

Lloyd's List Intelligence 

Maritime safety trends 2012-2022

Advancing a culture of safety in a
changing industry landscape



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FOREWORD

Class, collaboration and safety culture on a journey to transformation



Companies must develop a robust and trustworthy safety culture, placing people at its core, says **Knut Ørbeck-Nilssen, CEO, DNV Maritime.**

The maritime industry is on a journey of transformation. Demand for a more decarbonised world and rapid technological advancements are leading to significant changes to the global maritime fleet and compelling us to calibrate our way of thinking about safety. New engine types, fuels, and digital systems offer many solutions but also bring increased uncertainty and new risks. The maritime industry needs to embrace safety as it adapts to these changes.

Continued accidents and loss of lives means that we must strive to do better and continue to ask challenging questions when it comes to safety. As the report shows, negative safety trends continued in 2022, reminding us that our work on safety is never done.

To reverse these trends and bring the maritime industry as close as possible to a zero accidents aspiration, a more holistic approach needs to be adopted. This means placing equal value on human, organisational and technological elements when designing safety practices.

When we think about safety it is easy to fall back on old habits and think about rules, procedures, and guidelines. While these are essential elements, they mean less if they are

not embraced by all crew members and onshore workers or if they don't become ingrained in the culture of a company.

Companies must develop a robust and trustworthy safety culture, placing people at its core. A deeper awareness of how humans interact will lead to a more comprehensive understanding of new technologies. This will help us develop training programmes that are safe, reliable, and considerate of the day-to-day realities of those who depend upon them most.

Recognition of health and wellbeing is also a crucial part of this process. Proactive investment in the psychological and physical welfare of a ship's crew and onshore workers will lead to reduced human error, more enthusiastic collaboration, fewer accidents and ultimately a greater return on investment for ship owners.

Adopting more progressive and effective safety standards also needs to go beyond the actions of individual companies and be considered from an industry-wide standpoint. The transition to new types of engines running on new fuels may be accompanied by machine failure and accidents. As an industry, we will benefit from sharing the experiences and lessons learnt so

that we all continue to move in the right direction. This will help us all to maintain progress while, much more importantly, minimising the risk to human life.

All industry stakeholders have a role to play when it comes to driving safety standards. At DNV we take seriously our responsibility in developing safety guidelines, standards and rules which can help deal with the challenges of a maritime industry in constant evolution.

This requires collaboration with a range of stakeholders and industry groups, and we hope that this spirit of knowledge sharing will continue to be adopted by all players in the industry as we cast aside our competitive instincts and strive for improved safety standards for all.

Although the maritime industry is on the cusp of exciting change, it is coupled with uncertainty. Navigating these waters requires effective leadership, teamwork, and a new way of thinking.

Placing safety at the heart of our actions will help us to embrace the transformation while always remembering that nothing will ever be more important than the safety of our people, vessels, and the environment.

RICHARD CLAYTON
Chief Correspondent, Lloyd's List

BRIDGET DIAKUN
Data Reporter, Lloyd's List Intelligence

ADRIAN SKIDMORE
Sales Lead, Lloyd's List Intelligence
adrian.skidmore@lloydslistintelligence.com

NEIL WIESE
Commercial Editor, Lloyd's List Intelligence

DNV EXPERTS
Øystein Goksøyr, Head of Department Safety Advisory, DNV
Kathrine Ilje Nerland, Senior Principal Engineer, DNV
Kirsten Birgitte Strømsnes, Head of Section Maritime Advisory, DNV
Georg Gissegjerde, Senior Consultant in Human Factors, DNV Maritime

William Cunningham, External Communications & Corporate Publishing, DNV
Jeannette Schäfer, Senior Communications Manager, DNV

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INTRODUCTION

Tackling shipping's 80% safety conundrum



There is no reason we should just accept that four-fifths of maritime accidents and incidents are inevitable because they are a symptom of humans' capacity to make mistakes, says **Richard Clayton, Chief correspondent, Lloyd's List.**

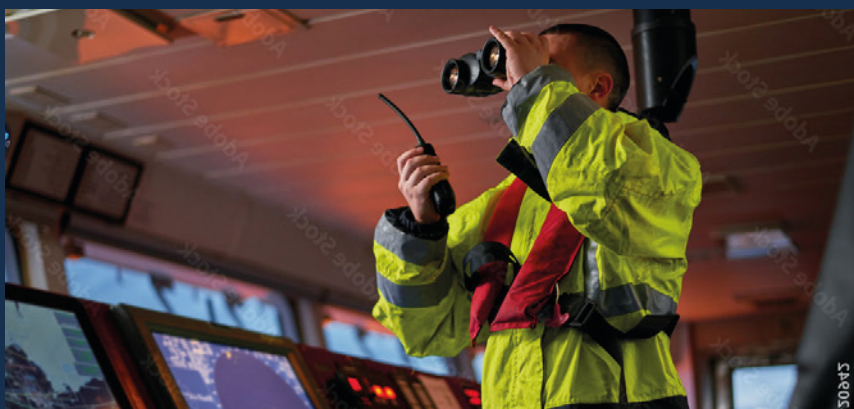
If there is one number in shipping that disappoints me more than any other, it's 80.

Apparently, 80% of all maritime accidents and incidents can be put down to human error. Not deliberate malpractice but mistakes people make as they go about their everyday business. At some point in almost every conference, every webinar, every presentation that touches on safety, someone is sure to mention human error.

What's more disappointing than the number itself is the industry's acceptance of it. Very few conference speakers ask what lies behind this bald statistic. Is it accurate? Is it inevitable? Can nothing be done about it? Is the only solution to take humans and their errors off ships?

This safety report is an attempt to get behind the numbers. Lloyd's List Intelligence (LLI) has crunched the data for the global fleet. The general trend is an improving level of safety over the past decade, although the second half of that decade has shown how hard it is to isolate trends during geopolitical tension, a viral pandemic, climate change, and the beginnings of a fuel revolution.

The conclusion reached by LLI and DNV Maritime is that humans must be seen as the solution to accidents and incidents. A great deal of effort has been invested in identifying the sequence of events that leads up to an error, understanding why accidents happen, and what can be done at the corporate level to manage risk at the earliest stage.



“THE ANSWER LIES IN CREATING A SAFETY CULTURE THAT FLOWS FROM THE SENIOR LEADERSHIP TEAM DOWN THROUGH ALL LAYERS OF THE BUSINESS ASHORE AND AT SEA, AND THEN BACK AGAIN TO THE CEO.”

In essence, the answer lies in creating a safety culture that flows from the senior leadership team down through all layers of the business ashore and at sea, and then back again to the CEO. There are several elements to this culture, which interact with one another, support and affirm when necessary, and warn of gaps when they appear. The report explores the overarching safety culture and each of the elements. It concludes that shipping must collaborate and share safety experience if that 80% is to be seriously addressed.

This paper comes at an appropriate moment. The industry is pushing

hard to achieve decarbonisation goals and is introducing operational technologies and developing a range of fuels to help meet those targets. While decarbonisation grabs the headlines, it's vitally important that the safety implications are built into an innovation at the launch of a project. Failure to do this will open the industry to safety vulnerabilities that will be harder to address a decade or two ahead.

If human safety and environmental protection are embedded within shipping's decarbonisation push, there's no reason why that 80% can't be tackled. Let's try!



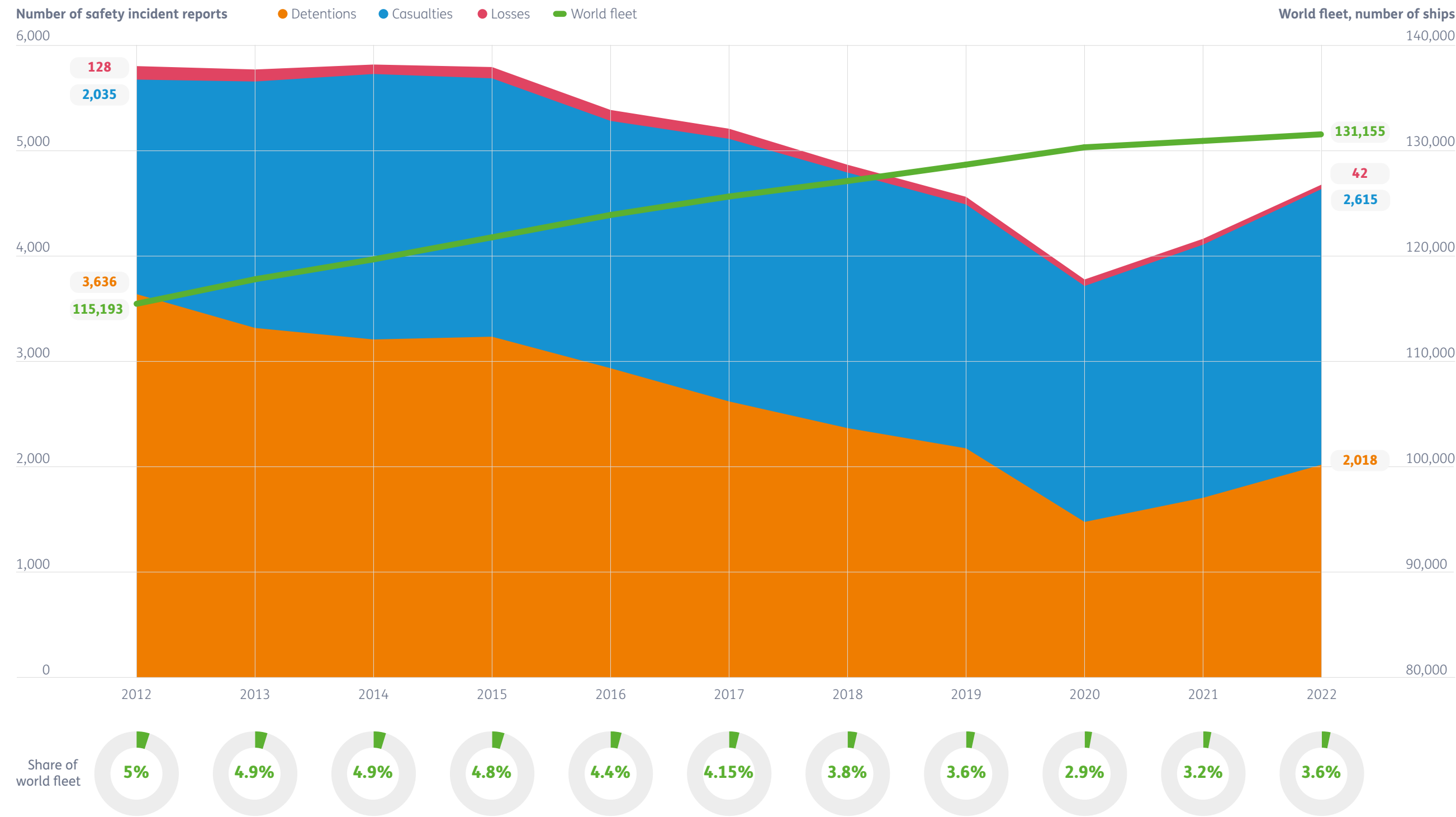
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STATISTICS

Positive trend stopped with opening economies and conflict



65%
of casualties were on ships under 10,000 gt

45%
fall in detentions 2012 – 2022

2%
of casualties were on ships of 100,000 gt and above

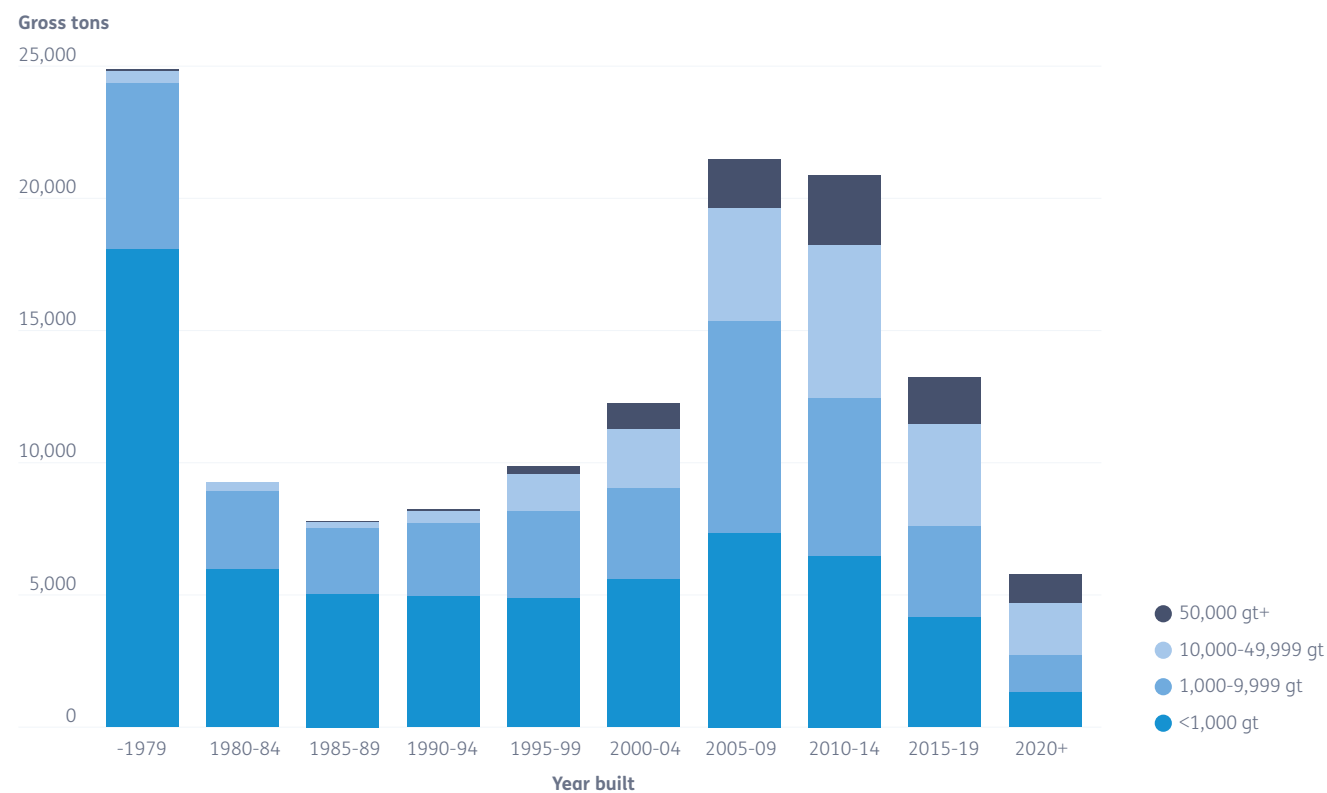


Figure 1: World fleet age profile by gt and year built

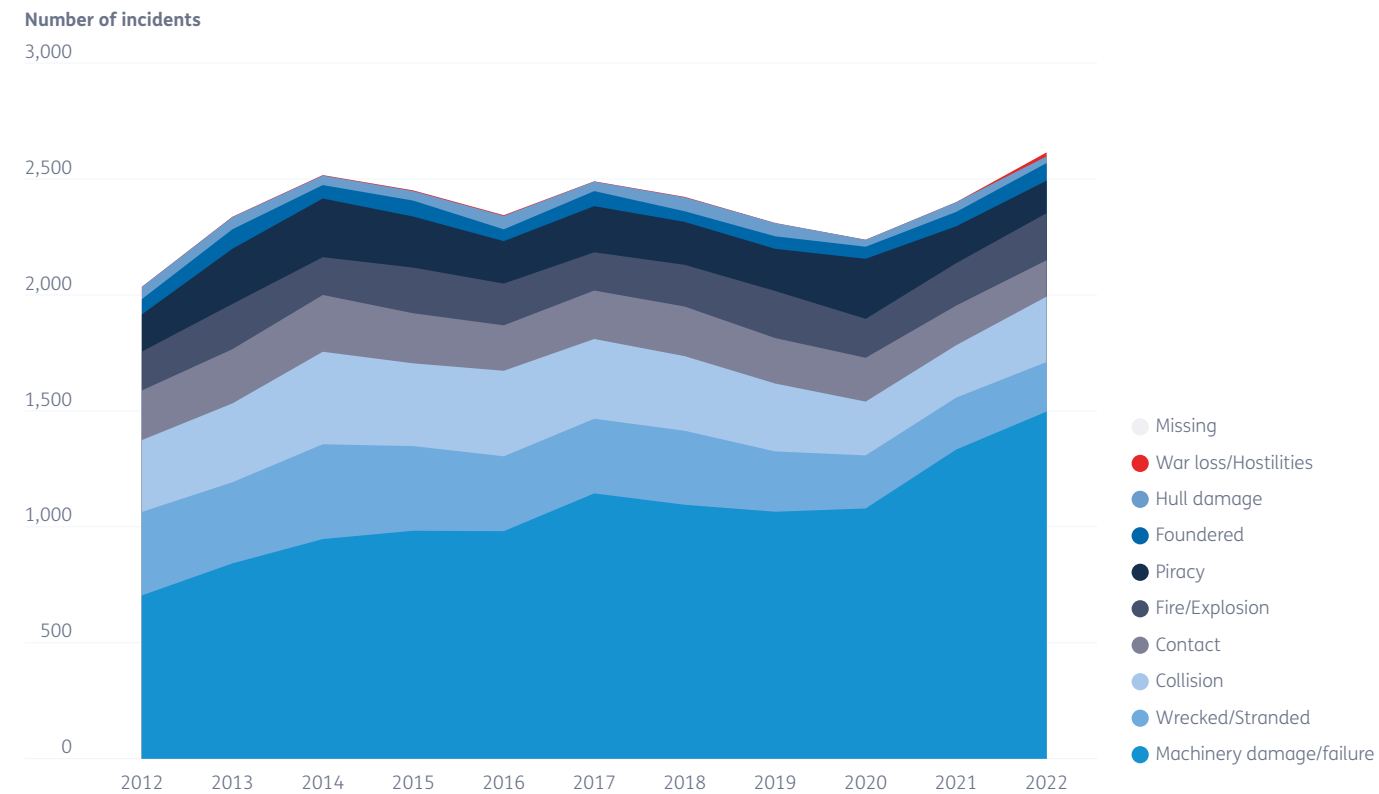


Figure 2: Incidents by casualty type 2012-2022

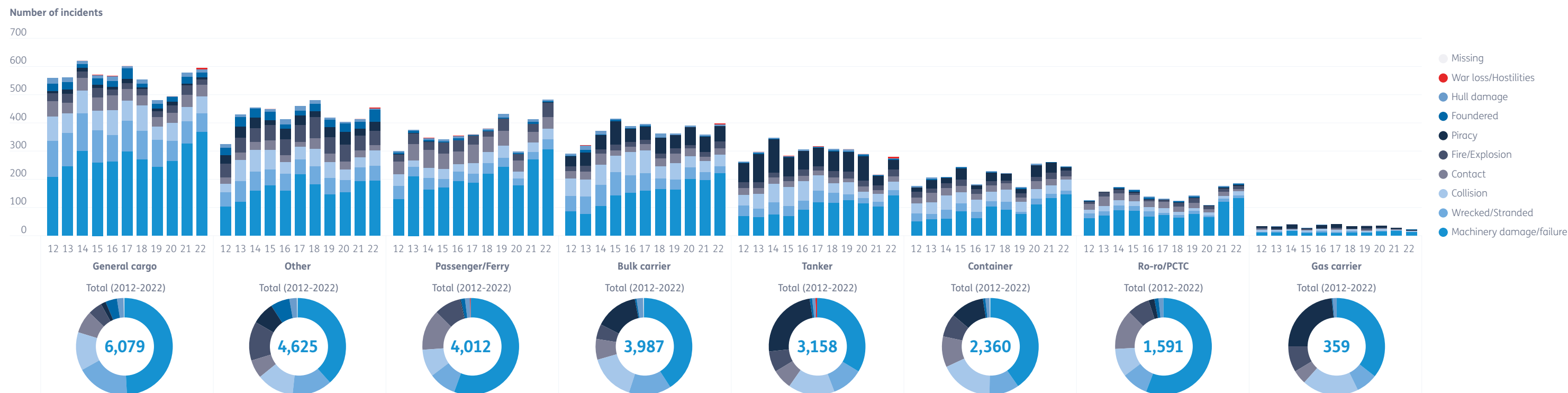


Figure 3: Casualty incidents by type and sector 2012-2022



TREND ANALYSIS

Steady rise in machinery failures leads casualty listings

A doubling in machinery incidents between 2012 and 2022 is revealed in an analysis of world fleet casualties; more fires but fewer piracy attacks; Ukraine conflict makes its mark.

The global fleet of ships is growing steadily. Data is now available for the full decade between 2012 and 2022, showing the impact of reopening after the uncertainties of the Covid-19 period and the turmoil of the first year of conflict in Ukraine.

Casualties have been categorised under the following headings: collisions with another vessel, contact with a static object, fire/explosion, foundering (sunk or submerged), hull damage (hole, crack, or

structural failure), machinery damage or failure, piracy, loss or damage during hostilities, and wrecked or stranded.

The number of vessels involved in collisions steadily declined from 2016 to 2021, before rising to 282 in 2022. The number of incidents involving ships striking harbour walls and other static objects hit a high in 2014, at 245, before slipping steadily back to a low for the period of 157 in 2022.

It is likely that softer markets in most sectors influenced the

smaller number of casualties during the pandemic years, with the subsequent revival of demand bringing an increase in incidents.

Casualties involving fires and explosions revealed less defined peaks and troughs during the period. Between 2013 to 2017 the yearly average totalled 180, rising to 187 over the past five years.

The elevated number of incidents in 2021 and 2022 might again be related to reactivating ships. The statistics

Number of incidents

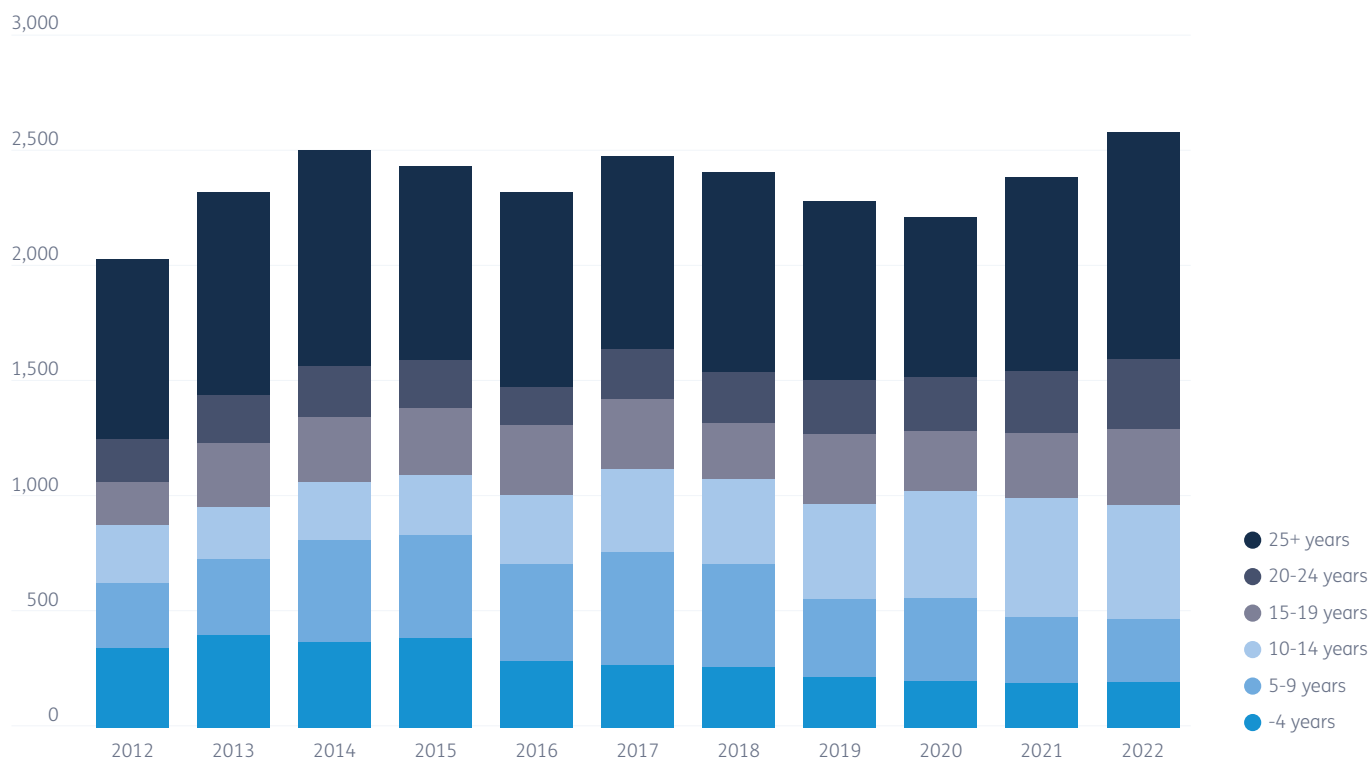


Figure 4: Casualty incidents, age at time of incident



“THE LARGEST NUMBER OF INCIDENTS IN 2012-2022 INVOLVED MACHINERY DAMAGE OR FAILURE. HERE THE TREND IS NOT GOOD... IT APPEARS CLEAR THAT UNDERSTANDING THE INCREASE IN MACHINERY DAMAGE INCIDENTS SHOULD BE AN EARLY TARGET FOR INVESTIGATION.”

do not indicate the severity of fires onboard.

Far fewer vessels were reported to have foundered in the period, with 2013 recording the highest number – 84. The number of these incidents grew again in 2022, with 76 reports, coming from 62 in 2021. The number of ships reporting structural failure or other damage to the hull appears to show no upward or downward trend, with almost all years reporting between 20 and 40 incidents. The fewest reports were received in 2020 and 2022, with 30 and 29 incidents.

The number of incidents in which ships were lost or damaged in conflicts around the world was minimal – until 2022. Last year's invasion of Ukraine by Russia led to significant damage at ports in the Black Sea and Sea of Azov. Some 17 incidents were reported in 2022 involving vessels trapped in hostilities.

Piracy appears to be slipping, with reports from the International Maritime Bureau putting incidents in 2022 at the lowest level for 30 years. However, this category

is evolving. Statistics also include armed robberies, for which the Singapore Straits now accounting for half the incidents.

There has been a steady improvement in the trend of ships wrecked or stranded, from a peak for the period of 409 vessels in 2014 to 214 in 2022.

The largest number of incidents in 2012-2022, by some distance, involved machinery damage or failure (including lost rudder or fouled propeller). Here the trend is not good, although some class societies continue to report an improvement. Some 704 ships reported machinery trouble at the beginning of the period, rising to 983 in 2015 and 1,497 in 2022.

While individual class societies, flag states, and insurers will report trends that vary from this general global snapshot, it appears clear that understanding the increase in machinery damage incidents should be an early target for investigation.

Analysis of the trends in figure 4 shows positive progress towards fewer incidents for vessels of 0 – 4 years of age

and 5 – 9 years. Older ships between 15 and 19 years and between 20 and 24 years of age appear to be maintaining a level of incident reporting that has changed very little over the full decade.

Two age brackets stand out for the negative trend they show: vessels of 10 – 14 years of age have doubled in number of incidents between 2012-22. As for machinery failure, this age segment should be analysed more closely. The second age segment involves vessels of 25 years and older, which have consistently suffered from incidents through the period under study with twice as many reports as for the age of 10-14 years. Ships coming to the end of their working lives can be expected to be more susceptible to hull damage, foundering, or stranding. That's perhaps less surprising than the mid-life vulnerabilities.

In conclusion, analysis of the number of incidents for the period 2012-2022 shows a mixed picture. Incidents involving vessels in collision showed a positive trend until economies reopened after lockdown. The number of fires appear to be rising, but the number of piracy incidents is falling.

Reports of wrecks and strandings has also fallen, as did the number of vessels damaged by conflict, until 2022. Shipping has suffered in the battle for Ukraine, with more ships lost last year than in the rest of the decade combined.

The focus of research should be in the area of machinery failure, where there is a steadily rising trend for the global fleet. In an age of transition to cleaner fuels and digital technology, there is an urgent need to understand what lies behind this trend, where it is concentrated, and how to address it.



REGULATION

Goal-based regulations top of the IMO safety agenda

Rapid technological advancements are changing the ways in which international safety standards are developed, says **Kathrine Ilje Nerland**, **Senior Principal Engineer and safety regulation expert at DNV**.

Safety guidelines and regulations developed by the International Maritime Organization (IMO) have constantly needed to evolve to remain in step with new technologies. This has never been more notable than with the changes facing the maritime industry today.

Because of the rapid pace of technological transformation, regulations traditionally designed for the ships and systems of today can become outdated and less relevant as new machinery, fuels and operating systems become more prevalent. Moreover, they are hindering application of new technologies and slowing down further development.

Much of today's international regulatory safety framework is empirical and assumes large levels of human intervention and fixed technologies. However, with the industry shifting towards increased automation, alternative fuels, and more advanced navigation and communication equipment, there is a need to design new regulations accounting for these technological shifts, while also integrating these changes into the existing regulations.

Because of this fundamental concern, the IMO has shifted the way in which it approaches safety regulation and is moving from prescriptive regulation towards goal-based requirements.

Goal-based safety requirements are fundamentally broader and more flexible than prescriptive regulations. This strategic shift enables the IMO to define fundamental aspects of safety criteria to be met in order to ensure safe shipping.

Crucially, goal-based requirements will give regulations the flexibility to accept new technologies and novel designs by meeting the safety

requirements instead of specific design criteria. Technological innovators or ship designers adopting new fuels or operating systems can already be aware of broad safety expectations when developing new technologies, thus paving the way for smoother and more aligned development.

Many technologies, particularly digital ones, are developing quickly and goal-based safety requirements can help to facilitate their advancement. This kind of regulatory framework also necessitates high performance standards, and this is where Class can claim its role.

The wide experience and technical expertise of classification societies like DNV means that we are in an excellent position to add value to safety regulations by providing assurance that new systems and technologies are safe and compliant with goal-based requirements.

The IMO has also launched multiple initiatives to improve the safety of vessels and seafarers in a changing market. Several amendments to the International Convention for the Safety of Life at Sea (SOLAS) and associated Codes will enter into force in 2024. These include new requirements for ships carrying industrial personnel, modernisation of the requirements to the worldwide system for communication of emergency information, new requirements to safe

mooring operations, and updates to the requirements for ships using LNG as fuel.

Highlights of the work in progress towards 2026 and beyond include the development of provisions for autonomous ships, measures to improve the fire safety of ro-ro passenger ships, and a regulatory framework for ships using alternative fuels like methanol, LPG, hydrogen, low flashpoint oil fuels and ammonia or installing fuel cells onboard.

Although we are witnessing growth in automation, new technologies will continue to rely on interaction with human beings. It is therefore vital that training programmes are developed in such a way that systems can be operated to high standards which preserve safety levels.

Industry stakeholders, regulators and classification societies remain central to the development and protection of safety standards in the maritime industry. Rules and guidelines must keep up with technological advancements to ensure that shipping remains a safe and reliable means of transportation.

DNV continues to work alongside the IMO, both in helping to develop safety standards and in supporting companies to apply rules in the development of new technologies. Doing this well will help us to continue to advance our overall goal of safeguarding life, property, and the environment.

“GOAL-BASED SAFETY REQUIREMENTS ARE FUNDAMENTALLY BROADER AND MORE FLEXIBLE THAN PRESCRIPTIVE REGULATIONS.”



TRANSFORMATION ROADMAP

Digital transformation roadmap unlocks safe and efficient potentials

Øystein Goksøyr, Head of Department Safety Advisory, DNV, believes that Change Management is crucial to the success of shipping's transformation to a cleaner, greener industry.

The shipping industry has been undergoing a significant transformation in recent years, driven by the increasing trend towards digitalisation. Emerging technologies such as the internet of things (IoT), data sensors, artificial intelligence (AI), big data, machine learning, and cloud connectivity are reshaping the industry, presenting new opportunities for decarbonisation, efficiency improvements and safety monitoring.

Data-driven technologies enable real-time processing of data, leading to actionable insights and more reliable decision-making for the crew. This enables businesses to optimise their operations, resulting in improved efficiency, monitoring, control, quality assurance, and verification. For instance, condition monitoring can help reduce machinery incidents by

allowing closer monitoring and prompt, pro-active action when deviations are detected.

All in all energy efficiency measures, fuel consumption monitoring, condition monitoring of ship components for preventive maintenance, optimised weather routing, and vessel performance management can all contribute to operational safety and economies and reduced emissions.

DIGITALISATION FOSTERS DECARBONISATION

According to industry studies, around 15% of the decarbonisation gains required to meet the International Maritime Organization's (IMO) goal of halving greenhouse gas (GHG) emissions by 2050 can come from operational efficiencies on existing ships.

Thus digitalisation can help shipowners keep their vessels GHG compliant while awaiting more mature alternative fuel technologies.

Despite technological advancements, humans still play a critical role in the operation and management of digital systems. Mistakes, misinterpretations, or intentional misuse of digital tools or data can lead to safety incidents or operational disruptions. Therefore, adequate training, awareness, and

accountability among the workforce are crucial in mitigating human errors and ensuring safe usage of digital systems.

Digitalisation also supports the switch to alternative fuels. But while digital tools can provide valuable insights and automate certain processes, human judgment, expertise, and decision-making are still essential. Crew members and other stakeholders need to be vigilant, proactive, and well-trained to identify and address potential safety risks.

To support the industry shift towards digitalisation, DNV has established a digital transformation section. The section is based on its smart vessel class and cybersecurity notations for data infrastructure related to operations, maintenance, and energy efficiency. The initiatives cover four main areas of transformation: strategy, smart fleet transformation, management implementation, and smart vessel operations.

By implementing a strategic digital transformation roadmap into the overall business strategy, shipping companies can take a structured approach to leveraging digital technology. It enables them to identify and prioritise opportunities for innovation, streamline processes, leverage data-driven insights e.g. for safety improvements, and adapt to changing market demands, ultimately leading to improved performance and a sustainable competitive advantage.

Active leadership, support, and involvement from management are essential in promoting a collective understanding of the benefits and consequences of identified digital initiatives. A clear vision and long-term strategic goals are necessary to determine the current status and the desired ambition of the company.

The success of a transformation process also depends on effective change management, which involves getting employees on board and fostering a sense of ownership.

DIGITAL ROADMAP

DNV helps maritime companies in developing a digital transformation roadmap to guide them on their journey towards smart shipping.

This roadmap includes establishing strategic goals, assessing the current status in areas such as

- smart maintenance
- energy management
- safety

and identifying the gap between the current status and the long-term ambition. The roadmap is then used to identify action areas, appropriate tools, and a timeline.



HUMANS IN THE LOOP

Seafarers will remain part of the safety solution

Safety experts must convince the industry to shift from reactive to proactive in its attitude, giving equal weight to human element, organisational, and technical dimensions.

Our perception of safety in maritime is in transition.

There is good reason for this. Partly it's because of advanced technologies bringing new risks onboard ship and partly because the discipline of psychology has reached the seafarer, refocusing our understanding of human behaviours and of safety itself.

But there's something else: a determination to sweep away the old acceptance that shipping is dangerous so there will always be incidents, accidents, and casualties, and lives will always be lost.

The question to be asked is: if safety is the management of risk, is it a feasible objective to manage risk out of maritime altogether? This leads on to what is still a theoretical discussion, whether ships would be safer if seafarers

SAFETY CULTURE FRAMEWORK



were removed entirely because human casualties would be minimal.

It all comes down to whether people are seen as the problem or the solution.

Traditionally, safer industries are thought to be those with fewer reports of incidents and casualties. The weakness of this judgement lies in how inconsistently safety is monitored and measured. Every accident investigation hears how earlier incidents went unreported because officers feared for their jobs. That fear also results in missed opportunities for the industry to learn, improve, and avoid similar incidents in future.

Shipping is reactive when it comes to safety: a major incident with a significant loss of life will be followed by an investigation, recommendations, and perhaps a tightening of regulations. But what about an incident in which only one or two lives were lost? Can the seriousness of an incident be measured by the number of deaths rather than by the trail of shortcomings that inevitably ended in collision or sinking?

A safety culture is grounded on the belief that humans should remain in the loop, working with the technologies available to achieve the best result for both seafarers and systems.

It begins with the positive assertion that no one person should shoulder sole responsibility for an incident even though he made a mistake.

The management of risk will in future be improved through a range of holistic initiatives focusing on seafarer health in body, mind, nutrition, and restfulness. These are positive for safety and show a proactive attitude within the organisation's safety culture.

Humans will remain in the maritime loop throughout the industry's transition to decarbonisation. By including seafarers in the holistic approach to safety, shipping will shift from reactive to proactive and will confirm its long-held belief that seafarers are part of the solution to safety issues.

FROM REACTIVE TO PROACTIVE

The task facing safety experts is how to turn the industry from reactive to proactive in its attitude, leading to improved learning cultures. This would involve a holistic methodology that gives equal weight to the human element, organisational, and technical dimensions (the HOT approach).

DNV believes this holistic approach is needed to address the safety challenges created by decarbonisation, digitalisation, and automation of maritime work processes.

The next section of this publication delves into safety culture, which is defined as the product of both individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to an organisation's health and safety management.



LEADERSHIP

Safe shipping is built on the foundation of good leadership

Safety leadership is about unlocking people's potential to become safer. Effective leadership and safety culture work in tandem to drive greater engagement in managing risk.

Effective leadership drives safety culture. This is so obvious it's often overlooked. Safety culture underpins safe shipping, therefore effective leadership is the bedrock for safe shipping.

Shoreside leaders have many competing demands on their time and talents. In certain cases, safety might not be given the highest level of importance, although keeping employees, assets, the environment, and the community safe from harm is never more apparent than after an accident or incident.

Damage to reputation is much more costly than the impact on a balance sheet made by a safety-related investment.

At sea, leadership is vested in the Master, who is responsible for creating a safety culture among the officers and ratings he or she has onboard. Again, Masters have many calls on their time – increasingly so now that connectivity with shoreside teams has improved – but the dangers posed by changeable sea states and weather conditions means that safety of the ship, its crew, and cargo are always uppermost in the Master's mind.

There is a close relationship between the safety culture nurtured across the entire organisation by the Chief Executive Officer and the safety culture created onboard ship by the Master.

Safety experts have established a series of leadership principles that have been designed to be dynamic and to evolve as safety expertise grows. These flow throughout this report. They include good communications, leadership by example, reinforcing positive actions, and making safety a corporate value.

“LEADERS ARE EXPECTED TO ENSURE THAT INCIDENTS ARE THOROUGHLY REVIEWED AND ADDRESSED TO PREVENT AN AVOIDABLE RECURRENCE.”

Leaders are expected to ensure that incidents are thoroughly reviewed and addressed to prevent an avoidable recurrence, to provide a safe space where people can speak up about their concerns, and to ensure that all employees at sea and onshore have a duty to care for each other.

This goes far beyond the minimum requirements of the International Safety Management Code, which stipulates that safeguards should be established against the safety and pollution risks involved in shipboard operations. The Code calls for a set of procedures that would, if followed, bring improved operational efficiency and fewer losses arising from accidents.

Traditionally, the safety officer has made sure the ISM Code rules and regulations are applied onboard. Safety culture is not usually part of their remit unless the company has chosen to build it into their role.

However, human element experts insist that safety is unlikely to progress by following procedures; rather it is led from the front.

Training is key to leadership development, yet safety training is not a priority for either senior executives or Master mariners.

For the latter, safety training has traditionally come through many

years of experience at sea, rather than in the classroom. Recently, as a result of fewer officers available to take senior positions combined with experienced senior officers retiring, promotion to positions of leadership has come earlier than anticipated. This is a concern for the development of an effective safety culture onboard.

The upshot of this can be seen in accident investigations, when lack of experience and reluctance to admit to it become dangerous bedfellows. Interpersonal relationships play an important role in almost all incidents, however this is not always picked up in investigations.

The strengths and weaknesses of leadership in any situation are often the clue to solving the events that led to an accident or incident.

Good leadership is proactive, engaged, and committed to improving the safety culture of an organisation or onboard a ship. Committed leaders influence the people around them and drive change. Conversely, if leaders are not engaged with the organisation's safety culture, it will be much harder to effect change.

As Georg Giskegjerde, senior consultant in human factors at DNV Maritime, says: “Safety only works if people are encouraged to be part of building the safety culture.”

COMPETENCE

Competence is more than the sum of skills and abilities

Competence encompasses the elements that are assessed in a safety culture evaluation, including skills to manage safe operations and the adequacy of employee training.

Competence is an essential element of safety culture. It reflects the knowledge, skills, abilities, and qualities that enable a person to perform a task in a successful manner. Organisations should exhibit safety and risk competence – the proficiency to understand and assess risk and to manage that risk – at all levels.

Competence also has regard for the factors that make up a safety culture assessment, such as whether the skills are in place to manage operations safely, whether recruitment is carried out effectively, and whether employees are being trained appropriately.

This mindset is not limited to managers; it involves all an organisation's employees at sea and on shore. It does not require that everybody becomes an expert in safety culture, however it expects everyone to acknowledge that the behaviour and role of each person has an influence on everything else.

New technology and better trained and motivated seafarers ought to

mean that levels of competence at sea are higher than in the past, which in turn should mean that shipping is safer.

While this is undoubtedly the case, the safety of any ship is only as strong as its weakest link. While technical systems might be installed onboard, the hull might be stronger than the previous generation of ships, the engine more powerful and with improved manoeuvring ability, it is the crew – together with the systems – who must keep the venture safe.

The trinity of competencies: the human element, organisational systems, and technology will ensure safety when deployed in combination

“THE TRINITY OF COMPETENCIES: THE HUMAN ELEMENT, ORGANISATIONAL SYSTEMS, AND TECHNOLOGY WILL ENSURE SAFETY WHEN DEPLOYED IN COMBINATION.”

rather than any one of them in isolation.

Training will be an increasingly important aspect of competence for the crew as new risks emerge.

In the transformation to advanced technologies, understanding how the crew currently manage their operations and how they will be expected to manage in future will become a critical element in competence.

It will be essential for the Management of Change process to identify risks and safety issues up front, then specify safety measures – including competence and training needs – prior to implementation of a new operating ecosystem.



THE MISSION TO SEAFARERS

IDENTIFYING THE GAPS

That leads on to how levels of competence should be improved, how gaps should be identified, and whether there is a system in place to fill those gaps.

In light of safety culture, there are two important questions to ask: firstly, whether the right competence is in place to identify risks, which must be shared; second, whether the right systems are in place to ensure that, by means of recruitment, selection, training, and education, the right people are onboard.



COMPLIANCE

Compliance takes human behaviour into account

Compliance with procedures is valued by seafarers when the benefits are well understood. However, a company's reporting culture might damage this element of safety culture.

Shipping is a highly regulated industry. Compliance with procedures put in place to meet international, regional, and even national regulations is part of the seafarer's life and is understood by most as being integral to crew safety and environmental protection.

Procedures, as an element of safety culture came top of a list of factors highlighted by seafarers in interviews conducted as part of the EU-funded SAFEMODE project. It appeared to be a surprising answer, given interviewees' earlier complaints about too strong a focus on procedural compliance during investigation. However, seafarers recognise when procedures are in place to protect them, especially when involving the use of protective equipment and lifelines.

The SAFEMODE interviews highlighted different perceptions of procedures and regulations such as the Safety Management System (SMS), whereby compliance with safety procedures was accepted as being beneficial while SMS was viewed as a "burdensome tool barely known to seafarers", and compliance was reluctant.

One possible interpretation was that safety in shipping comes from a combination of compliance with company procedures and the crew's own experience. Compliance alone is only half the story, although it is one of the building blocks of safety culture. 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.

However, seafarers do not always comply with procedures, even when they acknowledge their importance. A significant element in safety culture is understanding why this happens. This is more than an academic exercise and could shine a light on why incidents occur even when procedures are clear.

According to the SAFEMODE investigation, the SMS is often generic and only partially relevant to the individual ship. This reinforces 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. Levels of compliance suffer accordingly.

This suggests that the SMS needs to be more reflective of realistic operations and conditions on board. Because each ship is different, individual SMSs would serve safety better than generic ones. Compliance as part of a safety culture is, therefore, valuable and recognised, but sometimes neglected.

Human behaviour plays a critical role in an assessment of safety culture. In order to understand

“SEAFARERS RECOGNISE WHEN PROCEDURES ARE IN PLACE TO PROTECT THEM, ESPECIALLY WHEN INVOLVING THE USE OF PROTECTIVE EQUIPMENT AND LIFELINES.”

why near miss incidents go unreported, for example, in a clear breach of compliance with procedures, investigators must ask questions of the individuals involved through interviews, observations, and discussions. There needs to be a qualitative dimension to the investigation.

An initial survey into failure to comply with instructions to report an incident provides insight into a company's reporting culture. Some employees might fear repercussions if they report an incident, while others know from experience that it's doubtful any action will follow from putting in a report.

Compliance with procedures in a shipping company requires attention to several key elements. Firstly, they must be relevant, updated, adequate, and fit for purpose. Secondly, procedures and necessary tools or aids must be easily accessible for seafarers. Finally, seafarers must receive the necessary training and have the competence to understand and follow the procedures effectively. Ensuring these elements are in place can help establish a strong safety culture and promote compliance within the shipping company.



CONFLICTING GOALS

Safety and commercial goals should be mutually inclusive

The key to managing the conflict between safety and business profitability lies in understanding an organisation's priorities. The two should be working towards a common expectation.

An important element of safety culture is management of the fundamental conflict between contradictory goals. Safety and revenue are often perceived as such.

Some ship masters still confess to being subjected to commercial pressure, whether direct or indirect, to perform operations that may jeopardise the ship's safety. The competitive nature of the market demands timely and efficient delivery of goods or keeping operating schedules, and there might arise instances where adhering to such requests could put the ship's safety at risk.

However, unless safety is a priority and safety goals have been implemented, organisations will struggle to be profitable – if not immediately, then in the long term.

Safety goals can act as safety barriers within an organisation, helping to balance out commercial pressures. The issue is how these pressures are discussed and prioritised. A healthy safety culture will treat prioritisation as a way to address conflicting goals.

GOOD FOR REVENUE

In the past, many executives appeared to put safety on the agenda for as long as it didn't cost any money. This attitude was communicated down through an organisation.

A combination of regulations, reputation, and revenue has led a change in attitude.

Revision of regulations following an accident prompts

change across the industry, while a blow to corporate reputation following an accident that causes environmental damage accelerates transformation.

However, the optimal way to manage conflicting goals is to recognise that improved levels of safety benefit the bottom line. This is not always transmitted clearly, which puts the onus on management to be transparent, and for both management and workforce to trust one another.

Safe operations are good business practice because accidents cost a lot – not just in terms of money.

Measuring risk has always been an inexact science, and unless

“SAFETY GOALS CAN ACT AS SAFETY BARRIERS WITHIN AN ORGANISATION, HELPING TO BALANCE OUT COMMERCIAL PRESSURES.”

levels of risk are understood it's hard to know whether levels of safety are acceptable. No one puts themselves in greater danger than necessary, but the consideration becomes whether HSE (Health, Safety, Environment) performance targets are a good indicator of safety.

Monitoring should add value and not become a tick-box exercise. Good quality monitoring will not only identify problems but will also help to bring an understanding of what caused them.

In managing the conflict at board level between safety and revenue, mindset is more important than monitoring.

SAFETY AND REVENUE WORK TOGETHER

The mindset should be that safety and revenue are not mutually exclusive but inclusive: they work together. Incorporation of safety within ESG (Environmental, Social and Governance) reporting – safety expectations are embedded within all three categories – enables prospective business partners to observe the priority placed on safe performance over a long period of time.

INCENTIVES

Incentives are the motivations that create a safety culture

For a safety culture to be effective, it's important to have clear mechanisms in place to encourage positive behaviour while discouraging negative behaviour.

Safety works best when employees are encouraged to be part of the safety culture.

Encouragement often takes the form of incentives, both positive and negative. Human behaviour reacts to incentives, so being familiar with what motivations are in place, and how employees are likely to respond to them, will help to understand the extent to which people are likely to buy into the safety culture.

Positive and negative incentives are two dimensions of the same goal.

While positive incentives may include rewards and recognition to demonstrate safe behaviour, negative incentives might include punishment or disciplinary action for showing unsafe behaviour.

Although it is important to have both, safety leaders must be mindful that there may be potential side-effects to negative incentives in creating a culture of fear or resentment.

A balance of encouraging positive behaviour while discouraging negative behaviour is required.

There might be incentives in place to promote reporting or recognition for those who promote good safety behaviour. On the other hand, it should

“ALTHOUGH IT IS IMPORTANT TO HAVE BOTH, SAFETY LEADERS MUST BE MINDFUL THAT THERE MAY BE POTENTIAL SIDE EFFECTS TO NEGATIVE INCENTIVES.”

be understood that unwillingness to report near misses will be punished.

Incentives go to the heart of human behaviour and, therefore, to the heart of a safety culture. Humans are simple: if they don't receive a reward or recognition, or they can't see the purpose in taking a certain action, they stop doing what they are required to do. For a safety culture to be effective, it's important to have clear mechanisms in place to encourage positive behaviour while discouraging negative behaviour.

“That's the main point about incentives,” says DNV Maritime's Georg Gissegjerde. “The fundamental questions for safety culture to address are ‘What's in it for me?’ and ‘If I don't get anything out of it, why should I do it?’”

Incentives must promote an attitude that what benefits the

individual will simultaneously benefit the company.

This aspect is connected to the dimension of creative worry.

“Employees need to be assimilated into organisational culture,” Mr Gissegjerde adds. “It is organisational commitment: employees are committed to the values and purpose of the organisation.”

A great deal of research has been carried out into how and why people become committed and take on a sense of ownership. The larger the organisation becomes, the more separated employees are from core values unless there are clear incentives – both positive and negative – to keep them incorporated into the culture.

Like every other element in a safety culture, incentives are dynamic and should be revisited regularly to keep them fresh and relevant.

FORMAL AND INFORMAL INCENTIVES

For organisations, it is important to ensure that they have systems in place that bring the incentives into life. This is done through the formal incentives the company has in its management systems and the informal incentives where people watch out for each other, praise good behaviour, and react when they see unsafe behaviour.



THE MISSION TO SEAFARERS

COLLABORATION

Collaboration will be essential for higher levels of safety

It makes good sense to work with other industry stakeholders to improve levels of safety while shipping transitions to decarbonisation. There are one or two hurdles to overcome first.

Collaboration is a key ingredient within an organisation's safety culture. It reflects teamwork across different levels, linking management with workforce and bringing departments together. It is important to be part of a team with a common goal, and to acknowledge that handling risks involves people from different groups and levels.

However, there is often a nervousness about departments, groups, and individuals learning from one another.

Successful companies require individuals to work together, organisational units to join forces, and even competitor businesses

to explore ways to build bridges to ensure safety for seafarers across the industry. Charterers, financiers, terminal operators, ship agencies, class societies and other stakeholders seek ways to combine their expertise in the pursuit of energy efficiency, sustainability, and higher levels of safety.

LESSONS MUST BE LEARNT

It is generally agreed that safety performance should not be a competitive advantage. One life lost by any operator is one too many, and lessons must be taken onboard by all operators. This will only be achieved if the industry pushes for improved transparency.

Data is the key to collaboration and is fundamental to safety. If safety is one of the few areas in shipping for which collaboration benefits all parties, breaking down barriers to sharing safety data will play an important role in boosting collaboration, starting within an organisation.

The question is not whether there should be collaboration for safety in shipping, it's how that collaboration should work in a way that maintains the competitive edge and keeps trade secrets secure.

Solutions are expected to emerge from decarbonisation, which will have increasing ties with ship and crew safety over the coming decade.

A multi-fuel future will throw up safety issues that will need to be addressed for all vessel types, sizes, and trading routes. It is certain that experiences gained by early adopters of engines running on new fuels and on ships fitted with new technologies will be shared across teams, companies and the industry.

As it relates to safety culture onboard a ship, the introduction of new technologies will require seafarers to work together closely when planning and executing operations, tasks, and missions. Collaboration, therefore, takes place at several levels at the same time.

Collaboration for higher levels of safety will be stimulated by collaboration in decarbonisation and digital solutions. It will be driven by organisational leadership, embraced by competent individuals, and built into corporate incentives. It will form a critical element in organisational learning and set targets for those confused by conflicting goals.

“SUCCESSFUL COMPANIES REQUIRE INDIVIDUALS TO WORK TOGETHER, ORGANISATIONAL UNITS TO JOIN FORCES, AND EVEN COMPETITOR BUSINESSES TO EXPLORE WAYS TO BUILD BRIDGES TO ENSURE SAFETY FOR SEAFARERS.”



CREATIVE WORRY

Creative worry is looking for the unexpected time after time

The big risks are reliance on procedures and forgetting to seek out deviations in repeated operations. Creative worry sharpens the eyes and keeps the mind alert to what might happen.

The environment in which shipping operates is in constant change. Sea states can swiftly shift from calm to rough as weather conditions deteriorate, traffic might be light and predictable in the open ocean but busy and mentally challenging when approaching port. The people on duty also change.

A safe response to this dynamic situation is to embrace a mindset of ‘creative worry’, a way of thinking that looks out for the unexpected.

This element of safety culture is never satisfied with the status quo, it seeks to find deviation from the norm as early as possible to present situations developing. It challenges what is seen and prepares for what might be unseen.

“Be aware”, Georg Gissegjerde advises. “To think beyond the obvious and anticipate potential hazards before they arise requires a proactive and imaginative mindset.”

Knowing what to look for depends on the situation. Safety onboard ship is dynamic: something that used to be predictable becomes uncertain when the context changes. The bridge team should be trained to look for situations both on the ship and in the waters around the ship that might need a response.

Many shipping organisations claim they are aware of all the risks they face, he says. That’s a red flag. “If it’s a risk, how should it be handled?”

Creative worry is especially important when dealing with very complicated, non-linear tasks. The way of thinking can be taught in simulators, training for different scenarios, adding deviations into the mix, instructing in ways to look for the unexpected.



“THIS WAY OF THINKING CAN BE TAUGHT IN SIMULATORS, TRAINING FOR DIFFERENT SCENARIOS, ADDING DEVIATIONS INTO THE MIX, INSTRUCTING IN WAYS TO LOOK FOR THE UNEXPECTED.”

Training on the same specific procedures time after time will discourage a constant search for deviations from normal situations.

While creative worry can be taught, the most important thing is to be aware of its importance. It’s normal for humans to oversimplify a minor deviation and ignore it.

The biggest danger is complacency. Every time an operation is repeated successfully it gradually loses the element of surprise, so much so that it becomes dangerous. Many navigational accidents and incidents follow hundreds of iterations of the same operations that didn’t cause any concern.

Incidents occur when something happens that wasn’t expected, despite the risk.

Humans don’t like using energy and effort in evaluating the same thing. Mechanisms have been put in place to improve the efficiency of everything we do, so it’s against human nature to submit to creative worry.

It runs against a safety policy that relies on procedures. In themselves, safety procedures are not the problem, however having too many procedures and depending on them too rigidly is to neglect normal risk.

Organisations that have embraced creative worry in their operations are becoming mature in safety culture.

RESILIENCE

Resilience is a vital component in succeeding in a transforming industry

All organisations with a mature safety culture are to some degree resilient. However, resilience will be important during the introduction of new technologies and new ways of working.

The traditional view on safety is to agree a set of safety factors, create rules and regulations, set out safety procedures, and build in redundancy. Although this is a practical response to predictable events, there will always be some scenarios that haven't yet been experienced.

New technologies and fuels in shipping are likely to generate many unknown scenarios that can't be handled in the traditional way. Therefore, a final piece in the safety culture puzzle must be resilience.

Resilience is the ability to be dynamic, to adapt to variations, disruptions, and surprises, says Kirsten Birgitte Strømsnes, Head of Section Maritime Advisory at DNV. It is the capability to solve the pressing problems that occur.

"You are trained to manage unforeseen situations," she explains. "Resilience is the ability to handle these situations and to recover to normal as soon as possible."

Resilience is connected to creative worry, the mindset that keeps a constant look out for deviations, and when they are found, applying a dynamic response to managing that situation.

Action must be taken where the problem lies rather than repeatedly cascading it upwards.

A classic challenge to resilience onboard ship is the arrival of new officers. It's important to create a strong and mature safety culture that is learned, carried, and shared by everyone onboard, which will withstand the disruption of new officers. Instead, the new officers will adapt to the established safety culture.

Such a culture takes time to create and maintain, especially when there is

“RESILIENCE IS THE ABILITY TO HANDLE A NEW SITUATION AND TO RECOVER TO NORMAL AS SOON AS POSSIBLE.”

a regular changing of the guard on the bridge or in the engine room.

Spending time and effort in finding out how officers relate to each other onboard will become even more valuable with the introduction of new technologies, new fuels, and more complicated operations.

THINKING DIFFERENTLY

It's important for shipping because digitalisation and decarbonisation will prompt all officers to think differently about operational safety. There will need to be a regime: new officers will not be introduced onto the bridge without more thought being given to training.

Bringing new fuels onboard will, therefore, demand a new level of resilience during the transition phase.

DNV believes the introduction of new technologies, new ways of working,

and fuels demands a greater focus on the safety culture, and especially the quality of resilience.

There is already a level of resilience on the bridge to accommodate the cultural differences among the range of officer nationalities. Senior officers have learned to find ways to handle such differences.

"It's tricky," Strømsnes observes. "The way of handling it depends on the management saying: 'this is how we do things around here'."

It demands a lot of the management onboard the ship. As a higher degree of resilience creates a demand for increasing empowerment at all levels and flexibility, the Master will need to be a far better person-manager than in the past. Unfortunately, there is a little personnel management built into courses at seafarer academies.



ORGANISATIONAL LEARNING

Accidents and incidents have much to teach organisations

A slow shift is under way from a scapegoat culture to a Just culture that encourages employees to report incidents and expects organisations to learn from the experience.

Accidents and incidents can be a valuable source of insight for an organisation willing to learn the lessons they teach.

Recognising how organisations learn from incidents, and why different organisations learn in different ways, is fundamental to creating a safety culture. The key ingredient is feedback. Mechanisms that encourage feedback and learn from it are on the road to managing uncertainty, not only in safety but in all aspects of business.

When things do not go as expected, instead of blaming someone because they didn't do what they were supposed to, look at the feedback mechanism, DNV Maritime's Georg Giskegjerde advises.

"We should ask questions of the systems in place to facilitate organisational learning. Does the reporting system work? Who is responsible for following up, and is it working as it's supposed to?"

The second element in organisational learning is creating a Just Culture. This concept emphasises that mistakes are generally a product

“IF YOU DON'T REPORT SMALL EVENTS AS WELL AS BIG EVENTS, YOU ARE LOSING AN IMPORTANT SOURCE OF ORGANISATIONAL LEARNING TO PREVENT IT FROM HAPPENING AGAIN.”

of faulty organisational cultures, rather than solely brought about by the person or persons directly involved.

"In a Just Culture, you don't ask who did the wrong thing, you ask what went wrong?" explains Kirsten Birgitte Strømsnes, Head of Section in DNV Maritime Advisory.

"What can be learnt from an incident and how it might be prevented from recurring. A Just culture is, therefore, the opposite of a blame culture."

To embrace a Just culture, a company would need a safe environment that supports the right to report not only accidents and incidents but also situations that might develop into something serious.

"That is a challenge in the maritime industry today," Strømsnes says. "I'm not certain there is a Just culture or a reporting culture. People are afraid of reporting [in case there are repercussions.]

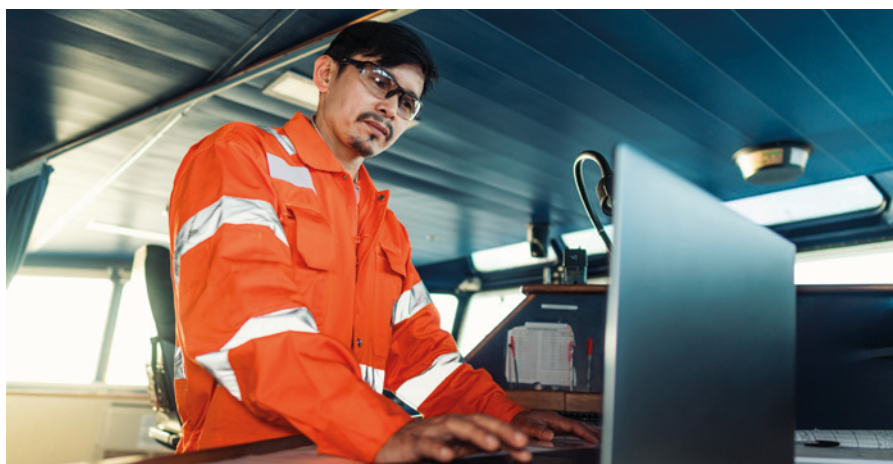
"If you don't report small events as well as the big events, you are losing an important source of organisational learning to prevent it from happening again."

DNV believes the industry must cultivate a sound, safe, trusting, and open reporting culture and move away from the traditional scapegoat culture that demands to know who is at fault.

The organisation must make it easy for employees to report incidents, ask questions, and learn.



AS REGARDS THE TECHNICAL SYSTEMS NEEDED TO MAKE EFFECTIVE REPORTING A REALITY, THESE MUST BE USER FRIENDLY AND EASILY ACCESSIBLE.





SAFETY IN TRANSITION

New fuels and digital tech call for a safety reassessment

Shipping is on a transition to technological transformation, decarbonisation, and diversification of the workforce. Each of these will require safety to be at the top of the agenda.

Safety underpins everything shipping does, so the industry's understanding of safe shipping must align with the significant changes that are being made to marine fuels and maritime technologies.

The majority of the global fleet of ships will continue to be operated by seafarers even if some vessels become fully autonomous over the next 10 or 20 years. Advances made in vessel operations technology over the past decade have already seen routine activity shifted from ship to shore. This has the benefit of relieving seafarers of some stress at busy times while generating data-led insight ashore to inform bridge and engine teams onboard.

In order for this ship-shore partnership to work as it should in an industry embracing technological transformation, decarbonisation, and diversification of the workforce, safety and security training of both seafarers and shoreside teams must be reassessed.

This involves a shift of mindset for everyone from senior leadership to the newest cadets. Without fresh thinking on training there will be no fresh expectations about safety.

NEW GENERATION

The pace of transformation means that training on fuels and tech can no longer be confined to the classroom but must be provided straight to tablets and phones to enable the next generation of seafarers to learn wherever they feel most comfortable. The experience of training during the Covid-19 pandemic helped this transition enormously.

“INCREASING MATURITY IN THINKING ON SAFETY CULTURE IS LIKELY TO REFLECT NOT ONLY A TRANSITION IN GENERATIONS BUT ALSO A GREATER FOCUS ON SAFETY TRAINING IN MARITIME ACADEMIES, A REVOLUTION IN HOW TRAINING IS PROVIDED.”

The development of new fuels for shipping brings safety concerns as regards handling and storing as well as the consumption of fuel. Meanwhile, a range of digital technologies from continuous monitoring and reporting through to artificial intelligence will challenge crews' knowledge and skills. Learning how to work with technology has been underlined by an increase in ransomware and other cyber security attacks on maritime businesses, which have left vessel operations vulnerable.

According to a recent report, one-third of seafarers say they do not conduct regular cyber security drills, while four out of 10 senior leaders ashore do not have a cyber security response plan. As digital technology becomes more prevalent in shipping, identifying the risks this brings and putting in place back-up plans to ensure resilience will add to the safety portfolio.

Shipping has already come a long way towards valuing a safety culture. This trend will continue as seafarers who trained before the International Safety Management Code became a requirement are replaced by younger

generations for whom safety culture is a part of their life.

Increasing maturity in thinking on safety culture is likely to reflect not only a transition in generations but also a greater focus on safety training in maritime academies, a revolution in how training is provided, and a new awareness that training partnerships must now include equipment manufacturers, fuel suppliers, and technology providers.

Shipping's transition to a cleaner, greener ecosystem will demand a move away from safety as measured against health, safety, and environment requirements and towards safety as a culture that pervades all levels of the ship and the business ashore.

“When DNV conducts safety culture assessments, most employees appear to have a good understanding of safety in light of their roles and responsibilities,” says Georg Giskegjerde. He believes there has been an evolution in the way the industry understands safety and what makes systems safe. Today's seafarers are not only more aware of safety issues, he adds, they are also more responsive to them.

TRAINING FOR SAFETY

Seafarer training and skills are key for safe fuel transition

Already in the least ambitious IMO 2018 scenario, 310,000 seafarers are expected to be sailing on ships with alternative propulsion technology by 2050 and would require extra training. In a zero-carbon by 2050 scenario, all 1,800,000 seafarers would need to be trained.

The Maritime Just Transition Task Force was set up in 2021 at COP 26 to ensure the transformation of the shipping industry does not leave any seafarers behind. It commissioned the study 'Insights into seafarer training and skills needed to support a decarbonised shipping industry'.

The aim is to explore how best to support the maritime workforce in making the shift to a decarbonised shipping industry. The study offers an initial assessment of how decarbonisation may impact crew member skills and training needs.

THE SCOPE OF THE STUDY

The study has been prepared by DNV with input from the Maritime Just Transition Task Force and its Global Industry Peer Learning Group and supported by a literature review. It focused on two tasks:

Quantitative: to estimate the number of seafarers who will need additional training in connection with the introduction of alternative fuels;

Qualitative: to present an overview of the skills needed for the decarbonisation of shipping, and of the challenges that training seafarers for the transition will entail.

The alternative fuels and power systems considered in the study include

dual-fuel internal combustion engines running on methanol, ammonia, or liquid hydrogen as well as hydrogen fuel cell, ammonia fuel cell, and battery systems.

THE NUMBER OF TRAINING NEEDS DEPENDS ON DECARBONISATION AMBITIONS

As there is no final timeline by when shipping must be fully decarbonised, the study modelled three different decarbonisation scenarios for the shipping industry and their consequences for crew training needs:

1. IMO 2018 scenario: Greenhouse gas reduction of at least 50% by 2050; modelled by DNV





“THERE IS A HUGE NEED FOR TRAINING PROGRAMMES FOR SEAFARERS TO ENSURE A SAFE TRANSITION TO A DECARBONISED FUTURE; THERE IS AN IMMEDIATE NEED TO PUT TRAINING INFRASTRUCTURES IN PLACE.”

2. Decarbonization by 2050

scenario: Based on the DNV Maritime Forecast, 2021 (95% reduction of GHG)

3. Zero Carbon by 2050 scenario:

Achieving zero-carbon operations by 2050 (modelled by Lloyd's Register and University Maritime Advisory Services (UMAS), 2019).

Already in the least ambitious IMO 2018 scenario, 310,000 seafarers are expected to be sailing on ships with alternative propulsion technology by 2050 and would require extra training to handle alternative fuels and technologies.

In the Decarbonisation by 2050 scenario, which sets stricter decarbonisation requirements, the number would increase to 750,000 seafarers by 2050. With the Zero

Carbon by 2050 scenario, which allows for no carbon fuels used in 2050, all 1,800,000 seafarers would require extra training to handle alternative fuels and technologies by 2050.

“The high demands show that there is a huge need for training programmes for seafarers to ensure a safe transition to a decarbonised future and that there is an immediate need to put training infrastructures in place,” says Peter Nyegaard Hoffmann, Head of Section Digital Transformation at DNV.

FUTURE OPERATIONS CALL FOR DIFFERENT CREW SKILLS

Fulfilling decarbonisation goals coupled with fast-moving technological developments, including increased automation, shows a general need for

‘higher-skilled’ seafarers. Increased IT, digital, technical, STEM, and organisational competence will be needed in future education to meet decarbonisation demands. That involves understanding fuel specific chemistry and physics, handling more digitalised systems on bridge, deck and engine.

IMPORTANT STEPS IN ESTABLISHING SEAFARER TRAINING

“Proper training of seafarers is crucial to filling new roles and positions on board as is a strong safety culture with processes that facilitate learning and knowledge sharing. Several factors will have to be taken into account before sufficient numbers of seafarers can be trained to handle the responsibilities resulting from decarbonisation competently,” says Raymond Kaspersen, Principal Consultant.

Firstly, to develop appropriate training programmes there needs to be clarity about the relevant technologies to train for, and about the applicable regulations. Secondly, training facilities need to be planned, built, and properly equipped to implement effective training programmes. Thirdly, it will be challenging to define the content of training programmes and train the many trainers needed as multipliers of this new knowledge.

Finally, there will be global competition for people skilled in dealing with alternative technologies, and experienced and certified seafarers will be scarce.

The global training standard for shipping – the STCW Convention – provides an opportunity for the entire global workforce to transition as new training courses on alternative fuels become increasingly available.

DNV's ‘HOT’ (Human, Organisation, Technical) approach to safety can also play an important role in the development and implementation of the new technologies and fuels. The safety of maritime systems can best be understood in a system perspective that requires constructive interaction between HOT elements, which together create robust and resilient systems capable of continuous improvement.

SAFETY CHALLENGES ASSOCIATED WITH ALTERNATIVE FUELS

While the shipping industry is knowledgeable and experienced in transporting most alternative fuels as bulk cargo, their use and handling as fuel carries additional risks and requires extra precautions.

Safety challenges associated with alternative fuels include:

- **Pressurised storage** – explosion risk, especially hydrogen;
- **Low flashpoint** – flammability risk, especially hydrogen, but also methanol and ammonia;
- **Toxicity to humans and the environment** – especially ammonia but also methanol.

Some knowledge and expertise needed for safe application of alternative fuel technologies already exists in parts of the industry. But the rapid technology development, automation, and digitalisation as well as ‘deadline pressure’ are changing job profiles and call for higher skill levels across the board.

SEAFARER WELLBEING

Improving seafarer living and working conditions will bring greatest boost to safety

Managing crew health and wellbeing is an investment that pays handsome dividends in efficiency of vessel performance, upgrading levels of sustainability, and improving safety all round.

Shipping is slowly embracing a 'culture' of safety, the main elements of which have been discussed above. Meanwhile, another issue rising up the safety agenda is seafarer wellbeing. Understood holistically, wellbeing covers not only physical and mental health but also diversity and equal opportunity onboard.

One healthcare provider has described crew health and wellbeing as an asset management issue.

While that might seem an insensitive term, it mirrors the terminology an engineer would use to regularly maintain a vessel's machinery to avoid costly breakdowns. The same applies to crew. Seafarer wellbeing should be considered an investment just as much as machinery maintenance.

This has growing significance at a time when a seafarer shortfall is starting to hit the industry. As a strategy, the healthcare provider observes, crew asset management is a "valuable return on investment complemented by a rigorous influence on safe vessel operations."

Another healthcare provider offers services ranging from telemedicine to nutrition consulting and mental health support. As an illustration of how seriously the industry is starting to take mental health, this provider is recruiting psychologists across many geographies because seafarers "explain their feelings in their native language."

Crew managers have become much more scientific about seafarer wellbeing, with senior executives listening to helpline calls to pick up trends that should be addressed at a ship- or fleet-wide level.

"Years ago," one manager said, "mental health was seen as a weakness and was stigmatised. Today, we see calls



THE MISSION TO SEAFARERS

“THE ACTIONS TAKEN BY OFFICERS AND CREW ARE VERY MUCH IMPACTED BY THE WORKING AND LIVING ENVIRONMENT ON BOARD. IT AFFECTS BOTH PHYSICAL AND MENTAL HEALTH, ALERTNESS, AND CONFIDENCE TO ACT.”



to the 24/7 helpline rising – because we have asked our seafarers to talk to us.”

Seafarers are increasingly selecting their next ship by the operator’s attitude to wellbeing, which has implications for operational efficiency, sustainability and, crucially safety. No doubt the Covid-19 pandemic gave seafarers a voice on mental health issues. While it’s still not in the open, the silos are being broken down.

SLIPPING THROUGH THE NET

Alongside tackling mental health issues goes addressing abuse onboard. The problem here is that seafarers are hidden, so much so that their role in the maritime supply chain is little understood even in crew-supply nations. Perhaps it’s not surprising that substandard shipowners and manning agencies, working on the margins of the industry, slip through the net.

Abuse of human rights comes in many forms. The headline-grabbers are abandonment and bullying but fatigue, criminalisation, delayed repatriation, and sexual assaults must not be missed.

However, while almost all companies would claim they care for the wellbeing of seafarers, meaning they broadly adhere to human rights, some believe too little attention is paid to providing readily available and financially accessible legal support for seafarers to challenge their situation.

Tackling abuse at sea begins with an honest and realistic image of seafarers. The mental image held of those who serve on board often leads to a poorly informed view of their needs. Safety of ship and crew might be compromised unless seafarers’ needs are properly understood.

Speaking at a marine insurance claims conference in Dublin late in 2022, the head of claims at one of the largest insurers underscored the importance of taking the holistic view.

“Research has found – and I believe – that the decisions and actions taken by officers and crew are very much impacted by the working and living environment on board,” he commented. “It affects both physical and mental health, alertness, situational awareness, collaboration, and confidence to act.”



THE MISSION TO SEAFARERS

If so, he noted, it follows that improved working and living conditions for crew are likely to lead to safer ship operations and, thereby, less risk of accidents.

The speaker confirmed that the top cause of marine casualties remains human error, which would mean that the main risk for any marine insurer is the crew.

“The crew is a special risk breed: they represent the biggest risk of accidents and are at the same time most exposed to the consequences of accidents. Unlike us, crew sometimes pay the ultimate price for mistakes.”

If the thesis that seafarer wellbeing has a direct bearing on safety is accepted, three points should be noted.

The first is that the pandemic heightened the profile of the seafaring life among sections of the industry that usually ignore it, and among a wider public; the second that the rapid evolution of maritime technology must involve the seafarer at all stages; and the third that unless and until ships become fully autonomous, they will be run by people. People with heavy responsibilities facing sometimes difficult and risky work conditions.

By their own admission, technology providers have had a sea-change in their attitude to seafarers. In the past, one technology leader acknowledged, businesses were keen to keep seafarers away; now they are just as keen to bring them in.

“Seafarers play a key role in contributing their experience to new designs for ships,” he said, adding that

providers are learning from seafarers what should go into the end-product “by watching what they do with our technology.”

The development of new technology focusing specifically on safety has been positive. Simulator training, e-learning to upgrade seafarer skills, and closer collaboration between tech companies and deck and engine officers all feed into the development of improved equipment.

Meanwhile, seafarers are working alongside shoreside operations teams to enable both parties to improve vessel performance and decision-support.

But safety might perhaps be best served in future not so much by new technologies or the acknowledgement that autonomous shipping will only be people-free in its ultimate stage, but by the improved understanding of the role of the seafarer that emerged from the pandemic.

CODE OF CONDUCT

According to the authors of a report into seafarers’ rights issued by the Sustainable Shipping Initiative and the Institute for Human Rights and Business, the crew change crisis “permanently altered the landscape”.

At a roundtable discussion held in Singapore last October, ship owners, operators, and cargo owners expressed the hope that a seafarers’ Code of Conduct, which had been launched a year earlier, might become mandatory across the industry. When seafarers’ rights are upheld, it’s likely that safety levels will improve.



SEAFARER WELLBEING

Seafarer wellbeing and safety: the vital role of welfare charities in a digital age



Rev Canon Andrew Wright, Secretary General at The Mission to Seafarers, reflects on the lessons learnt from the pandemic and concludes there are no short cuts to the value of human contact.

I have often quoted the Captain who said to me, “Happy seafarers make good seafarers. Happy seafarers make safe seafarers. You make seafarers happy. Thank you”. It was a wonderful summary and affirmation of our work at The Mission to Seafarers, and of our colleague welfare organisations across the world.

I always make the point that we are a vital service deliverer within the maritime industry. Others may go on board to shift cargo, undertake repairs, do customs inspections, arrange immigration for crew, remove waste, and add fuel and supplies. We go on board, physically or digitally, to support seafarer well-being. In doing so, we believe that we are making a major contribution to safety.

Despite so much work and improvement, no one knows better than our teams the continuing fragilities of seafaring. They often deal with the welfare aftermath of injury or, tragically, of fatality.

Early in my Mission time, I received my own stark reminder of those fragilities when I witnessed an accident aboard a vessel. A piece of cargo fell from a forklift truck leaving two crew prone and still on the deck. Thankfully, neither proved to be too seriously injured but it could have been otherwise.

Even as I write, I have been informed by one of our teams that they are dealing with the death of a seafarer, found floating in the harbour. Yesterday, I was in touch with another team who have been visiting the traumatised crew of a ship which suffered a fire in which two crew died.

Such things are sadly part of the bread and butter of our daily work. For all the improvements in safety, serious

incidents continue, perhaps more commonly than many imagine and not always reaching the media. Local experiences undergird our commitment to play our part, not just in reactive response but in proactive prevention.

The Together in Safety Coalition has the fundamental purpose of “protecting seafarers’ lives and improving the safety performance in shipping”. It identifies three strategic drivers in building enhanced safety programmes. The first two are Leadership and Incident Prevention. The third is Wellbeing and Care.

HIGH-PERFORMING TEAMS

Together in Safety is headed by one of our organisation’s Vice-Presidents, Dr Grahaeme Henderson OBE. He writes that “ensuring wellbeing and showing care is key to developing a happy, healthy and high performing team”.

The safety implications of seafarers who may be anxious, distracted, lacking sleep, or overworked are obvious. These can undermine motivation and good judgement. Similarly, crews who might lack unity or suffer disabling tensions can easily compromise a safety response. Language, cultural differences, and discrimination can all play their part.

An inclusive workspace is vital. It struck me when I spent some time

“HAPPY SEAFARERS MAKE GOOD SEAFARERS. HAPPY SEAFARERS MAKE SAFE SEAFARERS. YOU MAKE SEAFARERS HAPPY. THANK YOU.”

sailing with the crew of a container ship that one of any Captain’s key functions is to be an effective community builder. It sounds an obvious thing to say but perhaps is often overlooked. In the case of that ship, an excellent job was being done, but it is not always so.

It is my hope that our teams play key roles, not just with individual seafarers but in support of on-board community development.

The last three years have brought enormous threat to seafarer wellbeing, first with Covid-19 and then the fallout from the war in Ukraine. Seafarers and their families often feel global crises first and hardest.

In those early months of the pandemic, one of our chaplains summarised his experience of working with crew by talking “of a mental health epidemic paralleling the pandemic”. The crew change crisis combined with the lack of shore leave and fear for family back home created huge levels of anxiety.

In response, the industry pulled together in a way which perhaps surprised and certainly impressed. The shared drive to resolve the issues brought both solutions and frustrations. The latter was particularly a result of the reluctance of many governments to grant seafarers “essential” status, and



THE MISSION TO SEAFARERS

later to provide easy access to vaccines. Hopefully, the lessons learnt will be structurally adopted to prevent repeats.

UPGRADED PRIORITY

One of the great legacies to come out of Covid-19 then has been the much-upgraded priority being given to seafarer wellbeing by the maritime industry. This has been hugely welcome. It is evidenced in numerous ways, including in its prominence in industry literature and public events. I am being asked to write and speak much more regularly in these contexts.

It is also evidenced in actions being taken by shipping and management companies, and far beyond. Helplines have been introduced, sometimes with online counselling, along with a whole variety of programmes aimed at enhanced crew welfare.

The Mission to Seafarers' own Seafarers Happiness Index (increasingly being used as one measure of benchmarking within shipping) has also reflected positive change. As one of the judges for the Mission's annual awards, I have also been impressed by the sheer number of submissions reflecting extraordinary and entrepreneurial company and individual contributions to welfare through this period. These actions and realities will have made a difference to wellbeing and ultimately to safety.

So, what are the essential elements of maritime welfare? Certainly, those of us working in this area recognise that things are changing. They were already changing pre-Covid-19, with smaller

crews, ever-quicker turnaround times, and onboard Wi-Fi. The pandemic changed things radically for a long time – the usage of our 120 seafarers' centres dropped by 93% in 2021 from 2019 levels. It picked up significantly in 2022 but still we are a long way from shore leave returning to pre-pandemic normal.

What will be the longer-term implications of all this to company policies and, most importantly, to seafarer behaviour? The arrival of accessible, decent, and affordable Wi-Fi on board has been much enhanced by the pandemic, and now undergirded by recent International Labour Organization (ILO) resolutions. In addition, we await the future impact of the whole automation agenda.

Some suggest the future of maritime welfare will lie almost exclusively in a digital approach. Of course, we recognise the vital importance of digital and virtual to seafarer mental health and support.

We have our own programmes. During Covid-19, we launched our Chat to a Chaplain facility which proved a vital digital tool during the height of the pandemic. Our port-based teams also use social media to sustain relationships with crew and provide continuity of care.

However, we believe face-to-face contact will remain essential. We continued our ship visitation programme right through the pandemic, albeit at the gangway in a masked and distant way. That ensured some human contact with crew who may have been on board for up to 17 months with, perhaps, no shore leave at all.

It also enabled us to provide transformational personal shopping (over \$3 million last year alone), including vital medicines and SIM cards. In 2022, we launched a GBP750,000 programme to provide speedy expansion of our ship visiting capacity across all our nine regions, ensuring we can sustain a proactive approach to meeting crew.

We also believe that seafarer centres will have a vital role, providing they are of the right type, in the right places, providing the right services. We expect to see much modernisation in this area over the coming years, especially with new modular and mobile facilities. Equally, our transport services will remain essential.

SUPPORTING SEAFARERS' FAMILIES

Even in a digital world there are no short cuts to the value of human contact.

In addition, the Mission, like so many of our colleague welfare organisations, is also prioritising its wider programmes. For example, we are investing strongly in Family Support Networks – in the Philippines, India, and Myanmar. These link our support for crew with that of their families.

In the context of this article, however, I conclude with mention of our WeCare educational programmes. One of these units helps seafarers and their families understand how to use the Internet and social media safely. Few things, surely, are as undermining of safety than a member of crew who has heard bad news from home way out at sea, perhaps inappropriately delivered and when he or she is powerless to respond. Our suicide awareness training, heavily in demand throughout 2022, also helps equip crew, and those who work closely with them, to recognise signs of suicide risk in others, and indeed in themselves.

We believe that the work of the maritime welfare sector, in its diversity of approaches, is at the core of sustaining wellbeing, and consequently safety, among crews. The ultimate test of these proactive and reactive interventions must be to build in crew the resilience to look after themselves and their colleagues, even when far, far from all the support networks which most of us take for granted.

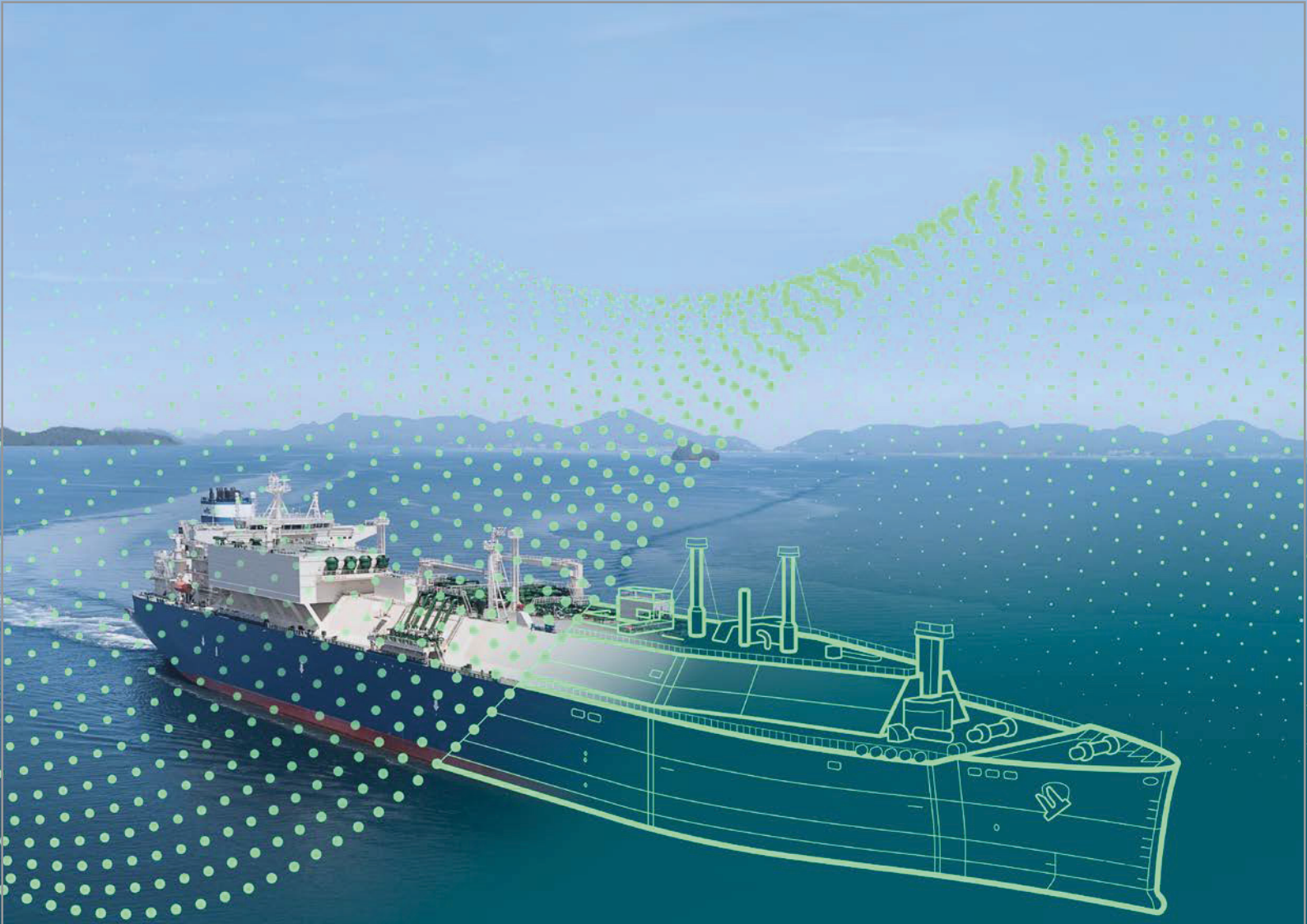


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