was not universal, with some companies clearly having good onshore and at sea relations and trust, but the issue arose a number of times.

Others noted that there were cultural variations concerning openness during investigations, but added that these could be overcome if the investigators were seen as taking a non-blaming approach, and if there was a good Safety Culture on the ship. There were positive examples where investigation and reporting were felt to be fair and reasonable, and certain approaches such as the *Five Whys technique*² were seen as useful in getting beneath the surface factors.

² https://en.wikipedia.org/wiki/Five_whys



The Investigator's Perspective

'The aim is to define the causes, not the responsibility. The idea is to determine the technical causes, including the Human Element.'

'Investigation reports are not there to apportion blame, but compliance needs to be verified.'

'Recommendations are generated through a collaborative process.'

'Early on you get a feeling of culpability: whether it will be a straightforward investigation dealing more with technical issues than human ones. Usually navigational incidents are related to Human Factors whereas engine fires are heavy on technical factors.'

'Sometimes by the time I [the investigator] arrive, the person involved has been sent home or is no longer with the company.'

'For the judiciary, there is direct causality, which is different from what is in the incident report.'

'The investigator creates a narrative, then the judiciary creates a different one, sometimes conflictual with the investigatory one. There is a judiciary sense that Justice must be served.'

'We are trying to raise our game. We now want to investigate and interview the crew as a team. We want to become a learning organisation.'

The Seafarer's Perspective

'There can be finger-pointing in investigation. Nobody likes it. It can make it difficult to get to the bottom of an investigation.'

'Investigators are not looking for the guilty person, but to see which procedures were not followed.'

'During an investigation the company lawyers come aboard and will protect you, but the main reason is to ensure the company is not seen as being at fault.'

'Sometimes the way questions are asked by the company calls the crew's professionalism into doubt.'

'It is always "Blame the ship." That is the first reflex of some companies.'

'An investigator comes on board and starts asking questions to the people involved, trying to understand what the technical issues might be.'

'Sometimes the real truth about what happened does not come out until months later.'

'Degree of openness can vary strongly according to culture.'

'A captain is often blamed by the company if not on the bridge when an incident occurs.'

'There is a lack of empathy and trust from onshore personnel, even when they have offshore experience.'

'The "Five Why's" approach is a good one, as it gets beneath the surface issues.'

II. Reporting

Reporting mainly concerns seafarers, those who report. The responses were generally unfavourable concerning reporting, although there were some instances of positive reporting attitudes and practices. The prevailing picture is one of not reporting unless you have to, because reporting is complicated and seen mainly as a way of attributing blame to those at the 'sharp end'. As one seafarer put it, 'Convince me I won't be punished, and I'll report.'

On the positive side, several seafarers talked of the importance of having an open culture on board the ship, in particular led by the captain and the senior officers. Several captains, including older ones, remarked that this was a general trend they saw as newer and younger captains gained their commands.

There were also several positive examples where ships received weekly information sheets concerning incidents and safety issues from other parts of the fleet, an excellent example of Safety Learning best practice.

'Reporting is what seafarers try to avoid at all costs.'

'The captain is key for reporting – (s)he sets the tone of the on-board reporting culture, especially with multi-cultural crews. The captain needs to be seen around the ship and talk to people, be open with them.'

'The formal system for reporting is very complicated, with multiple forms. It is a hindrance to reporting.'

'The captain needs to send the message: We are human and things can go wrong; there is no blame, only questions.'

'You are encouraged to report for safety. But nobody from the office comes offshore.'

'The best way to find out what really happened is to keep talking to the crew and have an open door policy – some cultures are very closely-knit and will defend each other.'

'The distant factors, those under the influence of the company, don't get reported. In one instance after most of the crew had just been changed, the captain was blamed for not preventing the incident.'

'We receive [learning] reports from other ships in the fleet. It is easy to make a report.'



III. Near Miss Reporting

Near miss reporting, in which people report events that *could* have resulted in a reportable event (but did not in this particular instance), are important in a learning system. They help to see what could have happened, and anticipate accidents rather than waiting until they occur. However, the feedback on near miss reporting was negative.

Despite this negative impression, there were constructive comments on how to improve it, and the barriers that need to be removed, including a mistaken mindset that an increasing number of reports indicates a lack of safety. Rather, more reports should be taken as more feedback, more data upon which to understand and improve safety.

National investigators were quick to point out that generally speaking they have just enough resources to analyse formal reports, and so do not have time to delve into the near misses. The near miss reporting domain therefore more properly resides with the organisations and their safety departments.

Issues

'We do not get the reports we want. We get trips and falls, but never a mariner falling asleep on watch, or an engineer having problems assembling machinery.'

'If you are lucky, 10% of near misses are reported.'

'Some companies have near miss reporting targets in their SMS. So the captain ends up altering reports to reach the target.'

'There is a lot of data but we don't know how to analyse it. We're lacking strong methodologies.'

'Procedures that are not working are hidden.'

'Such reporting schemes promote organisational secrecy rather than organisational learning.'

'For near misses, the narratives are more useful than the checked boxes, but companies count the latter.'

'There is an anonymous reporting scheme. It has been used once in 17 years.'

'We have a near miss reporting system. It is electronic and time-consuming, and not very helpful.'

'Near miss reporting App can be used to report violations by another person, to discredit them.'

Work in progress

'To make them useful, companies need to focus on quality of the reports, not quantity, and disseminate anonymised descriptions of what happened for learning purposes.'

'We have an electronic voluntary reporting system which leads to monthly lessons learned. But on board there is no easy access to computers and very little or no wifi.'

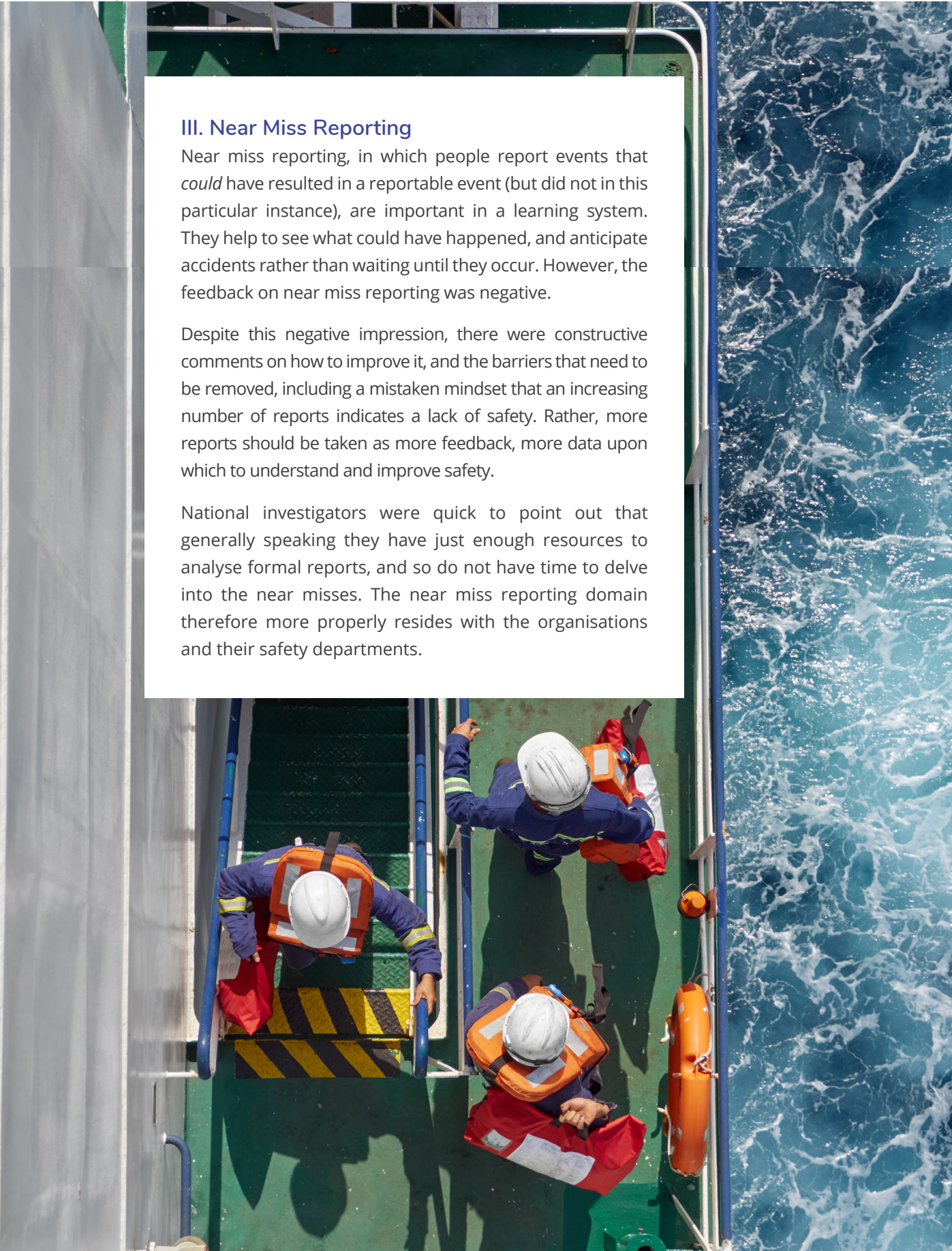
'National administration tried to implement one but there was no participation.'

'We have a near miss system, but if a ship reports too many near misses, the company will say "your ship is not safe."'

'People have to believe they will not be punished, or else they will not report.'

'Our near-miss system informs the SMS. If they [onshore] detect a trend, they update the SMS.'

'A new App is being introduced by the company.'



IV. Understanding the Human Element

In order to learn across events, there is a need to categorise them in some way, otherwise there is a ‘Tower of Babel’ effect, resulting in an abundance of rich stories but little learning from one event to another. Investigators are often skilled in various scientific and engineering disciplines that can help explain fires, corrosion, mechanical failures, etc. When it comes to the Human Element, however, it appears that there is far less expertise, or access to such expertise, to help explain why and how crews behaved the way they did.

Seafarers had relatively little formal training on the Human Element, but surprisingly, a number of investigators similarly felt under-informed about the Human Element. While one or two felt they had sufficient knowledge, most investigators called for more formal training on Human Factors in incidents. Certain sources of Human Element training were mentioned by several investigators, such as Cranfield University, and also the so-called *Deadly Dozen* developed by MCA³. It is a useful list, borne from the analysis and experience of countless incidents and accidents, and allows training on how to avoid these problems in day-to-day operations (e.g. as used by Shell⁴).

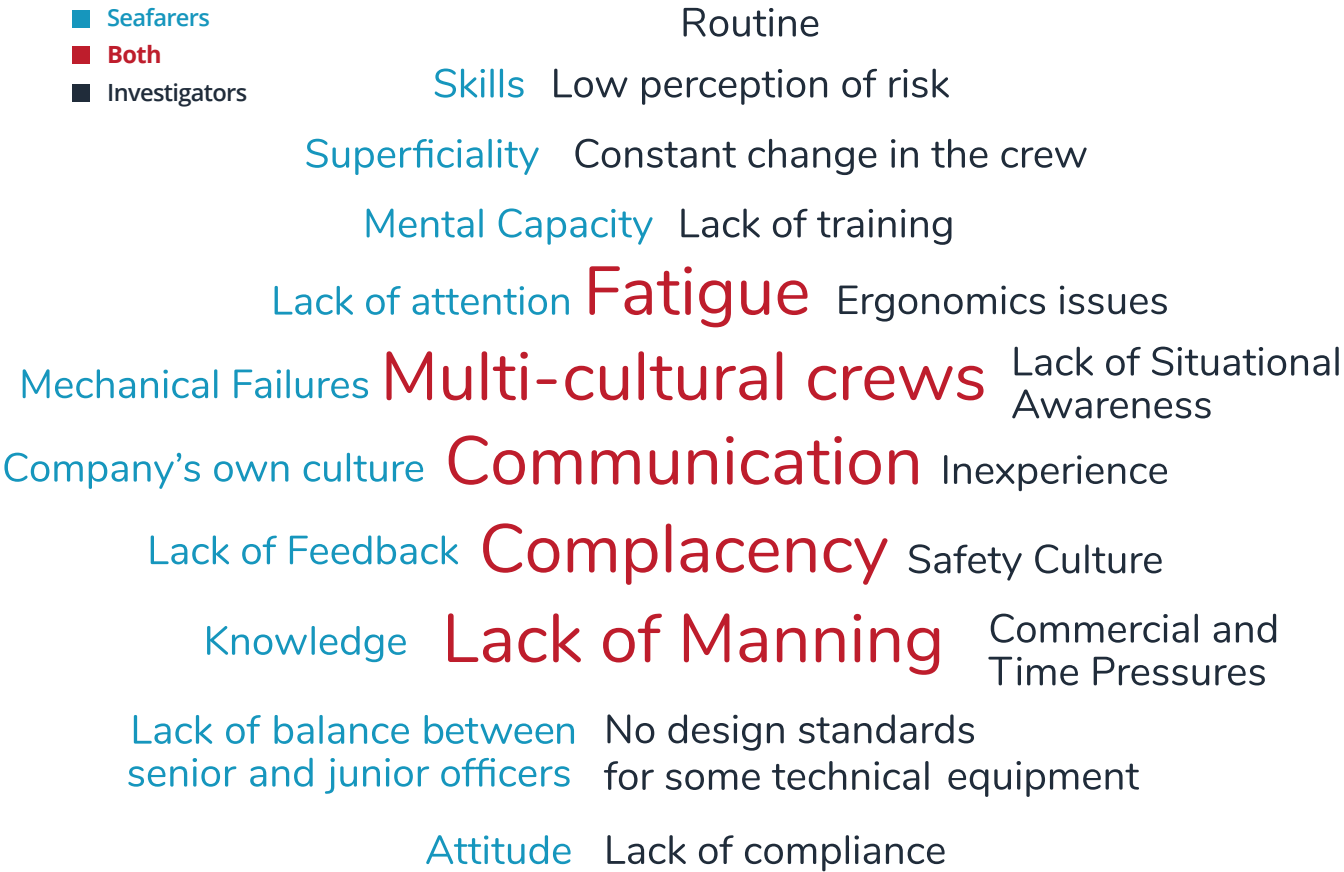
Whilst these categories represent a good and manageable hit-list of predominant factors, responses from the interviewees raised a wider spread of factors they thought led to accidents and incidents, as shown on page 19, including some related to the more ‘distant’ factors mentioned under the section on reporting, above, such as lack of manning, bridge design and equipment, frequent change in crew, and commercial and time pressures. What is interesting in the word cloud below and the one in section V, is that, despite some overlap, there are substantial differences between investigators and active seafarers’ views about the contributory factors and the positive safety factors. It seems seafarers focus more on the enhancement of their immediate surrounding (their crew and ship) while investigators include higher-level factors such as design and ergonomics or organizational



factors. This indicates the need for a common language between investigators and seafarers on the real factors that contribute to incidents and accidents at sea.

- The “Deadly Dozen”
- Situation awareness
 - Alerting
 - Fitness for duty
 - Fatigue
 - Communication
 - Complacency
 - Culture
 - Distraction
 - Work pressure
 - Capability
 - Teamwork
 - Local practices

³ MCA - Marine Guidance Note MGN520 (M)
⁴ Shell LFI - People Make Mistakes (rapidview.co.uk)



‘There is not much training for investigators on the Human Element or Organizational factors.’

‘Human Factors training may not be quite useful for generalist inspectors. They just need to be aware that models exist and they can be used if needed (behavioural, individualistic, systems-type approach). Much of the shipping industry is really focused on procedural compliance.’

‘Human Element is taken into account in the investigation, because some elements such as fatigue, time on ship and operational environment) are in the investigation procedure manual. But I do not use a specific classification of Human Element.’

‘More time should be dedicated to the Human Element. Current requirements imply 4-5 days of Human Element training out of a 2-3 year training programme, this is simply not enough.’

‘The industry remains very varied and there is very little Human Factors knowledge and training.’

‘It is still very common in maritime to believe that if things go right, it is because you are a good sailor and if they go wrong, it is because you are stupid.’

V. What Keeps Ships Safe?

One question asked of all interviewees was *what keeps ships safe most of the time?* This question is rooted in the knowledge that safety is generally high in the shipping industry, despite a number of adverse and unpredictable factors. Top of the list were *procedures* and *experience*.

Procedures was a little surprising given the interviewees’ earlier comments about too strong a focus on procedural compliance during investigation, but it appears this focus is not unjustified, as several interviewees highlighted that procedures are in place foremost to protect them (use of protective equipment, lifelines, etc.). It should be noted that the terms *procedures* and *SMS* were clearly covering different aspects for the people interviewed, who considered procedures as a safety protection in their day to day operations, while the Safety Management System is viewed more as a burdensome tool barely known to seafarers (see section VI below).

Experience was seen as key, especially at senior level, as so many things can happen which are not covered adequately by procedures, and because conditions can change rapidly on a ship. Professionalism, training and flexibility were also seen as key attributes for safety. Interestingly, many of the investigators went out of their way to praise the ship personnel for maintaining such a high level of safety under frequently very challenging circumstances including, but not limited to, the COVID-19 pandemic.

One interpretation of the results here is that safety in shipping comes from a combination of procedures (from company) and experience (from crew). Optimum safety is achieved whenever procedures take into account the realities of the operational context, and experience is complemented with factors such as professionalism, training and flexibility.

It may be useful at some point to develop a ‘mirror-image’ counterpart of the *Deadly Dozen*, naming those factors and properties of the shipping industry that need to be kept healthy in order to have a safe and resilient ship and fleet.



- Seafarers
- Both
- Investigators



‘Ship crews excel in being adaptive to changing circumstances.’

‘Crews come from various crewing agencies so they are all from various backgrounds, with different training and experience; they are constantly partially replaced and yet, nothing goes wrong.’

‘Seafarers look after each other, they take actions they were not required to take to save the day.’

‘Some national stereotypes are sometimes noticed by investigators but, all in all, they are all trying to do the best they can.’

‘The common goal of all seafarers is to keep the operations safe. Day after day they practice safety.’

VI. Safety Management Systems (SMS)

Safety Learning is usually part of the safety approach of a company or organisation, and so fits under what is called the Safety Management System or SMS. However, feedback on SMS from seafarers was not positive, as is highlighted in the insert. This to an extent corroborates the earlier assertion that there is sometimes quite a gap in understanding between onshore departments and operations on a ship.

Any SMS usually includes a learning process, but if reporting is poor or ‘shallow’, as indicated by the interviews, then learning will be limited. Moreover, having a learning process does not mean you have a Learning Culture (in the same way as owning a cookbook does not mean you are a good cook). Nevertheless, having an SMS is ultimately positive, as it means that new learning processes can be incorporated, and certain foundations for developing a Learning Culture are already in place.

However, if the SMS remains generic and only partially relevant to the individual ship, this may simply serve to reinforce what some seafarers believe, that while procedures may be there to protect them and the ship, the SMS may be perceived as a tool to first preserve management interests. This suggests that the SMS needs to be more reflective of realistic operations and conditions on board, and since each ship is different, individual (or at least ‘tailored’) SMSs would serve safety better than generic ones.



‘Ships often have a generic SMS, rather than a specific one for the actual ship. It doesn’t fit the unique working of the individual ship.’

‘For some, safety in the seas just means nothing.’

‘We have an SMS but it is ‘work as imagined’. It is pretty awful.’

‘There is one standard SMS for the whole company, but each Master has their Standing Orders.’

‘The SMS is a single tool for the entire fleet, regardless of the type of vessel. It has identical procedures and instructions even when they make no sense, e.g. for closing ramps when the ship has no ramps.’

‘The amount of documentation Masters are supposed to know is staggering e.g. 5000 procedures, all in a three-day handover.’

‘We have a general SMS but there are special procedures for each class of ship. It is complicated, you have to dig and dig to find the element you are looking for. The captain has to forward any updates to the engineer.’

VII. Just Culture

A number of the comments until now reflect the fact that seafarers are reluctant to report in case they are punished for their actions, whether this amounts to a reprimand, loss of job, or even in extreme cases being sent to prison. Just Culture, which means that no one is punished for honest mistakes, is now implemented in a number of industries to facilitate learning valuable safety lessons. For example, for some time now in aviation the decision has been made that it is better to learn than to blame, because if you blame someone you stop asking the harder questions about the underlying factors that contributed to the event, which will contribute to the next event if unchecked. This decision has certainly contributed to aviation becoming the safest mode of transport. The way it works is that pilots and controllers are not prosecuted after incidents or accidents (aside from a very small number of exceptions), and so feel safe to report honestly and completely, which maximises learning. In Europe, Just Culture in aviation has been enshrined in law, and is defined as follows:

“A culture in which front-line operators or other persons [staff] are not punished for actions or decisions taken by them that are commensurate with their experience and training, but in which gross negligence, wilful violations and destructive acts are not tolerated.”
(Regulation No. EU 376/2017)

It is not a perfect definition. Determining what constitutes ‘gross negligence’, for example, can be very subjective and culturally-dependent. Similarly, ‘wilful violations’ can be interpreted in different ways. One way out of these difficulties is known as the **substitution test**, in which the question is asked whether someone else in the same situation might have made the same decision or error. It is important that those applying this test are familiar with the realities of

Is making Just Culture a legal requirement a good idea?

‘If we could eliminate criminal & civil case proceedings, it would really help. Stop criminalizing seafarers! Sometimes they are used as scapegoats.’

‘Ships are manned by ship owners via a cascade of sub-contracting parties and manning agents. Most crew are on 6-month contracts. They know that if they report something, they will never get another contract. Blacklisting is a reality.’

‘You need to send the message: we’re not blaming you, but we need to learn.’

‘Most Human Resources have no marine background. They are defensive as they could end up in industrial tribunal trying to defend the company.’

‘The term Just Culture is not what is important. Better to talk about Learning Culture.’

work in practice, with all the constraints and trade-offs that people have to make on a daily basis. Many aviation organisations do not adopt Just Culture merely because the law says they must. For example, one European low-cost airline has a simple rationale as to why Just Culture is important:

- Finding out what’s really happening
- Having honest discussions
 - Between managers and staff
 - Between companies
- Learning from events
- Being able to anticipate future events

All interviewees were asked if they believed putting Just Culture into legislation in shipping was a good idea (the Just Culture concept had to be outlined to about half the participants, who had not heard of it). Only half thought the industry was ready for such legislation. All, however, felt that criminalising seafarers was a significant impediment to reporting and learning.



Just Culture Charter

Ensure freedom to work, speak up and report without fear: people at work should feel free to work, speak up and report harmful situations, conditions, events, incidents or accidents without fear of unfair, unjust or unreasonable blame or punishment.

Support people involved in incidents or accidents: the organisation must support people who are involved in or affected by accidents. This is the first priority after an unwanted event.

Don't accept unacceptable behaviour: gross negligence and wilful misconduct are very rare, but cannot be tolerated.

Take a systems perspective: safety must be considered in the context of the overall system, not isolated individuals, parts, events or outcomes. The system is the main influence on performance.

Design systems that make it easy to do the right things: improving safety means designing ways of working that make it easy to do the right thing and hard to do the wrong thing.

Can you have a Learning Culture without Just Culture?

This is a key question, and the short answer is that you can use Just Culture principles to enhance learning, even if they are not enshrined in the law. An example of key principles is shown here via a charter for Just Culture developed in the European aviation industry.

There was a feeling amongst a number of interviewees, however, that Just Culture in the shipping industry is a step too far at this time. Reasons cited included the complexity inherent in the shipping industry with multiple interconnected stakeholders (ship builder, owner, charterer, and manning via a cascade of sub-contracting parties, etc.) which may hinder global acceptance of Just Culture throughout the industry. The absence of secure long term contracts and economical pressure were also mentioned as potential hurdles to Just Culture implementation.

As there are some excellent approaches to learning in the industry, this may be a more achievable and pragmatic destination for shipping. Safety Learning approaches are therefore discussed in Chapter 3.

VIII – Safety Learning

National Investigators were asked how often their investigation reports led to actual improvements. Somewhat surprisingly, this did not appear to happen that frequently (though there were concrete examples in the leisure and small boating sectors).

Much of the learning cited seemed to be indirect, happening inside the organisations who received the reports, or via subtle shifts in their Safety Culture. This contrasts with other industries, where the primary purpose of investigation is to prevent recurrence of adverse events wherever possible, and recommendations often lead to system changes. Nevertheless, in several cases good learning systems were reported by seafarers, whereby they as captains received weekly or monthly briefings on safety issues and events relevant to their ship and its operations, and they cascaded the information to their crews. This represents excellent Safety Learning practice. This suggests, as one investigator put it, that the investigator’s role is to lay out the facts and analysis as best they can, and then it is up to the company and organisation to decide how to use this information for Safety Learning.

Overall however, and despite ‘pockets’ of good Safety Learning practices, the shipping industry does not seem to focus on Safety Learning. The lack of reporting, the criminalisation of seafarers (not necessarily widespread but enough to set the tone), the ‘blame the ship’ mentality, the lack of common terminology, and also the diversity of ships and ship systems (bridges etc.), are all seen as strong impediments to learning. In a sense these factors are akin to a current causing a ‘drift’ away from effective Safety Learning, which means that more affirmative actions need to be undertaken to get back on course. Such actions are the focus of the next chapter.

The Investigator's Perspective

- “Can’t think of an example where a recommendation led to a safety improvement”*
- ‘Investigators define problems, but they don’t fix them. They serve a dual purpose, a societal one (e.g. for families of those affected) and an industry one (impartial feedback to organisations).’*
- ‘Investigations don’t lead to short term improvements – they are there to improve the overall Safety Culture. This is starting to happen in ferry and merchant sectors.’*
- ‘Even though investigators don’t provide solutions, there is organisational learning in some companies.’*
- ‘Companies who combine managers and ship owners are more willing to learn.’*
- ‘Pure management companies want strict recommendations so they can ask for more money from ship owners.’*
- ‘Maritime has plenty of accidents to learn from, but due to resources, we are analysing just the tip of the accidents.’*
- ‘Recommendations can improve safety, though sometimes the process takes years.’*
- ‘There is a strong resistance in the industry to link anything organisational to safety.’*

Safety Learning Approaches for the Shipping Industry

This chapter reviews ten Safety Learning approaches that should be a good fit for the shipping industry (some are already in use by various companies). Taken individually, they can improve safety via learning from mistakes (as well as successes). Taken as a whole, and if ‘enacted’ (made real, and not simply talked about), and backed up by safety leadership onshore and at sea, they can lead to a true Safety Learning Culture.

Because Safety Learning can take place at many levels in shipping organisations, it is useful to first consider how Safety Learning works via a *Safety Learning Cycle*, and what Safety Learning means to different layers in a company, from deckhand to CEO.

The Safety Learning Cycle⁵

In this cyclical model developed for the SAFEMODE project, if any adverse or potentially adverse events, or significant successes or recoveries from failure are detected during operations or maintenance, they are reported and documented. This is *Data Capture*. These data are then analysed to see how and why the events occurred – the context, causes and contributory factors – as well as what stopped them from having worse consequences, sometimes called the barriers.

This leads to the identification of key factors and barriers to act upon to reduce recurrence, and hence to the specification of safety improvement measures. So far, this is *localised* learning: these specific factors on this particular day on this specific ship with this particular crew led to these outcomes, and here is how to prevent it happening again. This learning can then be expanded to consider other events that could have happened with this crew and ship, knowing its operations and constraints, leading to more generalised *ship-wide learning*.



⁵<https://safemodeproject.eu/about-safemode>



However, more effective Safety Learning goes deeper, identifying how to protect other ships and crews on other days under similar but not identical circumstances. Learning is focusing on the shipping system, through the lens of the event or accident in question. Often at this level, multiple events or accidents are being considered, in order to achieve **system-wide learning** rather than ‘episodic’ learning.

The final step in the learning cycle, which is more rare to see, is when lessons learned do not simply affect training, crewing and procedures – the so-called ‘softer’ (and also cheaper) elements to fix – but also the **design of vessels and the on-board equipment**, including human-machine interfaces as for example found in the engine room and on the bridge. Ideally, at this level, design changes are informed by **risk models** that consider all possible known causes and contributors, and their relative importance as evidenced by operations as well as incident and accident experience. Such risk models can help pinpoint where to best focus safety-related

changes to the ship system. This then constitutes **risk-informed design**.

Risk-informed design is rarer to see because ships, like aircraft or trains, last decades, and once designed and built, are very expensive to retrofit. Nevertheless, since many new interfaces are digital, this means more change is possible, and it also makes sense to feed what is known about human error as a function of design, into the design process.

At this level there can also be **Deep Learning**, related to system-wide issues such as crew manning or fatigue management, or to factors deeper in the organisation concerning how ships and fleets are run, and how safety and human resources are managed. Deep Learning aims to tackle the endemic and sometimes structural organisational, design or Human Element issues that contribute to a wider range of incidents and accidents, whether these are at the level of the organisation, a segment of the industry, or the industry as a whole.



Six Safety Learning Levels

Safety learning can occur at various levels in the industry:

The most obvious level is **individual** – we all try to learn from our own mistakes, or from watching others make or avoid mistakes. However, this is not so helpful when the first time you find yourself in a situation, you make a mistake and there is an accident.

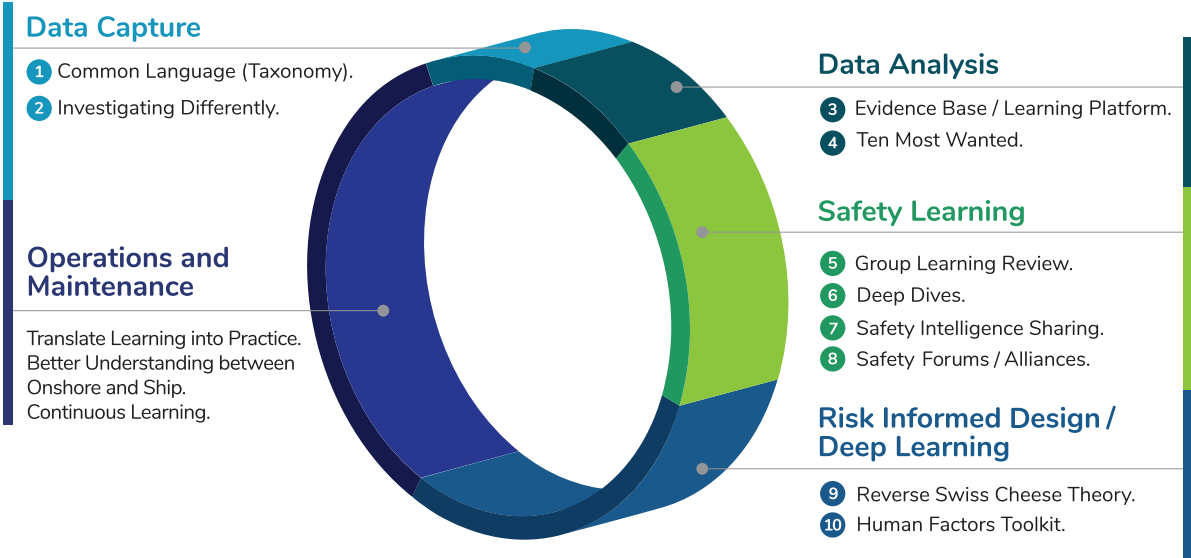
The second level is **Team or Group learning**, where we learn as a work-related group. This can be a very effective form of learning, because we are hearing from our peers, who perform the same jobs as us. This learning can be formal or informal, for example via team debriefs, or simply sharing stories within the group. The group may also be **culturally defined**, e.g. along national lines, so that learning occurs within a segment on the ship, that can then ideally be spread across different teams and hierarchical boundaries. Again, this can lead to effective Safety Learning because the group shares the same language, cultural references and values. And if staff turnover is relatively high, this can be an effective form of induction into the ship-wide Learning Culture, so new arrivals know very quickly ‘how safety is done around here.’

The third level is **ship-based learning**, whereby lessons learned are cascaded up and down between the crew and senior officers, the intention being to instil safety awareness throughout the entire crew. This is where Safety Learning starts to become systemic, because the various crew components are adapting the information to their ways of working.

The fourth level is **fleet-wide Safety Learning**, e.g. a company’s fleet of ferries or chemical tankers or containerships, etc. This is a powerful learning platform, as the organisational culture will be relatively stable across the ships in the fleet, the operations and crewing conditions will be similar, and the recipients will generally see the lessons as relevant, since the lessons come from the company they work for. In short, people reading or hearing about lessons from other ships in the fleet will be thinking, *‘that could have been me!’* The language, format and media of such lessons can be standardised across the company, and messages from the company leadership can accompany them periodically, to show that those at the top are serious about safety. This level of learning is critical to the fleet’s operational safety, so it is important to ensure that lessons learned are not ‘lost in translation.’ There is little point in transmitting Safety Learning aggregated by the organisation to the ship level, if the information cannot be adequately interpreted by the particular ship and its crew.

The fifth Safety Learning level is **sector-wide**, e.g. all chemical tankers, all cruise ships, etc. Safety Learning at this level can be harder to achieve due to competition and industry complexity. But at this level, statistics can be both powerful and compelling concerning the high priority threats in terms of safety, along with their causes and contributors. This is also the level at which systemic learning can have significant impact; if certain safety recommendations are adopted as best practice in one part of the sector, they can rapidly spread across the entire sector. This is the level at which regulatory institutions often get involved, because they collect and analyse casualty statistics that demand intervention. In other industries this is usually the level at which organisations collectively tackle key safety issues, because they are seen as business imperatives. Thus, multi-stakeholder safety alliances can form in different shipping sectors to address a **hit-list of safety concerns**, with or without regulatory encouragement.

The final level is **industry-wide**, dealing with issues that affect multiple sectors, such as regulations related to work and rest hours, or minimum safe crewing, or rules concerning increasing automation (including future autonomous shipping). At this level it is usually the institutional body at the top of the food chain – e.g. IMO in maritime, ICAO in aviation and IAEA in nuclear power – who coordinates learning, via stakeholder meetings and state-level committees. Safety learning at this level can be relatively slow, but can have the most widespread and sustained impact.



Ten Safety Learning Approaches

The ten Safety Learning approaches broadly fit into the earlier Safety Learning cycle. One difference in the two cycles is the focus on *Deep Learning* rather than *Risk-Informed Design*. This is because risk models are not so commonly used in the shipping domain.

1. A Common Language [Taxonomy]

In order to learn, there must be commonly understood ways of describing events, accidents and the Human Element. The technical term for this is a *Taxonomy*, which is basically an agreed set of definitions and descriptions. If every incident is described in everyday parlance, there is a *Tower of Babel* effect, because we all see and describe things slightly differently, so learning will be hard because every single event will seem unique. In practice, taxonomies can become complicated and unwieldy, to the point that seafarers don't relate to them, so care must be taken in their development. A taxonomy needs two components – a way of describing the **context** – the ship operation (e.g.



mooring, navigating in a narrow channel, watch-keeping, etc.) and the **Human Element**, especially the human performance influencing factors (e.g. fatigue, situation awareness, workload, etc.). If an organisation can agree on these, learning can really take off. For the Human Element part, the taxonomy should deal with not only what happened, but also how and why it happened, including more distant organisational factors. This ‘extra thinking’ already goes a long way towards Safety Learning.

There are many taxonomies (see above one example developed by SAFEMODE), and they can all facilitate learning, so an organisation needs to decide and settle on one – chopping and changing is counter-productive.

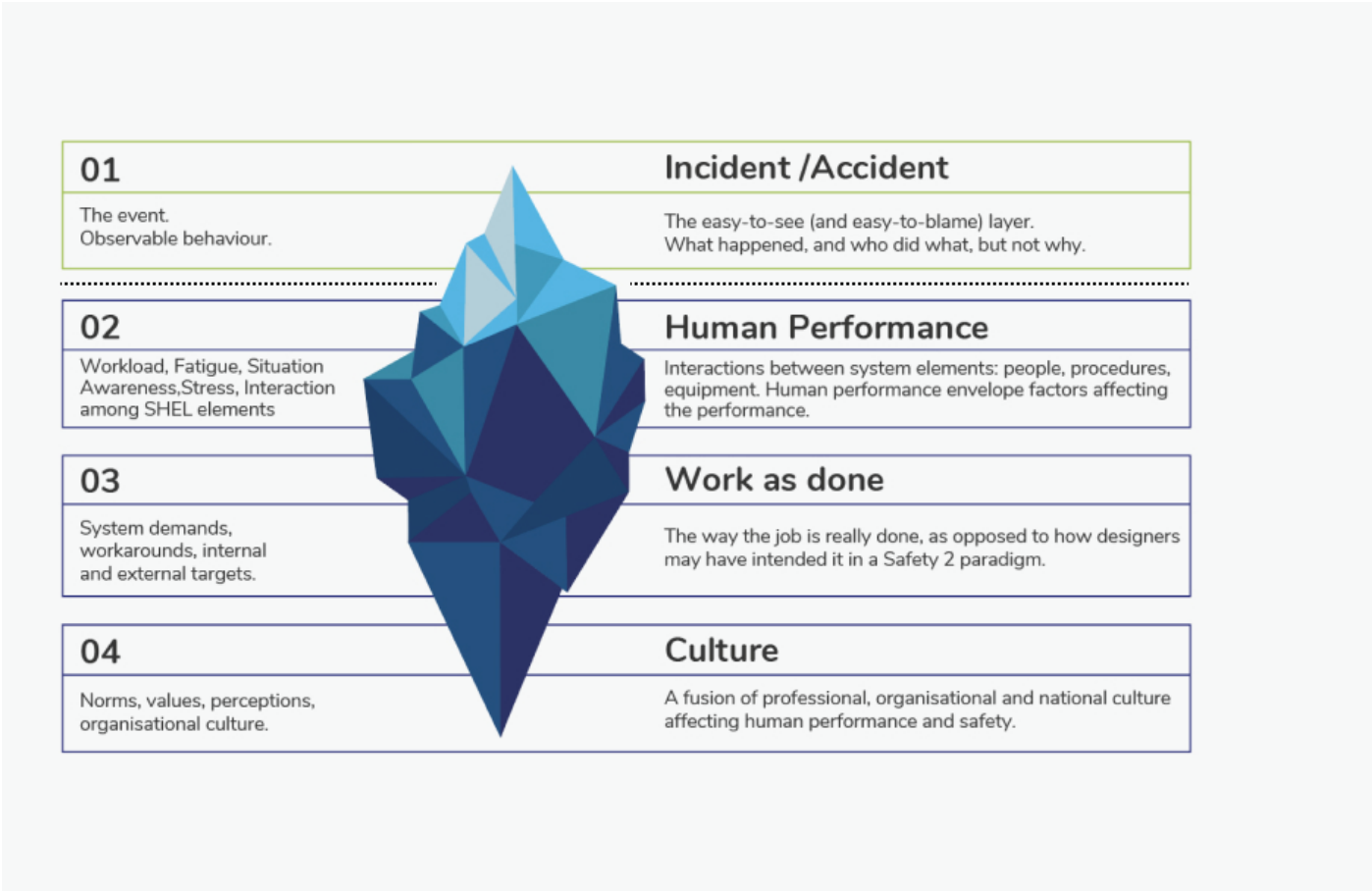
2. Investigating Differently

The investigation process is clearly key to learning. The actual information entered into a database is the first step leading to what will ultimately be discussed by the company in terms of how to prevent accident recurrence. Incident and accident records can even inform a court of law judging culpability after an accident. Such information critically depends upon what was recorded and stated during the initial investigation. Investigations are generally good at determining *what* happened, and the immediate factors that led to the event. They are sometimes less good at determining *why* the event happened, as well as the more distant organisational factors that, if left unaddressed, will lead to recurrence or occurrence of a similar event.

It is useful to consider the accident ‘iceberg’, as shown on the following page, when considering causality and Safety Learning. The events and facts – *who did what, when and where*, are the surface layer, relatively easy to document. But they in no way tell the whole story.

Below the waterline are the Human Factors, or in Human Element terms the ‘*Deadly Dozen*’ factors, that can lead people into error. Deeper still are the factors affecting how we get the job done on a day-to-day basis, when workarounds might be necessary, or when someone – whether the individual seafarer or their senior officer or captain – has to make a judgment call concerning trade-offs between risk and productivity. This is where we have to admit that we don’t live in a perfect world, that procedures will not cover every possible situation. Procedures must therefore always remain open to improvements that better reflect the reality of working conditions / work as done.

At the deepest level are the organisational and cultural factors that can affect safety. These are usually only detected when looking across a number of incidents, or else are raised to the surface and brought into the daylight following a major accident.



Investigating differently goes hand-in-hand with a taxonomy that enables the investigator to plumb these depths when required, and contributes to identifying deeper levels of factors beyond the surface causes. It also goes without saying that investigating differently means focusing on *learning*, and throwing *blaming* overboard. This means that the language and nature of investigative interviews must be non-pejorative. The good news is that this approach and attitude doesn’t conflict from what was heard in the interviews with national investigators.

Since taxonomies change and evolve over time, and any classification system inevitably refines what seafarers originally said, and so loses something, it is crucial for Safety Learning purposes to include a **narrative** as part of the investigation, i.e. what the seafarer(s) said, in their own words. Ultimately, investigation is a form of sense-making, trying to make sense of an unplanned, unfortunate event

that nobody meant to happen. Investigation intends to make sense of the event to a number of parties: those caught up in it, their parent organisation, the loved ones of those injured or killed, judiciaries, society as a whole, and of course the industry that wants to do better next time. It is important for Safety Learning to retain the original sense-making of those at the heart of the event. Simple narratives are the best way to achieve this.

3. From a Database, to an Evidence Base, to a Learning Platform

Usually the problem with databases is not so much putting the data in, but getting it out as useful information, and this is equally true of incident and accident databases. If the taxonomy is complex, as is often the case, searching for accident types or types of Human Element causes/contributory factors can be tricky. Yet a database can clearly be useful for Safety Learning, as it comprises an evidence base from which the most common and severe accidents, as well as their causes and contributory factors, can emerge. Rather than learning from each individual accident, more general and even system-wide lessons can be drawn by looking across different events, and the resultant lessons can have a more powerful impact on safety.

Additionally, the need for change may not be warranted by a single event until it is realised that there are many more similar events. Databases can therefore be a *call to action* and a means of prioritising safety recommendations. An example of this in shipping is the current concern over accidents in enclosed spaces on ships. Each accident may look different, and each ship and crew may be unique, but the problem clearly applies to many vessels.

Databases are often based on mandatory event reports and accident reports, unless they specifically include near miss or other types of reports. They can include links to official public reports, or may contain 'sanitised' material wherein the details of people and companies are excluded, to make them more anonymous. Such collections of incidents can be company-wide, national, regional (e.g. European) or global.

Even if the reports feeding into the database only deal with the surface layer of the event or accident, they nevertheless generate useful statistics to determine general safety priorities in a company or a sector of the shipping industry. If the database records go deeper into *why* the event happened,

there is more potential to analyse the data to determine more subtle systemic safety problems that need to be addressed. For example, if factors such as '*communications*' or '*situational awareness*' are cited in a sizable number of incidents and accidents, studies can be carried out to determine why they arise and how to mitigate these factors and their attendant risks. The ideal, therefore, is to have this kind of active database and evidence base from which to learn. It is then not simply a repository where incident data are stored for some later day, but an active learning platform whose analysis can guide safety improvement. The SAFEMODE project is developing a new database called SHIELD⁶, precisely for such a purpose. Although other Maritime databases already exist, SHIELD has a specific focus on the human factors in maritime accidents.



⁶ <https://safemodeproject.eu/shield.htm#safemode-hf-taxonomy>

4. Shipping’s Ten Most Wanted

In a number of industries there is a sense that you cannot address everything at the same time. This has resulted in a number of organisations identifying their ‘Ten Most Wanted’ list of accidents or factors to reduce, or of safety improvements to implement. Often such lists are updated each year, whereupon items in the list can either be removed or maintained, depending upon tangible improvement progress or shifts in priorities. The US National Transportation Safety Board (NTSB) has its own top ten, and for example, European air traffic management has its Top 5 risks. Both ‘hit-lists’ are updated annually based on safety progress and incident and accident occurrences. The advantage of a hit-list is a consolidated focus on key safety areas, often across companies and internationally, or segment-wide (e.g. container ships or cruise ships). Rather than a ‘drip-feed’ approach to safety due to diluted resources split between many safety issues, there is a concentrated surge of effort which can often create a breakthrough in safety terms.

5. Group Learning Review

Most of the time those involved in an incident are interviewed separately, and then part of the interviewer’s role is to ‘put the pieces together’ to yield a coherent timeline and account of the events as they unfolded, the factors impacting on the event, what went right, and what could go better next time. Yet ships are not composed of autonomous individuals, but of crews working in teams. For example, a collision between two ships involves two Watch-keeping teams. A mooring operation involves many parts of the ship’s crew in different locations, from the bridge to the engine room, to those handling the mooring operation down on the deck and quay. Whilst each seafarer involved should be interviewed separately (there are sound reasons for doing this), there are three reasons for also considering bringing the crew together at a later point, or subsets of the crew, to review the event and learn from it. This is less about investigation and more about learning. First, when people hear others’ stories about an event, they

Flooding / Foundering
Crane operations
Enclosed Spaces
Deck machinery handling
Hot Work Piracy
Contact Man Overboard Loss of Control
Grounding / Stranding
Lifeboat testing Electrocution
Falls from Height
Collisions Hull failure
Capsizing / Listing
Fire / Explosion
Mooring Operations



are often surprised, either because they didn’t see the event that way, or because they were unaware as to what was actually happening elsewhere. Essentially, new information may come to light, which can inform Safety Learning with respect to teamwork, understanding of each other’s roles, equipment design and communications.

Second, the individuals in the crew, and the crew as a whole, may otherwise never receive the full picture of what is believed to have happened and why. They can of course try to find the final report when it is delivered a year later, but this is very late from an individual learning perspective, and during this period they may try to draw their own lessons from the event, which may not be the right lessons.

Here is where *investigating differently* must also play a part. During such group interviews, the question needs to be asked, ‘*what would you do differently if this happened again?*’ This is a critical Safety Learning question used in a number of industries. However, in the interviews it was pointed out that if seafarers answer this question they may find themselves in trouble, as any answer could be taken as an admission of guilt that they knew of, and did not follow, a safer procedure.

Such a question should only be used for learning, not as a form of entrapment.

Third, group learning reviews can enhance Safety Culture on the ship, via involving the crew in a non-jeopardy, non-pejorative open discussion whose sole focus is to learn to be safer. It also serves to bolster collective (crew-based) Safety Culture, as well as peer understanding and support. If such reviews occur onshore, they can significantly enhance ship-shore understanding and relationships.

Group learning reviews do need to be handled carefully, and the investigator will need to judge whether senior officers being present might make other crew members ‘clam up’ and not say anything other than what they believe they are expected to say. It also needs to be ensured that one person does not become the focus of attention as the scapegoat for the incident. Furthermore, rather than recording it formally, it is about listening; not only the investigator listening to what the crew have to say, but the crew listening to each other’s versions of the event. The outcome should be deeper understanding, and a better idea of what to do next time should similar conditions arise.

6. Deep Dives

A deep dive is where a group of people try to get to the bottom of an accident or a series of related accidents, to look at it from all angles, to understand it and see what lessons can be drawn from it. It is called a deep dive because the idea is that the group immerses itself in the event(s) for a day or several days, to discuss and thoroughly understand it, and to see how it relates to current and future operations. As well as considering a specific accident or accident trend, Deep Dives can also focus on a particular operation, or a specific safety barrier, or a developing or new threat. Importantly, Deep Dives are seen as **core business**, and are carried out to protect business interests. Deep Dives can take place at three organisational levels:

I. Crew Level

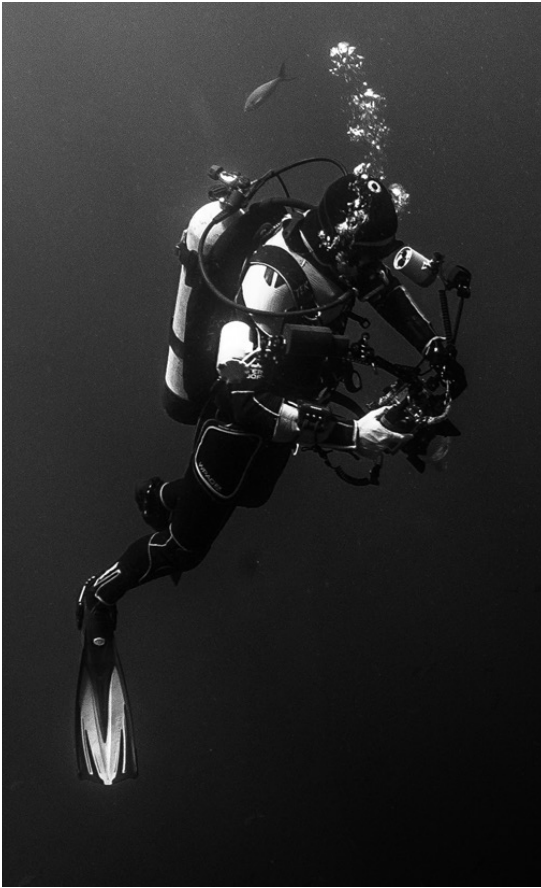
(on the ship, or onshore during training)

II. Safety Management Level

III. Board Level (involving CEO and other Board Members, facilitated by Safety Director / Manager)

A central part of Deep Dives entails considering which barriers are still working, and which are not. As a non-shipping example, following the tragic Überlingen mid-air collision between two aircraft in 2002, a ‘Swiss cheese’ type barrier model was constructed to understand fully what had gone wrong. This was independent of the exhaustive accident investigation going on in parallel at the time. What was found was that several barriers linked to coordination and communications, thought to be effective prior to the accident, were regularly failing, or no longer maintained. This had broad implications for a number of operations, and numerous organisations in Europe. Deep Dives can be used to consider how close an organisation believes it is to a major accident, by evaluating the health of the safety barriers in place, and how often they are being challenged or overcome.

Deep Dives are also used to look ahead, e.g. to consider the ramifications of future changes, such as digitisation, autonomous shipping, future pandemics, etc. When looking at new threats or



Safety Deep Dives

Explore a specific accident or incident trend.

Examine the basis for safety.

Which barriers are still working?

Which barriers are no longer working?

What are the key Human Factors involved (both positive and negative)?

Have any external factors changed?

Have internal factors changed (staffing, competency, etc.)?

Are the procedures still fit for purpose?

What are the deep systemic factors?

Where are the hotspots in the fleet?

Where are there best practices in the fleet?

What can be shared across the fleet?

developing trends, they are an organisational attempt to ‘see around the corner’, and are seen as a hallmark of *Safety Intelligence*. Deep Dives can also be used to determine where best practices seen in one part of the fleet could be applied elsewhere.

A significant added benefit of Deep Dives when carried out at Board level, is that they can have a positive impact on Safety Culture, both for the Board members participating, and for the general workforce who know that safety is being taken seriously at the highest level.

7. Safety Intelligence Sharing

Already from the interviews there were several excellent examples of rapid sharing of **safety-related briefing** notes or **safety stand downs** using safety materials produced centrally, across fleets. In some cases the captains of each ship receive weekly updates of key safety messages or of incidents that had happened very recently and lessons to be learned. This is very fast by any industry’s standard. The advantage of such fleet-wide safety bulletins is that ships’ crews can see what happened on similar vessels to their own, and the captain and other senior officers can brief their crews. Such briefings are critical, as Safety Learning is not so much measured by how much an organisation knows, or how much accident data it has, as by how much has been transmitted effectively to seafarers, so that they can integrate the learning into their working practices, as well as receive the message that the company cares about learning.

Safety videos are another excellent medium for transmitting safety information, and again some excellent ones have been seen in shipping, dealing with critical operations, or focusing on avoiding problems such as complacency with respect to following safety rules, or speaking up when necessary. Videos literally ‘bring to life’ safety concerns, and can show the unintended consequences that can arise from seemingly small mistakes or oversights.

Rewards and recognition of staff for safe behaviours – whether saving the day (avoiding an accident that

nearly happened, or rescuing someone), or simply doing the job in an exemplary and safe manner – can also encourage safer behaviour amongst the rest of the crew, and can send a strong message that safety is valued.

Safety stories along the lines of ‘*it nearly happened to me*’ wherein someone tells of how a normal operation nearly went badly wrong, are useful because they engender watchfulness in crews, which can counteract complacency and encourage them to speak up when they see an operation slipping out of its safe boundaries.

Safety scenario discussions are used to more actively engage crews in discussion and safety decision-making. The idea is to take an event – real or hypothetical – and talk through what is happening, and then every now and again stop and ask the participants what they would do at that point. Usually, even in a small group not everyone has the same idea, so it is useful to explore the reasons they each have for their proposed course of action, and then continue evolving the scenario. Such discussions are not intended to be judgmental, they are there to enable the crew to reflect on safety. They can also be useful to better understand why the procedures are there, or in some case, raise issues as to whether they are fit-for-purpose on the vessel in question.

Safety Exchange is where different groups in the same organisation, who never normally work together, can meet to enhance a better understanding of each other’s work, working conditions, operating culture and day-to-day constraints. This approach has been used in air traffic, for example, bringing together engineers and air traffic controllers, who rely on each other’s work, but have very little day-to-day connection, and represent quite different sub-cultures in the same organisation. In shipping, as has been voiced numerous times in the interviews, there is often a gap between personnel at sea and those onshore. Such meetings can lead to better understanding between all parties, and can

help the onshore personnel relate more to the realities of operational safety at sea, increasing an organisation’s Safety Culture.

Open Door Safety refers to senior managers, directors and CEOs being willing to listen to any safety issues. In one study, top aviation executives said that 50% of their ‘intelligence’ on safety risks came from talking to people. Furthermore, they know that people won’t always come to them, so they seek people out. This is obviously more of a challenge in shipping, but with modern technology, as the pandemic has shown, online meetings and discussions can be relatively effective.

8. Safety Forums, Safety Alliances

Safety Forums are inter-organisational groups, usually in one segment of an industry (e.g. oil industry, passenger ships, etc.) who get together periodically to discuss the key safety issues in their organisations, and to share best practices and lessons learned. Such forums can either be held at an executive level (e.g. annually), or more usually at a more operational or safety level (quarterly and annually). One that was mentioned several times during the interviews was the **Marine Accident Investigators International Forum (MAIIF)**, which seems to embody best practice in this area. Safety Forums are useful ways of exchanging ideas and disseminating good practices across a large range of organisations, and also across different segments of the industry. As such they contribute significantly to general shipping safety, and to Safety Culture in the industry as a whole.

Safety Alliances between a cluster of companies or organisations can be a powerful way to promote and enhance safety in key areas, especially when those companies put aside competition in certain areas in order to tackle key safety problems. An example of a safety alliance in shipping is the Oil Companies’ International Maritime Forum (OCIMF). Recently, *Together in Safety* was set up as a non-regulatory maritime industry consortium with the common purpose of working together to improve safety performance. Other safety alliances have

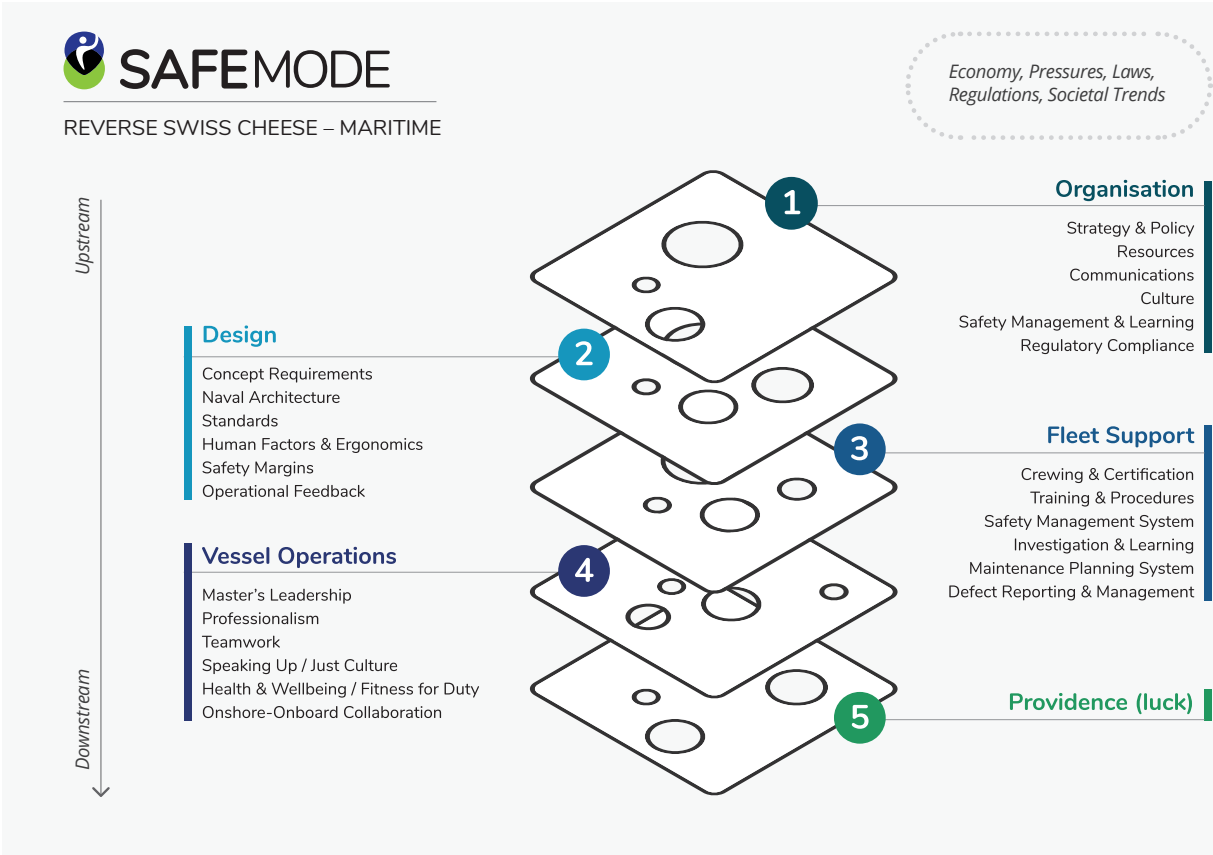
also been established between several NGOs to drive the international regulatory agenda, as is the case of the Human Element Industry Group (HEIG), whose members as accredited to IMO are dedicated to an increased understanding of the human element in order to improve safety and operations at sea.

9. Reverse Swiss Cheese Theory

When Professor James Reason proposed the Swiss Cheese accident model, in which safety barriers are like slices of cheese with holes in them (because no barriers are perfect), and if the holes line up you get an accident, the initial focus was on the barriers closest to the accident outcome. Later, however, he focused more on the organisational antecedents of accidents, on the grounds that decisions made and actions taken at these levels can lead to many accidental outcomes. These ‘upstream’ barriers, if deficient, put pressure on the downstream ones. Today, however, whilst it is common to talk of human error on the ship, it is less common to hear anyone talking about ‘error’ onshore, whether management decisions that make safe work harder on board ships, design choices that make operations more error-prone, programmer errors that can lead to system faults, or even the effects of weak regulation on safety at sea.

Reversing the Swiss Cheese model is a challenge, and requires the mindset that human error does not only affect those aboard ships, but affects us all. In fact human error is a normal process, the flip-side of human flexibility that is key to our ever-adaptive, and generally successful performance. We all make mistakes. Most mistakes onshore have little consequence. Yet some of them do, as they result in constraints for those at sea.

It is difficult to have a Safety Culture and an effective Safety Learning Culture when it is believed that only seafarers make mistakes of any consequence. Inevitably, there will be a tendency to blame those who make mistakes,



and replace people when things go wrong, rather than fixing the underlying problem. This is the opposite of Safety Learning.

This shift in mindset is a journey that any industry has to undertake if it is serious about increasing safety. This does not mean that managers, those at the so called ‘blunt end’, will find themselves in the dock or even imprisoned following accidents, as has happened once or twice in aviation and elsewhere. Managers are also subject to the full range of Human Factors, constraints and pressures and – as with seafarers – there is almost never an intention to cause harm. Rather, this means asking hard questions, such as *‘how are our decisions onshore influencing crew performance, safety and Safety Culture at sea?’*

The figure above is a provisional Swiss Cheese-style model of shipping safety, with a particular focus on the upstream safety determinants as well as the downstream ones. It is as if, rather than looking at human error through a microscope, focusing

intently on what the crew do on the ship, the lens is turned around and becomes a telescope, looking at the more distant factors, some of which may be onshore. An increasing number of organisations are also trying to do this, to learn deeper and more significant safety lessons.

Identifying where there are organisational safety vulnerabilities or ‘blind spots’ can be achieved in several ways. Safety Culture or climate surveys can reveal issues at this level, and analysing events and incidents/accidents using a taxonomy such as the SHIELD one can also pinpoint where to focus attention. Deep Dives, and focus groups with management and seafarers, can also help to see where safety concerns are not being tackled by the organisation, or could be better addressed.

10. A Maritime-Focused Human Factors Toolkit

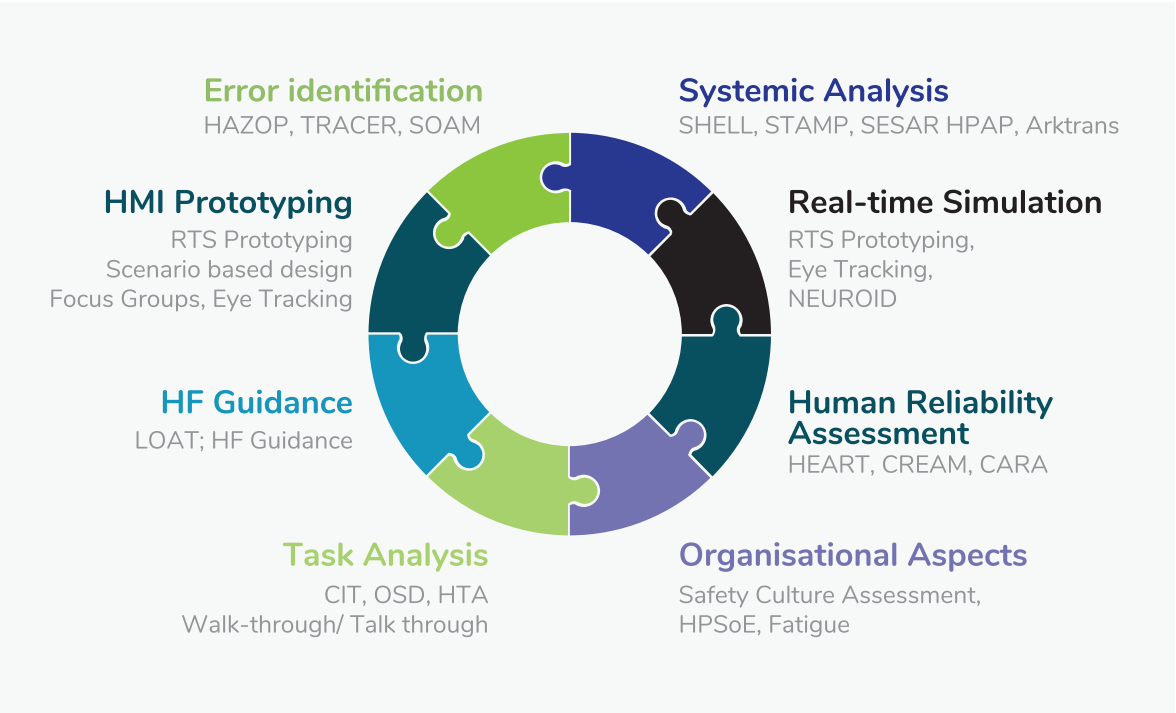
The discipline of Human Factors is aimed at giving industries a toolset with which to optimise human performance at work, thereby improving system safety, performance and resilience. Human Factors can help to maximise the safety impact of safety lessons learned the hard way via incidents and accidents. The SAFEMODE project is developing a Human Factors Toolkit for the Maritime industry, testing the ‘goodness of fit’ of each technique with maritime case studies and stakeholders. This toolkit can help to improve design of ships, their bridges and engine rooms, as well as enhancing training, procedures, team-working and human-machine interfaces for complex and safety critical operations.

It has been noted that each ship is unique, and each ship’s bridge is different. But the common element is the human crew. A Human Factors approach can generate general guidance that would be applicable to numerous ship bridge and equipment designs. This is the intent of SAFEMODE, to feed in learning from incidents and accidents (via the SHIELD database and taxonomy), as well as insights from application of the HF Toolkit⁷, and deeper risk understanding from risk models, to lead to a more resilient ship system.



Human Element and Human Factors: what's in a name?

During the interviews and subsequent discussions, it was noticed that there is little mention of Human Factors, the scientific discipline associated with human performance in work situations. Indeed there appear to be less Human Factors people working in the shipping industry than in comparable domains. The term *Human Element* has a slightly different sense compared to *Human Factors*. An accident due to the Human Element is, superficially at least, suggestive that the human was at fault. An accident due to Human Factors is more likely seen as due to the factors that influenced the crew member(s) on that day, and that another person operating under the same factors might have made the same mistake. The inference then is that the system needs to change in order to avoid recurrence, whether through changes to training, procedures, design, etc. It may therefore be worth considering in the shipping industry whether to continue with the term *Human Element* (e.g. for practical or legacy reasons), or transition to the term and scientifically-grounded discipline of *Human Factors* at some point in the near future. This could also help learning between shipping and other industries.



⁷ <https://safemodeproject.eu/products.aspx?id=4>

A New Destination for the Shipping Industry?

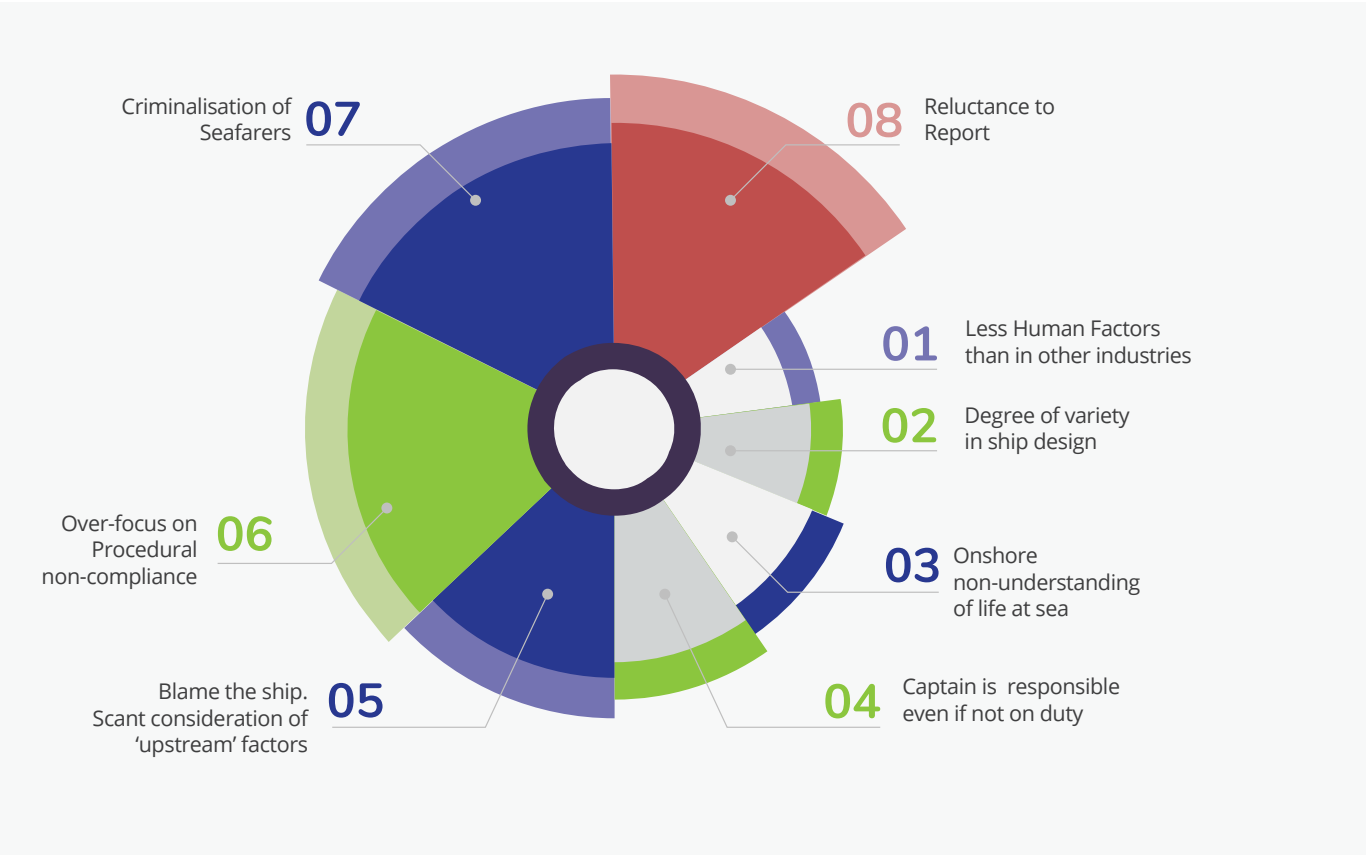
Throughout the interviews and subsequent discussions with shipping personnel and experts, four potential ‘destinations’ have been under discussion, and a fifth – *Culture of Care*, focusing on wellbeing, respect and empathy – was added following presentations of interim results at two international meetings.

The originally intended destination of Just Culture has been found repeatedly to be problematic at this time, though not perhaps for certain shipping organisations who are already well on their way with this journey. Reporting Culture is desirable, but is essentially an outcome of other destinations, and cannot be forced to happen on its own. This leaves Safety Culture, Culture of Care, and Learning Culture.

Culture of Care is relatively new, and probably needs to be developed to see how it would apply, and championed by leading organisations who are convinced of its merits. If shipping chooses to chart this destination, other industries will no doubt be interested to follow its progress.

Safety Culture, which in effect sits above and encompasses the other four ‘cultures’, is already in existence in certain quarters, but appears to be patchy and uneven in its application, and misses a guiding model or framework that could foster more widespread uptake of Safety Culture approaches and practices. Although there have been numerous reviews of Safety Culture for Maritime, the shipping industry needs to adapt an approach and ‘own’ it, so that it truly fits the industry.

It is therefore Learning Culture that has gained most traction in all the interviews and discussions, because of an appetite to learn to be safer, and because there are already excellent examples of learning practices in the industry. A Learning Culture is therefore concluded by this study to be the most worthwhile destination at this stage, in terms of increasing operational safety. This does not preclude other destinations being followed at the same time, whether Safety Culture, Culture of Care or even Just Culture.



That would represent a ‘fleet’ approach to enhancing safety. In reality, none of the five ‘cultures’ are truly independent from each other; they all influence each other to a degree, and so moving ahead in one direction will ultimately make travel to the other destinations easier, too.

Navigating Tricky Waters

However, the interviews highlighted a number of impediments for the development of a Learning Culture. The criminalisation of seafarers involved in accidents, and the ‘blame the ship’ attitude cited repeatedly in interviews, are real blockers to reporting and learning, and hence to safety overall. Similarly, an over-focus on procedural compliance without fully questioning the fitness-for-purpose of those procedures in the actual event, as well as a lack of focus on ‘upstream’ or distant factors as precipitators of accidents, means that learning will remain at the surface level, and incidents and accidents are doomed to recur. These and other such problems – often known as *elephants in the room* because

everyone knows they are there but they are not acknowledged, discussed or addressed – need to be tackled, or else safety progress may be slowed. The good news is that some best practices are already in evidence in a number of companies, and it is clear that there is strong motivation for safety on board most ships, as well as significant safety expertise and procedural know-how both onshore and at sea. This means there is a good foundation for a Learning Culture, even if certain normally prescribed prerequisites, such as Just Culture, are absent, at least at the institutional level.

From Safety Learning to a Safety Learning Culture

Whilst Safety Learning approaches may appear relatively straightforward, achieving results from them and cultivating a Safety Learning Culture takes time and commitment.

The difference between Safety Learning and Safety Learning Culture is that in the latter, Safety Learning is seen as a core part of the business and all activities in an organisation, from the Board to the ‘sharp end’. It is not simply the implementation of a set of techniques and processes used by the organisation, but is a *mindset* throughout the organisation, in which thinking and speaking up about safety in order to learn and share safety lessons becomes a reflex.

Achieving a Safety Learning Culture is a voyage that takes time, as well as understanding and commitment from the organisation’s leadership. The good news is that applying any of the Safety Learning approaches during the journey towards a Safety Learning Culture should result in safety improvements.

In terms of how the different Safety Learning approaches interact with different levels in an organisation, the pyramid figure gives an indication, in that three of the approaches are primarily aimed at seafarers (the lower part of the pyramid), four are of a more technical nature (often executed by the safety department), the others leaning towards senior management, assisted by the safety technical layer (note that Deep Dives can involve all three layers). The shape of the pyramid is intended to show that even though operational safety is at the bottom, in order to achieve significant Safety Learning and a Safety Learning Culture, there needs to be engagement from the top.



Safety Learning Culture Arrival Checklist

Can seafarers point to where better practices were adopted due to Safety Learning?

Are the top 5 safety risks identified?
Do seafarers agree these are the top 5?

Learning only happens when people speak up. How does the company leadership encourage open communication on safety?

Do seafarers and onshore staff see Safety Learning as part of their job?

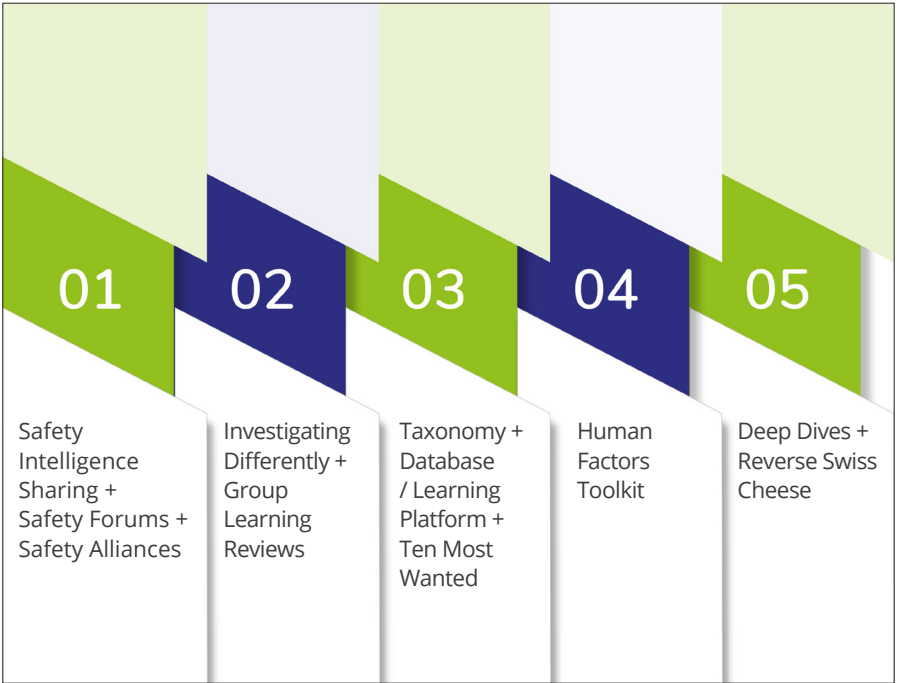
Do procedures ever evolve, or are they cast in stone?

SMS is the embodiment of organizational Safety Learning. Do seafarers see the SMS as relevant to them?

Is there a forum where captains and Board members meet and talk safety?

Which best describes your company’s mindset:

- People are people, so accidents will inevitably happen. We must stay vigilant...
- We aim to learn from all events, so that everyone gets to go home after each voyage...



Way-points towards a Safety Learning Culture

There is a certain logical progression in the learning steps, from straightforward information-sharing approaches to learning, to enhancing the investigation approach, to analysing events formally with explanatory taxonomies leading to prioritised recommendations for risk reduction, to investing in Human Factors, leading to risk-informed design and decision-making, all the way through to actively involving the Boards of shipping companies in risk management.

There are no hard divisions between these ‘steps’, and organisations may choose to do things in a different order, or skip some elements. But many organisations, depending on the size of their operation, could reach Level 3 relatively quickly and, for example, add ‘Deep Dives’ from Level 5, and decide to drop anchor. This would already represent a good learning culture. Other larger organisations, or groups of companies, may decide to venture further to Level 5, in order to remain at the leading edge of Safety Learning. Once levels 3 and above are reached, there is also the potential to collaborate with other industries. Rather than simply *comparing* between shipping, rail, aviation, etc. there is the potential to *collaborate* on Safety Learning. This represents the highest form of Safety Learning.

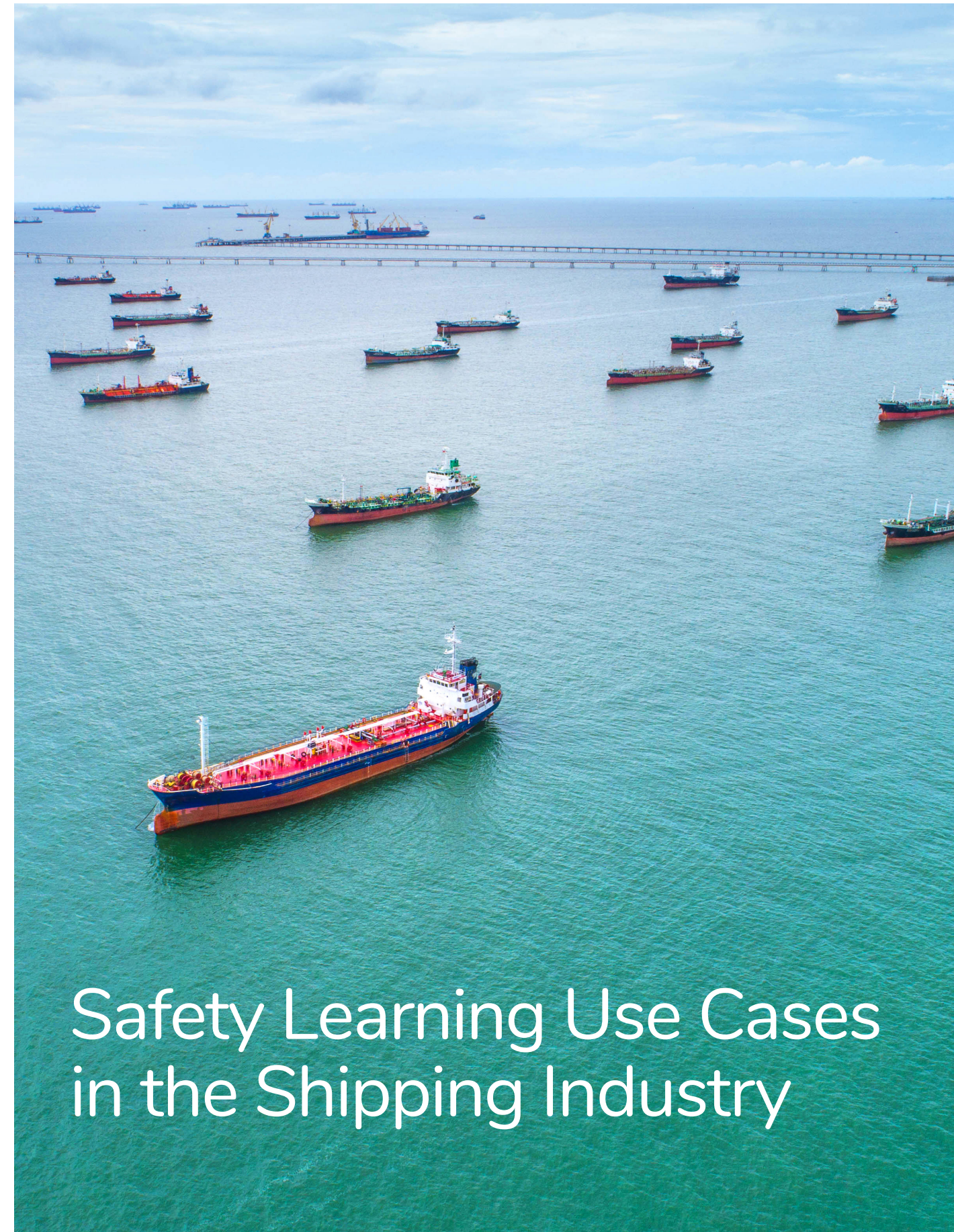
In practice, in any industry we learn most from our peers, and this is equally true at the organisational or corporate level, which is why Safety Forums and Safety Alliances between companies are so important for Safety Learning.

Conclusions

This White Paper has explored how the shipping industry can improve operational safety, via in-depth interviews of national investigators and seafarers, as well as meetings and discussions with a range of maritime representatives at various levels, from shipping companies, NGOs and regulators. The resulting recommendation is to develop a Safety Learning Culture, and towards this end, ten good practices in Safety Learning have been outlined.

There are two key waypoints on the journey towards a Safety Learning Culture. The first is achieving effective Safety Learning, based on more accurate and consistent understanding of the critical factors leading to incidents and accidents, as well as how to avoid them via more systemic accident prevention strategies that go beyond the single ship or isolated event. This requires *investigating differently*, so that there is more detailed and insightful reporting, and the adoption of an enhanced *taxonomy* to describe what happened and why, and how recurrence can be prevented. An enhanced taxonomy requires either enriching existing ones such as the Deadly Dozen, or else developing and applying a new taxonomy. Both avenues would benefit from an increased application of the scientific discipline of Human Factors in the shipping domain.

The second key waypoint is improving the shipping industry's Safety Learning *integration*, ensuring that Safety Learning occurs at all levels, whether on the ship, onshore, across the fleet, across a segment of the industry, or throughout the industry as a whole. Here is where approaches such as *group-based reviews*, *safety intelligence sharing*, *safety alliances* and *top ten most wanted* come into play. The latter two approaches in particular would demonstrate senior-level leadership, and would encourage Safety Learning across the shipping community. This would enable shipping to accomplish, in a matter of years, the transition from the application of Safety Learning *practices*, to the evolution of a true Safety Learning *culture*, improving safety at sea, and safeguarding the continued prosperity of the industry.



Safety Learning Use Cases in the Shipping Industry

USE CASE #1

Safety Learning in Action

Capt. Thodoris Lefakis,
Giorgos Diamantis and
Stelios Volakis
Minerva Marine & ATHINA
Training Center

This incident echoes the difficulties that may be encountered in inland navigation, particularly in limited waterways such as the Mississippi River. Here, the prevailing strong current and ship-shore interaction caused the bow of a laden oil tanker under pilotage to be deflected for a moment when entering the cross current-influenced zone, affecting her maneuverability and leading her close to the bank. Fortunately the vessel did not run aground, thanks to the reaction of the bridge team who ordered an astern movement, resulting in the vessel's forward port bottom softly touching the river's sediments.



The bridge team did not effectively assess the anticipated effect of ship-shore interaction and of the strong current, and were over-reliant on the Pilot's orders to bring the vessel close to the river's east bank that eventually "sucked" her stern towards the east bank with her bow swinging dangerously to the western side of the river.

Immediately after the notification of the incident by the Master of the vessel, the investigation process by the two professional Investigators of the company was initiated

with collecting and preserving evidence to help understand as much of what and why this happened and to establish a sequence of events leading to the incident. Due to its obvious potential impact, the incident was classified as a high risk navigational incident of medium severity requiring - according to the company's policy and Safety Management Procedures - an Immediate Incident Notification to be circulated as an alert to the whole fleet (*Safety Learning Objective No. 7 Safety Intelligence Sharing*).

The above classification of the incident is in line with adopting a common language (*Safety Learning Objective No.1 Common Language*), so that the seagoing and shore personnel of the company refer to and consider the type and the underlying causes of the incident clearly and unambiguously.

"The incident was simulated and incorporated into ship handling training."

The ultimate goal of each investigation is to determine the root causes of an incident, which if eliminated, could prevent similar incidents from occurring by effectively learning from them. These causes are always attempted to be identified not only to the human performance level on the vessel (Master, Pilot, Watch Keeping Officers and Ratings), or to the technical conditions level, but also to the documented procedures, the

organization and to the management level of the company. The Marine Systematic Cause Analysis Technique (M-SCAT) is being used by the company with the aim to support a rigorous investigation of an incident (*Safety Learning Objective No.2 Investigating Differently*).

Through the analysis of the VDR (Voyage Data Recorder), the interviews with the Master and the Officers on the bridge during the incident, their communication with the Pilot,

the analysis of information relating to their experience, qualifications, possible fatigue and other factors, a "picture" of the conditions on the navigation bridge was reconstructed looking especially at the relationship between the employed Pilot and the ship's team and how the right and obligation of the Master to intervene in case of the Pilot's misjudgment was exercised (*Safety Learning Objective No.10 A Maritime Focused Human Factors Toolkit*).

The incident was simulated in a full-mission ship handling simulator of the ATHINA Maritime Learning and Development Center (Minerva Marine's exclusive Training Center) based on a similar ship model, the same environmental conditions and most importantly at the same geographical area of the Mississippi River with the appropriate ENCs (electronic nautical charts) RADAR images, visuals, traffic, landmarks and bathymetry. The incident had taken place during night time (23:30 HRS), while the vessel was attempting a turn to starboard in a sharp right turn of the river making around 7 knots (speed over ground) against 4 knots current and under 16 knots NE wind.

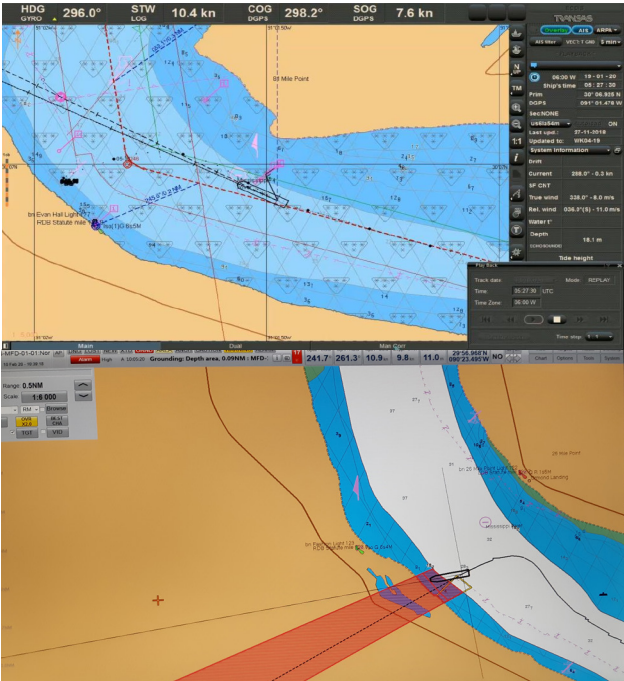


As required by the Incident Investigation, the scenario was incorporated in the Bridge Resource Management Ship Handling Training Course, supporting the theoretical learning on the wind/current effect and ship-shore interaction.

Additionally, the Master and the Officers of the bridge team of the vessel attended a refresher course prior to their next assignment, and other Deck Officers now participate in the above simulated exercise.

A Lesson Learnt Report for the incident was circulated to the fleet of the company to be discussed in a Safety Committee meeting on each vessel. It was also included as a case study in the agenda of the in-house crew training seminars and forums (*Safety Learning Objective No.8 Safety Forums*).

Learning effectively from incidents helps Minerva Marine to further develop its culture of learning as an integral part of, and a measure of its overall Safety Culture, which is supported by the company's inherent willingness to improve and adapt, aiming for zero incidents.





USE CASE #2

On Just Culture – a Marine Investigator's Viewpoint

Keith Fawcett,
Marine Investigator,
United States Coast Guard

In complex marine accidents the job of a marine accident investigator can be very difficult, especially when the investigation is conducted where there may be ramifications in terms of the loss of a job, enforcement action against a mariner's credential or even possible criminal prosecution. It can be difficult for the investigator to even imagine what went on in the complex operations onboard the ship or within a shipping company, which might have been a significant contributing factor to the accident. Licensed ships officers or company personnel fear that mistakes or errors may lead to a finding of fault that may affect their livelihood.



As an investigator you probe deeply to gather the facts about an accident following all leads and even following your well-developed investigator's intuition. But as an experienced investigator and perhaps a former mariner you may not understand all the underlying activities that took place aboard the vessel or during its marine operation. Can you understand all the nuances of the complex world of today's shipping industry? Think about the times that you have completed an investigation and then submitted an exhaustive report of investigation, only long after the investigation is completed you find out an important piece of information that might have significantly influenced or changed your analysis for that complex investigation.

Without the cooperation of witnesses at all levels of vessel and company operations you may miss a very significant fact which directly led to the cause of the accident. Relying on interviews where witnesses might be hesitant to disclose the truth, it is even more difficult when a witness is under oath or being interviewed where making a false statement can be viewed as a violation of law. Adopting a "Just Culture" and ensuring that you explain the nature and scope of the investigation and the

"Without the cooperation of witnesses at all levels... you may miss a very significant fact."

ground rules that support a "safety" investigation may reduce this hesitancy to have witnesses come forward and give full and complete information. To effectively shift to more productive interviews will require significant work throughout the marine industry and investigations community to ensure that the people interviewed understand the fundamentals of a "Just Culture", that human error is just that, people can and do make mistakes. Identifying the near misses, patterns, events and circumstances

that lead up to an accident is a daunting task for an investigator and a culture shift will result in more effective investigations. Aggressively promoting this "Just Culture" framework for marine operations and if necessary, conducting investigations, gathering facts and speaking to ship personnel at various levels from oiler to Captain, when required, will lead to a deeper understanding of the underlying causes of marine accident.

Photo insert is of the grounding of the Kulluk mobile offshore drilling unit in 2012 on the Alaskan coast. Photo reprinted with the permission of USCG.



USE CASE #3

An Agile Approach to Safety Learning Culture in the RORO Sector

Mary Ann Pastrana,
FastCat,
APFC

Archipelago Philippine Ferries Corporation (APFC) is a RORO vessel company with decades of experience in the industry, serving the needs of the travelling public and business entities nationwide through its passenger and cargo services. The company aims to connect the Philippine islands using its state-of-the-art and brand new vessels, FastCat. APFC has 18 vessels as of 2021 and has the goal of having a fleet of 30 vessels by 2031, facilitating the economical movement of people & goods in the Philippines. APFC's state-of-the-art RoRo vessels are designed specifically for Philippine water conditions ensuring its passengers' safety, welfare and comfort. The vessels are fitted with world-class amenities and fully compliant with international standards for lifesaving, firefighting, and damage-stability.



APFC takes pride in having built strong and lasting ties with its brand commitment of "Ferry Safe, Ferry Fast, Ferry Convenient" travel. It ensures safety is top priority each and every day by imbuing a strong safety and learning culture spearheaded and supported by top management.

In 2017, FastCat launched its **E-learning management system**, called *iLearnFastCat*. A platform where employees and crew can cultivate knowledge on the different maritime safety and training in standards that are essential to the progression on

their competencies and ultimately the Philippine Marine Industry. The online training includes relevant courses and modules from vessels, station bills, emergency signals, first aid apparatus and specific safety features, the first of its kind in the country. *iLearnFastCat* is further supported by the **4 pillars of continuous learning**: portable training, advance analytics, quality content and expert support. *iLearnFastCat* utilizes technology to raise awareness and **let everyone be a part of the solution, from students to the upper management**. It is developed to harness continuous learning and is aligned with the company mission and vision to uphold growth in learning for its employees, crew and cadets.

"...a strong safety and learning culture spearheaded and supported by top management."

For the Maritime students training with Fastcat, an Electronic Training Record Book is in place which is aligned with the STCW standards. APFC is also part of the Safemode Consortium and the learnings here are introduced and integrated in its Safety Management System.

In its daily operation, APFC has adopted the Entrepreneurial Operating System where the team discusses its scorecard and people headline, and where issues, solutions and to-do's **are raised without fear of being apprehended and blamed**. Everyone's participation is encouraged and data are studied and used to improve processes and achieve its goals. Additionally, FastCat also continues its drive to help boost local businesses and tourism, to uplift the lives of the Filipinos and contribute to the overall economic development of the country.

USE CASE #4

Charting a Course towards a Safety Learning Culture

Rob Faricy,
Director of Safety
and Assurance
Ben Wood,
Safety Learning Manager
Lifeboats

In early 2020, we set out on our **new safety learning journey** at the Royal National Lifeboat Institution (RNLI), the charity that saves lives at sea in the United Kingdom and Republic of Ireland. At the core of our approach is **engagement with our people** – both volunteers and employees. The simple formula is that engagement breeds trust, meaning people feel psychologically safe to share, which in turn enables us to learn from them, helping us improve our risk controls that keep us all safe.



Drawing on feedback from those involved in our incident investigation process, it was clear that it **often felt like a process done to our people, rather than with them**. As an organisation reliant on volunteers, engagement and trust is paramount, and yet with the best intentions, we had created an investigation process that frequently put those core tenets in jeopardy.

The happy coincidence is that an approach focused on engagement also lends itself to learning about work as it's really done from the people who actually do it. **Actively listening** to understand the perspectives shared by those at the operational front line, **asking them for their help in how we can learn and improve** enables us to better understand the system and environment in which our crews and teams are operating. Our intent is to close the gap between 'work as imagined' and 'work as done'.

To do that calls for a large and sometimes **uncomfortable dose of humility** on the part of managers and leaders, as it starts with an admission that we don't have all the answers; our policies might be impossible to implement, our procedures might be creating unintended risks, our equipment might actually be unfit for purpose. The tables have to turn so that **we start listening rather than telling**.

"Better safety conversations lead to positive safety outcomes."

The first tangible change was around our language. Our Investigation Team became the **Safety Learning Team**, who conducted **safety learning reviews** as opposed to 'investigations'. The learning teams are deliberately inclusive of those directly involved in the occurrence working alongside subject matter experts from across the organisation led by the Safety Learning Team. One-to-one formal interviews are replaced by collaborative facilitated discussions with the teams involved in the work, in which they teach us about the realities of **work as done**. To help these conversations we seek to **create an environment where people are free to speak up, without fear**.

Alongside the learning team approach, for the analysis of our work we are exploring contemporary safety science from **Safety-II**, **Safety Differently** and **Human Factors**. Techniques like barrier management, task analysis and other tools help manage our critical safety risks.

"The feedback from our first few safety learning reviews has been overwhelmingly positive."

Understanding performance influencing factors and how they converge to create the conditions in which incidents sometimes occur are key.

The intention is to use learning teams both **reactively** (following an incident) and **proactively** (during normal operations) to test the real-life effectiveness of our defences that make up our Safety Management System.

The feedback from our first few safety learning reviews has been overwhelmingly positive, largely thanks to the willingness of both our safety team and our operational crews to try new things, make mistakes and learn from them. Implementing learning teams has itself been a learning process, and our openness about that has really helped bring people on this journey with us.

Some of our next steps include;

- Creation of a dedicated **independent directorate** that will extend this approach to learning from normal operations, through an independent assurance team.
- Development of a **safety learning training package** with external support to embed the key principles.
- Workshops to introduce the **Safety II 'new view'** thinking to a wider group of stakeholders.
- **Bow-tie barrier management** and fault and event tree risk modelling. Mapping of critical risks and controls to focus our learning on those areas of greatest risk/criticality.
- Creation of a **Safety Risk Insight Specialism** in the RNLI, drawing learning from incidents and assurance findings to drive improvement plans.

We're still in the early stages of this transition, but there is a buzz around the teams involved, and it's an exciting thing to be a part of, and we are hugely optimistic about the future of safety learning at the RNLI.



USE CASE #5

A Look at CalMac Ferries' Incident Investigation Approach

Louis De Wolff,
 Director of HSQE
 Francesca Wade,
 Safemode Researcher

CalMac Ferries Limited is a Scottish Ferries company operating 34 ferries serving 50 ports and 24 island destinations, with 5.6 million passengers, 1.6 million cars and over 150,000 sailings in a typical year. To put that into an operational context, this involves tight timetables and short sailings.

CalMac works to a safety strategy (Total Safety II) designed to deliver an improved safety performance as we work towards a zero-accident culture. Aligned to Scotland's National Transport Strategy, this strategy follows our Total Safety Strategy. Successful delivery will transform CalMac into an organisation that learns from all incidents and where everyone actively works to improve our safety performance, strengthened by a Just Culture model.



It was recognised that the best way to improve safety is to look for trends and patterns in current operations. To do this effectively, a lot of data are needed. To turn all the data into useful management information, it is important to apply a standard analysis methodology. An effective investigation process provides a valuable measure of the organisation's safety performance. By collating many reports and applying a standard method to incident analysis, the strengths and weaknesses within the organisation's systems can be identified. There were two major barriers to gathering the data necessary for effective incident analysis. Firstly, there was a practical issue of gathering information from across a fleet of 34 vessels and 50 ports. Secondly there were issues with the culture and attitude of team members fearing blame and repercussions for reporting incidents.

To overcome these barriers, in 2019, Calmac procured a new system called PURE. PURE is an electronic system for the reporting and analysing of incidents. In this context an incident is an event that either causes harm (to people, to assets or to the environment) or it does not. The first category where harm is caused, is labelled an accident, with the second category, where no harm occurred is labelled a Near Miss. Trust must exist to ensure that Near Misses and Incidents are reported. To build trust

"Investigations are carried out in a way that creates learning opportunities,"

in the organisation, a Just Culture framework must be implemented. CalMac have engaged with consultants Baines Simmons to create a Just Culture framework that will be delivered towards the end of 2022. Investigations are carried out in a way that creates learning opportunities, and these lessons must be communicated effectively back to the fleet and ports that reported the incidents. This will allow for improvements to be implemented at an organisational level.

Incidents reported online

Our investigation approach is to learn. In order to do this, we need to encourage reporting and apply a standard method to incident analysis. The PURE system is a streamlined reporting tool that allows easy access to personnel across both fleet and shoreside locations. The system is designed so that the reporter is required to provide standard information on the incident, such as environmental conditions, time stamps and a brief description of the incident. The reporter is then prompted to do a basic analysis of the event using the '5 why's' methodology.

"The method examines incidents to determine unsafe acts, pre-conditions to these acts, supervisory factors and organisational influences."

Assessed for impact

The number of events reported into Pure is typically 1200 each year- combining Accidents and Near Misses. Upon receipt of the incident, shore-based personnel triage the incidents using an assessment based on the likelihood that the incident will repeat and the worst credible outcome of the incident. This assessment provides a score which determines the detail of the follow-up investigation. Following CalMac's procedures, only those incidents scoring higher than 24 points, are subjected to an analysis using the Human Factors Analysis and Classification System (HFACS).



Analysed using HFACS

The HFACS methodology is embedded into PURE but is of a basic format. This methodology examines incidents and relevant data to determine unsafe acts, pre-conditions to these acts, supervisory factors and organisational influences. The options that can be selected at each category are pre-determined and programmed into the software. This ensures a consistent analysis and provides a platform that can be interrogated for incident trends. This moves away from identifying one root cause to incidents, and instead looks for causation at various levels in the organisation. It allows the analyst to identify the underlying factors associated with an unsafe act. Once these are identified it allows us to improve our safety culture from a deeper level.

Since setting up this new approach to incident investigation we can clearly map our journey to date, enabling us to see our progress. We are also able to learn from these trends to ensure appropriate interventions are introduced. Since the introduction of PURE in 2019, this has resulted in improved navigational standards, enhanced asbestos management, a reduction of serious incidents and better engagement with the Network. In conclusion, CalMac has made progress in laying down the groundwork to improve our safety culture over recent years. Although progress is still to be made, PURE has put us on track to improve trust, improve reporting and to become an organisation that wants to learn.

Reflective Safety Learning for Seafarers

Stuart Edmonston
Director Loss Prevention,
UK P&I Club

As one of the largest mutual marine protection and indemnity organisations in the world, the UK P&I Club insures over 240 million tonnes of owned and chartered ships from more than fifty countries across the globe. The UK P&I Club is committed to safety. Its high-level loss prevention programme – one of the most extensive in the marine insurance industry – aims to offset rising claims and maintain quality amongst Members.

Across the globe, every major industry is undergoing a digital awakening, and the shipping sector is no different. The progressive transition towards an increasingly digital and automated future brings with it safety, technical and training challenges the industry will have to face.

As we look ahead, it's more vital than ever to provide consistent, clear leadership. It's integral to develop training tools and methods, which, if used properly, will help to establish and embed a sound and well run safety culture on board. Safety training at all levels is important because it has the capacity to unite the managers ashore and seafarers in the pursuit of a common purpose – to create a safe and secure workplace that ensures the welfare and success of everyone involved.

As an industry, we see the same incidents happening repeatedly. For the crewmembers involved, and their families, these often tragic and avoidable accidents can be life changing. For shipowners and operators, the financial impact of claims can be significant, in addition to the disruption and inconvenience caused by accidents on board.

We are committed to safety and the Club's high-level loss prevention programme aims to offset rising claims and maintain quality among its members. As part of this drive to share knowledge and encourage collaboration throughout the sector, the Club has recently expanded its award winning 'Lessons Learnt' reflective learning animated videos across personal injury, navigation, pollution, and cargo. These training videos enable seafarers to learn not just by their own mistakes, but by the mistakes of others. Making the videos freely available to the wider shipping community gives these vital safety messages enormous reach.

There is a great deal we can learn by casting the net outside our comfort zone, and collaborating with like-minded organisations and companies from related industries. While it is acknowledged that the maritime industry is very different from aviation in many respects, there may be lessons worth learning from an industry with such an excellent safety record.

"... to learn not just by their own mistakes, but by the mistakes of others."

Aviation has benefited from decades of research into the areas of risk management that others in the transport industry can learn from. A unique initiative by the UK Club, in partnership with the world's largest civil aviation training company CAE, offers and encourages a step change in human performance crew training and safety outcomes for shipowner members. Introduced by the Club in 2019 to boost member

access to top-class safety training, training sessions have taken place at CAE's new EasyJet Gatwick facility and JetBlue Orlando, and online after the pandemic struck.

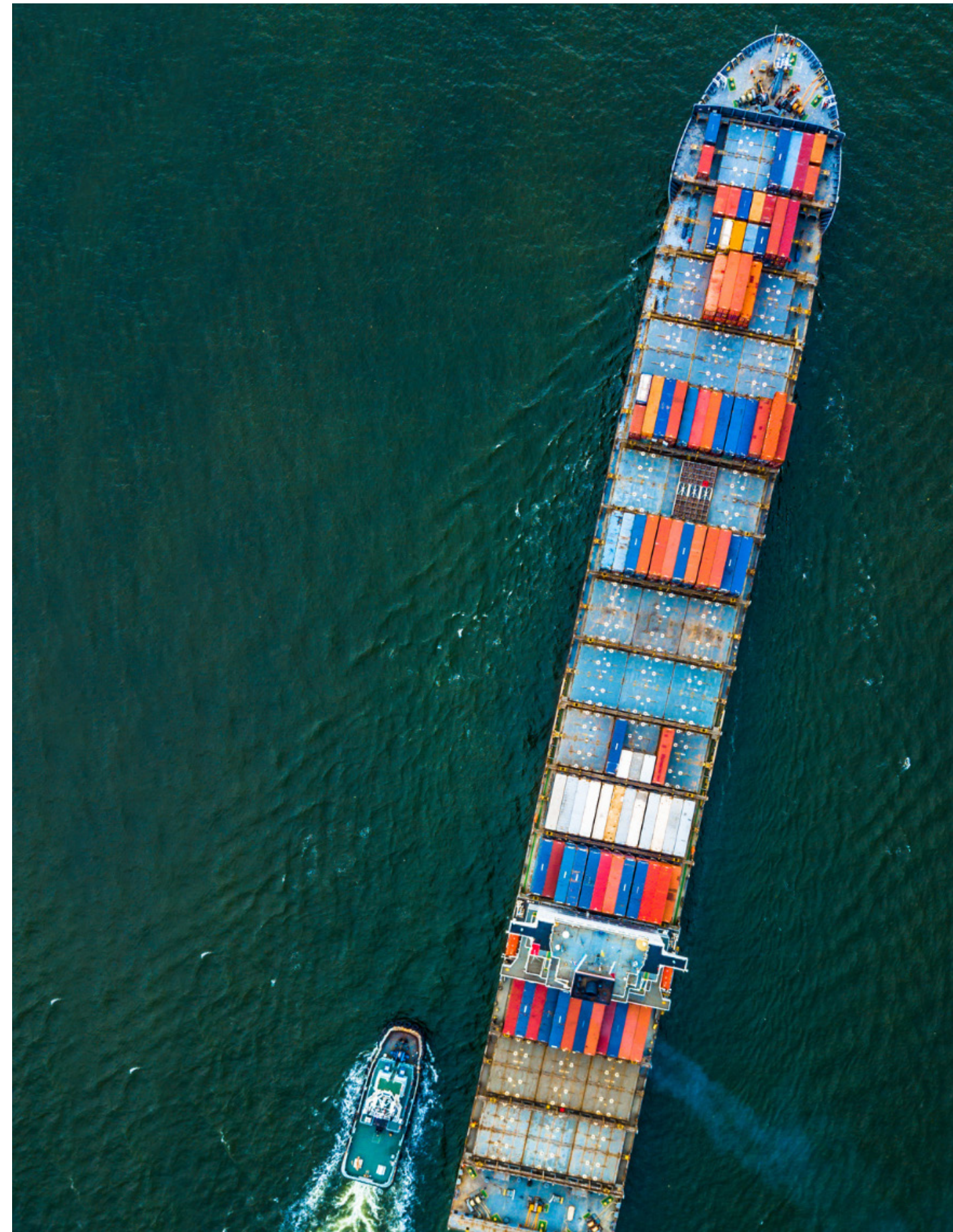
In this moment, we operate in an industry in flux and exist in a world in crisis. Collectively as a sector, it's integral that we continue to adapt to these shifting demands and conditions, reviewing how we can improve and enhance safety methods, training and services, while harnessing innovative technological solutions and embracing collaboration.



Lessons Learnt: Collision when Overtaking

Playtime: 4:28

20/03/2019





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