



Global Maritime Issues Monitor 2018



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MARITIME
FORUM



MARSH



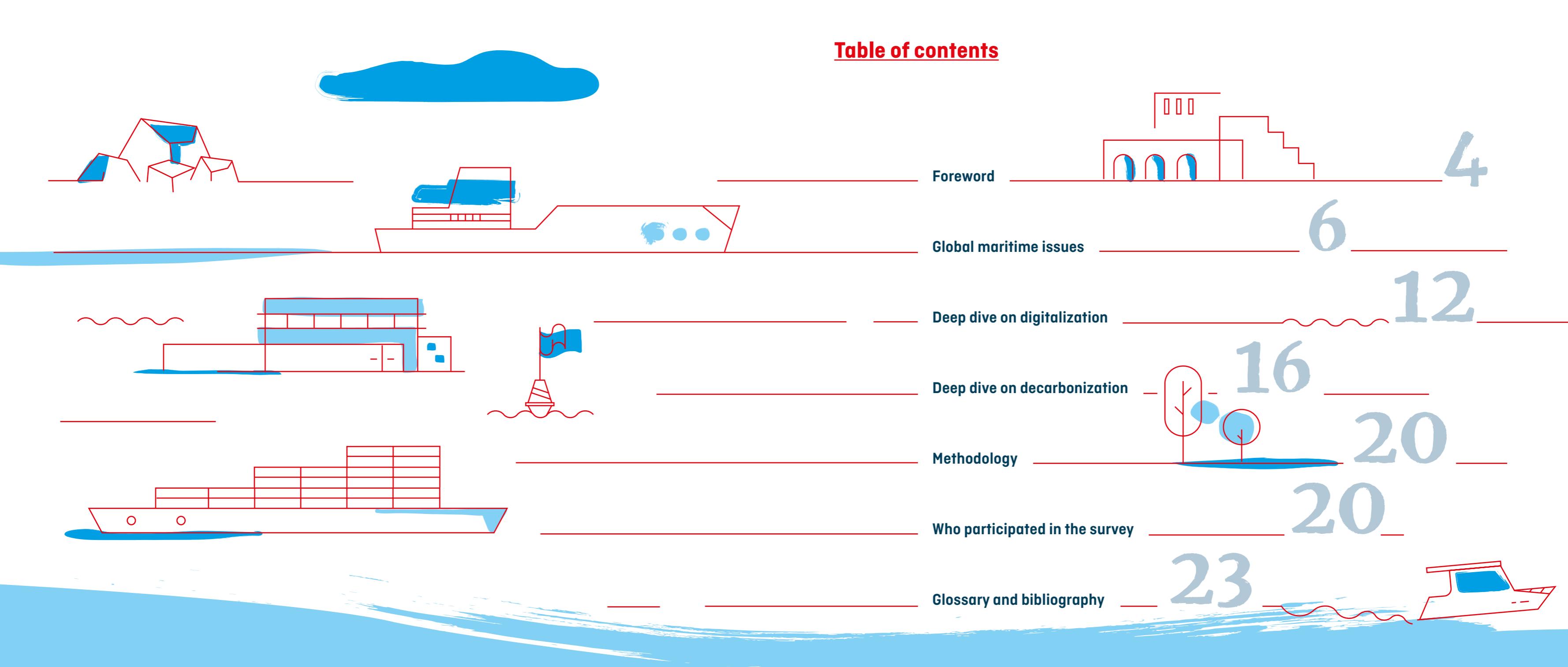
IUMI
International
Union of
Marine Insurance

Global Maritime Issues Monitor

2018



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Foreword

Understanding the current state of affairs

The Global Maritime Issues Monitor 2018 takes a global look at some of the major issues likely to impact the global maritime industry. The report is based on the input of senior maritime stakeholders from more than 100 countries and the perceptions of our global panel of industry experts. The report is based on a number of issues potentially likely to impact the global maritime industry. The report is based on a number of issues potentially likely to impact the global maritime industry. The report is based on a number of issues potentially likely to impact the global maritime industry.

When it comes to this sector, it is important to look at the challenges and opportunities that the industry faces. The challenges in this publication examine some of the social, economic and environmental challenges and opportunities that maritime companies face. The opportunities are those that arise from digitalization and decarbonization, which have forced the industry to re-examine some of the basic assumptions that have driven traditional risk conventions.

With the right approach, the industry can have the opportunity, at least partially, to shape it for themselves. Due to the systemic nature of changes the industry is or will likely be subject to, the effort could be made for pre-emptive action and wider collaboration, through which a critical mass of industry actors could come together to sway the outcome in the industry's favour. The Global Maritime Issues Monitor can be seen as a modest contribution to this goal as it gives a partial account of what should be at the basis of any such attempt at a thorough understanding of the current state of affairs.

The Global Maritime Forum, Marsh and IUMI would like to thank those who participated in the survey. We dedicate our special thanks to the various individuals who have kindly provided their perspective on our findings and whose contributions have been instrumental in the analysis and presentation of the survey results.

Peter Stokes
Chairman
Global Maritime Forum

Marcus Baker
Chairman & Managing Director
Global Marine Practice, Marsh

Richard
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Foreword

The **Global Maritime Issues Monitor 2018** takes a global look at some of the major issues that are likely to impact the global maritime industry. The report is based on the insight of senior maritime stakeholders from more than 50 countries, and their perceptions on the impact, likelihood, and preparedness on a number of issues potentially affecting the global maritime industry. The report also undertakes deep dives into the emerging trends in digitalization and decarbonization, which have forced the industry to re-examine some of the basic assumptions that have driven traditional risk conventions.

As a result, companies in this sector now need to look afresh at the issues facing the maritime industry. The articles contained in this publication examine some of these crucial issues and aim to provide critical insight into the challenges and opportunities facing maritime companies as they navigate through the profound transformation that is under way.

With the future of the maritime industry uncertain, maritime leaders may have the opportunity to, at least partially, shape it for themselves. Due to the systemic nature of changes the industry is or will likely be subject to, the case could be made for pre-emptive action and wider collaboration, through which a critical mass of industry actors can come together to sway the outcome in the industry's favour. The Global Maritime Issues Monitor can in this perspective be seen as a modest contribution to this goal as it gives a partial account of what should be at the basis of any such attempt: a thorough understanding of the current state of affairs.

The Global Maritime Forum, Marsh and IUMI would like to thank those who participated in our survey. We dedicate our special thanks also to the various individuals who have kindly provided their perspective on our findings and whose comments complement our analysis of the results in all three sections of this report.

Peter Stokes
Chairman

Global Maritime Forum



Marcus Baker
Chairman & Managing Director

Global Marine Practice, Marsh



Richard Turner
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Global maritime issues Overview

Global maritime issues map

IMPACT vs LIKELIHOOD vs PREPAREDNESS



The issue that we perceive as most **impactful**

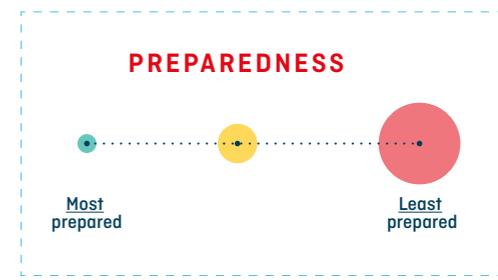
The issue we are least **prepared** for

The issue that we perceive as most **likely**

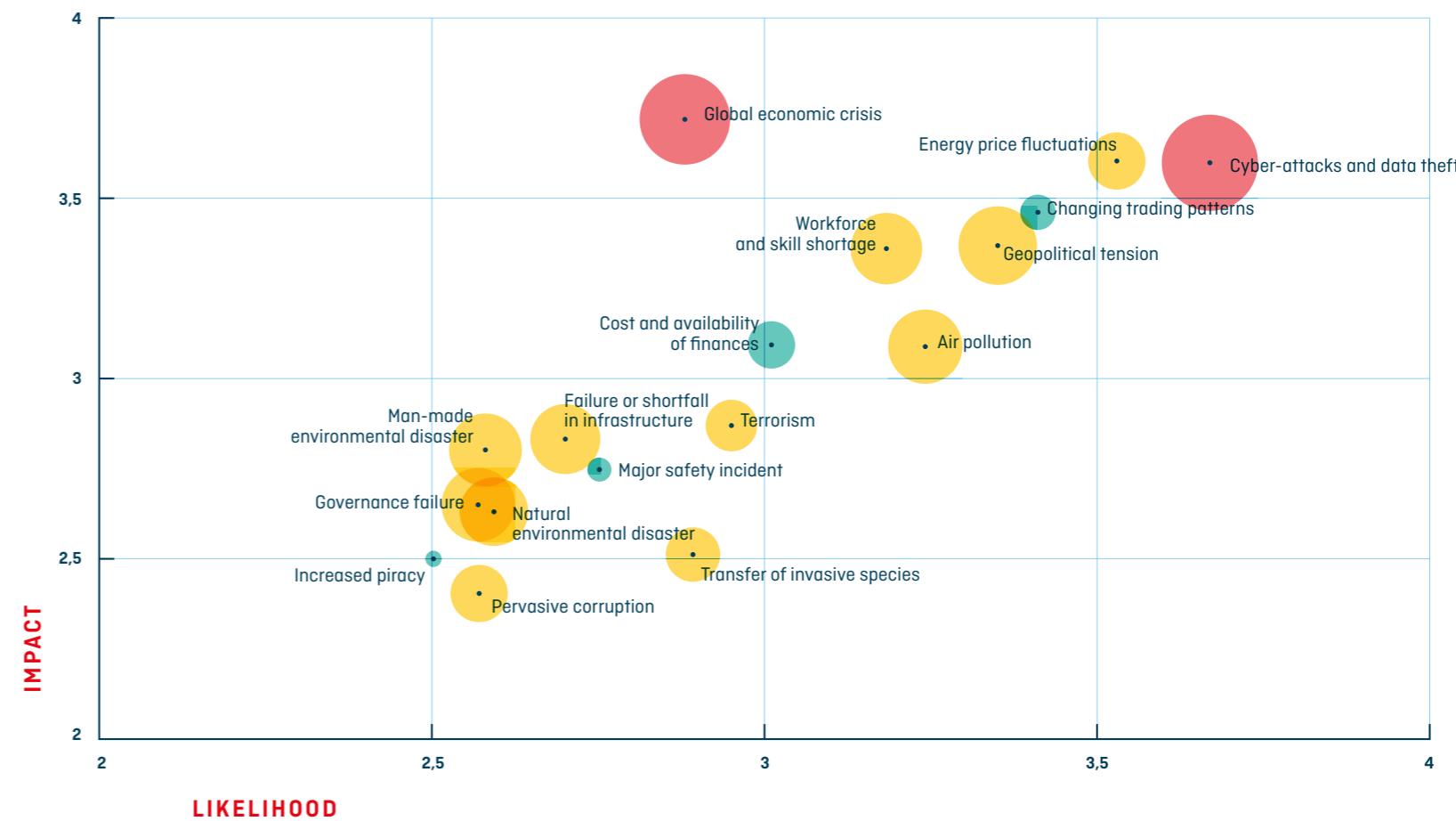


Global maritime issues overview

Global maritime issues map



IMPACT vs LIKELIHOOD vs PREPAREDNESS

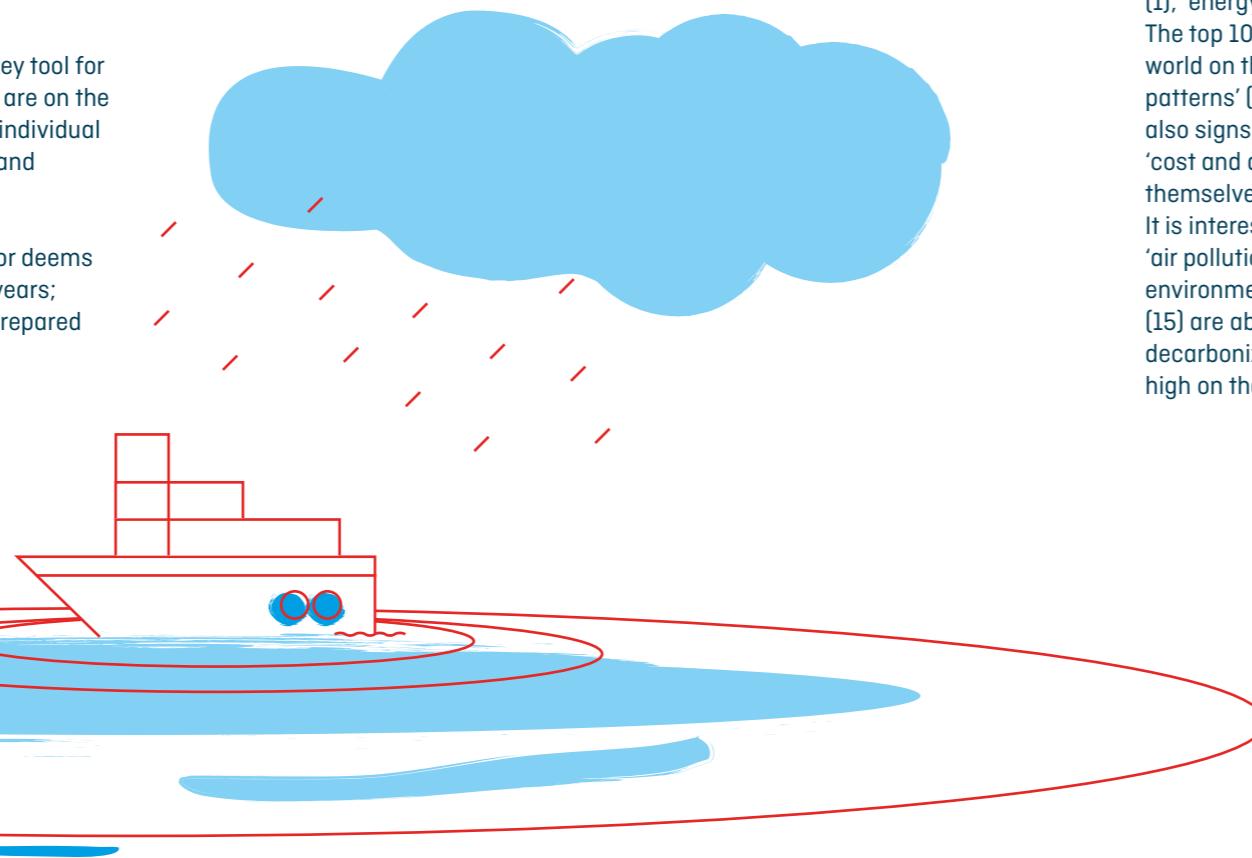


Global maritime issues

Many sectors are currently faced with disruption and the maritime industry is no exception. Emerging issues and opportunities are challenging norms and may be the catalysts that set a new path for the sector.

As we enter a period of change, examination will prove a key tool for success, as understanding what issues and opportunities are on the horizon is a useful barometer for preparedness – both for individual players and for the sector as a whole against an evolving and increasingly disrupted global landscape.

In this survey, we gained insight into what issues the sector deems most likely to have a significant impact over the next ten years; which issues would be most likely and, importantly, how prepared participants feel the sector is to deal with these issues.



Economic issues dominate the maritime agenda

The top three issues deemed to have the highest impact-potential on the maritime sector over the next ten years are ‘global economic crisis’ (1); ‘energy price fluctuations’ (2); and ‘cyber-attack and data theft’ (3). The top 10 list portrays an awareness of the impact of the modern world on the sector, with ‘geopolitical tensions’ (5), ‘changing trading patterns’ (4), and ‘terrorism’ (9) all making appearances. There are also signs of introspection, with ‘workforce and skill shortages’ (6) and ‘cost and availability of finance’ (7) ranking highly, but even these lend themselves to the overall impact of an evolving global landscape. It is interesting to note that traditional environmental issues such as ‘air pollution’ (8), ‘man-made environmental disaster’ (11), ‘natural environmental disasters’ (14) and the ‘transfer of invasive species’ (15) are absent from the top of the list. Having said that, the issue of decarbonization, as shown in the separate deep dive on this topic, is high on the maritime agenda.

What **impact** do you think the following issues will have on seaborne trade over the next 10 years?

1 Minimal impact / 2 Minor impact / 3 Moderate impact / 4 Major impact

RANK	ISSUE	IMPACT
1	Global economic crisis	3,73
2	Energy price fluctuations	3,61
3	Cyber-attacks and data theft	3,61
4	Changing trading patterns	3,47
5	Geopolitical tension	3,38
6	Workforce and skill shortages	3,37
7	Cost and availability of finances	3,10
8	Air pollution	3,10
9	Terrorism	2,88
10	Failure or shortfall in infrastructure	2,84
11	Man-made environmental disaster	2,81
12	Major safety incident	2,76
13	Governance failure	2,66
14	Natural environmental disaster	2,64
15	Transfer of invasive species	2,52
16	Increased piracy	2,51
17	Pervasive corruption	2,41

Impact and likelihood strongly correlated

The top three issues deemed most likely to occur within the next 10 years are ‘cyber-attacks and data theft’ (1); ‘energy price fluctuations’ (2); and ‘changing trading patterns’ (3). This top three is closely mirrored by the top most impactful issues, with the issues ranked first, second and third most likely, occupying the second, third, and fourth most impactful in varying order.

Generally speaking, the impact and likelihood of the issues seem to be correlated, with ‘workforce and skill shortages’ (6) ranking the same way on both scales; and both ‘geopolitical tension’ (4) and ‘terrorism’ (8) differing by only one rank on the respective scales. The issue that most significantly bucked this trend is ‘global economic crisis’.

This issue, ranked number one as most potentially impactful, is positioned at number ten in the likelihood rankings. ‘Air Pollution’ is another example with the issue being ranked as number eight in terms of impact, but number five in terms of likelihood.

What is the **likelihood** of the following issues occurring within the next 10 years?

1 Very unlikely / 2 Unlikely / 3 Likely / 4 Very likely

RANK	ISSUE	LIKELIHOOD
1	Cyber-attacks and data theft	3,67
2	Energy price fluctuations	3,53
3	Changing trading patterns	3,41
4	Geopolitical tension	3,35
5	Air pollution	3,24
6	Workforce and skill shortages	3,18
7	Cost and availability of finances	3,01
8	Terrorism	2,95
9	Transfer of invasive species	2,89
10	Global economic crisis	2,88
11	Major safety incident	2,75
12	Failure or shortfall in infrastructure	2,70
13	Natural environmental disaster	2,59
14	Man-made environmental disaster	2,58
15	Pervasive corruption	2,57
16	Governance failure	2,57
17	Increased piracy	2,50

The maritime industry does not feel prepared

The survey indicates that the respondents in general perceive the maritime industry to be relatively unprepared to deal with these issues. The highest preparedness score is 3.47 out of 5 and 13 of the 17 issues have a preparedness score of less than 3 - with 3 being the score given to an issue where the industry is perceived as neither prepared nor unprepared. It is also concerning to see that the issues deemed to potentially have the most significant impact on the sector are the ones they are least prepared for.

The issue that those surveyed feel least prepared for is ‘cyber-attacks and data theft’ (1), which is also the issue deemed most likely. Second to this is ‘global economic crisis’ (2), which is deemed the number one most impactful issue. Again, another issue that featured high in the likelihood and most impactful rankings but has a low preparedness ranking is ‘geopolitical tension’ (3). Respondents likewise consider the industry to be relatively unprepared for addressing ‘air pollution’ (4), which is also in the top five in terms of likelihood.

How **prepared** is the maritime industry to deal with the following issues?

1 Very unprepared / 2 Unprepared / 3 Neither prepared or unprepared / 4 Prepared / 5 Very prepared

RANK	ISSUE	PREPAREDNESS
1	Cyber-attacks and data theft	2,34
2	Global economic crisis	2,42
3	Geopolitical tension	2,59
4	Air pollution	2,65
5	Governance failure	2,66
6	Man-made environmental disaster	2,67
7	Workforce and skill shortages	2,69
8	Failure or shortfall in infrastructure	2,71
9	Natural environmental disaster	2,73
10	Energy price fluctuations	2,89
11	Pervasive corruption	2,89
12	Transfer of invasive species	2,93
13	Terrorism	2,97
14	Cost and availability of finances	3,03
15	Changing trading patterns	3,20
16	Major safety incident	3,36
17	Increased piracy	3,47

→ See Glossary of terms at page 23 

Top issues

As well as taking note of the overarching trends seen within the likelihood, impact, and preparedness outcomes, it is worth taking a closer look at the issues that held specific significance. Most notably, four issues stood out based on a combination of the three parameters examined in the survey: ‘cyber-attacks and data theft’, ‘global economic crisis’, ‘energy price fluctuations’, and ‘changing trading patterns’. For this reason, the following pages are dedicated to a more detailed analysis of these top issues.

CYBER-ATTACKS AND DATA THEFT

The issue deemed to have the highest likelihood of occurring in the next ten years is ‘cyber-attacks and data theft’. This is also the third-highest issue with regard to perceived impact and the lowest related to preparedness – a fact that compounds this issue for the maritime sector.

According to Marsh & McLennan Companies’ Global Risk Center Director **Richard Smith-Bingham**, a feeling of under-preparedness for ‘cyber-attacks and data theft’ is common across many sectors due to the way the issue is developing and the increasing sophistication of malicious attackers.

According to **Richard Smith-Bingham**, *“the sector understandably feels unprepared for cyber-attacks because the threat landscape is constantly evolving and attack surfaces are broadening as companies throughout the value chain take increasing advantage of opportunities based on interconnectivity and automation.”*

In the World Economic Forum’s Global Risk Report 2018, cyber-attacks occupied the third highest ranking, which underlines the fact that cyber-attacks is an issue high on the global risk agenda, not just in the maritime industry. This is a highly pervasive and problematic issue, with Gartner believing that, by 2020, 60% of all businesses with digital operations will have suffered major service failure related to digital issues. Furthermore, hacks are often not detected for several months from first inception. IBM has calculated the mean time to identify a breach as 197 days, and the mean time to contain it a further 69 days. In monetary terms, IBM outlined that “companies that contained a breach in less than 30 days saved over US\$1 million, compared to those that took more than 30 days to resolve the issue”.

The recent tribulations faced by A.P. Moller-Maersk – where the container shipping and logistics company was left reinstalling over 4,000 servers, 45,000 computers, and 2,500

applications after it was hit by the NotPetya ransomware attack – are likely to have put the maritime sector on even higher alert with regard to this issue.

In similar fashion, Chinese shipping and logistics company Cosco Shipping Lines was also hit with a ransomware attack, one year after the Maersk incident. While the firm managed to maintain stability in its business operation systems, its terminal at the Port of Long Beach in the US was impacted.

According to Lloyd’s Register CEO **Alastair Marsh**: *“Facing this complex cyber threat landscape requires a shift in mindset. The maritime industry needs to take a more strategic approach to protecting critical assets and business drivers. I’m aware that this is a challenge for the industry, especially when it is not always entirely clear what they will be defending, and from whom.”* He adds that *“a good approach is to start by gaining a better understanding of the threats and the vulnerabilities to the wider supply chain. Once an organisation has sufficient knowledge, on who is likely to attack and what they will be targeting, they can then build a scalable security posture that can be continuously adapted to meet the changing threat landscape.”*

It is worth noting that the sector can learn from the Maersk and Cosco incidents because both firms have been open about these breaches. Many cyber incidents are not reported publicly and this lack of transparency, in the maritime as well as in other sectors, is a hindrance to progress in tackling the issue.

GLOBAL ECONOMIC CRISIS

The issue deemed to have the greatest potential impact on seaborne trade over the next ten years is ‘global economic crisis’, which is also ranked as second to last in terms of preparedness.

The perceived lack of preparedness to withstand a global economic crisis could be related to the difficult market conditions that the industry has been facing in recent years, which make it difficult to build up the financial resilience to withstand the impact should a crisis occur. In this regard the maritime industry differs from many other major industries, many of which have enjoyed good business conditions in recent years.

An interesting take on the apparent lack of preparedness comes from **John Hadjipateras**, CEO of Dorian LPG. He explains that because shipowners and operators are used to dealing

with unforeseeable events, they develop an inherent agility that enable them to deal with crises effectively, even those which might trigger a global economic upsets. In his opinion the best protection against the unforeseen and unforeseeable in shipping, as in other businesses, is a strong balance sheet. The difference in the overall business climate could also help explain why the maritime industry has more focus on economic risk than other industries. According to the World Economic Forum’s Global Risks Report 2018, no economic issues featured in the top five global risks in terms of impact, which was dominated by environmental and technological issues. From 2008 to 2012 however, economic issues dominated the top five, with fiscal crises and asset price collapse as key concerns to the global pool of executives surveyed.

For the maritime sector, geopolitical tension – in both the east and west – is likely a reason why ‘global economic crisis’ is deemed to have the largest potential impact on seaborne trade over the next ten years, while concerns about trade patterns being disrupted by new protectionist measures could also be an important factor. It was noted that while ‘global economic crisis’ will have the greatest impact, the likelihood of this occurring was deemed to be relatively low with this issue

barely making the top 10 most likely issues out of the 17 assessed.

ENERGY PRICE FLUCTUATIONS

It is no surprise that the issue of ‘energy price fluctuations’ is one of the top three issues measured by impact, given the historic symbiotic nature of energy price fluctuations and global economic crises. When it comes to the industry’s perceived preparedness, however, the issue seems to fare significantly better than ‘global economic crisis’, being the issue ranked in tenth place in terms of preparedness.

In addition, around 40% of world seaborne trade – more than 4 billion tons in 2016 – is related to the transportation of energy commodities, whether in the form of oil, coal or gas. This means that energy price fluctuations can have a big impact on both trade flows and trade volumes.

To add to this, Marsh & McLennan Companies’ **Richard Smith-Bingham** highlights that the maritime industry is particularly susceptible to oil-price fluctuations, for both logistics and geopolitical reasons: *“Given the high share of fuel to running costs and challenges in passing price rises to cargo customers, the maritime industry is more inherently exposed*

than many other industries to geopolitically driven oil price fluctuations – notwithstanding hedging opportunities.”

The general feeling among participants in the survey is that there is a strong likelihood that energy price fluctuations will occur, with the issue deemed second in the rankings. This view may be influenced by some of the changing dynamics the energy sector is currently seeing.

One of these important factors is the rise in US exports of energy, which could see the country become a net exporter of energy within the next few years. This is a significant development that could alter global energy trade patterns. Additionally, geopolitical events such as the recent reintroduction of US sanctions on Iran and new or renewed conflicts in energy-producing regions could also significantly impact energy prices and trade flows.

At the same time, reaching the goals in the Paris Agreement on climate change will require significant reductions in global emissions of greenhouse gases, which would have a profound impact on the future energy mix. There is, however, a great deal of uncertainty regarding the precise effects of this energy transition and how quickly

it will occur, since it is both dependent on political decisions and the development of the necessary technologies.

CHANGING TRADING PATTERNS

Around 90% of global trade by volume is carried on ships, which makes it only natural that ‘changing trading patterns’ is ranked high as an issue that is potentially very impactful for the maritime industry. It does, however, receive the third best preparedness score, indicating that maritime stakeholders are aware of the changes underway.

One of the drivers of changing trade patterns is the continued rise in importance of emerging economies, not least in Asia, which is fueled by broader demographic and economic trends, and supported by significant investments in infrastructure such as those being embarked on in the context of China’s trillion-dollar undertaking, Belt & Road Initiative (BRI).

At the same time, the rise of global protectionism risks putting a brake on the growth in trade and could in a worst-case scenario lead to the unravelling of the current global multilateral trading system anchored by the World Trade Organisation.

Jan Dieleman, President of Cargill’s ocean transportation business believes that the concerns related to changing trading patterns largely revolve around trade conflicts:

“The impact of the trade conflict between the world’s two largest economies is leading to serious consequences for economic growth and global trade. While we don’t foresee any negative impact on demand for dry bulk shipping in the short term, tariffs and retaliatory measures could alter trade flows and we may begin to see long-term realignment of global markets.”

It should also be noted that the issue of trade cannot be seen in isolation from wider geopolitical developments, since geopolitical conflicts often spill over directly or indirectly onto trade flows. According to Director and Vice Chairman of SEACOR Holdings, **Oivind Lorentzen**: *“Today I think there is a real threat of changing trade patterns, as China continues into new territory.”*

The only constant is change

The Issues Monitor gives an overview of the global risk landscape facing the maritime industry today as ranked by stakeholders from within the broader maritime sector. ‘Cyber-attacks and data theft’ is the issue that

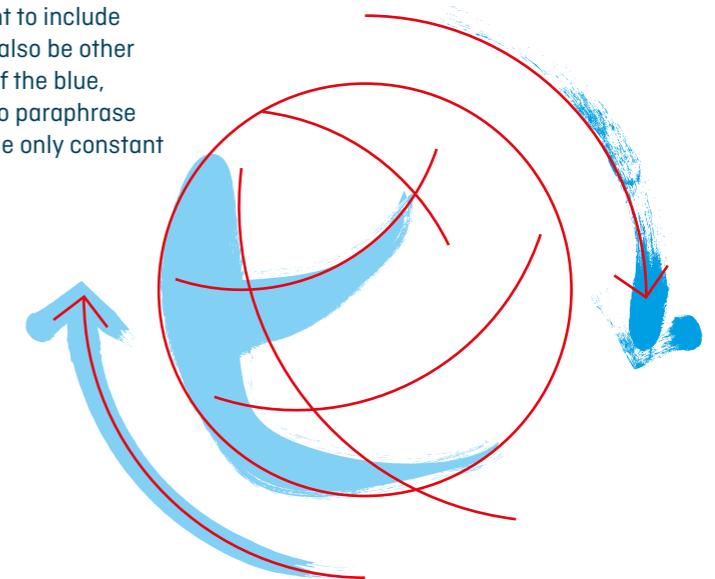
has proved to be the most pressing for the maritime industry, showing a keen awareness of the impact of digital technologies, which is explored further in the next chapter, a deep dive on digitalization.

Furthermore, looking at the other top issues, there seems to be a leaning towards economic risk factors, such as ‘global economic crisis’, ‘energy price fluctuations’, and ‘changing trading patterns’. This sets the maritime industry apart from other industries which currently seem less concerned about economic risk. This could be due to the continued difficult business conditions in shipping. Another interpretation, however, could be that the maritime industry is the global economy’s equivalent to a canary in the coal mine, picking up signs of economic risks before they hit the wider economy.

Typical environmental concerns such as ‘air pollution’ and natural or man-made environmental disasters are relatively low on the maritime agenda. This should not be seen as a lack of awareness of global environmental concerns, especially related to climate change, as the deep dive on decarbonization lays out in a later chapter. Another key finding of the survey is that the maritime industry in general considers itself quite unprepared to deal with many of the

issues surveyed. From an optimist’s point of view this could be interpreted as a clear sign that the maritime industry has become aware of the risks facing them and is ready to take the necessary steps to address them either through individual or collective actions. Whether this is indeed the case is something that future editions of the Global Maritime Issues Monitor will help shed light on as they track developments in the perceived levels of preparedness.

In addition, future editions of the Issues Monitor might be expanded to include new issues that are rising on the maritime agenda. Industry stakeholders have already pointed to ‘diversity in the workforce’ and ‘ship recycling’ as issues that could be relevant to include in a future survey. But it could also be other issues that seem to arise out of the blue, since in the maritime world – to paraphrase the philosopher Heraclitus – the only constant is change.

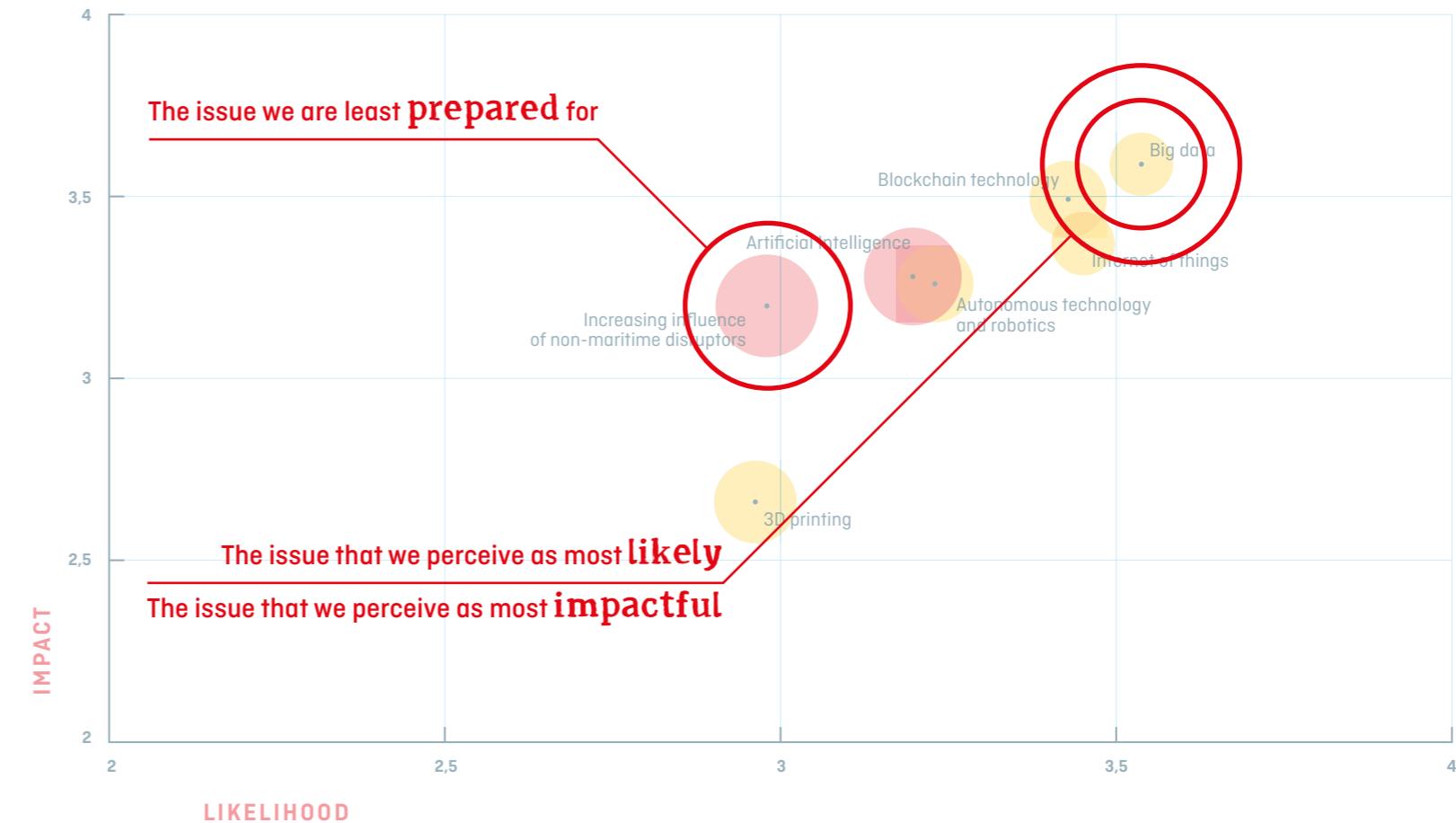


waves of digital transformation

Deep dive on digitalization

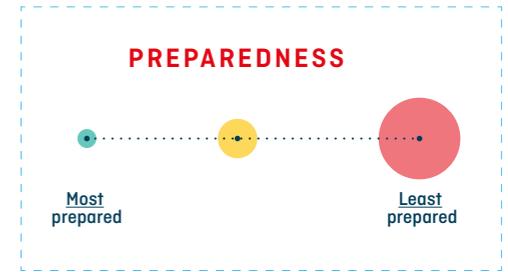


IMPACT vs LIKELIHOOD vs PREPAREDNESS



waves of digital transformation

Deep dive on digitalization



IMPACT vs LIKELIHOOD vs PREPAREDNESS



Deep dive on digitalization

Digital technology can be a significant enabler of growth and innovation, though its power is not only to enhance, but also to disrupt. With the exponential digitalisation of our world, it should come as no surprise that digital disruption is one of the burning issues all parts of society are faced with.

The sphere of global seaborne trade is no exception. The maritime industry is looking for ways to apply new digital technologies to conventional and new business models and making headlines with announcements of maritime companies partnering up with tech firms. But, along with its transformative power, digitalisation has also brought its own risks. ‘Cyber-attacks and data theft’ ranks high among global risks in virtually every sector, and as we have seen in the previous section of this report, it is one of the biggest concerns for the maritime industry as well. Technology companies, such as Amazon, Google, Uber, Airbnb, etc., could represent another risk. They have disrupted many traditional industries by introducing new business models with end-to-end value chains, and could potentially set their sights on the maritime sector.

It is not just big tech corporations, however, that have the potential to influence the industry. The world of start-ups might also have a great deal to offer maritime portfolios by providing specialised knowledge, innovative ideas and out-of-the-box thinking. These qualities can have immense value for companies wishing to find innovative ways to apply digital technologies to their business models, a process which some claim will determine which maritime businesses survive the waves of digital disruption.

This deep dive on digitalization looks closely at a range of topics related to existing and emerging digital technologies in the context of the maritime industry. The survey shows that ‘big data’, ‘blockchain technology’ and the ‘Internet of Things’ are expected to have the most significant impact on the sector in the next ten years. The results of the survey also indicate that, although differences exist between the individual issues, the industry considers itself as generally unprepared to face the age of digitalization.

A realm of opportunities

The top three issues both in impact to seaborne trade and likelihood of occurring over the next ten years, as perceived by the maritime industry, are ‘big data’, ‘blockchain technology’ and the ‘Internet of Things’, with ‘big data’ seen as having the highest potential impact and likelihood. In perceived impact, ‘blockchain technology’ follows closely in second place, and the ‘Internet of Things’ comes third, with these two issues switching places when it comes to the likelihood of their occurrence.

In line with the high significance accorded to these three topics, the industry also seems relatively well prepared to face them. They were ranked as the three digital risks the industry is most prepared to deal with. This ranking could potentially be explained by the fact that they are, for the most part, already on their way to becoming integral parts of the way many companies in the industry operate. Several maritime leaders have, for example, announced their projects to integrate blockchain technology into their business models, signalling that the technology is closer to becoming market-ready.

If the higher level of preparedness for the three above mentioned technologies is due to their gradual integration into maritime business models, this assumption could also explain why less importance was

accorded to ‘artificial intelligence’ and ‘autonomous technology and robotics’. These are digital technologies where concrete applications in maritime are mostly still in the development phase, which makes them less likely to have a significant impact on global seaborne trade over the next ten years.

This analysis of the situation seems to be confirmed by various stakeholders from the industry. **Christopher Rex**, Head of Innovation at Danish Ship Finance, concurs: *“The application of big data, Internet of Things and blockchain technology is clearly on its way to upgrade some parts of our daily operation and decision-making process.”*

As for autonomous technology and AI, he states that they will have a significant bearing on the industry, but only in the longer term.

Lasse Kristoffersen, CEO of Torvald Klaveness agrees with the high importance of ‘big data’ indicated by our results, with one significant caveat: *“I believe that the real value of big data will only be captured in combination with artificial intelligence.”* To this he adds that, *“over a 15-20-year horizon, artificial intelligence will be THE most important technology to create and capture new value.”*

Finally, ‘3D printing’, the last digital technology included in the survey, received the lowest impact and likelihood rating, while also figuring among the top three issues the industry feels unprepared to face. Indeed, it could very well be that, at least in the near future, 3D printing will mainly be relevant for prototyping or specialised applications, and therefore not a significant threat to traditional manufacturing processes and trade flows. Additionally, it is unlikely that 3D printing will have a major impact on the transport of raw materials, which after all makes up a very large part of global maritime transport.

Regardless of the time horizon for the implementation of these digital technologies, they have potential to enable the improvement of the maritime sector in many ways that should not be overlooked. In a

short-term perspective, within the timeframe of 5-10 years, **Lasse Kristoffersen** believes the Internet of Things will contribute in a significant manner to the optimisation of vessel performance and maintenance. Additionally, Vice President of Shipping & Maritime at Shell, **Dr Grahaeme Henderson**, points out that *“big data analytics can be used to develop new tools for identifying safety risks that allow action to be taken before accidents happen.”* He goes on to say: *“Using sensor technology, it is now also possible to remotely monitor the performance of ships in real time to increase efficiency, thus both improving safety and reducing emissions, and at the same time, lowering costs.”*

No danger of external disruption?

Given the growing influence of data-based companies and the increasing power of data in our society, some might consider our findings regarding ‘increasing influence of non-maritime disruptors’ surprising: the issue was ranked number six out of seven both in impact and likelihood, placing higher only than ‘3D printing’. It is also the issue for which the maritime industry feels the least prepared. Whether barriers to entry into the maritime industry are simply too big or the profit margins too low to attract new entrants, or whether key maritime stakeholders are not sufficiently informed on the potential risks involved, is a matter that merits further exploration.

Richard Smith-Bingham of Marsh & McLennan Companies considers this risk more likely than our results seem to indicate. He suggests that disruption may arise due to *“the competitive threat to existing shipping firms facing competition from technology giants that see opportunities in owning more of the delivery value chain, especially the most lucrative parts, and have the data analytical skills, as well as the capital, for market entry”*.

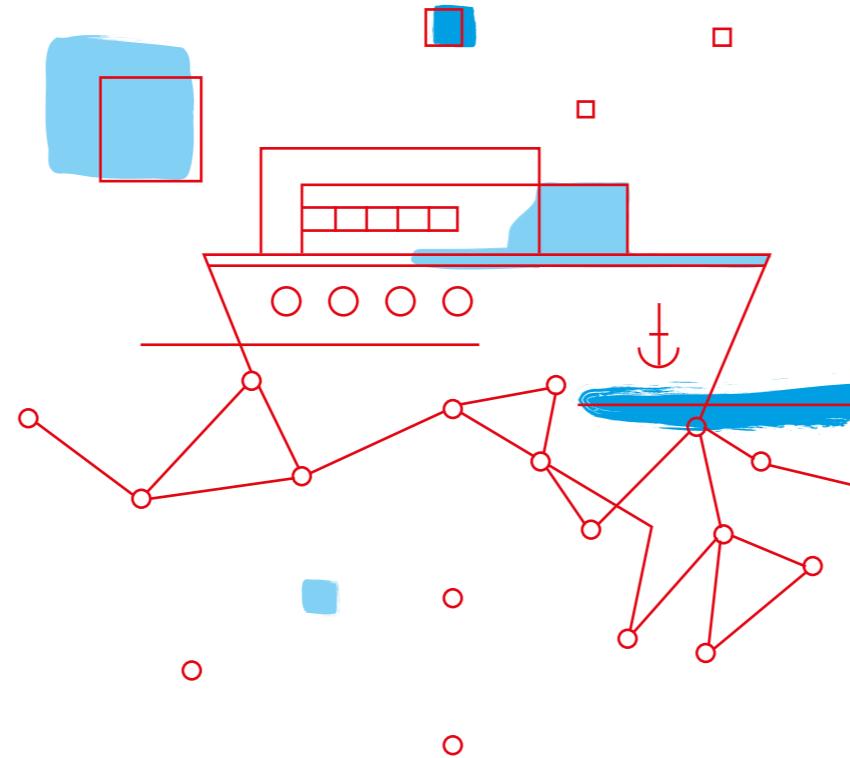
This view is supported by **Christopher Rex**, who cautions: *“We may soon need to rethink our business models, change our strategic outlook and change the way we earn our money.”* He believes that the industry is focusing too heavily on potential shifts in power that result from the merger and acquisition of vessels and overlooking the changes that might arise through the introduction of trading platforms: *“Consider a future where the access to customers has been consolidated between a few trading platforms, from which most cargo volumes are fixed. The ownership of the fleet will in this scenario become less important.”*

Christopher Rex echoes Ian Goldin’s comments, but considers it likely that these shifts will start unfolding over the next 10 years: *“The introduction of new technologies will change the outlook for seaborne demand by enabling more local or regional production, lower the labour market outlook in emerging markets, reduce inefficiencies in global supply chains, reduce the energy intensity of the global economy and eventually reduce the trade impact per dollar growth.”* If these profound changes truly come to pass, they will entail a systemic transformation of the maritime business model.

Towards a future of profound change

While this deep dive on Digitalisation has focused primarily on a 10-year horizon and shown that the industry has the opportunity to harness the power of digital technologies in the near future, it is equally important to consider possible long-term scenarios. While there may be increased uncertainty surrounding the more distant future, it is important to consider them now, as later may be too late.

Looking beyond the scope of the maritime industry alone, **Ian Goldin**, Director of the Oxford Martin Programme on Technological and Economic Change at Oxford University, believes that artificial intelligence and robotics, as well as 3D printing will have an important role to play in the future of the maritime industry: *“[they] will lead to a dematerialisation of economies, localisation of production and massive disruption to job markets and subsequently on economies and politics”.*



What **impact** do you think the following issues will have on seaborne trade over the next 10 years?

1 Minimal impact / 2 Minor impact / 3 Moderate impact / 4 Major impact

RANK	ISSUE	IMPACT
1	Big data	3,59
2	Blockchain technology	3,49
3	Internet of Things	3,37
4	Artificial intelligence	3,28
5	Autonomous technology and robotics	3,26
6	Increasing influence of non-maritime disruptors	3,20
7	3D printing	2,66

What is the **likelihood** of the following issues occurring within the next 10 years?

1 Very unlikely / 2 Unlikely / 3 Likely / 4 Very likely

RANK	ISSUE	LIKELIHOOD
1	Big data	3,54
2	Internet of Things	3,45
3	Blockchain technology	3,43
4	Autonomous technology and robotics	3,23
5	Artificial intelligence	3,20
6	Increasing influence of non-maritime disruptors	2,98
7	3D printing	2,96

How **prepared** is the maritime industry to deal with the following issues?

1 Very unprepared / 2 Unprepared / 3 Neither prepared or unprepared / 4 Prepared / 5 Very prepared

RANK	ISSUE	PREPAREDNESS
1	Increasing influence of non-maritime disruptors	2,26
2	Artificial intelligence	2,33
3	3D printing	2,54
4	Autonomous technology and robotics	2,62
5	Blockchain technology	2,62
6	Big data	2,81
7	Internet of Things	2,81

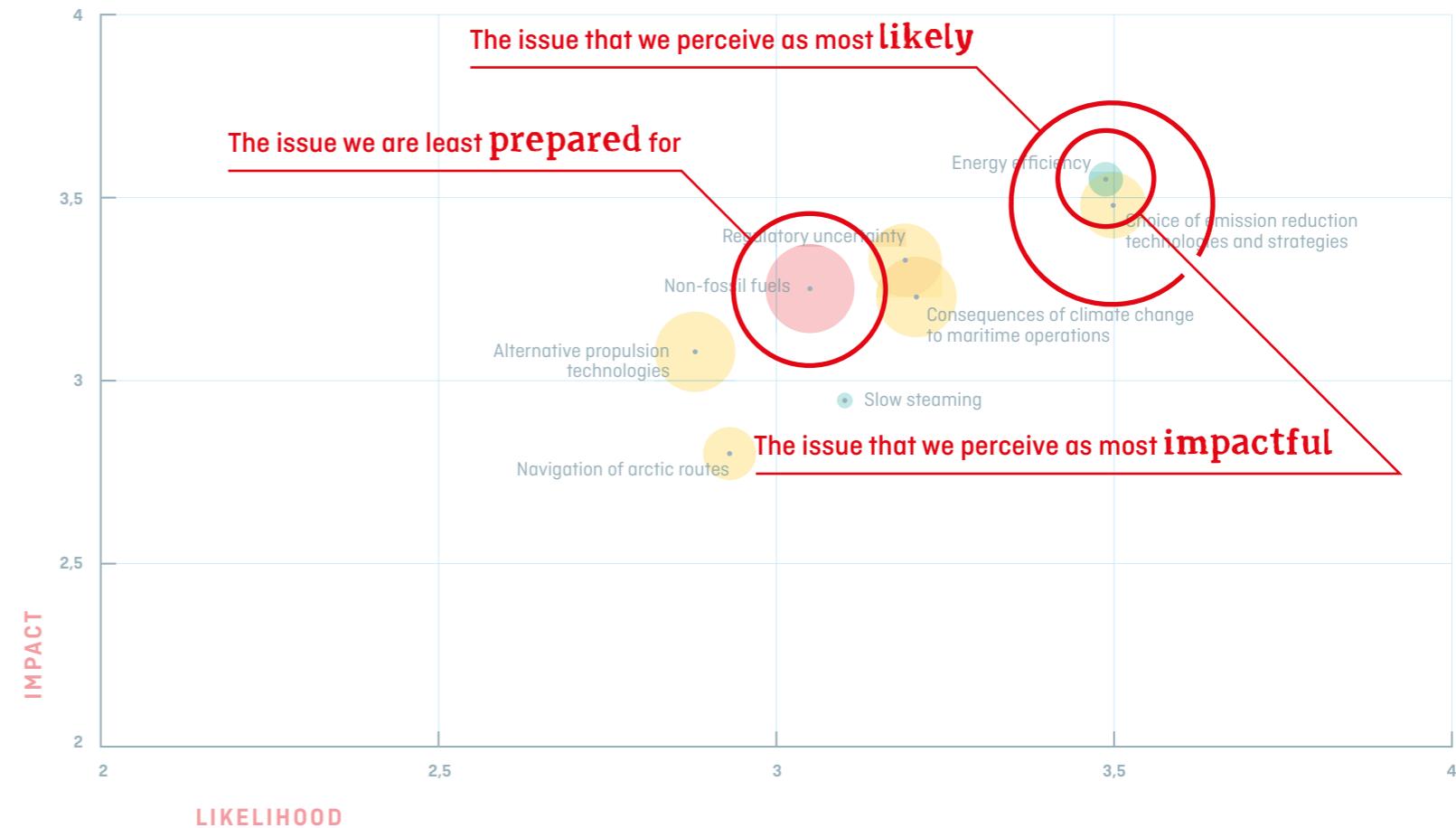
→ See Glossary of terms at page 23 *

A journey into uncharted waters

Deep dive on decarbonization

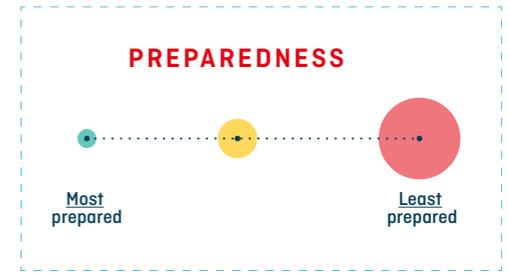


IMPACT vs LIKELIHOOD vs PREPAREDNESS

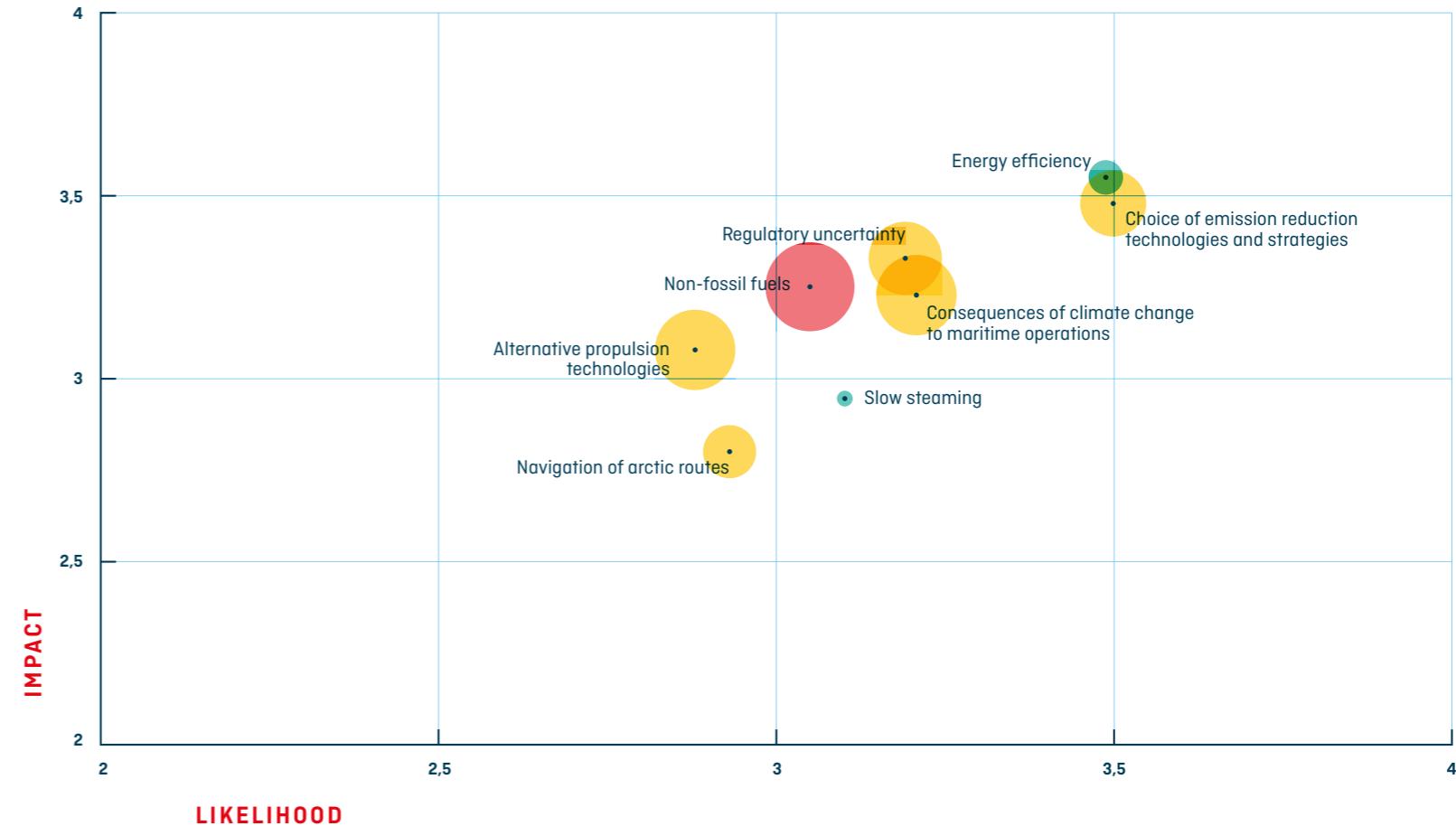


A journey into un- charted waters

Deep dive on decarbonization



IMPACT vs LIKELIHOOD vs PREPAREDNESS



Deep dive on decarbonization

The maritime industry is responsible for the transportation of approximately 90% of global trade while emitting approximately 2.5% of global greenhouse gas (GHG) emissions annually. It has long been recognised as the most cost-effective and energy efficient mode of transport. However, as other sectors decarbonize and trade continues to grow at a steady clip, shipping's share of global GHG emissions will continue to disproportionately increase, and the maritime industry's role in addressing climate concerns thus cannot be overlooked.

In April 2018, International Maritime Organization (IMO) member states adopted an initial climate change strategy, under which international shipping must reduce its GHG emissions by at least 50% by 2050. This constitutes a crucial step on the long road towards more climate-friendly seaborne trade, and, as this section of the Global Maritime Issues Monitor 2018 shows, many challenges are yet to be met and overcome.

The IMO identifies four major pathways towards emissions reductions: improvements in energy efficiency, renewable sources of energy, fuels with lower carbon content and technologies to remove emissions released during operations. If the maritime industry is to deliver on the IMO's 2050 goal, all pathways are likely to play a part in the future of shipping.

It is to these challenging waters that the Deep dive on decarbonization is dedicated. The survey reveals that the maritime industry deems 'energy efficiency' and 'emissions reduction technologies and strategies' as those issues to have the biggest impact on the sector over the next ten years. Exactly which emissions reduction strategy to choose, however, seems to be uncertain. This lack of certainty could also help explain why the industry considers its general level of preparedness to deal with decarbonization-related issues to be quite low, with the notable exception of the immediately executable actions of improving energy efficiency and adopting slow steaming.

Reducing GHG emissions: which pathway?

Improving the energy efficiency of vessels and deciding on a strategy to reduce GHG emissions are two very important first steps on the path towards decarbonizing the maritime sector. It should therefore come as no surprise that 'energy efficiency' and 'choice of emissions reduction technologies and strategies' are the two issues maritime leaders ranked as most impactful and most likely to influence the sector in the next 10 years.

'Energy efficiency' was also among the issues with the best preparedness score, which could reflect the fact that the industry has been working on improving energy efficiency for a number of years and is preparing for the implementation of the necessary measures in this field. This seems to be confirmed by our results on 'slow steaming', which received the best preparedness score of the section. The 'choice of emissions reduction technologies and strategies', on the other hand, is an issue which the industry feels less prepared to take charge of. This could be explained by the fact that none of the competing technological alternatives to fossil fuels are currently seen as sufficiently mature or cost-effective.

This lack of mature alternatives to traditional propulsion technologies could also be reflected in the fact that 'non-fossil fuels' and 'alternative propulsion technologies', both potential pathways towards the goal of reducing GHG emissions, are perceived by the industry to be less significant in impact and likelihood over the next 10 years. This seems to be further confirmed by the industry's low perceived preparedness for both issues: 'non-fossil fuels' were given the lowest preparedness score of the section, with 'alternative propulsion technologies' ranking in third lowest place.

Christine Loh of the Hong Kong University of Science and Technology and former Under Secretary for the Environment in Hong Kong does not find the results regarding energy efficiency and emissions reductions surprising: *"The maritime sector has already made decisions, so the impacts will show in the next decade. But regarding preparedness, maritime professionals seem unsure whether their company has made the right emissions reductions decisions."*

Alastair Marsh, adds that a combination of measures will be needed to reach the IMO goal, but that *"there is no clear pathway, as pathways will depend on where investments are made from a production and infrastructure perspective and mitigation of safety and engineering risks for ship deployment"*.

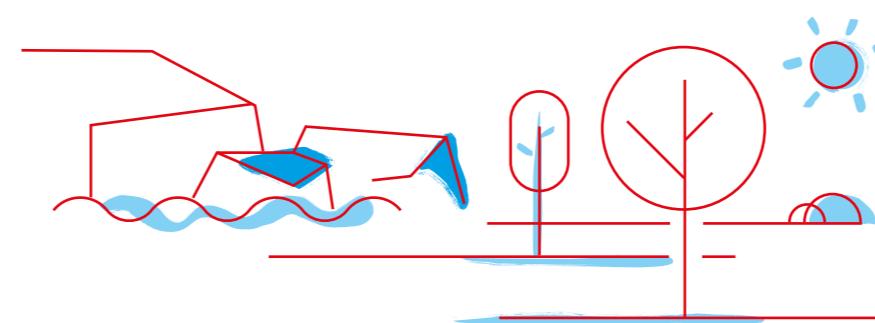
Adapting to a changing regulatory landscape

When it comes to issues over which the maritime industry does not have direct control, they seem to score relatively high on the impact and likelihood scale. 'Regulatory uncertainty' and 'consequences of climate change to maritime operations' placed at number 3 and 5 on the impact scale, and 4 and 3 on the likelihood scale, respectively. For both these issues, the industry feels neither prepared nor unprepared.

In response to this result, **Hideaki Saito**, Chair of the IMO Marine Environment Protection Committee, referred to the IMO's initial GHG strategy as a "landmark achievement". but noted that the exact measures to support the 2050 goal, as well as frameworks for implementation, are not yet fully decided upon. The process is therefore still ongoing, which could explain why the area of regulation appears uncertain to maritime leaders. Nevertheless, **Mr Saito** emphasises: *"I am confident that the IMO will develop robust international measures to effectively reduce GHG emissions in cooperation with broad stakeholders, and clearly reveal how much GHG emissions reduction has been achieved."*

He is, however, also aware of potential pitfalls on the path ahead: *"In order to secure effectiveness in GHG emissions reduction as well as a level playing field in international shipping, which plays an important role in the global market, it is crucial to secure international integrity under IMO's framework in developing and implementing any measures."* In this context, he warns that unilateral regulation could have a detrimental effect on the sustainable development of shipping.

Addressing the issue of climate change and its consequences to maritime operations, on the other hand, is an even more complex challenge. According to **Ian Goldin**, climate change *"will lead to more*



intense storms, disrupt many ports, and over time lead to ocean rise which is likely to disrupt many ports and perhaps require over time very significant investments in new facilities. It will also change economic competitiveness and trade". Because of these vast but unpredictable impacts of climate change, this risk might prove difficult to manage.

Finally, 'navigation of arctic routes' ranked as the issue with the lowest perceived impact over the next 10 years. This could be due to the continued uncertainty about if and when arctic waters will be readily open for navigation, as well as due to arctic routes' relevance mainly for trade between specific locations in the northern hemisphere. The industry seems to be well informed of these facts, since the issue received the third best preparedness score of the section.

A look beyond the Global Maritime Issues Monitor

While this deep dive addresses many of the crucial decarbonization issues on the maritime agenda, it does not presume to offer an entirely comprehensive overview of this wide and far-reaching topic. With this limit in mind, **Jan Dieleman**, offers an interesting perspective on which areas the Issues Monitor might have overlooked. He states that green ship financing in particular should have been featured more prominently: "Banks are becoming more demanding about lending to companies which are increasingly asked to demonstrate solid corporate social responsibility credentials".

Additionally, **Jan Dieleman** sees carbon pricing as an important issue as it could bring companies to reduce their GHG emissions: "We are concerned by how the industry might attract outside innovation to develop emissions reduction technologies. Potentially a carbon pricing initiative could incentivise this".

The challenge ahead

The results of our survey, presented in this year's Global Maritime Issues Monitor, have revealed to some extent the risks and issues that are placed high on the maritime agenda and how well prepared the industry deems itself to face them. This information allows for the identification of some key areas that need priority action. At the same time, our results, while providing answers to some questions, raise many new ones that it will be challenging to answer.

If we look into the future, it is **Ian Goldin's** view that "the industry's contribution to climate change, although small, will come under growing scrutiny and require over time very significant investments in lower carbon propulsion and the scrapping or heavy taxation of ships that depend on carbon intensive – as well as SOx and NOx – fuels". **Alastair Marsh**, in turn, is confident that the industry is aware of the scale of this difficult task ahead. However, he states that "the challenge is the sense of urgency to act now and innovate today to accelerate the production and uptake of zero-carbon fuels and technologies to deliver zero-emission vessels in 2030". He adds that for the industry to increase its preparedness for climate-related risks, it will need to understand and raise awareness of these issues, collaborate and co-create with all stakeholders across the value chain, and demonstrate the business opportunity in taking voluntary leadership action and innovation.

What **impact** do you think the following issues will have on seaborne trade over the next 10 years?

1 Minimal impact / 2 Minor impact / 3 Moderate impact / 4 Major impact

RANK	ISSUE	IMPACT
1	Energy efficiency	3,54
2	Choice of emission reduction technologies and strategies	3,49
3	Regulatory uncertainty	3,33
4	Non-fossil fuels	3,25
5	Consequences of climate change to maritime operations	3,23
6	Alternative propulsion technologies	3,08
7	Slow steaming	2,95
8	Navigation of arctic routes	2,80

What is the **likelihood** of the following issues occurring within the next 10 years?

1 Very unlikely / 2 Unlikely / 3 Likely / 4 Very likely

RANK	ISSUE	LIKELIHOOD
1	Choice of emission reduction technologies and strategies	3,50
2	Energy efficiency	3,49
3	Consequences of climate change to maritime operations	3,21
4	Regulatory uncertainty	3,19
5	Slow steaming	3,10
6	Non-fossil fuels	3,05
7	Navigation of arctic routes	2,93
8	Alternative propulsion technologies	2,88

How **prepared** is the maritime industry to deal with the following issues?

1 Very unprepared / 2 Unprepared / 3 Neither prepared or unprepared / 4 Prepared / 5 Very prepared

RANK	ISSUE	PREPAREDNESS
1	Non-fossil fuels	2,46
2	Consequences of climate change to maritime operations	2,58
3	Alternative propulsion technologies	2,58
4	Regulatory uncertainty	2,68
5	Choice of emission reduction technologies and strategies	2,78
6	Navigation of arctic routes	2,96
7	Energy efficiency	3,22
8	Slow steaming	3,48

→ See Glossary of terms at page 23

Methodology

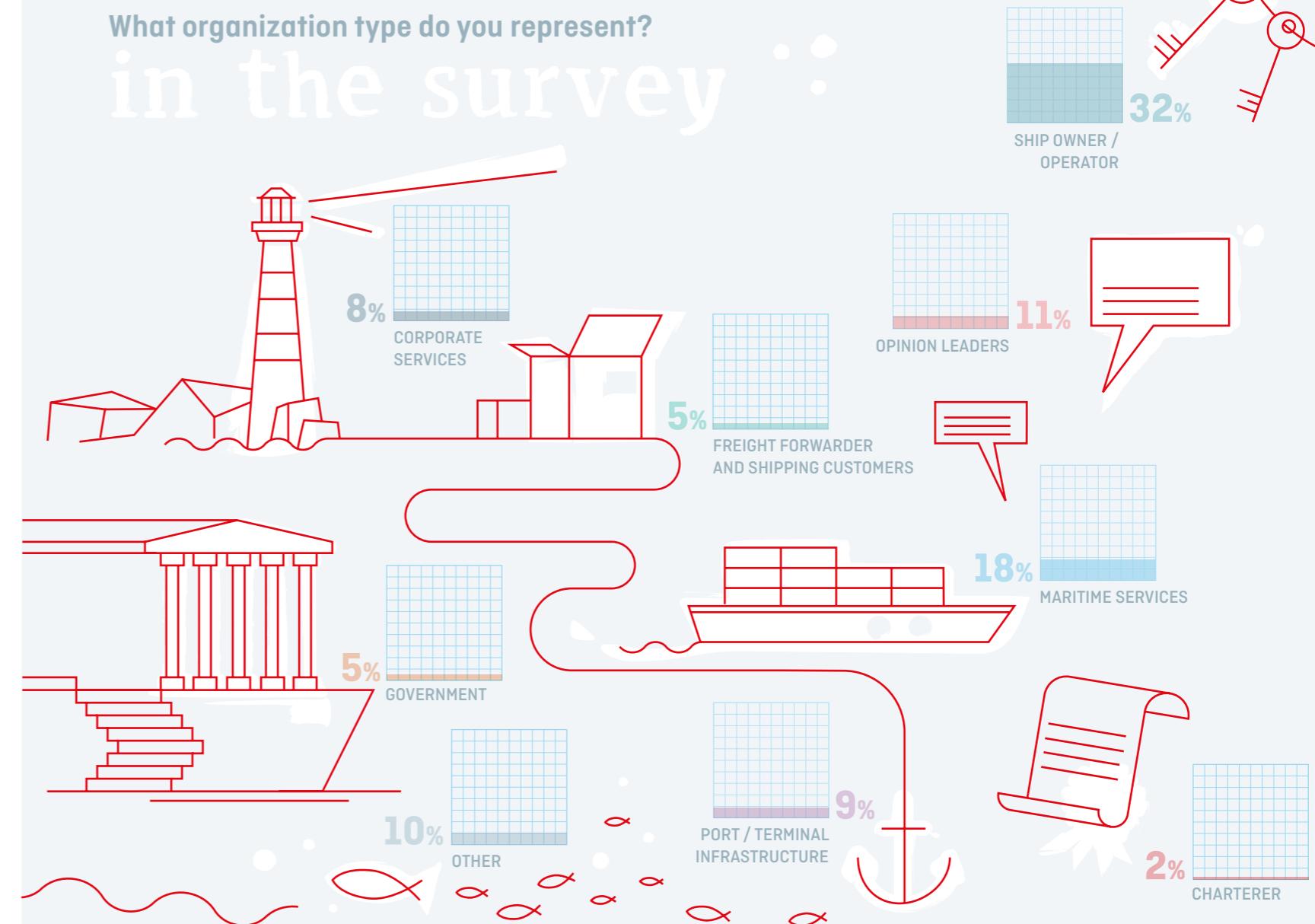
The Global Maritime Issues Monitor 2018 is based on an annual survey, which this year was conducted from 8 May to 15 June 2018. The survey questionnaire was completed by senior maritime stakeholders from the Global Maritime Forum and Marsh's multi-stakeholder networks. The survey sample was made up of board members, c-suite and functional decision makers from the private sector, alongside government and civil society representatives. The sample represents a diverse network of maritime stakeholders from 52 countries.

The survey questionnaire asked respondents to rank a series of global maritime issues on their potential impact to seaborne trade, the likelihood of different events occurring over the next 10 years and the maritime industry's preparedness for these events. The survey questionnaire looked at 17 general maritime issues and sought to understand specific priorities in digitalization and decarbonization, with two deep dives containing seven and eight issues in each respective field.

The responses from the survey were coded numerically to allow for comparisons. Arithmetic mean scores were calculated for each of the issues and were used to rank the issues in terms of likelihood, impact and preparedness. Relevant stakeholders have been asked to comment on the survey findings to contextualise the data used in the Issues Monitor. The results of the survey were used to produce impact vs. likelihood vs. preparedness charts and provide supplementary evidence used throughout the Global Maritime Issues Monitor.

Who participated in the survey

What organization type do you represent?



Methodology

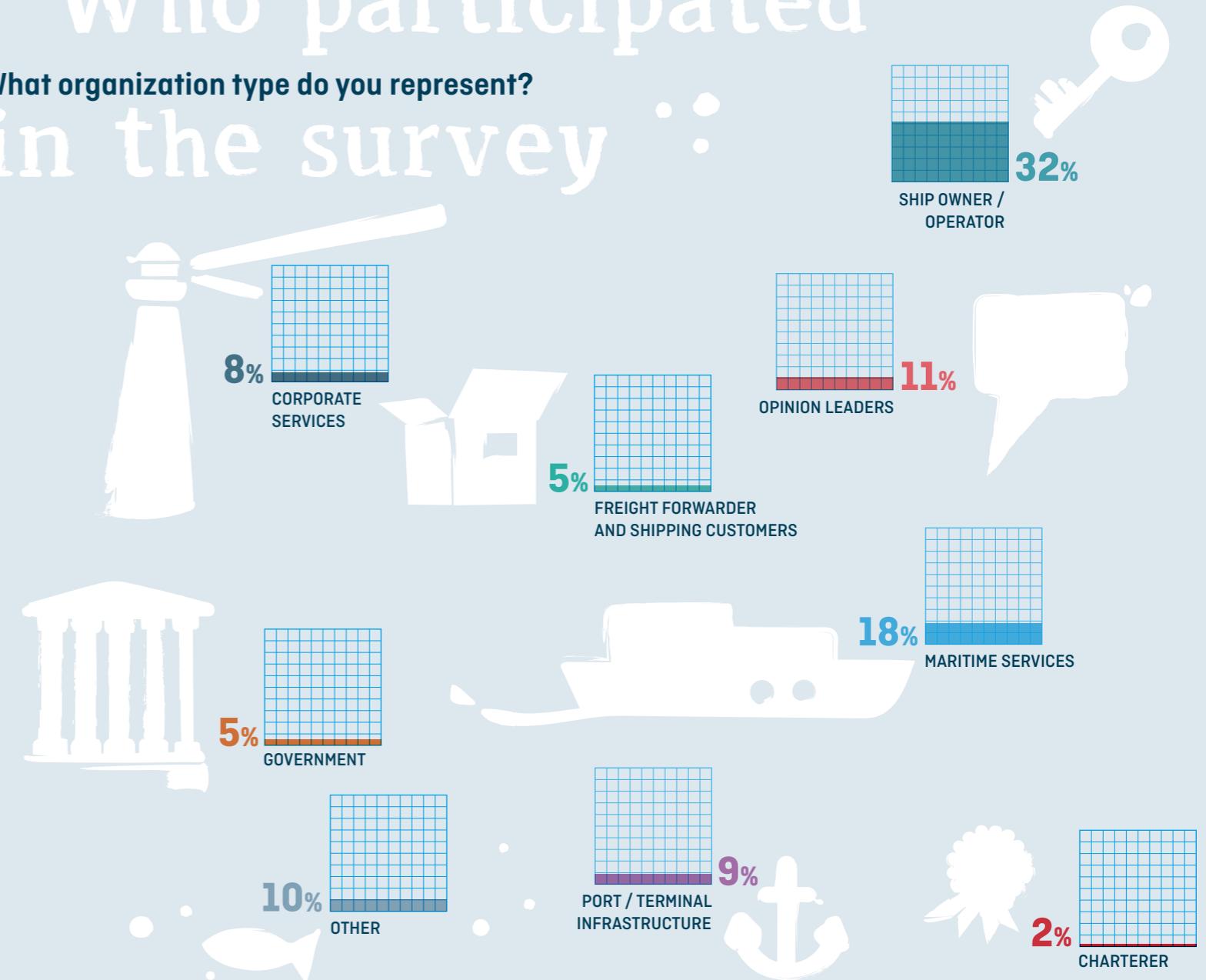
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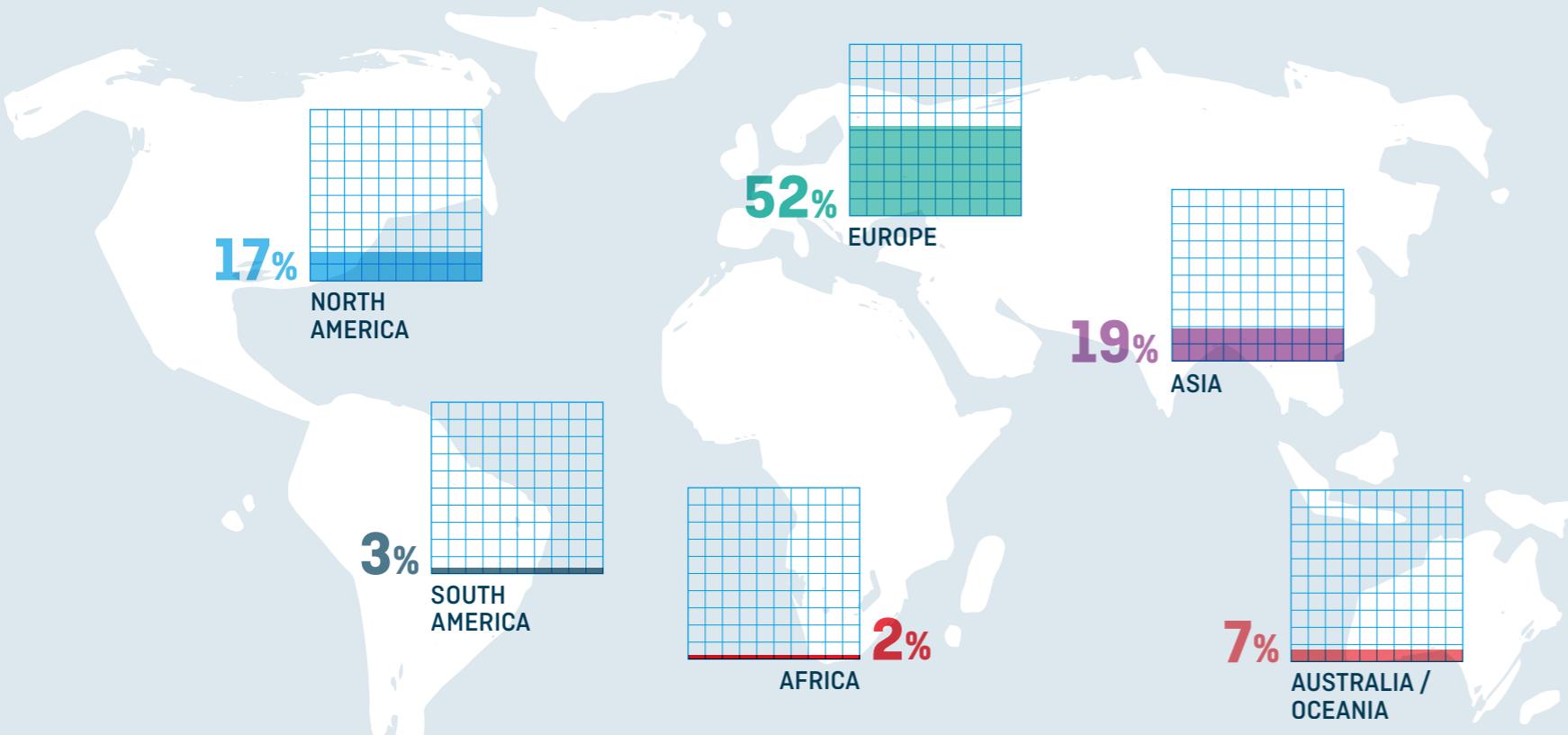
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Who participated in the survey

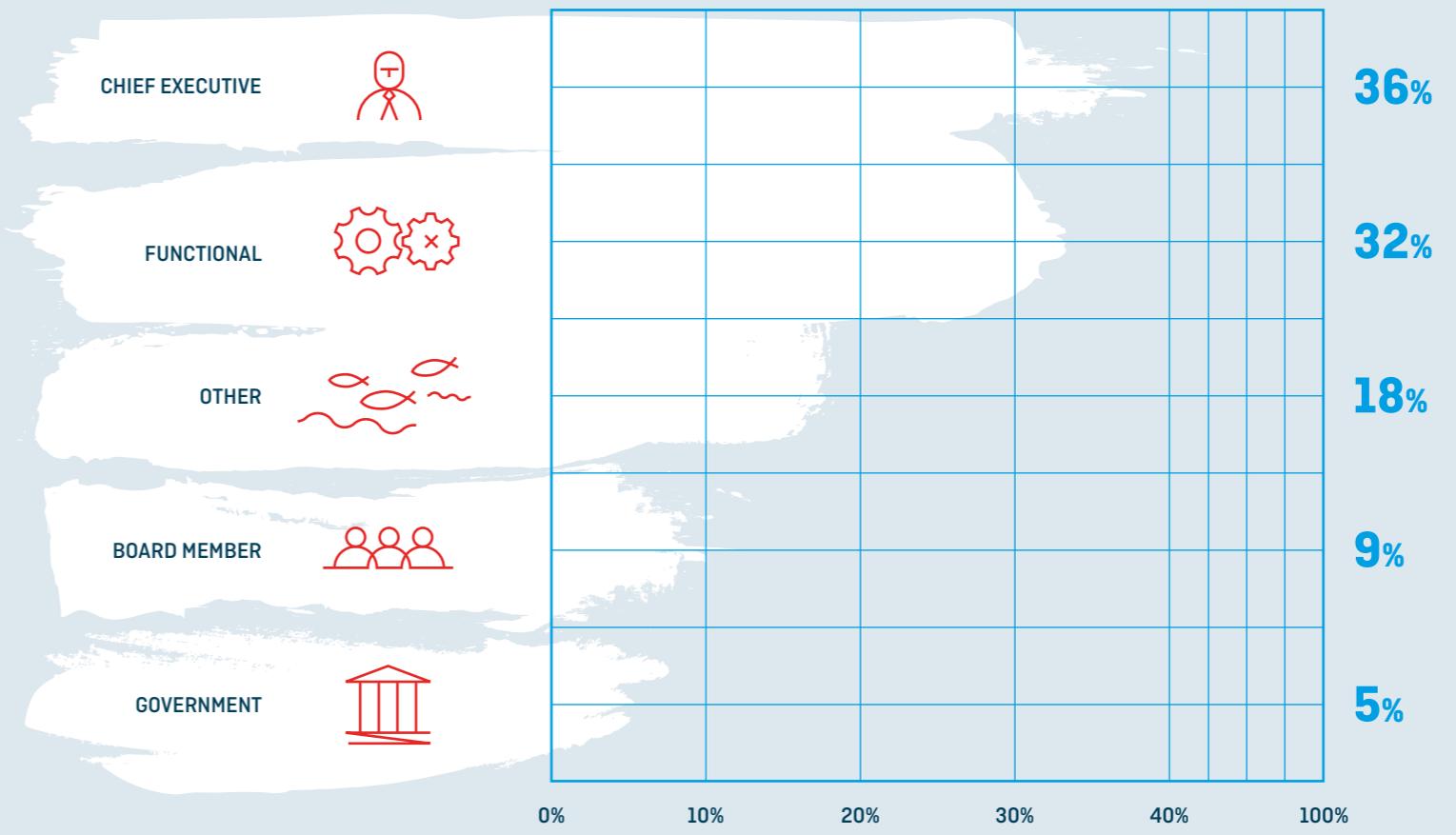
What organization type do you represent?



What country is your organization headquartered in?



Which role best describes your current position?



{ Global issues }

Air pollution

For example: the emission of SOx and NOx from ships and the consequences for human health and the environment.

Changing trading patterns

Changes to the maritime trading landscape and supply chain which will have an impact on global trade (for example: One Belt One Road, deindustrialisation, near-sourcing).

Cost and availability of finance

Increase in the cost of finance to maritime businesses influenced by availability, security, credit, and rating.

Cyber-attacks and data theft

An attempt by hackers to damage or destroy a computer network or system causing economic impact and the exploitation of private or official data.

Energy price fluctuations

Fluctuation in energy prices leading to economic pressure or uncertainty for the maritime industry.

Failure or shortfall in infrastructure

Failure to adequately invest in, upgrade, and/or secure transportation infrastructure, leading to loss of economic activity, pressure, or a breakdown with system-wide implications.

Geopolitical tension

A bilateral or multilateral dispute between states that escalates into economic (for example: trade/currency wars, resource nationalisation) military, cyber, societal, or other conflict.

Global economic crisis

A significant downturn in the global economy resulting in a lack of growth for the maritime industry.

Governance failure

Inability of regional or global institutions to resolve issues of economic, geopolitical, or environmental importance.

Increased piracy

An increase in the practice of attacking and robbing maritime businesses at sea or on land.

Major safety incident

Any occurrence that is associated with the operation of a ship and affects, or could affect, human

Man-made environmental disaster

A catastrophic event regarding the environment due to human activity subsequently impacting the maritime industry.

Natural environmental disaster

A major adverse event resulting from natural processes subsequently impacting the maritime industry (for example: tsunami, hurricane, flooding).

Pervasive corruption

Corruption that is so pervasive that it is accepted as the way to do business.

Terrorism

An unlawful use of violence and intimidation that successfully inflicts human or material damage.

Transfer of invasive species

The transfer of non-indigenous species from one region to another through a ship's ballast water tanks, leading to invasiveness and environmental problems.

Workforce and skill shortages

Shortages in maritime workforce size, type, skill, and experience.

{ Digitalization }

3D printing

The process of printing a three-dimensional object.

Artificial intelligence

The development of systems able to perform tasks normally requiring human intelligence, for example: applications that reduce fuel consumption.

Autonomous technology and robotics

A technology that allows a machine to accomplish defined tasks without operator (human) interaction.

Big data

The process of examining large and varied data sets to make more informed business decisions.

Blockchain technology

Utilising open-source peer-to-peer software which is totally decentralised and the management of all transactions takes place collectively by the network.

Increasing influence of non-maritime disruptors

The influence of non-maritime competition from, for example: entrepreneurs, new platform business models, or companies (like Amazon) whose products or services have the potential to commoditise or outperform maritime transport.

Internet of Things

The interconnection of everyday maritime devices enabling them to send and receive data.

{ Decarbonization }

Alternative propulsion technologies

The outlook for electric and hybrid vessels, wind assistance, etc.

Choice of emission reduction technologies and strategies

Uncertainty on the maturity and competitiveness of different potential emission reduction technologies and strategies

Consequences of climate change to maritime operations

For example: increased risk of damage to maritime infrastructure, navigational hazards, etc.

Energy efficiency

The role of measures (design/operations/technologies) to reduce energy consumption.

Navigation of arctic routes

The possibility of establishing new navigational routes in the Arctic due to the melting of the polar ice caps.

Non-fossil fuels

The outlook for non-fossil fuels such as biofuels, hydrogen, ammonia, etc. as part of the energy mix.

Regulatory uncertainty

Lack of clarity in the rate of emissions reductions that will be pursued by the IMO, and/or in the policy measures that will be used to incentivise its achievement.

Slow steaming

The role of slow steaming as a measure to reduce energy consumption.

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World Maritime News 2018. *COSCO Shipping Lines Falls Victim to Cyber Attack*

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