

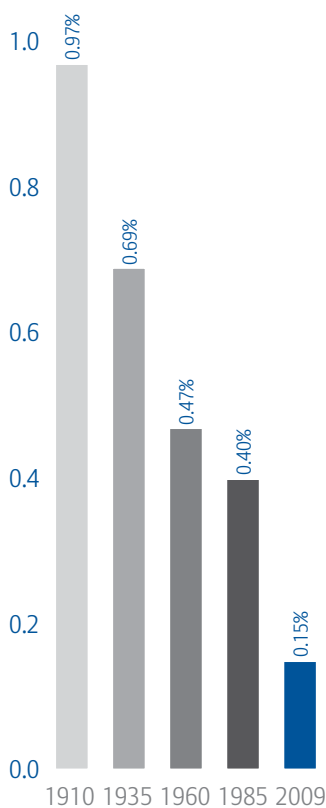
Executive  
SummaryMarch  
2012Safety and Shipping 1912-2012:  
From Titanic to Costa Concordia

An insurer's perspective from Allianz Global Corporate &amp; Specialty

This Executive Summary highlights key findings from a detailed report prepared by Allianz Global Corporate & Specialty (AGCS), in conjunction with the Seafarers International Research Centre of Cardiff University. For a copy of the full report please visit [www.agcs.allianz.com](http://www.agcs.allianz.com)

Maritime safety affects everyone, from blue collar factory workers and school children, to journalists and company chief executives. The global population depends on a safe and efficient shipping trade network for modern day living to continue unchecked. In the 100 years since the loss of the *RMS Titanic*, the maritime industry has worked steadily to improve safety performance so that the 23 million tonnes of cargo and 55,000 cruise passengers that travel by ship every day do so safely and efficiently in the vast majority of cases.

## Total losses - % of world fleet



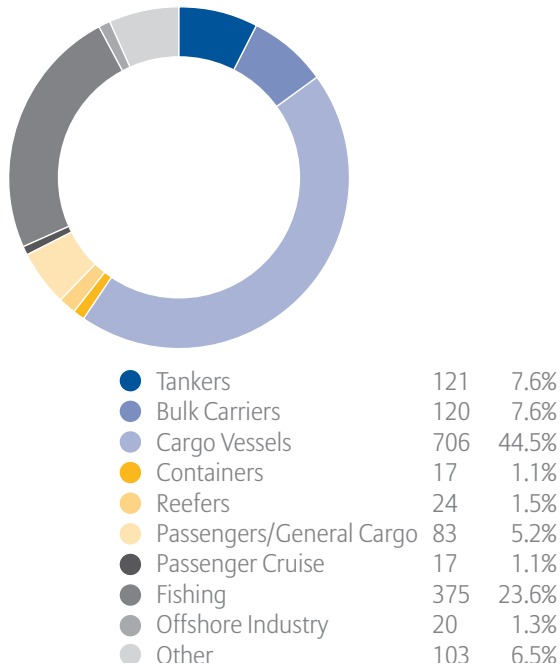
Source: Calculated from Lloyd's Register World Casualty Statistics 1900-2010

At the turn of the twentieth century, one of the most renowned shipping tragedies of all time occurred in the midst of the Atlantic Ocean. In April 1912, the *RMS Titanic*, the pride and joy of White Star Line, sank on her maiden voyage from Southampton, UK to New York, USA. *Titanic*, at the time the world's largest passenger steamship, struck an iceberg four days into the crossing and sank to the ocean bed taking 1,513 lives. Since that human tragedy, the maritime industry has actively endeavored to improve safety records and it is no understatement to say that shipping in 2012 is a far safer form of transport for passengers, cargo, seafarers and ships. However, notwithstanding these advances, significant challenges remain as the recent *Costa Concordia* and *Rabaul Queen* disasters have demonstrated.

No one separate development can be singled-out for this progress: today's safer shipping environment is the culmination of a number of initiatives, research, regulations, and innovations. The full report outlines some of the major areas where the shipping industry has benefitted from improvements, explains how shipping in the twenty-first century is now safer than ever, and reviews current and future challenges to maritime safety. Perhaps of most interest are the emerging challenges facing the industry. Key findings about future challenges are listed overleaf.

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## Total losses by ship type: 2000-2010 (number of losses)



Source: Lloyd's Register Fairplay, World Fleet Statistics 2000-2010

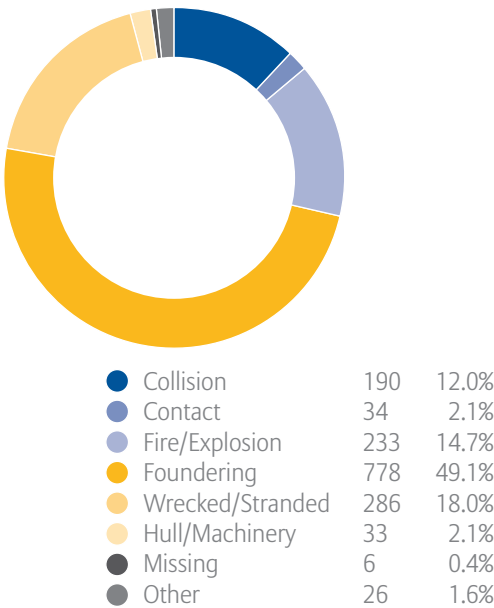
- **Ship sizes** have increased significantly, dwarfing the *Titanic* in comparison. The largest modern container ships, such as Maersk's new Triple-E class, pose challenges for insurers due to their sheer scale and value. Other ships are pushing the design envelope, breaking new ground in terms of design challenges which has led to concerns about structural integrity.
- **Cruise ships:** Despite the strong passenger safety record of the cruise industry, the modern trend towards ultra-large cruise ships, carrying over 6,000 passengers, poses new challenges, especially in terms of evacuation and rescue in remote environments. The International Maritime Organisation (IMO) has introduced regulations addressing such risks, including proactive risk management with improved fire safety systems and a focus on the need for such vessels to be their 'own best lifeboat' so that, in the event of a casualty, persons can stay safely on board, as the ship proceeds to port.
- **Training and labor:** with increased cost pressure, many ship-owners look to source crews from emerging economies due to lower wage demands. Despite IMO attention through international standards, training regimes and assessment are not consistent and may lead to variations in crew and officer competence.
- **Crewing levels** in a competitive industry continue to pose risks, despite the greatly improved efficiency of modern vessels, and may compromise margins of safety. Some commentators regard minimum crewing levels as too low, and point out they do not allow for the inevitable extra tasks that 24 hour operations require – with 'human factor' risks such as fatigue being significant causes of accidents.
- **Inadequate risk management** is identified as a key challenge which can be addressed through improved safety management systems and processes.
- **Piracy** continues to threaten shipping, especially off Somalia and the Horn of Africa where 28 ships were attacked in 2011, with attacks also being seen in other regions (such as West Africa). The economic impact of piracy was estimated to be around \$7 billion in 2011.
- **Language barriers** are also cited as potential risks, given the dependence on English as the 'language of the seas'. With increasingly multi-national crews, concern has been raised about communication in an emergency, or even misunderstandings in routine operations.
- **Arctic and Polar waters:** climate change is opening up access to previously impassable seaways, but the development of new routes, such as the North East Passage, pose great challenges in terms of ice navigation, environmental concerns, and design and construction demands, as well as emergency procedures in extremely hostile environments.
- **Poor enforcement & coordination:** with a complex regulatory environment, coordination of such regulations needs to be improved. Despite an alignment of objectives, individual enforcement bodies do not always coordinate actions, nor is it easy to enforce responsibility in the event of an incident.
- **Bureaucracy** is cited as a pressure on crews and officers, diverting them from other tasks and potentially compromising safety. This is compounded by minimum crewing levels which place further burdens on already hard-pressed crews. Allocating responsibility for such matters, perhaps via a 'purser' role, could address this challenge.
- **Fire** remains a major on-board risk especially in 'Ro-Ro' ferries (with relatively open decking) and also on passenger ships with increased 'hotel' services and large passenger numbers.

While these emerging safety risks need to be addressed to further improve incident records going forward, in its review of safety improvements since the *Titanic* accident, the report finds that much progress has been already made in attending to safety issues.

### Key facts and figures

- Despite a trebling of the world fleet to over 100,000 ships in 2010, and a total fleet tonnage now approaching 1 billion gross tonnes, shipping losses have decreased significantly from 1 ship per 100 per year (1912) to 1 ship per 670 per year in 2009.
- World seaborne trade continues to grow rapidly, driven by globalization and supported by containerization, having trebled since 1970 to over 8.4 billion tonnes of cargo loaded per annum.
- Marine transport can be regarded as one of the safest means of passenger transport overall: in Europe, it is ranked after rail, air and bus/coach as the fourth safest means, with far lower fatal accident rates than car, motorcycle, bicycle or walking.
- However, seafaring remains dangerous as a profession. While professional seafarer fatality rates have fallen – for example, in the UK per 100,000 seafarer-years, from 358 (in 1919) to 11 in 1996-2005 – this fatality rate is still twelve times higher than in the general workforce. Despite inconsistent data, other country statistics appear to be considerably higher: for example Hong Kong recorded 96 per 100,000 seafarers per annum for 1996-2005, and Poland a rate of 84 per 100,000 seafarers per annum for the same period.
- Most losses can be attributed to ‘human error’ – a broad category estimated to be responsible for between 75%-96% of marine casualties. Pressures of competition (often shore-based) and fatigue are frequently cited as significant causes – a particular matter of concern in busy shipping areas such as the Baltic where crews may have little time to rest between periods of duty.
- The most common primary causes of shipping losses are foundering (49% of losses), wrecking/stranding (18%) and fire/explosion (15%) while hull or machinery failure only accounts for around 2% of losses.
- Dry (bulk) cargo vessels have higher than average loss rates (44% of losses, despite representing 20% of the world fleet by number). Conversely, tankers, container vessels and offshore industry ships have relatively low loss rates.
- Shipping is highly concentrated into modern sea-lanes as vessels navigate between major ports to optimize efficiency. This results in clustering of losses in certain key regions. Accident ‘black spots’ include South China, Indo-China, Indonesia and Philippines (17% of losses in 2001-2011), followed by East Mediterranean and Black Sea (13%), and Japan, Korea and North China (12%). The seas around the British Isles also show relatively high loss concentrations (8%).

Causes of total loss (2000-2010)  
(number of losses)



Source: Lloyd's Register Fairplay, World Fleet Statistics 2000-2010.

### Driving safety

Safety has improved through a combination of technology, cultural and training improvements, and regulations, as well as through new construction and design techniques.

Additionally, past experience demonstrates that major accidents have often been the catalysts for key changes: for example, the International Convention for the Safety of Life at Sea (SOLAS) of 1914 was spurred on by the loss of the *Titanic*. A similar impact can be expected from the *Costa Concordia* incident – just as we have previously seen with the *Herald of Free Enterprise* (1987), the *Exxon Valdez* (1989), and the *Estonia* (1994) losses, which drove the creation of Safety Management Systems under the ISM Code.

## Technology & design in focus

Technology has been a key driver of safety, from the introduction of gyrocompasses and the first use of aviation to spot icebergs in 1914 to the mandatory use of Electronic Chart Display & Information Systems (ECDIS) in 2012.

Military innovations drove improvements in the mid-20th century - for example, in Radar and in wireless communications - while later technologies such as Automatic Radar Plotting Aid (ARPA), Global Positioning Systems (GPS) and Automatic Identification System (AIS), have reduced accidents through greatly improving 'situational awareness' via increased access to real time information.

In addition, search and rescue efforts are greatly assisted by modern (satellite-assisted) location-finding technologies such as radar transponders and distress beacons.

However, experts warn of dependence on single technologies, citing examples where reliance on technology has led to major incidents.

Improvements have also stemmed from changes in construction and design processes. Ship building techniques such as pre-fabrication and welding have improved quality and structural integrity, while computer aided design has radically speeded up the design process, allowing modeling to replace physical trial and error.

## Training & Culture

Over the past one hundred years, training has moved from being localized and unregulated to a global footing and is now subject to close international scrutiny. The

Standards of Training Certification and Watch-keeping for Seafarers Convention (STCW) in 1978 established international benchmarks in this area – and has since been enforced by the IMO through publishing its 'White List' of countries which comply with these standards. Safety Management Systems have also driven an increased safety culture, in part arising from the failures of the previous piecemeal approach highlighted in the aftermath of the *Herald of Free Enterprise* disaster in 1987. Spurred by this accident, the International Safety Management Code (ISM Code), which the IMO adopted in 1993, has driven best practice to be more widely accepted and institutionalized in the industry.

However, inadequate risk management remains a challenge – with one survey attributing this as a main or contributing factor in nearly 40% of accidents.

## Regulation

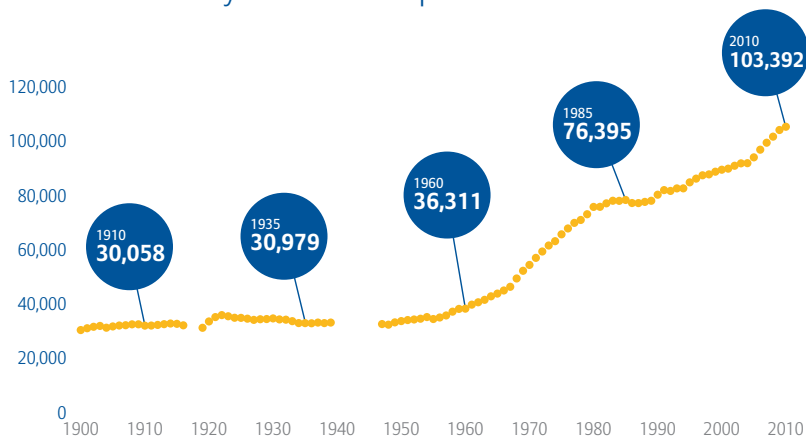
The maritime industry is now highly regulated, with a large number of organizations responsible for different facets of safety. However, it is the primary body, the IMO, formed in 1948, as a United Nations agency, which has driven much international regulation.

Prior to the IMO's formation, the first SOLAS convention was driven by the loss of the *Titanic*, and on being adopted by its international signatories in 1914 formed a landmark treaty on marine safety. Subsequent revisions, combined with other key IMO conventions such as the International Regulations for Preventing Collisions at Sea (COLREG) and the International Convention on Loadlines, have further tightened safety rules.

Such regulations have not simply reduced the risk of accidents; they have also addressed the challenges of responding to an accident with, for example, the Global Maritime Distress and Safety System (1999) establishing improved global procedures for search and rescue.

The industry itself has also played an active part in self-regulating to improve standards: for example, oil tanker owners have set higher standards since environmental disasters such as the *Exxon Valdez* by tightening risk management procedures and establishing vetting systems, forcing others to adopt similar safety standards.

## World fleet size by number of ships: 1900-2010



Source: Lloyd's Register Fairplay, World Fleet Statistics 1900-2010

## Quality control and enforcement

Working with the IMO, Members States check operational safety at ports around the world through the Port State Control (PSC) system.

Established under the STCW convention in 1978, national PSC can inspect and detain shipping when necessary to enforce standards. The results of inspections are published freely online, creating considerable transparency in this process.

While the number of inspections has increased with increased trade, detentions have notably decreased: in the Asia Pacific region, inspections increased by 48% from 2001-2010, but detentions dropped by 5%.

Flag States further support the global enforcement of IMO legislation. Flag states are those under whose national flag a ship sails, and on whose register of shipping each vessel is recorded.

However, “open registries” or “Flags of Convenience” have also emerged since the 1950s, and some have attracted criticism for a perceived relaxation of regulatory control, either through non-ratification of legislation, or non-enforcement of ratified legislation.

Classification Societies offer another important element to maintaining safety standards. These independent bodies develop and apply technical standards to ship design and construction. They have, however, been subject to criticism for failing on occasion to spot potential technical weaknesses in advance and, more recently, when some Societies have started to enter into ship design services – a move that has raised concerns in respect of conflicts of interest when the Societies may classify the very ships they have themselves designed. However, other commentators refer to the improvements in ship safety that have been achieved through the design contributions of some Societies.

Marine insurers such as AGCS should also contribute through transparent underwriting and dialogue with ship-owners, supported by proactive risk consulting to reduce risk in advance. Insurers can encourage best practice in marine operations, recognizing the efforts of leading ship-owners to reduce risk – for the benefit of all parties.

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For more information or for a copy of the full report, please contact your local Allianz Global Corporate & Specialty Communications team, or visit the AGCS website.

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