

Working Group on the Development of a new Strategic Framework
2nd session
29 June – 1 July 2016

Extract from C 116/4/1

In the following pages, delegations will find an extract of developments and challenges from document C 116/4/1 to facilitate the work of the Working Group on the Development of a New Strategic Framework (see document SF-WG 2/1/1).

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1. Development and review of IMO regulations

37 International shipping activities are governed by a large number of rules and regulations (figure 9), which at times may overlap, be burdensome or outdated. Overregulation can result in severe commercial, economic and administrative burdens upon national administrations and the industry, threatening the sustainability of maritime transport. In addition, regulations which are hastily adopted can jeopardize the stability of the global regulatory framework, because not all consequences and impacts on the maritime industry might have been considered. However, it is important that Member States and other stakeholders have confidence in the process to ensure early adoption, ratification and entry into force. In this respect, the cooperation between Member States, official maritime industry associations and other stakeholders needs to be strengthened to ensure inclusion of different views when regulations are discussed or reviewed.

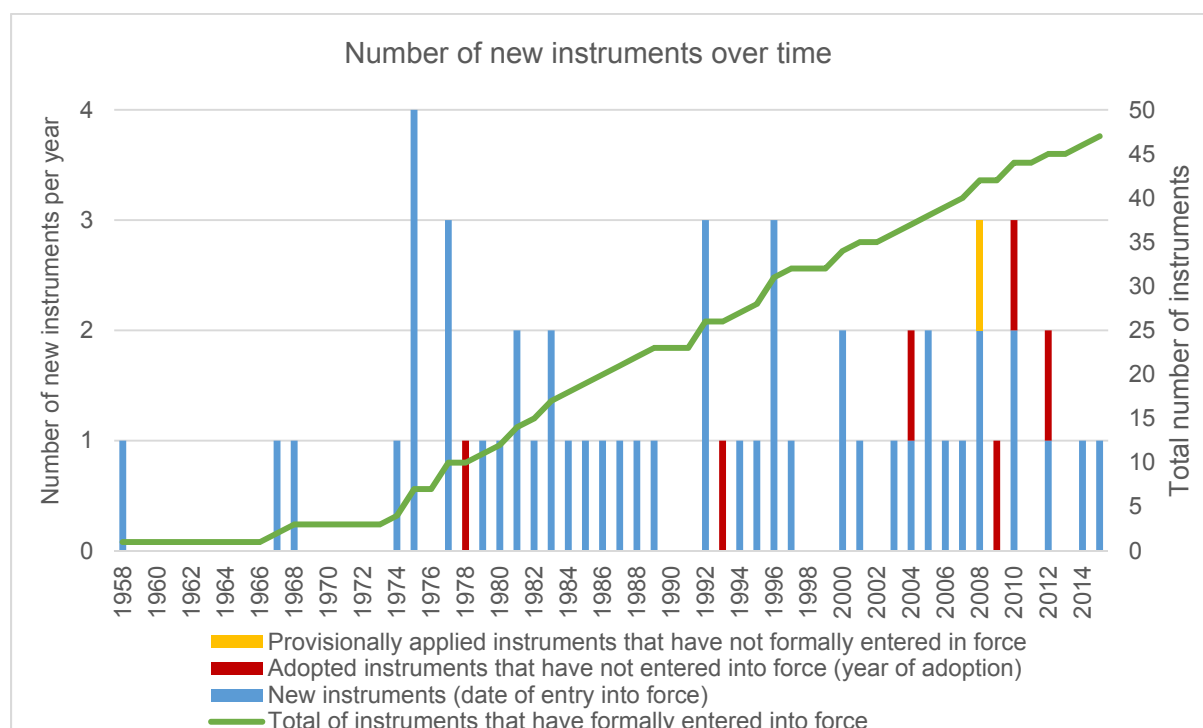


Figure 1 – Instruments over Time
(IMO, 2016a)

38 Regulations have in the past had a tendency to be developed as a response to a specific incident. In order to ensure a stable and predictable regulatory framework, increased emphasis on assessing the effectiveness on existing regulations could be a precursor for decisions on additional regulatory measures. New regulation should be developed only when the review and assessment of existing regulation establishes that it is necessary, because existing regulations do not sufficiently address the particular issue.

39 The development of individual regulations should not take place in isolation. The development of new regulation should be accompanied by the proof of an effective regulatory impact assessment (provision of technical and economic data) and a feasibility assessment (technical and commercial) to ensure that implementation of any new regulations do not conflict with instruments already in place, nor does it cause undue costs or administrative burdens for industry or for Member States. In order to achieve this, an analytical approach to assess safety, security and environmental issues should be applied before creating new regulation to ensure transparency and predictability of international regulations.

40 Traditionally, IMO's regulations have been prescriptive in nature. Prescriptive regulations tend to be a representation of past experience and, as such, become less and less relevant over time. This can, for example, hold back technically innovative ship designers from being able to properly address future design challenges. As a result, safety regulations need to be frequently updated to keep pace with lessons learned and with the latest technologies (figure 10).

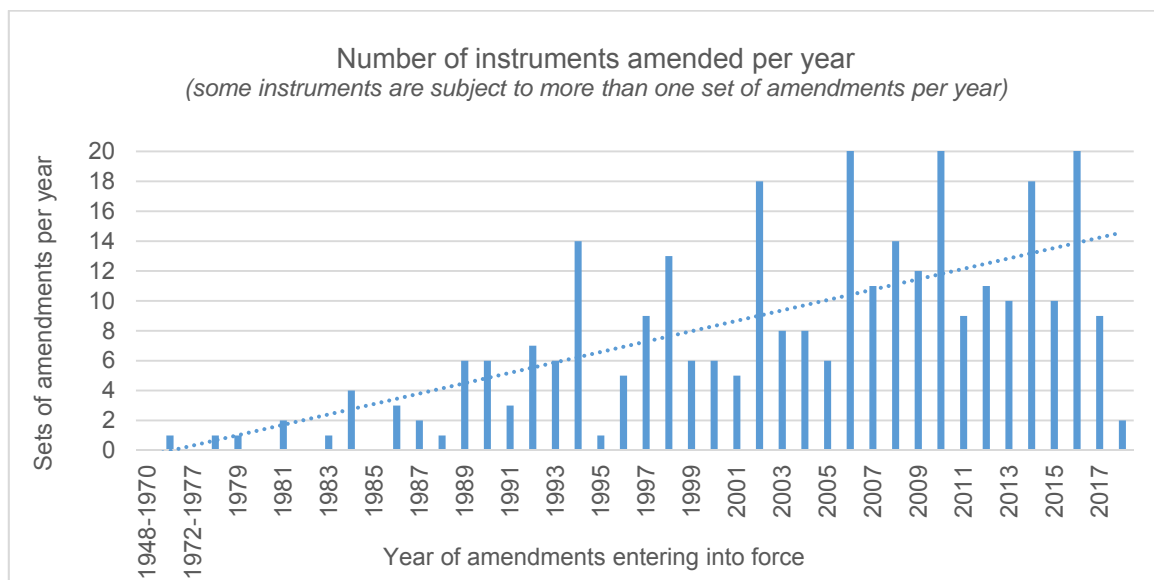


Figure 2 – Number of Instruments Amended per Year
(IMO, 2016b)

41 The ever increasing pace of technological developments and the overall improvement of technical capability are driving innovation in the shipping industry. Additionally, expectations of the public with regard to human safety and environmental protection are increasing. Given the fast pace of technological developments, adaption of new technologies or amendments of IMO regulations to enable new technologies without consideration of all safety aspects could easily undermine the regulatory framework and potentially have negative consequences. Therefore, in recent years, a clear tendency to move from prescriptive regulations to the adoption of a holistic risk-based or goal-based approach to maritime safety, is emerging. These approaches are balancing the elements affecting safety cost-effectively and throughout the lifecycle of the vessel. The goal is to assess safety as a key aspect of shipping with serious economic implications, rather than as an add-on in the design process seeking compliance with prescriptive regulations.

42 The creation of goal-based standards was introduced at IMO to enable the Organization to play a larger role in determining the standards of new ships built, which has been traditionally the responsibility of classification societies. Additionally, goal-based standards can also contribute to a more proactive approach of identifying possible adverse effects on the safety of ships at an early stage and to avoid excessive regulations.

43 The development of ship construction standards permits innovative designs but, at the same time, ensures that ships are constructed in such a manner that, if properly maintained, they could remain safe for their entire life-cycle. The standards also have to ensure that all parts of a ship could be easily accessed to facilitate proper inspection and ease of maintenance.

44 The implementation of the goal-based philosophy enables a new way of viewing the regulatory development process. Traditionally, issues related to fire protection, marine engineering, naval architecture and other maritime disciplines would, in most circumstances,

be considered in isolation from each other and, after deliberations, prescriptive regulations would be prepared on a piecemeal basis to address each specific area of safety. However, the new regulatory approach is holistic in nature and focuses on achieving goals.

45 With goal- and risk-based approaches, shipowners would be able to implement innovative ship and transport solutions. However, goal- and risk-based regulation as well as formal assessments for the introduction of new instruments require substantial amounts of data. This increase in data-based approaches also requires establishing of the necessary tools, i.e. data collection, verification, analysis standards and techniques within IMO's regulatory process for a consistent and transparent application. However, given that the submission of data to IMO is very inconsistent, the Organization would have to build and develop these resources to fully carry out risk-based assessment of any proposed regulation and develop further goal-based standards.

46 To assert its position as the main forum for the development of global and uniform standards, the main challenge for IMO is to ensure that its regulations keep pace with the developments within the maritime industry. This requires uniform and effective mechanisms for regular reviews of existing regulations and for the development of new regulations. This should take place in cooperation with all stakeholders, including the maritime industry. Additional challenges, related to the increasing pace of technological developments are the need to develop goal- or risk-based approaches for regulations. The expansion of these approaches within IMO regulations can only be ensured if data-based analytical mechanisms are established, for example by better utilizing port State control (PSC) and casualty data. Given the inconsistent submission of data to IMO, processes and capabilities have to be developed within the Organization to strengthen data analysis capabilities.

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2. *Assessing the effectiveness of IMO regulations*

47 Monitoring of the effectiveness of IMO regulations to assess that the measures introduced are implemented correctly and have achieved their aims, is currently not carried out systematically. Placing a greater emphasis on reviewing the effectiveness of IMO regulations could ensure that these instruments remain current, efficient and proportionate, while also achieving the outcomes envisaged by the maritime community during their negotiations. The review could establish if the measures are effective in achieving the required outcomes and if not, why (for example, it could be related to drafting, implementation or simply not having the desired effect).

48 A systematic process could reduce the need for Member States or observers to bring shortcomings to the attention of the Organization on an ad-hoc basis, and increase the maritime community's confidence in measures adopted.

49 Assessing the effectiveness of regulations, considerations would have to be given to not only the specific purpose of the regulations, but also consequential impacts on other areas, for example the safety impacts of an environmental measure, or the human element implications of the introduction of new technology and equipment. This matter should not only be considered following the introduction of the new measure, but also throughout the initial drafting. In the same vein, consideration should also be given to the financial impact on ship-owners and operators. Throughout the process of developing regulations the three dimensions of sustainability need to be balanced.

50 The challenges for IMO are to establish uniform and systematic mechanisms to assess the effectiveness of existing IMO regulations and to constantly consider the impact of newly developed or amended regulations on other areas of the Organization's work and in particular the impact on the maritime industry (financial and with regard to the practicability of implementation).

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3. *Improving IMO's working practices*

51 The five main IMO areas of work have their own distinct features, but are also partly overlapping or complimentary. The reduction of sub-committees has already enabled IMO to expedite matters and to deliver global solutions quicker.

52 However, some issues and regulations that IMO is dealing with cover more than one area of work and the Organization would be able to respond more comprehensively and effectively if all aspects of these issues were considered simultaneously. Some matters, such as the reduction of administrative burdens, require horizontal considerations to provide sustainable solutions.

53 While it has been a hallmark of IMO to deliver regulations of high regulatory and technical quality, one of the main challenges for IMO is that its overall working mechanisms need to be enhanced continually to ensure the decision making process continues to be agile and flexible to meet the future demands of Member States and the maritime industry in a timely manner.

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4. Uniform Implementation

54 One of the purposes of the Organization is to ensure a level-playing field. To fully achieve this, uniform implementation of IMO conventions by all IMO Member States is needed. Conventions must be ratified in a timely manner to enter into force. This would facilitate a higher degree of predictability for the maritime industry. Considering the amount of time and resources spent negotiating new mandatory instruments, the duration of time between adoption of new instruments and their entry into force is critical. Failing to ensure the entry into force of international instruments can lead to the adoption of unilateral or regional measures, which is detrimental to IMO's global role and credibility (figure 11).

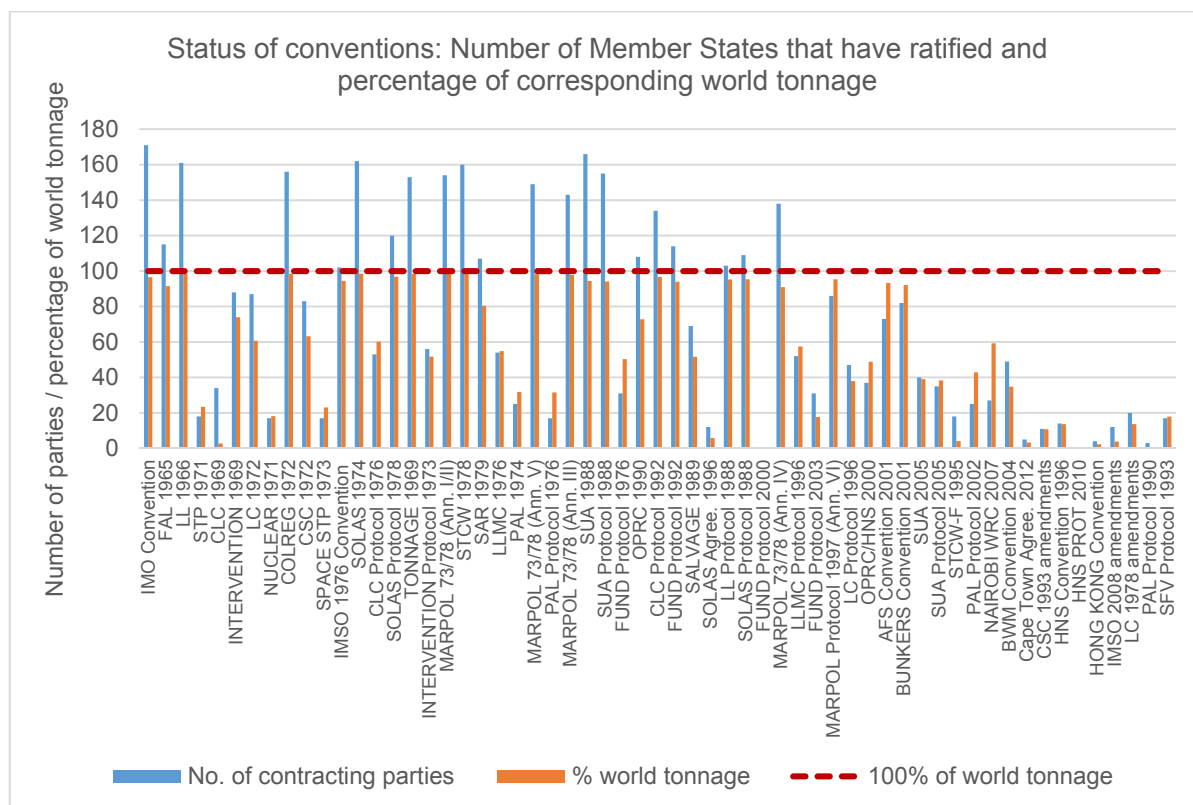


Figure 3 – Status of Conventions (IMO, 2016a)

55 The increasing number of safety, security and environmental protection requirements in IMO's mandatory instruments places an added emphasis on the uniform implementation of IMO instruments within the maritime community. The effects of the financial crisis demand further scrutiny on new requirements to minimize additional administrative burdens. As IMO and the maritime industry will be judged by their overall performance, there is a need to not only raise standards, but also increase overall implementation and compliance.

56 IMO needs to ensure an enabling environment to adopt and implement IMO instruments worldwide. The role of technical cooperation in this regard is important. In order to ensure better implementation, benefits could be gained from capacity-building initiatives, as well as partnerships (public or private) in developing countries, where the competencies of a broader range of stakeholders are shared through cooperation.

57 An important element to enhance the uniform implementation of IMO regulations is the IMO Member State Audit Scheme (IMSAS). The Audit Scheme is a primary tool in assessing Member States' performance in meeting their obligations and responsibilities as flag, port and coastal States under the relevant IMO instruments. Analysis of the audit reports

will provide a further component to assess the main needs of Member States and offer guidance for future technical cooperation activities.

58 Additionally, a better targeting of resources to where they are most needed would strengthen the current technical cooperation support system to provide a better mechanism for technical cooperation activities. These efforts will ultimately lead to better results with respect to the implementation of IMO regulations.

59 The challenge for IMO is to ensure that its instruments are implemented uniformly and without unnecessary delays. In order to achieve this, the Organization has to improve cooperation across all areas of its responsibility (safety, security, environmental protection) and with all stakeholders to assess the barriers to implementation and provide targeted technical cooperation activities. On an operational level, the main challenge will be the full implementation and utilization of the IMO Member State Audit Scheme (IMSAS) to systematically review audit findings to inform the regulatory process of the Organization and future consideration of new obligations and responsibilities for Member States under IMO instruments.

5. Reduction of administrative burdens

62 The increase in administrative burdens threatens these achievements and has resulted in the need to improve the facilitation of maritime activities. The increasing number of IMO conventions and their amendments have led to requirements to document many aspects of conducting shipping activities – all introduced to enhance safety, security and environmental protection. Paperwork and bureaucracy is an issue in most industries, but it is an especially significant problem for shipping because of its international nature with a lack of standardized forms, a traditional reliance on paper to document compliance and established procedures associated with the arrival, stay and departure of ships engaged on international voyages (figure 12).

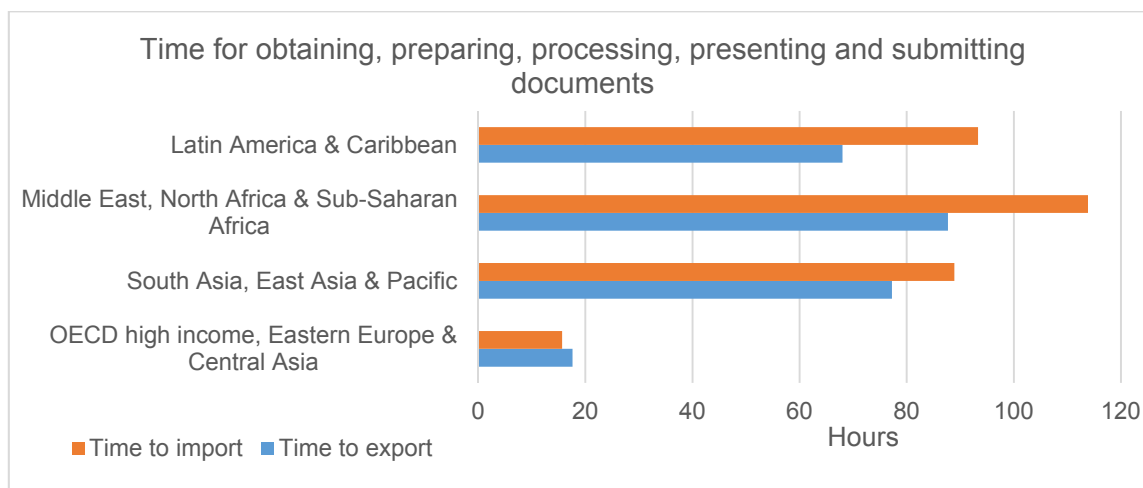


Figure 4 – Documentary Compliance
(World Bank, 2016)

63 The issue is not only related to the increase in the number of documents, but also the duplication of information to be provided, as well as the cumulative effect of the documentary requirements (figure 13). This is in particular a concern in relation to ships' crew with the responsibility of ensuring the safe navigation and operation of the ship, because time and attention is diverted to administrative tasks. Despite awareness about this, diverging practices in the clearance of ships and problems of duplication of information and multiple reporting have been pressing concerns for seafarers, ship owners and national administrations for years. The introduction of electronic information exchanges and electronic recording might present an opportunity to alleviate some of these burdens.

Perceived Level of Administrative Burdens (from survey among international seafarers)				
Type of task	Tasks are repeated too often		Tasks require too much documentation	
	Agree	Disagree	Agree	Disagree
Port and pre-arrival	71%	29%	79%	21%
PSC, FSC, class inspections	66%	34%	76%	24%
Vetting inspections	66%	35%	76%	24%
ISPS requirements	66%	34%	74%	27%
Internal QMS	63%	37%	76%	24%
Journals	59%	41%	65%	35%
Exercises and drills	51%	49%	64%	37%

Figure 5 – Perceived Level of Administrative Burdens
(COWI, 2013)

64 The challenges for the Organization are to balance the need to ensure the safety, security and environmental soundness of shipping and the shipping industries ability to manage their ships without being overburdened with paperwork.

6. Electronic transmission of information, including electronic certificates

65 The use of new technologies present both possibilities and challenges that need to be addressed. The use of new technologies, for example electronic certificates, have been identified as one of the major measures to alleviate administrative burdens (figure 14). To achieve this, electronic certificates need to be verifiable and be universally accepted. Without clear rules, ships may have to carry hard copies in addition to the electronic versions due to the uncertainty about the acceptance of electronic certificates.

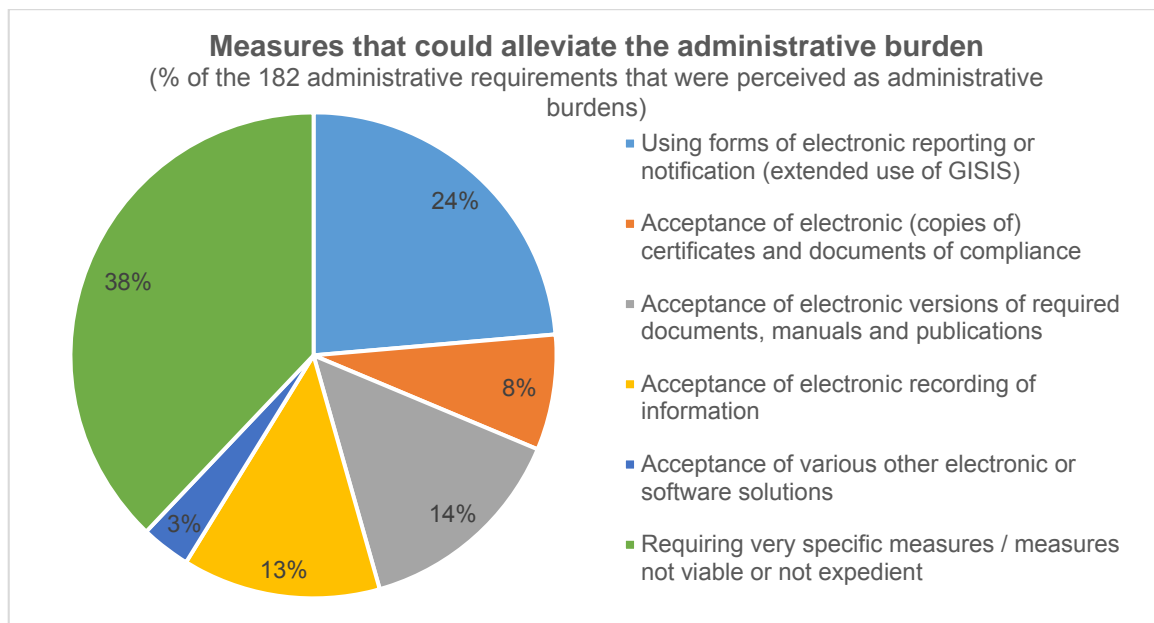


Figure 6 – Measures to Alleviate Administrative Burdens (IMO, 2014a)

66 To take full advantage of these technological developments, such as the electronic transmission of information, required by IMO instruments, a closer cooperation of flag, port States and the industry is necessary.

67 The challenges for the maritime community are to work on increasing the uniformity of certificates and move towards the universal acceptance of electronic certificates. IMO should encourage cooperation between the relevant stakeholders and enable the work on solutions for electronic certificates as well as the transfer of suitable technologies to developing countries.

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7. *Single Window Approach*

68 The single window approach provides a further possibility to utilize technological developments to reduce administrative burdens by facilitating the reporting requirements of a ship's crew. A single window is a facility that allows parties involved in trade and transport to provide standardized information and documents through a single entry point to fulfil all import, export and transit-related regulatory requirements. In 2014, 73 countries operated a single window of varying complexity¹.

69 At present, most existing single window systems are customs single windows and deal with the import or export clearance of cargo. While improving the performance of customs remains a high priority for many countries, it is only one of the many agencies involved in border processing, and is frequently the most modernized (figure 15). Customs agencies are often responsible for no more than one-third of regulatory delays.

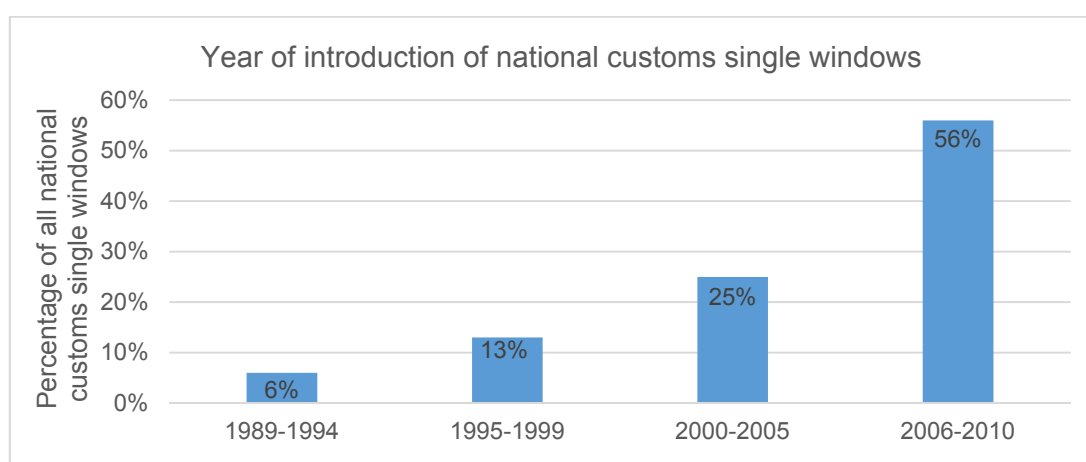


Figure 7 – Introduction of National Customs Single Windows
(World Customs Organization, 2011)

70 The focus of reform efforts therefore needs to shift beyond customs to tackle the systems and procedures employed by other border management agencies and myriad other organizations involved in regulating trade flows. Achieving meaningful trade facilitation gains requires a comprehensive approach based on effective information-sharing, streamlining of procedures and collaboration among all border management agencies.

71 An approach to border processing and clearance is the establishment of National Single Window systems, which allow traders to submit all import, export, and transit information required by regulatory agencies via a single electronic gateway, instead of submitting and processing the same information numerous times to different government entities, including some that are automated and others that still rely heavily on paper.

72 As 80% of the world trade is carried by sea, the issue of clearance of ships can be considered a major factor in facilitating international trade. However, a maritime single window system for shipping as a means of transport is less extensively covered. Thus, there is a need to provide more specific guidance on maritime single window systems that is focused on the clearance of ships, passengers and crew members. The aim is to enable the submission of all the information required by public authorities in connection with the arrival, stay and departure of ships, persons and cargo without duplication.

¹ World Bank, 2013.

73 In recent years, some progress has been made to develop a single window system for maritime transport, mainly through the developments of guidelines for setting up a single window system. However, further work is needed to support the implementation of single window systems.

74 The challenges for the maritime industry are to seek international consensus in simplifying reporting and recording requirements and to look for global solutions that may facilitate these exchanges such as the maritime single window. One of IMO's challenges is to enable the process of developing a maritime single window and explore possible synergies with existing national single window systems. Additionally, given the complexity of this approach, IMO will have to provide technical cooperation support to develop and implement single windows in developing countries.

8. Security

75 The FAL Convention encourages Member States to improve port and border procedures. However, the stringent security measures, established in the ISPS Code, surrounding shipping place additional strain on the flow of cargo through the maritime supply chain. In order to further facilitate trade, there will be a need to balance security and facilitation policies to improve the operational efficiency and effectiveness of procedures in the maritime supply chain. This can be achieved by increasing the flexibility of regulation to better reflect the variability of existing security threats in different countries and regions. In this respect, the knowledge and experience gained by contracting parties regarding maritime transport security should be considered. To reduce administrative burdens related to overlapping or unnecessary regulation, synergies between maritime transport safety, counter-terrorism and counter-piracy measures need to be improved.

76 With regard to piracy, while there is year on year decline in the number of vessels hijacked and crew members captured, for the first time in five years there was a reported increase in the number of actual and attempted piracy attacks during 2015 (though only by one incident; 246 compared to 245 in 2014) (figure 16). Attacks in South East Asia continue to increase, with this region now accounting for around 60% of global incidents. An issue with South East Asia is that traffic is very dense and different national territorial waters are adjacent to each other, making distinguishing responsibilities problematic.

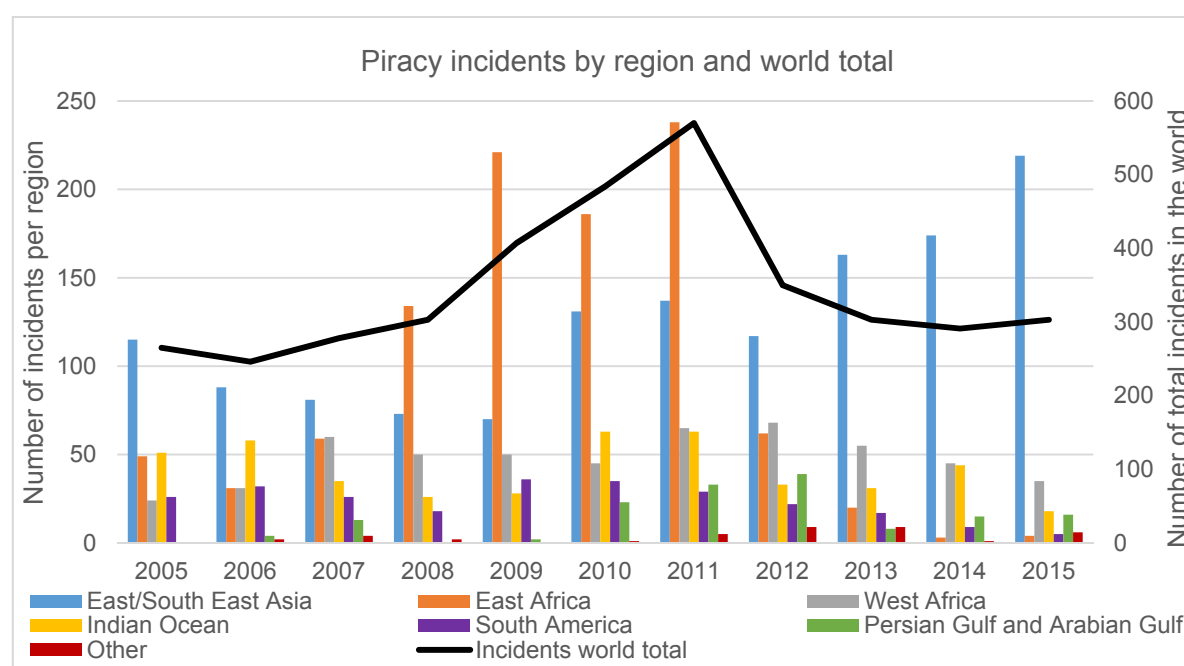


Figure 8 – Piracy Incidents, 2005-2015
(IMO, 2016c)

77 Of additional concern is the risk of cyberattacks by pirates. Pirates might exploit weaknesses in the shipping company's cybersecurity to track the movement of vessels or target orders for specific cargoes. For example, pirates could use their access to refineries to detect which vessel is carrying the fuel they are interested in and use the Automatic Identification System (AIS) information to locate and hijack the vessel. For example, there has already been one reported incident of Somali pirates that have hacked a shipping company's system to identify vessels passing through the Gulf of Aden with valuable cargoes and minimal on board security, which lead to the hijacking of a vessel.

78 The challenges for the maritime industry are to balance security and facilitation policies to improve the operational efficiency and effectiveness of procedures in the maritime supply chain. Additionally, new and emerging security issues, for example the increase of piracy in South East Asia and the threat of cyberattacks by pirates or terrorists, have to be monitored and measures to address these emerging issues need to be developed. The challenge for IMO is to support and enable the maritime community's efforts and provide a forward-looking perspective especially in the context of threats related to the usage of new technologies.

9. Infrastructure facilities

79 Sustainable economic growth, employment, prosperity and stability can all be enhanced through developing maritime trade by sea which will only continue to increase in volume and importance (figure 17). The economic, environmental and social developments facing ports include growing and concentrated traffic volumes brought about by ever-increasing ship size, the cost of adaptation of port and port hinterland infrastructure measures, volatility in energy prices, the new energy landscape and the transition to alternative fuels and potential changes in shipping routes from new or enlarged international passage ways.

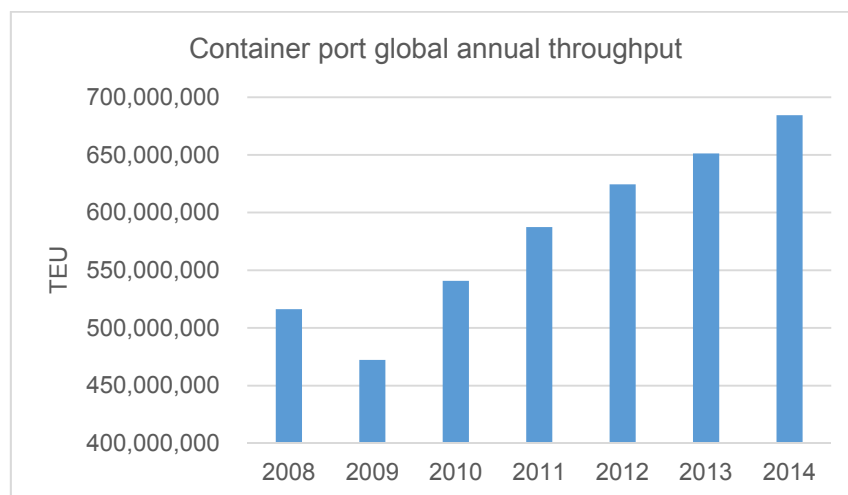


Figure 9 – Container Port Global Annual Throughput (UNCTAD, 2015e)

80 Ports are an essential vital link in the maritime transport chain (figure 18) and any measures to improve their efficiency increasingly come under IMO's purview. Improving port infrastructure and efficiency is vital in this respect, and the port industry faces many challenges today that mirror those faced by the shipping community.

Top 20 container terminals and their throughput, 2012-2014 (TEUs and % change)						
	Port Name	2012	2013	% change 2013-2012	2014	% change 2014-2013
1	Shanghai	35,529,000	36,617,000	12.57	35,290,000	-3.62
2	Singapore	31,649,400	32,600,000	3	33,869,000	3.89
3	Shenzhen	22,940,130	23,279,000	1.48	24,040,000	3.27
4	Hong Kong	23,117,000	22,352,000	-3.31	22,200,000	-0.68
5	Ningbo	15,670,000	17,351,000	10.73	19,450,000	12.10
6	Busan	17,046,177	17,686,000	3.75	18,678,000	5.61
7	Guangzhou	14,743,600	15,309,000	3.83	16,610,000	8.50
8	Qingdao	14,503,000	15,520,000	7.01	16,580,000	6.83
9	Dubai	13,270,000	13,641,000	2.80	15,200,000	11.43
10	Tianjin	12,300,000	13,000,000	5.69	14,060,000	8.15
11	Rotterdam	11,865,916	11,621,000	-2.06	12,298,000	5.83
12	Port Klang	10,001,495	10,350,000	3.48	10,946,000	5.76
13	Kaohsiung	9,781,221	9,938,000	1.60	10,593,000	6.59
14	Dalian	8,064,000	10,015,000	24.19	10,130,000	1.15

15	Hamburg	8,863,896	9,258,000	4.45	9,729,000	5.09
16	Antwerp	8,635,169	8,578,000	-0.66	8,978,000	4.66
17	Xiamen	7,201,700	8,008,000	11.20	8,572,000	7.04
18	Tanjung Pelepas	7,700,000	7,628,000	-0.94	8,500,000	11.43
19	Los Angeles	8,077,714	7,869,000	-2.58	8,340,000	5.99
20	Jakarta	6,100,000	6,171,000	1.16	6,053,000	-1.91
	Total top 20	284,059,418	296,791,000	4.48	310,116,000	4.49

Figure 10 – Top 20 Container Terminals, 2012-2014
(UNCTAD, 2015d)

81 The operational complexities of dealing with larger ships; the need to manage congestion; the need to do more with less space, the continued pressure to enhance safety and security in and around port areas and to embrace greener technologies (for example port reception facilities) and working practices, are among the specific developments that the entire supply chain needs to address. So too are the need to reduce the administrative burden on ship masters, seafarers and shipping companies, and to reduce the time scales of the ships and cargo at ports. The port infrastructure, support facilities, and the human capital throughout the maritime industry need to be further developed to enable ports to offer a more efficient service.

82 The main challenge for the maritime community is to assess and acknowledge the relevance of ports and port facilities for international shipping. A significant challenge for the Organization is to identify means to deal with the economic, environmental and social challenges facing ports in recognition of their vital link in the maritime transport chain, keeping in mind the significance of ports beyond issues of facilitation, i.e. the environmental as well as the safety and security impact of ports. A first step to strengthen the cooperation with ports could entail a closer cooperation and strengthened information sharing with port State control (PSC) regimes.

10. *Safe ship operation and navigation*

85 In the current connected world, news of maritime disasters is communicated faster. Although safety of shipping has increased significantly over time, which can be observed by the decrease of total losses of vessels by 45% over the past decade (figure 19). Nevertheless, the public's response to fatal accidents at sea has placed the industry under increased scrutiny, demanding action from regulators to introduce new requirements to improve safety. Avoiding accidents and ensuring the safety of on-board personnel and passengers presents one of the most complex challenges faced by the shipping industry as, unlike mechanical or technical systems, safety systems must account for the seemingly infinite variables of human behaviour.

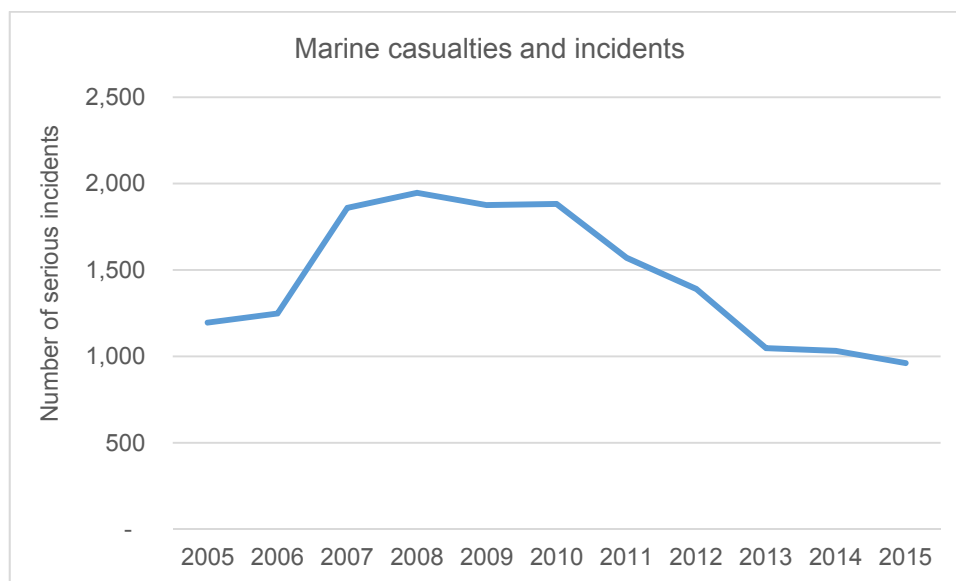


Figure 11 – Marine Casualties and Incidents
(IMO, 2016d)

86 Nevertheless, operational safety also relies on a broad range of technologies. Satellite and communication technology, surveillance and navigation technology have significantly changed the way ships are navigated and the planning of routes (figure 20). Those technologies also enable improvements with regard to distress and safety systems as well as Search and Rescue (SAR) activities. Increasing need for data transfer between vessels and onshore bases to ensure optimal operational efficiency, safety, and security are driving these developments, as is the need for shipping to deliver goods to consumers on time.

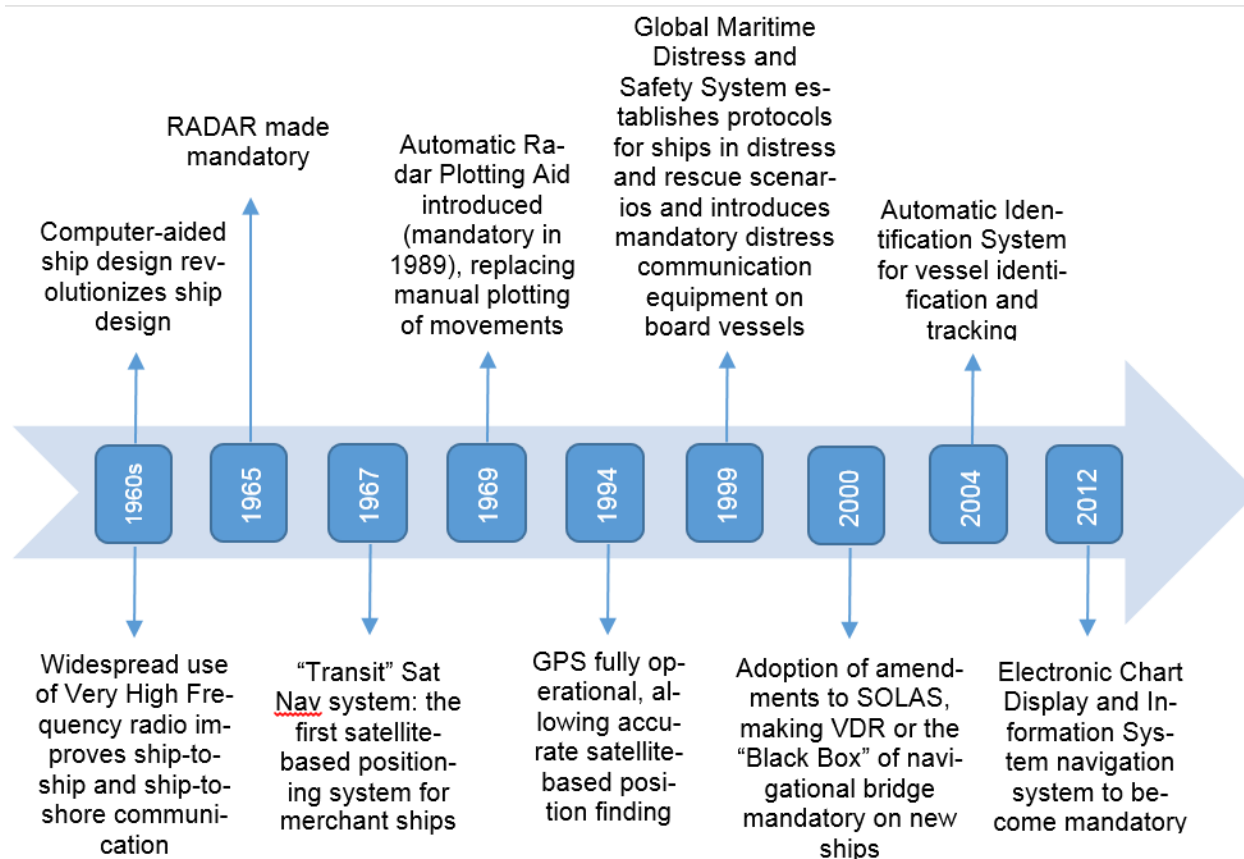


Figure 12 – Timeline of Developments in Navigation Technology
(Allianz Global Corporate & Specialty, 2012)

87 Advanced radio communication technology enables the transmission of information in a digital and language independent format, and can be used for on board, ship-ship and ship-shore communications. Increased reliance on these systems also means that vulnerability of ship operations increases. Additionally, issues such as interoperability between different hosts/systems, and the capacity of the systems and services become more important.

88 Interaction between the technological systems and the human element are becoming more complex and require a better understanding at the design, manufacturing and operational phases of the product and system development.

89 Today, increasingly ergonomic and integrated bridge control systems are available. The development of global standards and principles, i.e. IMO's e-navigation strategy, covering ergonomics and improved integration of bridge controls is already underway, helping to ensure better coordination between design and operations. Also, a more standardized bridge will reduce the time needed for personnel to familiarize themselves with bridge controls and eventually lead to the development of best practices that can be applied throughout the industry. At the same time, technologies developed by other industries (e.g. aviation) are being applied to shipping to help reduce port congestion and collision risk. Today, some of the world's busiest ports utilize satellite technologies to track and monitor vessel traffic (Vessel Traffic Service, VTS).

90 The main challenges for the maritime community are to increase and improve the utilization of these new navigation and communication technologies through their implementation and providing training to seafarers. A challenge for IMO is to enable cooperation between Member States, ship owners and the manufacturers of navigation and communication technologies to provide solutions that address issues of system compatibility,

standardization and the capacity of services to reliably transmit and store information. Another challenge for IMO will be to update relevant safety procedures, in order to keep them up to date with current technological developments. This includes the update of the Global Maritime Distress and Safety System (GMDSS) as well as the harmonization of international Search and Rescue (SAR) efforts. Additionally, IMO will have to support the education and training of seafarers to increase their awareness of safety and security issues of electronic navigation as well as to understand the dangers of overreliance on electronic navigation systems.

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11. Utilization of big data

91 The use of advanced information and communication technologies provides access to an unprecedented amount of data associated with shipping. This data is produced by different sources and in different formats, such as hydrographic data, maritime traffic data, maritime accident data and data on cargo flows across the world. However, to make full use of this amount of data, new strategies and methods of data analysis need to be developed, as among other issues, current data collection is inconsistent, patchy and sometimes unreliable.

92 The availability of data enables new avenues for increasing the safety of ship operation by facilitating the reduction of risks caused by human error, as well as increasing the efficiency of shipping. The use and analysis of the data available can enable real-time performance monitoring to improve safety through alert systems and increase operational efficiency through energy management, voyage planning and positioning.

93 For the review and development of IMO instruments, the availability of data creates the possibility to apply a more data-driven approach to the decision-making process. Data analytics can help to better understand the shipping industry and detect underlying developments in more detail and ultimately, basing regulations on objective criteria.

94 However, in order to utilize the data that will become available as technology evolves, mechanisms to ensure data integrity and data quality need to be developed. Additionally, as data networks and data management become increasingly vital to shipping, the systems will need to be able to shield themselves from external interferences, such as viruses, manipulations and cyberattacks.

95 The main challenge for the maritime industry is to utilize the data that is already available in an efficient way as well as to explore additional opportunities to utilize it. However, there is also the need for strategies and methods to ensure data quality and integrity and to acknowledge the impact of the reliance on data with regard to the human element as well as external interferences. The challenges for IMO are to also utilize data and develop data collection, monitoring and analysis mechanisms for amending and developing regulations based on objective criteria to ensure safer, more efficient and environmental sound shipping.

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12. Automation and remote operations

96 Advanced technologies also enable the automation of ships, which may lead to semi-autonomous ships (e.g. engine room crewless ships) or fully autonomous ships (remote controlled). Although, semi- or fully automated vessels are likely to first operate within territorial waters, it should be foreseen that they will eventually branch out to international waters.

97 Further technological evolution will also have an impact on the workflows and processes. For example, physical on-board surveys could be replaced by remote monitoring, regulatory compliance and enforcement could be achieved remotely without visiting the ship and real-time decision-making in ship management and autonomous operation will become feasible.

98 Advances in digital information exchange technology has permitted ship systems and shore based monitoring and communications to be linked in ways previously thought impossible. This relationship between ship and shore can open up the management of ship operations to others beyond the ship master who operates under the oversight and regulatory authority of the flag State. The potential for a division of authority might also divide responsibility and liability between multiple actors.

99 The main challenge for the maritime industry will be to assess the level of automation that still enables a safe and secure operation of a vessel, while also acknowledging the risks that might be associated with autonomous ships with regard to cybersecurity issues as well as the potential division of authority that a more autonomous shipping entails. The main challenges for IMO are to acknowledge and monitor the impact of increased automation as well as the effects of remote operations on ships, crews and shore-side personnel in terms of safety, security and training of seafarers. The Organization has also to take these developments into consideration when amending or developing instruments to protect the maritime transport system from negligence, attacks or possible malfunction arising from increased automation.

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13. Cybersecurity

100 Evolving technologies like sensors, robotics, information and communication technologies that drive advances in smart controls, optimization, decision support tools, automation, as well as system management, demand updates of international standards in order to mitigate any unforeseen safety, and especially cybersecurity implications, to the maritime transport system. As dependency on electronic information grows, the issue of cybersecurity becomes increasingly relevant (figure 21).



Figure 13 – Cyber Incidents, 2009-2014
(PwC, 2015)

101 Ship and port facility operators are increasingly dependent on computers and technologies for, for example, propulsion, engineering, cargo handling, safety and environmental control. In this respect security is a concern if faced, for example, with malicious acts to control, disable or exploit system, and safety issues such as malware, incorrect operation of systems and other technical errors. Navigation, for example, can be affected by accidental or intentional interferences with the GNSS signals, causing misleading situational awareness, the sabotaging of vessel traffic service, or the endangering of integrated bridge and autopilot systems.

102 Cyberattacks on the maritime industry are often under-reported as companies prefer to deal with security breaches internally. If reports of cyberattacks emerge, they are usually very vague, providing little insights into the progress the maritime industry has made in strengthening cybersecurity. Examples of cybersecurity issues reported to date include a hacker causing an oil platform located off the coast of Africa to tilt to one side forcing a temporary shutdown. In another instance, hackers infiltrated cybersystems of a port to locate specific containers loaded with illegal drugs and remove them undetected².

103 While the risk of loss or damage caused to, or by a ship as a direct result of a cybercrime is currently low for bulk or general cargo vessels, more specialized or technically-advanced vessels engaged in oil and gas exploration and exploitation are more predisposed through their use of remote systems. Therefore, apart from virus detection software, additional steps need to be taken by the maritime community to assist ship owners and operators to implement cyber risk management practices and ensure the security of the services delivered.

² Allianz Global Corporate & Specialty, 2016

104 The main challenge for the maritime industry is to acknowledge the risks of cyberattacks that might to some extent already take place undetected and to work on more robust cybertechnology, utilizing the experiences of other industries (in particular aviation). The main challenge for IMO is to take the necessary steps to develop and assist with the implementation of cyber risk management practices.

14. *Hydrographic surveys and nautical charts*

105 Shipping activity is increasing through trading on new routes with larger vessels, along with increased access to polar routes and larger vessels transiting the world's major canals. This, along with the limitations of information provided in nautical charts due to the gaps in hydrographic surveying, creates environmental and safety concerns and reduces the efficiency of maritime navigation. According to the International Hydrographic Organisation (IHO), around 70% of the world's coastal waters remain inadequately surveyed or unsurveyed, with specific areas, for example the polar regions, having over 95% of its coastal waters inadequately surveyed or unsurveyed (figure 22).

Examples of unsurveyed areas in the 0-200m depth zones	
Area	Unsurveyed area
South West Pacific	> 95%
Polar regions	> 95%
Caribbean	> 80%
West Africa	> 80%
Australia	45%
United Kingdom	29%

Figure 14 – Examples of Unsurveyed Areas
(IHO, 2016)

106 Additionally, technological developments are outpacing charts and surveys. Electronic navigational chart (ENC) detailing may not be as accurate as the Global Navigation Satellite Systems (GNSS) position of the ship displayed on its Electronic Chart Display and Information System (ECDIS). Reliance on modern navigation equipment may lead to seafarers overlooking the fact that caution is needed when planning routes and navigating ships to ensure that there is a sufficient safety margin between charted hazards and the ship's intended route.

107 This results in a widening gap between the overall quality of hydrographic surveys and nautical charts, which are collected using systems that do not meet modern standards and the requirements and navigation capabilities of deep draught shipping. Out-of-date maps can lead to accidents, longer voyages than necessary and may prevent the optimal loading of ships. These issues create environmental and safety concerns and reduce the efficiency of maritime navigation.

108 The main challenge for the maritime industry is to acknowledge and be aware of the deficiencies of hydrographic surveys and nautical charts as well as ensure that their personnel on board and ashore are aware of these deficiencies. The challenges for coastal States are to improve the hydrographic surveys and nautical charts within their territorial waters and to improve cooperation between states for surveying international waters, in particular the arctic region. The main challenges for the Organization is to recognize and promote hydrography as an important tool for efficient maritime navigation and to assist in global capacity-building initiatives to expand hydrographic surveying.

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15. Ship design and ship building

109 Ship design is fundamental to optimize performance and contribute to a safer, greener and more efficient shipping industry. The pressure to reduce costs and improve energy efficiency of shipping leads ship owners to increase the freight-carrying capacity of vessels. The freight capacity of container ships has increased by more than 110%, from 9,000 in 2005 to more than 19,200 twenty-foot equivalent unit (TEU) in 2015. This development is expected to continue (figure 23).

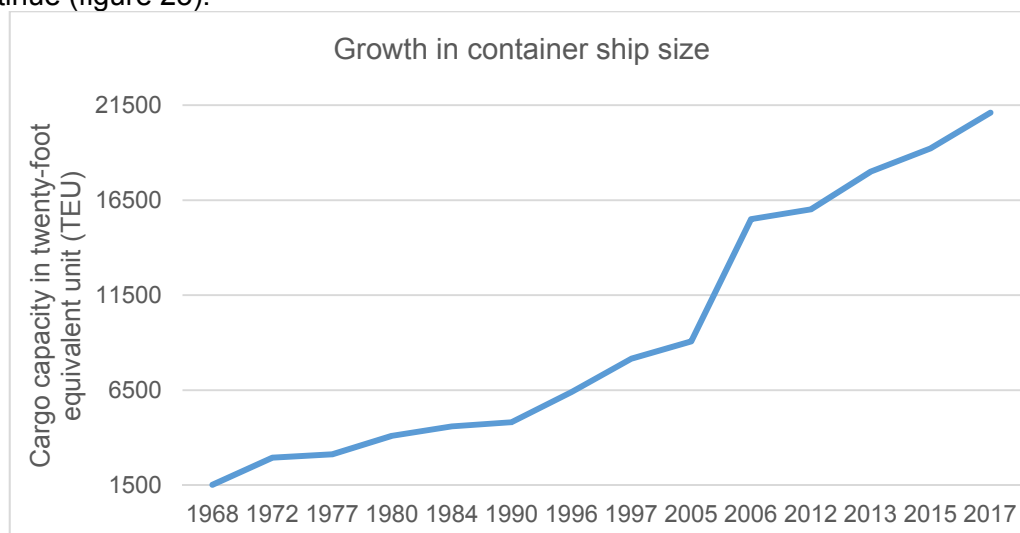


Figure 15 – Development in Container Ship Size
(Allianz Global Corporate & Specialty, 2015; Maersk, 2016; OECD & IFT, 2015)

110 The use of advanced materials for ship construction will be a factor in improving ship performance. With regard to composite materials, there is a push from certain sectors of the maritime industry to construct commercial vessels in whole or in part with these materials.

111 The use of new materials (such as composites, e.g. fibre reinforced plastics (FPR) or nanomaterials) have impacts beyond ship performance. Factors related to safety, such as fire risks, life safety appliances and health and environmental concerns regarding construction and disposal must also be considered.

112 The main challenge for IMO is to ensure its regulatory framework remains current and is adapted to address the changes in ship design and ship building, including the evaluation of the effects of changes in ships design on other aspects of shipping, for example environmental matters.

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16. Propulsion systems and alternative fuels

113 Ship propulsion and power generation are a major area of technological development (such as alternative fuels, propulsion energy-saving devices, renewable sources of energy and emission abatement technology), bringing with it the potential for reducing pollution (exhaust gas emissions) and a reduction of costs (rising fuel costs, fleet overcapacity) that will impact the shipping industry in the future.

114 Incremental improvements and the inclusion of technology already proven in the shipping context will be further explored. Shipping segments are already operating ships that use distillates like Marine Gas Oil and low-sulphur heavy fuel oil. Additionally, the adoption of Liquefied Natural Gas (LNG) as a marine fuel has begun although the number of LNG-fuelled ships in the global fleet is still limited. Information from DNV GL (March 2016) shows an operational fleet of 77 LNG-fuelled vessels, with another 85 confirmed for delivery by the end of 2022 (figure 24). This implies a doubling of the fleet over the period 2013-2018. Forecasts, assessing developments of the number of LNG fuelled vessels, even predict a possible increase of over 1000% by 2025 when assuming an increase in oil prices, the increase of environmental protection measures and an increase in bunker facilities (high case scenario in figure 25)³.

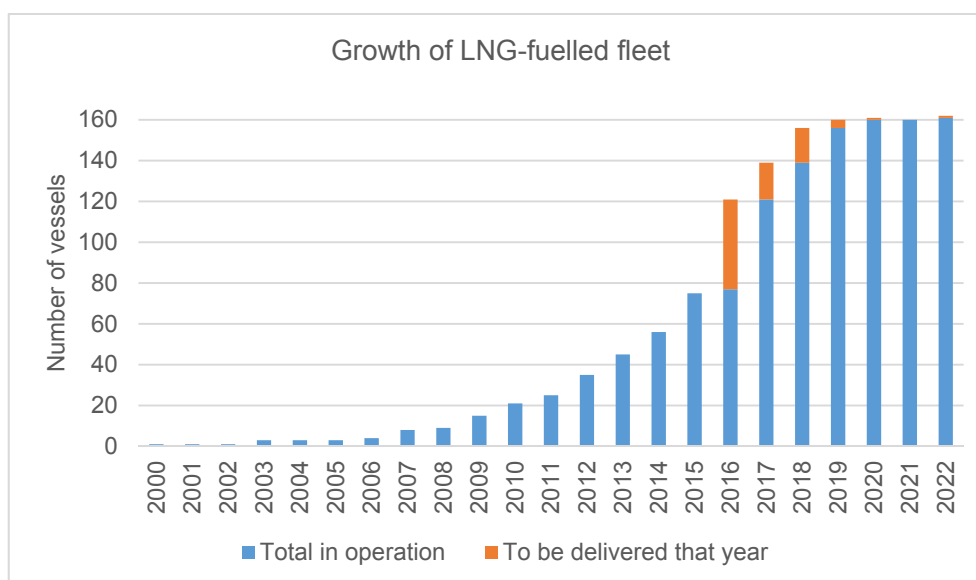


Figure 16 – World LNG-Fuelled Fleet
(DNV GL, 2016)

³ In the base case scenario, it is assumed that the number of ECAs stays the same, and the 0.5% global sulphur limit in bunker fuel enters into force in 2020. The high case scenario is based on the assumptions that there might be new ECAs in 2018; the 0.5 % global sulphur limit in bunker fuel enters into force in 2020; and a reduction in LNG bunker prices (Lloyd's Register, 2012).

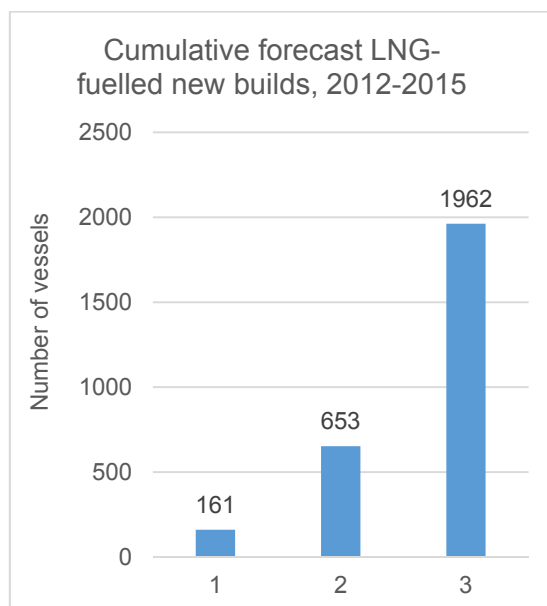


Figure 17 – Forecast: LNG-Fuelled new builds, 2012-2025
(Lloyd's Register, 2012; DNV GL, 2016)

115 Over the next years, it is likely that the energy mix will be characterized by a high degree of diversification. The viability of many new technologies depends heavily on the various fuel prices and their relative differences. However, the bunkering infrastructure will also need to be in place and fuel availability will need to be reliable. Safe transport, storage and use of such fuels must also be addressed.

116 To contribute further to the energy efficiency of the shipping industry, research into and development of novel solutions is currently taking place. Besides, the adoption of further alternative fuels, i.e. methanol or biodiesel and recent developments in the use of electricity from conventional or renewable power production (e.g. wind, solar), provide an alternative pathway for shipping. Fully electric and hybrid propulsion systems, like hydrogen fuel cells or battery powered propulsion systems can use electricity to power ships at berth and to charge batteries to facilitate energy storage and power management systems (figure 26).

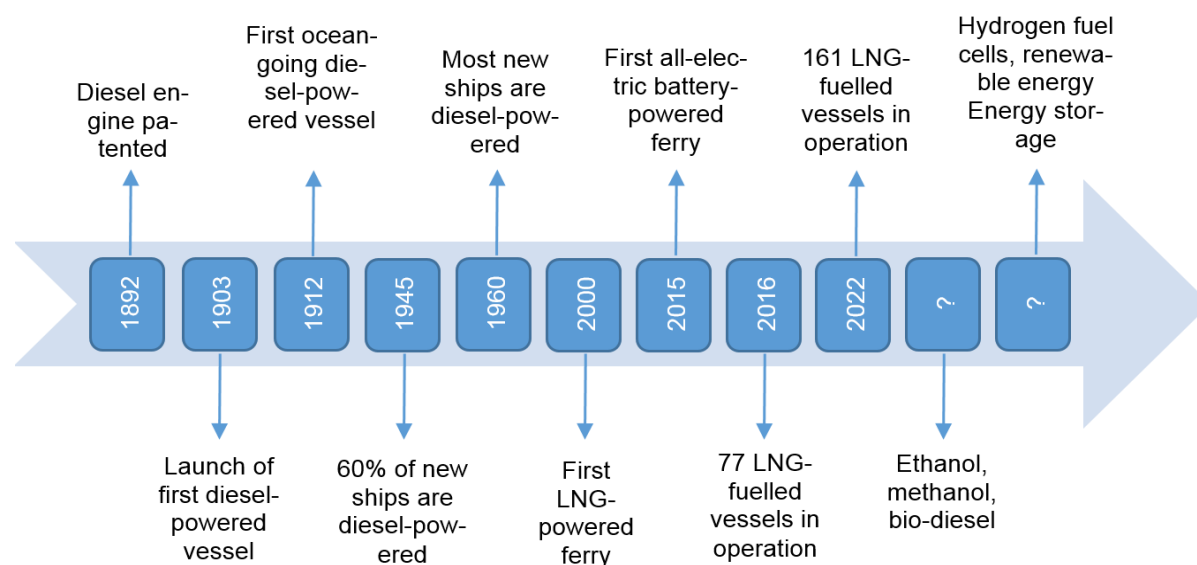


Figure 18 – Timeline of Developments in Fuel Types
(DNV GL, 2014; DNV GL, 2015a; Independent Barents Observer, 2016)

117 Energy storage is critical both for the use of electricity for ship propulsion and to optimize the use of energy on hybrid ships. Battery powered propulsion systems are already being engineered with engine manufacturers focused on hybrid battery solutions. Additionally, energy storage provides benefits in relation to availability of power, by providing emergency power and redundancy availability as well as enabling easier utilization of renewable energy sources. Although, these techniques have been proven in other sectors (in 2012, electric vehicles represented 0.02% of the world's passenger cars and by 2020 electric cars are expected to already represent 2% of all passenger cars⁴; the sales of hybrid cars have grown by 437% in the past decade⁵), they have not yet been implemented in the commercial shipping industry.

118 Although research has indicated that those technologies can be applied successfully to the maritime environment, further research is necessary before they can be used to complement existing power systems on ships. The development of electric or hybrid propulsion systems need to take into account cost, safety and reliability to ensure that a battery driven vessel is as cost-effective, safe and reliable as a traditional vessel. However, the pace of technology is advancing rapidly and solutions to these issues are likely to be developed for larger vessels.

119 The main challenge for the maritime community is the diverse range of alternative technologies that are currently available that entail the uncertainty of choosing a technology that will prevail. Additional challenges include the availability of alternative fuels and bunker facilities. For IMO the main challenge is to address the uncertainties with regard to new technologies and provide regulations that incorporate the utilization of these technologies in a timely manner. Besides, the Organization might need to establish mechanisms to support and enable the development of novel solutions to promote fuel efficiency through partnerships and cooperation with all relevant stakeholders.

⁴ International Energy Agency, 2013

⁵ ICCT, 2015

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17. Marine pollution

124 Marine pollution can be caused through a number of operations on ships, for example operational discharges from ships including garbage disposal. The control and management of operational discharges is already addressed by IMO with regard to environmental hazards associated with ships' cargo and fuel.

125 Garbage from ships, and in particular plastics, has negative effects on the marine environment and ocean dependent activities, and can lead to environmental degradation and loss, economic impacts on marine activities (fishing, tourism, etc.) and the marine ecosystems as well as pose a health risk for humans through the contamination of food sources, amongst others. The effectiveness of ships to comply with discharge requirements depends largely upon the availability of adequate port reception facilities, especially within special areas. Hence, Governments are obliged to ensure the provision of adequate reception facilities at ports and terminals for the reception of garbage without causing undue delay to ships, and according to the needs of the ships using them. As the public focus on specific materials like plastics increases, there might be the need to concentrate the attention on the adequacy of port reception facilities and to balance this with the promotion of the shipping community's achievements with regard to operational discharges from ships.

126 Additionally, when considering and developing new environmental regulations the consequences for the maritime industry have to be taken into account. As some environmental regulations on marine pollution entail significant cost implications for the maritime industry, provisions have to be made to lower barriers for implementation. For example, the expected entry into force of the IMO Ballast Water Management Convention will have a significant regulatory impact in the coming years. A fixed timeline mandates that most ships travelling international waters will be obliged to have ballast water treatment systems installed by the end of this decade. Once the Convention enters into force, a strong surge in systems demand is expected, as several thousand ships will need to have those systems installed in a short time span (figure 28).

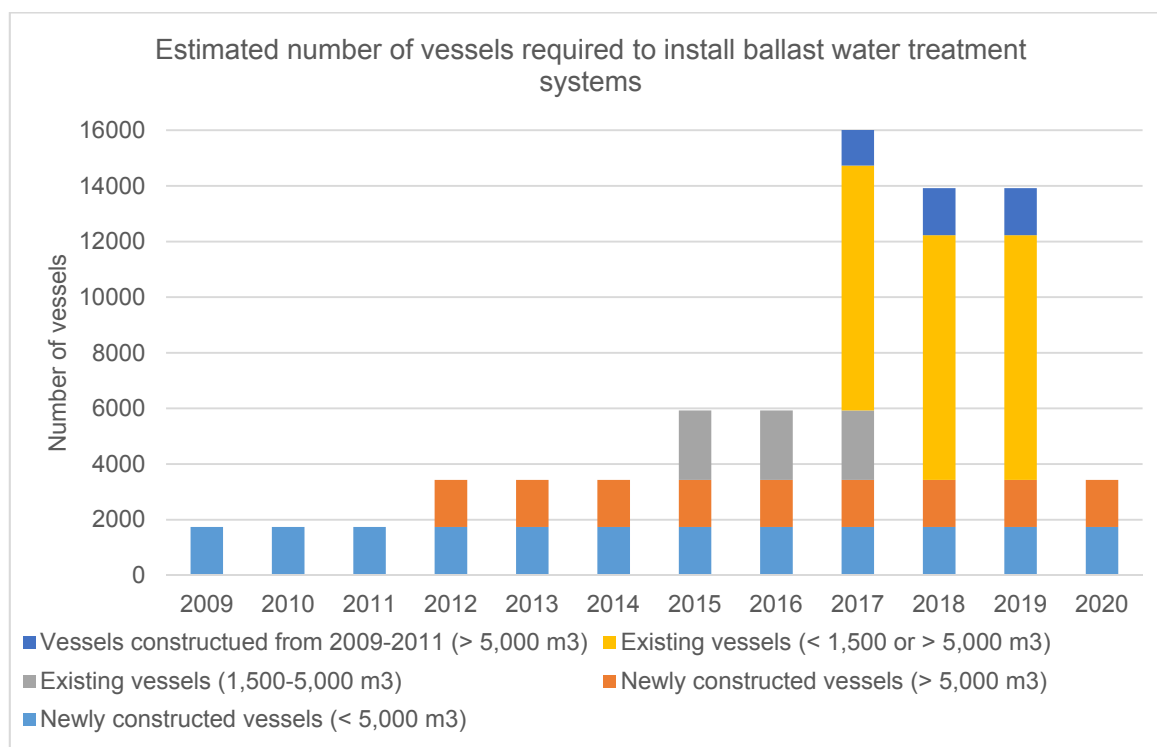


Figure 19 – Installation of Ballast Water Treatment Systems
(IMO, 2010)

127 The main challenge for the marine industry is to prepare for the implementation of necessary systems to adhere to IMO regulations. Additionally, with respect to the discharge of garbage from ships, it will be challenge to raise the awareness of crews with regard to this, as well as to adhere to the regulations set out in MARPOL Annex V. The main challenges for IMO are to enhance cooperation to build global capabilities and enable a more timely and efficient implementation of regulations in particular by lowering barriers for implementation. Additionally, with regards to garbage disposal, IMO has to promote the importance of port reception facilities as well as encourage Member States, in particular with the support of technical cooperation activities, to provide adequate port reception facilities. Besides, IMO has to pay attention to the needs and capabilities of developing countries, especially SIDS and LDCs, to manage waste disposals from ships and to protect their marine ecosystems which may be under increased pressure from the growth in maritime traffic.

18. Air pollution and energy efficiency

128 Although, the contribution of shipping to the global CO₂ emissions has decreased in the last years (figure 29), the predicted increase in the volume of shipping is likely to lead to an increase in greenhouse gas emissions from ships. Besides, with the recent Paris Agreement on climate change, the international shipping community will be expected to contribute further to the global efforts to address emissions.

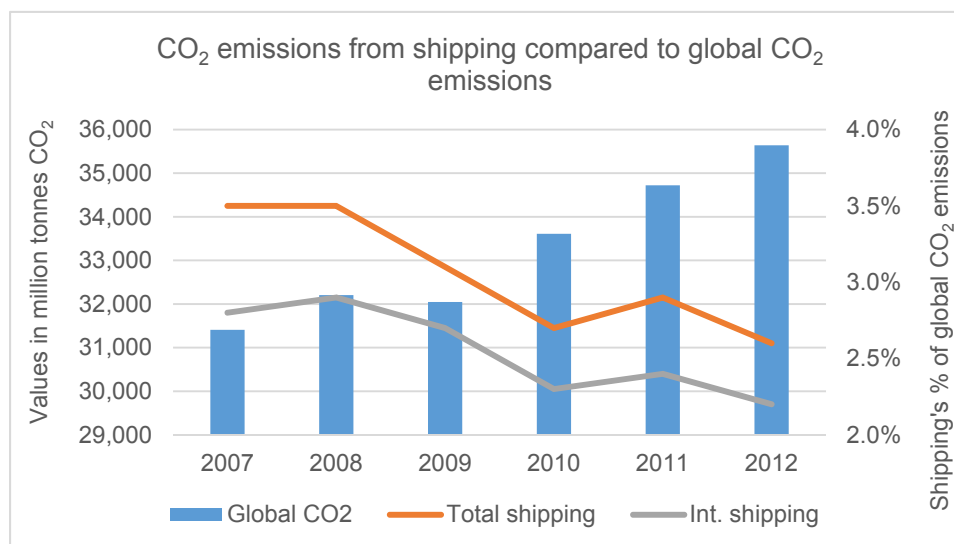


Figure 20 – CO₂ Emissions from Shipping compared to Global CO₂ Emissions (IMO, 2015)

129 The shipping industry is both a contributor to the global CO₂ emissions and but also a relatively low-carbon mode of transporting freight, as shipping has the lowest carbon footprint per unit of cargo transported. Nevertheless, ships carry more than half of international goods by tonne-mile⁶ and could substantially reduce emissions if the shipping industry can achieve an increased level of efficiency (figure 30).

⁶ UNCTAD, 2015.

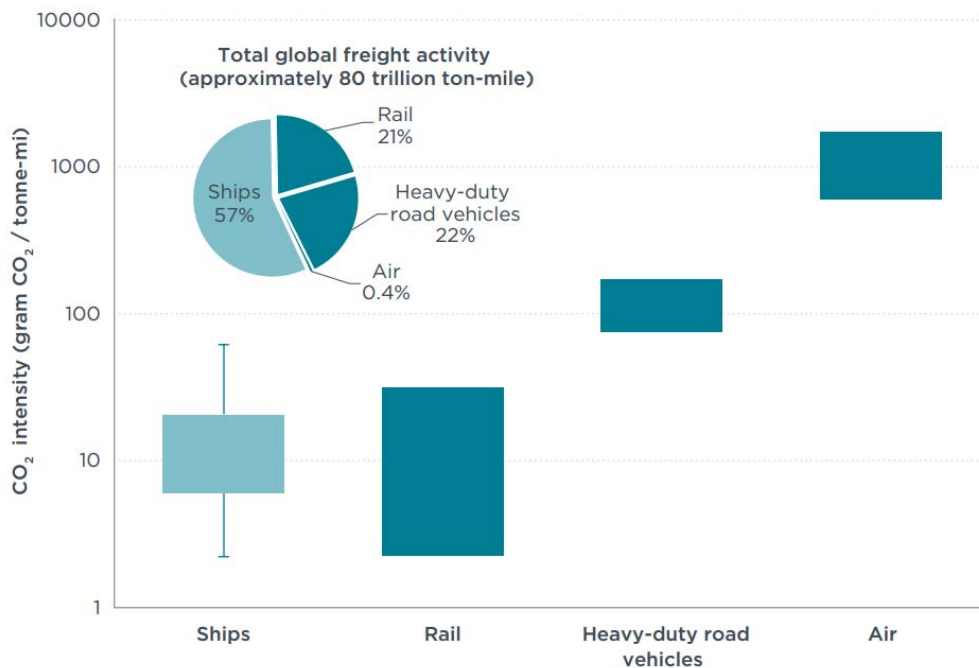


Figure 21 – CO₂ Intensity and Global Transport Activity of Different Freight Modes (ICCT, 2013)

130 In order to enable an increased energy efficiency, in 2011 IMO adopted the Energy Efficiency Design Index (EEDI) and Ship Energy Efficiency Management Plan (SEEMP) and in 2013 the EEDI and SEEMP entered into force. By setting increasingly stringent energy efficiency requirements for new ships, the EEDI is intended to stimulate the development of more energy efficient ship designs, leading to a reduction of operational CO₂ emissions on a ship by ship basis. The SEEMP, is designed to stimulate the increased utilization of energy efficient operational practices for shipping vessels (figure 31).

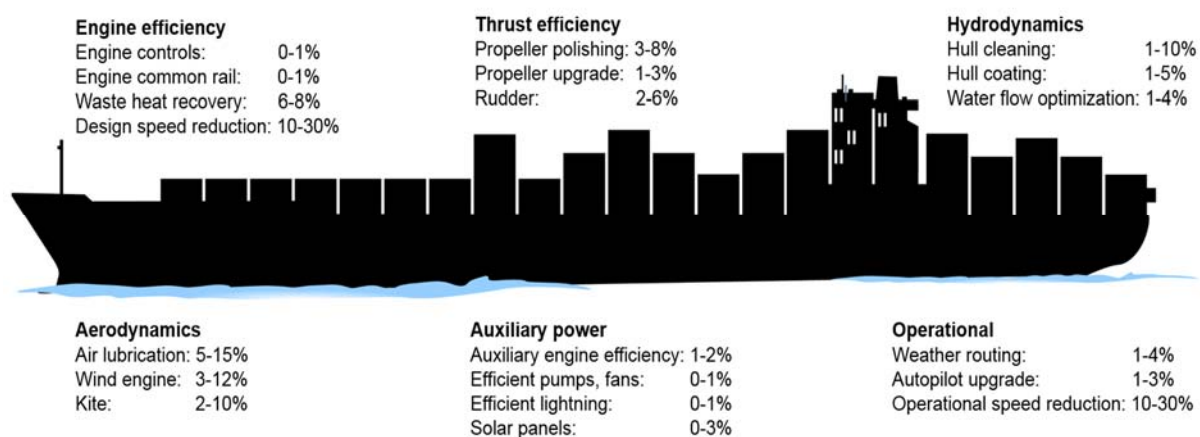


Figure 22 – Potential Fuel Use and CO₂ Reductions from Various Efficiency Approaches (ICCT, 2013)

131 However, with the expected growth of world trade over the next 20 to 30 years, these instruments might contribute to the lowering of the emission growth rate, but not to an absolute decrease in emissions (figure 32). Therefore, further measures might be needed for the shipping industry to contribute to the overall reduction of GHG emissions.

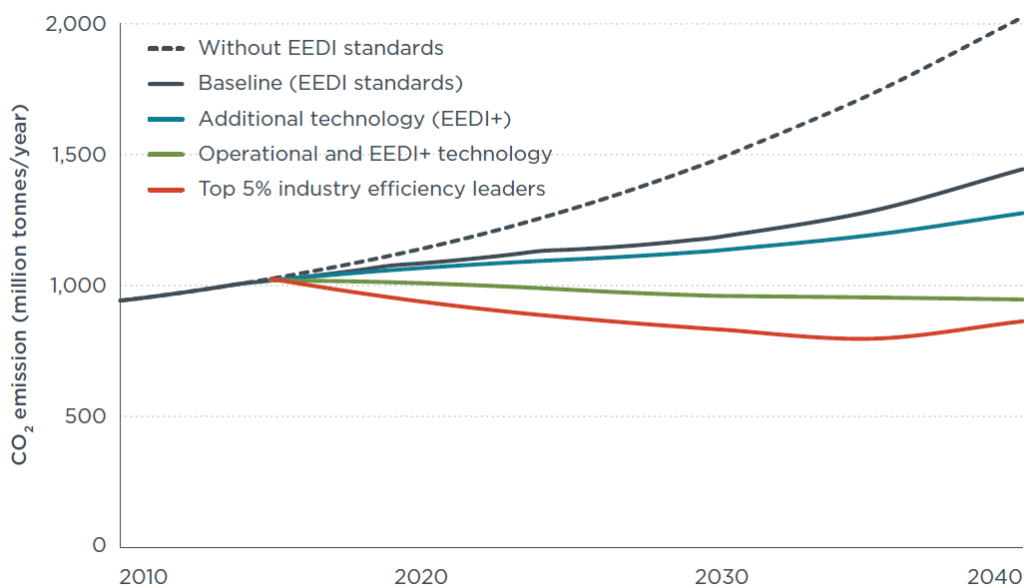


Figure 23 – Potential Reductions in CO₂ Emissions from Various Efficiency Standards, Use of Best Available Technologies and Best Practices (ICCT, 2013)

132 SO_x, NO_x, and particulate matter emissions have potential impacts on the ecosystem and negative health effects on exposed populations. These impacts have led to regulations setting maximum global emission levels as well as more stringent levels applying to designated Emission Control Areas (ECAs) (figure 33). The instruments allow emissions to be reduced by either using compliant fuel oil, an alternative fuel, for example gas, or an approved equivalent method like an exhaust gas cleaning ("scrubbers").

Current Emissions Control Areas (ECAs)	Entry into force
Baltic Sea (SO _x)	19 May 2005
North Sea (SO _x)	22 November 2006
North America (SO _x , NO _x and PM)	1 August 2011
US Caribbean Sea (SO _x , NO _x and PM)	1 January 2013

Figure 24 – Current Emissions Control Areas (ECAs) (IMO, 2012)

133 In 2015, stricter rules for ECAs came into effect limiting the sulphur content in fuel oil used by ships to no more than 0.10%. In 2020, or 2025 pending an IMO decision by 2018, the 0.50% sulphur global cap for fuel oil used by ships will enter into force (figure 34). The limitation of sulphur content will have a major impact on the shipping industry, by driving technological developments, developments with regard to operational issues of switching fuel types when entering ECAs, the investment into alternative fuels and the availability of low-sulphur fuel oil for vessels.

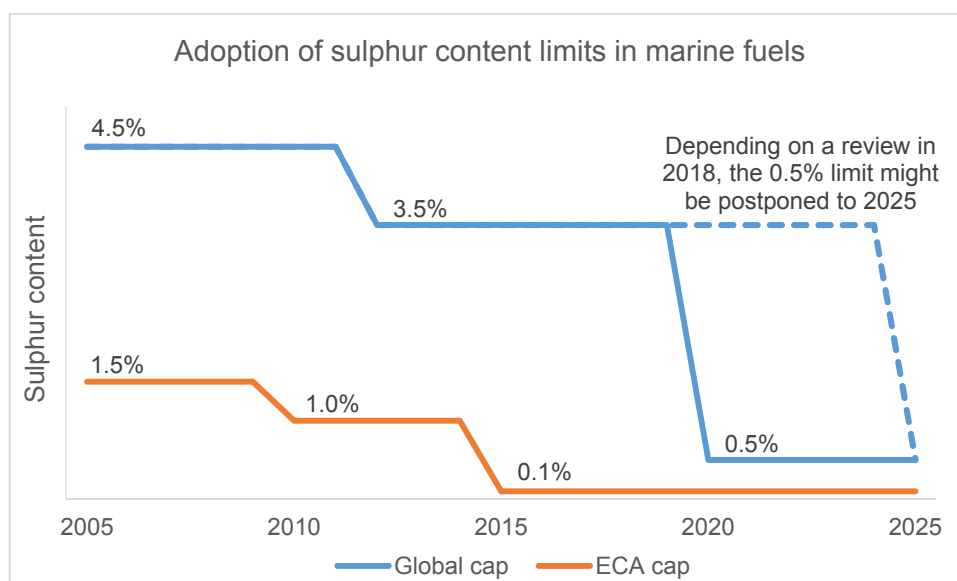


Figure 25 – Adoption of Sulphur Content Limits in Marine Fuels
(IMO, 2016f)

134 The main challenge for the maritime industry is to develop ways to fully utilize energy efficiency measures to substantially reduce emissions from shipping. The maritime industry will also have to provide adequate training to seafarers in order to utilize the operational practices to increase efficiency. The main challenges for IMO are to evaluate further measures that might help to address an additional reduction in CO₂ emissions from ships and develop systems to monitor the effectiveness of any new systems and regulations, for example by enhanced data collection and analysis capabilities. Additionally, IMO has to support the need and capabilities of developing countries to enable technology and knowledge transfer as well as adequate training for seafarers.

19. Emerging environmental developments

135 As environmental awareness and sensitivity of stakeholders increase, there will be pressure to address further potential environmental risks. Consequently, there are other environmental issues emerging on the agenda that might become more prominent in the coming years. Black carbon emissions from shipping may be a significant contributor to polar ice melting and, at present, extensive research into the contribution of black carbon to climate change is ongoing.

136 The increasing maritime trade and traffic volumes highlight the need to address issues such as marine bioinvasions (figure 35). Biofouling is recognized as a major transport pathway for alien species of the same order as ballast water (figure 36). However, it can not only endanger marine ecosystems but can also negatively impact ships' performance, increasing fuel consumption and emissions, further contributing to environmental degradation. To date, IMO has developed a set of voluntary guidelines to manage biofouling. As discussion on this matter continues, this could be transformed into further regulations in the next decades, taking into account potential economic implications for the shipping industry.

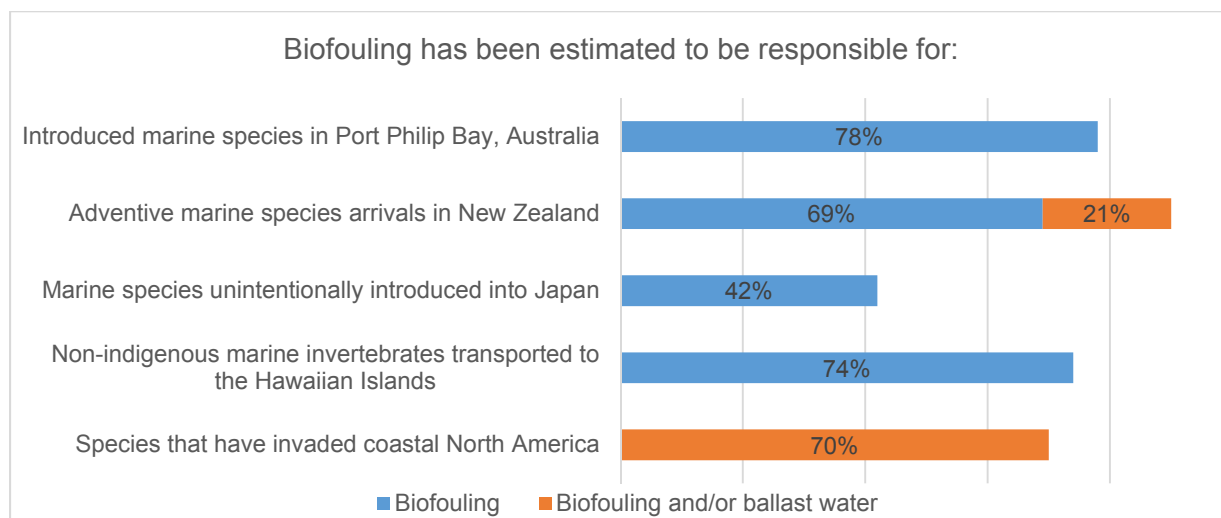


Figure 26 – The Impact of Biofouling
(Global Invasive Species Programme, 2008)

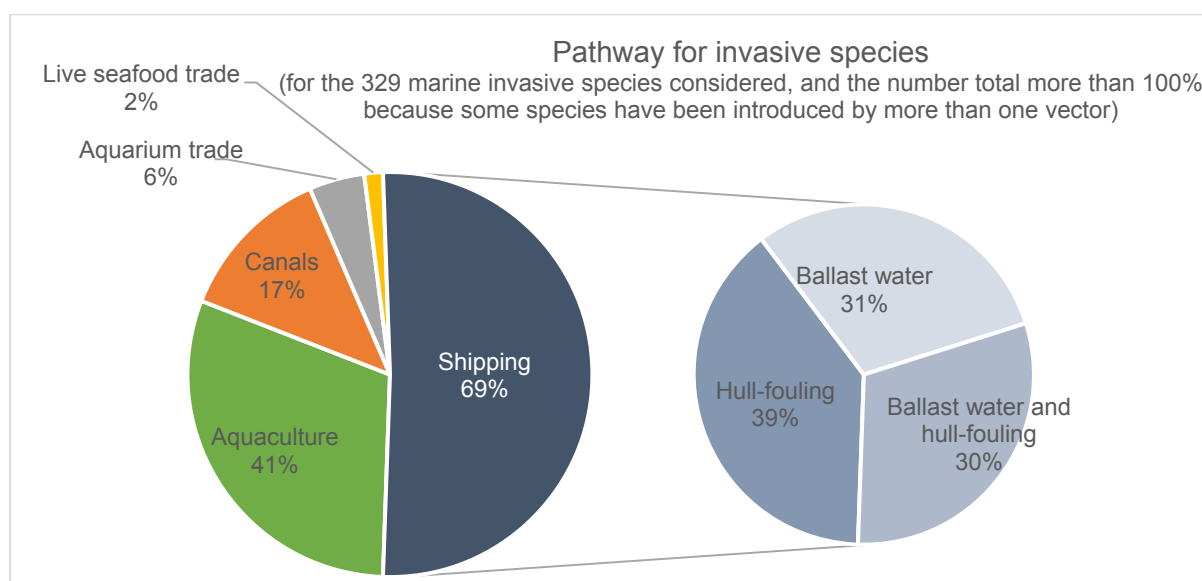


Figure 27 – Pathway for Invasive Species
(Global Invasive Species Programme, 2008)

137 The main challenge for the maritime industry is to acknowledge and be aware of the possible adverse impacts of emerging environmental issues. The main challenge for the Organization is to keep pace with emerging environmental developments and provide means to better assess the contribution and impact of shipping with regard to these developments, in order to consider the need for potential regulation or any other measures to mitigate the shipping industry's contribution.

20. Crewing and fatigue

139 With a need for an additional 42,000 officers by the end of 2019 to crew the expanded fleet, there is an expected shortfall of about 15,000 officers and engineers within the next three years⁷. Due to this shortage, there are expectations that officers working longer shift patterns will compensate the shortfall. The increased demand for a multi-tasking crew is accompanied by persistent pressure to further reduce crewing numbers.

140 Therefore, maintaining a professionally skilled and motivated labour force of seafarers across ranks and nationalities remains an issue of international importance. Maritime transport involves labour that resides at their place of work, where between 10 and 35 crew per ship operate the larger vessels 24 hours per day, for most of the year. Working conditions routinely involve motion, noise, vibration, and highly technical tasks that are associated with long working hours and varying shift patterns. All these elements, in conjunction with continued pressure to further cut costs by doing more with less crewing, contribute to workplace fatigue that increases the risk of human error during operations that can lead to severe accidents, the loss of lives and can have a negative impact on the environment (figure 37).

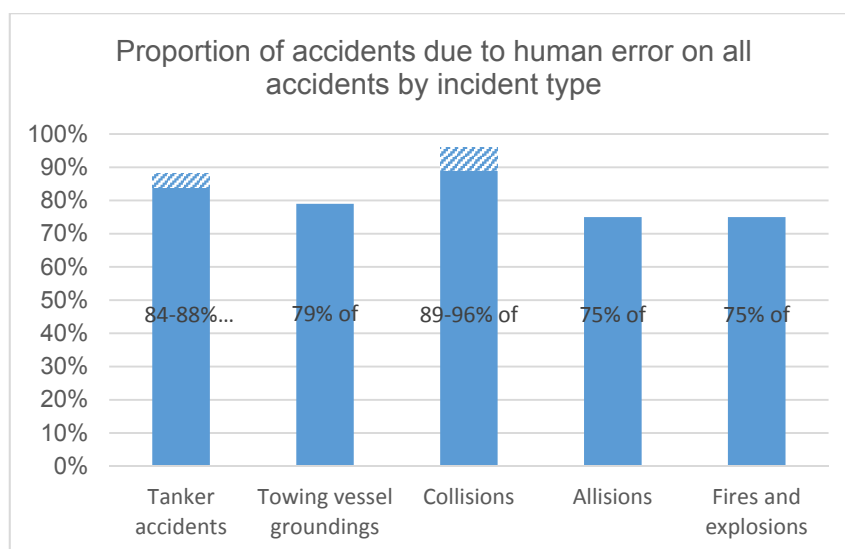


Figure 28 – Proportion of Accidents due to Human Error
(Rothblum, 2000)

141 The main challenge for the maritime industry is to implement the guidelines of IMO with regard to seafarer fatigue and continuously work on improving the working conditions of seafarers. The challenges for IMO are to monitor and assess the developments with regard to crewing levels, fatigue-related issues and human error related incidents to act accordingly. In addition, IMO might have to strengthen its cooperation with the shipping sector and other relevant United Nations Organizations, for example the International Labour Organization (ILO).

⁷ Drewry, 2015

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21. Seafarer demand and possible manpower gap

142 With the expected shortage of officers (figure 38), further efforts must be made to encourage new generations, including women, to consider a career within the maritime industry as a rewarding and fulfilling career choice. There are concerns within the maritime community about a lack of coherent initiatives to promote the attractiveness of a career at sea. These issues combined with working conditions and wages that are not competitive with those onshore, especially for highly qualified personnel, do not encourage potential seafarers to consider this career and render it difficult to retain seafarers for a life-long career at sea.

Supply/Demand Gap for Officers (negative values indicate demand exceeds supply)			
	2010	2015	2020
Cold Scenario (economic conditions worsen)	-2%	-2%	2%
Benchmark Scenario (2.3 % per annum increase in number of ships worldwide)	-2%	-5%	-1%
Hot Scenario (economic conditions improve)	-2%	-11%	-9%

Figure 29 – Supply/Demand Gap for Officers
(BIMCO et al., 2010)

143 Therefore, measures such as maritime awareness campaigns, international partnerships between maritime training institutions, implementation of various employee strategies, offering financial incentives to the maritime sector and increase the direct participation of the industry in skill development efforts, should be further explored and promoted.

144 One of the main challenges for the maritime industry is to develop coherent and global initiative to attract competent and qualified personnel. In this respect, IMO can provide a platform and support to commence these global initiatives to attract and retain qualified personnel through the widespread promotion of maritime careers.

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22. Seafarer education and training

145 In addition to the potential shortfall of seafarers, the education and training of crew remains a matter that requires further consideration. While in theory new technologies should make shipping safer, the human element is proving to be a major concern. Increasingly sophisticated maritime technologies can only be properly operated and managed by crew with considerable skill, knowledge and expertise. Apart from a highly-advanced skill set, personnel now also need training in management, communication skills, IT, budget handling and many other fields.

146 This will impact the provision of maritime education and training as more technologically advanced ships might require fewer but more highly qualified crew members. In the past, training courses have been provided based on generic models of navigation equipment. Now, there is a need to move towards more targeted and specific training to improve safety. Nevertheless, there is a fundamental need for standardization of equipment as well as the provision of unified training standards for electronic navigation equipment.

147 There is additional concern about the declining experience of onshore technical staff, as seafarers tend to shift from working at sea to a position onshore much earlier than they used to. This leads to a decrease in the level of experience among onshore personnel. With the rapid changes in technology, onshore staff cannot keep abreast of the technical equipment on board of ships. Therefore, mechanisms need to be in place to update onshore personnel with the technological developments on board. This will contribute to improving decision making onshore.

148 The main challenge for the maritime industry and seafarers is to emphasize life-long learning in order to keep pace with changing requirements, new technologies and expanding roles. The challenge for IMO is to create standardized training opportunities with regard to the use of new technologies for crew onshore and on board by, for example, strengthening its cooperation with relevant training institutions.

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23. Sustainable development of activities in the marine space

150 To ensure sustainable development of activities in the marine space, economic activity needs to be balanced with the capacity of the oceans to remain healthy and diverse in the long term. Uncoordinated, competing demands can lead to unregulated activities with regard to the usage of the maritime space and damages to the health of world oceans. In order to achieve a balance between competing interests, coordination is required. Any decisions on ocean use must be properly analysed and agreed upon by all stakeholders, taking into account all relevant global standards and ensuring the sustainability of all different uses. The aim should be the proper coordination of initiatives.

151 The maritime community is already involved in coordinating activities for ocean governance. An example is the designation of Particularly Sensitive Sea Areas (PSSAs), i.e. areas that need special protection through action by IMO due to their significance for recognized ecological, socio-economic or scientific reasons and their vulnerability to damage by international maritime activities (figures 40 and 41).

	Current PSSAs	Year
1	Great Barrier Reef	1990
2	Archipelago of Sabana-Camaguey	1997
3	Sea Area around Malpelo Island	2002
4	Marine Area around the Florida Keys	2002
5	Wadden Sea	2002
6	Paracas National Reserve	2003
7	Western European Waters	2004
8	Torres Strait as an extension to GBR PSSA	2003
9	Canary Islands	2004
10	Galapagos Archipelago	2004
11	Baltic Sea Area	2004
12	Papahānaumokuākea Marine National Monument (North-western Hawaiian Islands)	2007
13	Strait of Bonifacio	2011
14	Saba Bank (Caribbean Island of Saba)	2012

Figure 30 – Current PSSAs
(IMO, 2012)

	Potential PSSAs	Proposing state(s)	Stage
1	East Asian Sea region	Indonesia, Malaysia, Philippines and Viet Nam	Preparing to submit a PSSA submission for the East Asian Seas region at MEPC 69 (MEPC 69/15, p.5)
2	Tubbataha Reefs National Park	Philippines	Proposing the designation of the aforementioned area as a PSSA (MEPC 69/10/1; MEPC 68/10, p. 2)
3	Ha Long Bay (Quang Ninh) – Cat Ba (Hai Phong)	Viet Nam	A submission to the committee is currently being developed as part of the framework cooperation agreement between IMO and the Norwegian Agency for Development cooperation (MEPC 69/INF. 12)
4	Jomard Entrance, Louisiade Archipelago	Papua New Guinea	A submission to the Committee is currently being developed for the designation of a PSSA (MEPC 69/INF. 14)
5	Banc d'Arguin National Park World Heritage Site and an adjacent sea area	Mauritania	Following MEPC 68, a submission is currently being prepared to propose the designation of the Mauritanian upwelling zone as a PSSA, with the aim of this being considered by the Committee in 2016/2017. (MEPC 69/INF. 19)

Figure 31 – Potential PSSAs
(IMO, 2014b; IMO, 2014c; IMO, 2016g; IMO, 2016h; IMO, 2016i; IMO, 2016j; IMO, 2016k)

152 Nevertheless, ocean governance will gain further importance due to the adoption of the SDGs. SDG 14 specifically addresses the conservation and sustainable use of oceans, seas and marine resources, as careful management of the oceans is considered a key feature of a sustainable future. The development of a sustainable maritime transportation system that minimizes the environmental impact of shipping is a first step to support sustainable development. Further coordination to align ocean-related activities of all stakeholders could be enhanced by participating in designated coordinated organs, such as United Nations Oceans.

153 Waste dumping and the marine pollution caused by operational or accidental factors associated with ships, platforms and other marine structures engaged in deep seabed mineral exploration and exploitation activities, or in the transport of such resources towards areas of national jurisdiction, are not regulated by international instruments. This leaves a gap in the regulation of such activities at an international level. There are ongoing discussions under the London Convention and Protocol on the prevention of marine pollution by dumping of wastes and other matter to include the waste from undersea mining activities in jurisdictional waters into the London Convention and Protocol on the prevention of marine pollution by dumping wastes and other matters. An agreement would result in an international regulatory framework for undersea mining, applicable to the disposal of tailings and waste and also controlling the volume of such materials that may be dumped at sea. This would have major consequences for the maritime industry.

154 The main challenge for IMO and the maritime community is to ensure utilization of the marine space that does not adversely affect international maritime transport and consider the maritime community's responsibilities to contribute to better coordination and cooperation between all relevant stakeholders. Additionally, the IMO has to define its role with regard to the SDGs, in particular SDG 14 as well its involvement in the relevant United Nations forums.

24. Participation in and coordination with United Nations initiatives

155 There are ongoing United Nations negotiations relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction (BBNJ). After initial deliberations, a consensus was reached to develop a legal framework under UNCLOS on the conservation and sustainable use of BBNJs and an increase in the designation of Marine Protected Areas (MPAs). The potential entry into force of the legal framework under UNCLOS might have consequences for the maritime community, as IMO is the only Organization that legislates activities on international waters.

156 The emergence of new issues concerning oceans governance leads to the need to develop mechanisms to address these developments. A pathway to foster cooperation and enable stakeholders to address emerging issues is marine spatial planning of clearly defined ocean areas. This strategic process brings together all stakeholders engaged in different uses of the ocean, to ensure the best use of marine resources whilst managing the risks and balancing the trade-offs from marine activities, like coastal port development, fisheries management including tackling illegal, unreported and unregulated (IUU) fishing, seabed mining, oil and gas exploration and the dumping of waste.

157 IMO's active participation in United Nations initiatives is of utmost importance to enable the maritime community to proactively participate in decisions and regulations on ocean governance matters and prevent unexpected adverse impacts and implications of these decisions on the maritime industry. Additionally, the need for increased cooperation between the actors invested in ocean matters necessitates the development of new mechanisms to enable a constructive form of cooperation that comprises all relevant stakeholders.

158 The main challenge for IMO and the maritime community will be to assess and define its role within the context of ocean governance and to monitor the developments in all relevant forums discussing this issues of ocean governance, in particular United Nations forums. Further, IMO has to pay particular attention to the needs and capabilities of developing countries, especially SIDS and LDCs, to protect their marine ecosystems which may be under increased pressure from the growth in maritime traffic and use of ocean space.
