

LLM/MA IN: International Trade and Maritime Law

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DISSERTATION TITLE

Vessels today are more sophisticated than ever, and the international conventions apparently provide an appropriate standard of safety: however, with bigger, faster and more technical ships are the IMO looking at the future of shipping and are we in need of amendments to Colregs/SOLAS to combat the impacts?

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SCHOOL OF LAW

LLM/MA in International Trade and Maritime Law

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Lastly, I would like to remember the people that have lost their lives at sea so that conventions and safety are being constantly reviewed to prevent further loss.

RMS Titanic
Costa Concordia
MV Derbyshire
The Stellar Daisy
SS Electric Marine

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Chapter 1

Introduction

Vessels today are more sophisticated than ever, and the international conventions apparently provide an appropriate standard of safety; however, incidents at sea continue to increase. If this statement is true then the International Maritime Organisation (IMO) are indeed maintaining standards, but as mentioned, incidents at sea are still happening and even though they may not be headline news, they are still causing either damage to ships and or loss of life. So, this indicates that may be the international conventions may not be as appropriate as initially thought.

In this dissertation, the aim is to give a brief history of how SOLAS and Colregs came about, discuss some of the incidents at sea that helped change conventions to what we know them to be today and then understand the improvements that have been made and what still needs to be made when new technology is released into the maritime industry.

SOLAS and Colregs are the backbone of maritime safety and without these two key conventions, The IMO are the governing body with SOLAS and Colregs are the conventions (similar to UK legislation), that are enforced by the member states. The IMO has devolved power to the member states for them to include them in National laws. The fundamental foundation started with the RMS Titanic disaster where several safety breaches caused several losses of life. Even though SOLAS was becoming more enforceable and standardised, it wasn't until the 1960 London Convention that Colregs was voiced as a concern of discrepancies between countries.

Without the knowledge and understanding of how these two key conventions have become so important in maritime, it is difficult to assess the relevance with regards to amendments and change. It is important to look at history before we can improve and make suggestions as to whether SOLAS and Colregs are fit for purpose.

However, since SOLAS 1974 and Colregs 1972, there was an expectation that these would eradicate serious safety issues as well as loss of life at sea. Even though there was a vast improvement in Navigational equipment, Radio equipment as well as lifeboats and rafts, lives are still being lost at sea. In this dissertation we will explore why these incidents are still occurring; human error, lack of training and agony of the moment.

It would be foolish to think that these are the only issues, however, technology has moved apace, and bigger, faster and more sophisticated ships are now being utilised within the shipping industry. With this comes more advanced issues but with issues with the baseline of shipping, more sophisticated technological reliant ships are compounding the issues.

Industry have been in some instances pioneers in developing and ensuring that safety at sea is paramount in their ethos. However, with industry upgrading equipment and technology improvements there would be an assumption that conventions would have been the driving force in these upgrades. But this isn't always the case as industry have been more proactive in improvements and conventions have lagged behind.

Since 2018 the IMO have set up a steering group to review the future of maritime in regard to safety on or using automated ships. It has been a process driven by industry and technology advances and has become necessary for all in international maritime. It is important to explore the future of maritime and the rapid changes that are happening as SOLAS and Colregs could be compromised and safety affected.

With this in mind, as ships are becoming more sophisticated and conventions being a of a standard, are we in need of amendments to SOLAS and Colregs to improve life at sea without losing life at sea.

Chapter 2

History of SOLAS

To understand how and why SOLAS is important to today's maritime industry, we need to explore how this piece of legislation came about and whether there is a potential for history in one way or another repeat itself.

Prior to 1912 the element of safety on a ship was left to the judgement of the ship builders, and the British Board of Trade "Which had responsibilities to advise and implement shipping laws and regulations."¹

Up until this point in time, it was mainly commercial merchant ships that used the sea to carry goods from one continent to another. Passenger ships were 'new' to Maritime as passengers traditionally boarded cargo ships in order to sail. To try and address the now immediate issue of numerous passengers the British Passengers Act 1855 (BPA 1855) and 1863 (BPS 1863) came into force. This was to challenge the then current piece of legislation that was basing the quantity of lifeboats on the 'ships net tonnage (t) rather than the number of bodies onboard'². However, the carriage of lifeboats and cargo was still regulated by the Merchant Shipping Act 1854 (MSA 1854), so there was a conflict between two pieces of legislation on how many lifeboats for the number of passengers and crew' safety.³ They did agree that this was the minimum number required on a seagoing ship. However, minimum isn't necessarily sufficient when it comes to saving life, especially at sea where there are limited resources.

In 1870 The Secretary to the Board of Trade in answering a question in the House of Commons about the sinking of the PS Normandy (Paddle Steamer) said that "in the opinion of the Board of Trade, it would not be possible to compel passenger steamers running between England and France to have

¹ Buchanan, K – Failure to Update the Law a Titanic Mistake – blog.loc.gov (13.4.2012)

² www.rina.org.uk – Passenger Ship Lifeboats – Secretary of British Trade

³ www.rina.org.uk – Passenger Ship Lifeboats

boats sufficient for every numerous passenger they often carry. They would encumber the decks and rather add to the danger that detract from it.”⁴ The Normandy was a passenger ferry that sailed between Southampton and the Channel Islands and not an ocean or transatlantic ship. However, in March 1870 ‘The Normandy’ collided with another steamship ‘The Mary’. On board the Normandy was 31 passengers, 28 crew and a stewardess. At this time there were 3 lifeboats onboard and 1 was damaged due to the collision. All passengers survived; however, the captain and 15 crew tragically lost their lives.⁵ It can be argued that these lives could have been saved if there was sufficient lifeboats, training and navigational equipment in place. Even though 15 died in this tragedy this did not change legislation. Legislation was still using the same table for commercial/merchant ships as well as passenger ships. ‘Two boats for 100 tons and upwards, three for 200 tons and upwards, in case the passengers exceed 200, one of such boats to be a long boat and another properly fitted lifeboat, and also two regular fitted lifeboats.’⁶ The key issue with this is that as demonstrated in The Normandy, ships have lifeboats on both sides and an incident can take place on any part of that ship. So, to have a ‘minimum’ number for the passengers isn’t a given that all lifeboats will be able to function after the event of a collision or incident. Therefore, still leaving passengers and crew at risk.

In 1887 the House of Commons appointed a Select Committee to report on Saving Life at Sea, they reported ‘ That many passenger ships could not without great inconvenience, carry so many of the ordinary wooden boats as would suffice to carry the whole of the passengers and crew with safety in bad weather.’⁷ This highlights that the passenger ships at the time hadn’t been designed to accommodate a means of evacuation of a distressed ship. This does indicate is that the UK government were at least discussing and researching the whole SOLAS principle and in a very basic way trying to resolve the issue of lifeboats.

Even with this specific committee they were still using the tonnage v lifeboat ratio. Nevertheless, the Select committee helped instigate a change in the regulations and that was in the form of the Merchant Shipping Act (MSA) 1894, this increased the number of lifeboats per tonnage, however,

⁴ www.rina.org.uk – Passenger Ship Lifeboats

⁵ The Normandy (1869-72) L.R 3A & E152

⁶ www.rina.org.uk – Passenger Ship Lifeboats

⁷ www.rina.org.uk – Passenger Ship Lifeboats

when it reached a weight of 10,000t and upwards there was no further guidance on how many boats. When considering this point, the Titanic weighed 46,000t and carried just 20 lifeboats for the entire ships' population⁸.

It wasn't until 1900 that the first pleasure cruise ship 'The Prinzessin Victoria Luise'⁹ was built, but this was a fraction of the size of RMS Titanic, with 120 first class cabins, she was described as more of a luxury yacht rather than an ocean liner. This ship sadly met an untimely demise in 1906 where she struck rocks and then ran aground¹⁰. All passengers and crew were safely rescued with no loss of life. As we can see even at this point the fundamental safety of passengers isn't at the forefront of ship building, as the passengers were rescued and not off loaded via lifeboats.

RMS TITANIC

Even though the greatest disaster in Maritime history made the headlines in 1912 with the sinking of RMS Titanic, this was not the first ship to have encountered icebergs in the North Atlantic and have a tragic end. 'Between 1882 and 1890 there were 14 lost ships and 40 seriously damaged due to ice. It took one of the greatest disasters of all time to arouse public demand for international cooperative action to deal with the navigational hazard. This disaster was the sinking of RMS Titanic on the 15th of April 1912'¹¹.

The tragic incident of RMS Titanic has been well documented, dramatised and exhibited for over 100 years and it was this ships demise that led to the change in International Safety at Sea (SOLAS).

This disaster highlighted several significant issues concerning transatlantic ocean liners, their lifeboats, the masters/captain's authority and telecoms.

As we have already identified there was only 20 lifeboats onboard for over 3,330 people (Crew and Passengers). "Titanic could carry up to 2435 passengers and approx. 900 crew. As a result, even if

⁸ www.titanicfacts.net

⁹ www.cruiselinehistory.com

¹⁰ Miller, M-L - What happened off the coast of Kingston to the Prozessin Victoria Luise – www.digjamaica.com

¹¹ www.maritime-executive.com The History of the International Ice Patrol (US Coastguard News) 14.4.2017

the lifeboats were loaded to full capacity during an emergency evacuation, there were only 1,000 seats available for those onboard.”¹²

But this didn't contravene legislation, in actual fact it was compliant as they “exceeded the regulations laid down by the Board of Trade”.¹³ Even though this ship was compliant what it failed to do was practice an evacuation of the ship, so that everyone knew what to do, how to do it and where to go. If this had been practiced, this could have prevented some of the confusion and helped the passengers evacuate quicker. “ However, as continuing disasters at sea demonstrates and with the sinking of the Titanic in 1912, the regulations were not adequate to allow for a full evacuation of larger ships.”¹⁴

At the time of sailing this was branded 'The unsinkable ship' and “according to the Titanic's builders, even in the worst possible case of two ships colliding, the vessel should stay afloat for at least two to three days, providing adequate time for passengers to be ferried to safety.”¹⁵ With the way in which this ship was promoted, it could almost imply that the designers, builders and owners had become complacent with the grandeur and limitations of the ship. Almost becoming blinkered to the safety of everyone onboard as they will never need the safety equipment. However, there was a life jacket for every passenger onboard, which indicates that again this is the minimum that they need for the ship to be classed seaworthy.

Safety

The designers and builders were reliant on two factors to help support that statement and that was there was a ship in the area to swiftly sail to the Titanic and also that it would be struck by another ship. Sadly, neither factors would be a fact in this incident. The ship struck an iceberg and the nearest ship to them was The Carpathia, but she was 4 hours away. If their prediction that the ship would stay afloat for at least two days this would have been adequate, but then they still had the issue of just 20 lifeboats onboard. This would have then put the other ship into potential peril as they would

¹² www.history.com

¹³ www.rina.org.uk

¹⁴ Edmonston, S – UK P&I Club – The Importance of training for lifeboat safety

¹⁵ Kelly, H – The Sinking of the Titanic & “Titanic: The Unsinkable Ship”, Encyclopedia Britannica 1998

have had to have been a lot closer to ferry passengers between the two. This would have been just as perilous for the evacuees and The Carpathia. Even though it was reported that the sea was calm, the freezing temperatures and unnatural sea movement that a sinking ship creates would have put the wooden lifeboats under abnormal duress and therefore, adding to the potential loss of life.

But even with all these incidents, seafarers claim that whilst at sea ' your ship is your best lifeboat'.¹⁶ B Ismay the Chairman of the White Star Line reiterated this comment ' it would be fine to put just 20 lifeboats on a ship that could hold 2,800 people, (but the Titanic had 3,000+) it would clutter the decks he argued, when the ship itself is a lifeboat.'¹⁷ It now implies that aesthetics are more important than safety. During the hearings Mr. Ismay made a comment "that if the iceberg had hit head on, then the disaster would have been avoided and everyone would have survived."¹⁸ It became apparent during that hearing that the 'common theme was one of excessive wealth and power that the new technological world had gone wild.' Mr. Ismay's whole demeanor during the hearing was described as being 'confident and almost hubristic.'¹⁹ However, to make a comment about cluttering the decks with lifeboats hints an air of arrogance and lack of ship design/build knowledge.

Communications

Another failing on safety was the use of the "wireless technology". In 1912 the Titanic had onboard the most technologically advanced wireless system. They had two of the Marconi operators onboard to help with the use of this. This was a relatively new system not only to Titanic, but also other ships at sea during this period.

"Titanic was fitted out with some of the best equipment available. But there was not yet an established practice of keeping a clear channel for emergency communications."²⁰

¹⁶ Edmonston, S – UK P&I Club – The Importance of training for lifeboat safety

¹⁷ www.npr.org – "How to survive the Titanic and sink your name" – 15.10.11

¹⁸ www.titanicfacts.net

¹⁹ www.titanicfacts.net

²⁰ www.sciencemuseum.org.uk

Everyone at the time thought that they could send communications at all time of the day and night, but at the point in time when they needed a clear channel to transmit a distress signal, the channels were clogged with private messages. This delayed the transmission to all neighbouring ships to send help. However, even when the channel was clear, there was confusion within the radio room, and they were transmitting the old distress signal rather than the new.

At the time of the Titanic sinking, the distress signal SOS had not long been established as the recognised code. "It was established as an international distress signal in October 1906 and was introduced in July 1908. Prior to this, other countries had other signals to send out for help. The UK used CQD, Italy SSSDDD and Germany SOE. However, even though the distress signal of SOS was made official in 1908 the radio operator onboard Titanic still used CQD first before he joked that they may as well do the new signal too".²¹ From this statement, it is clear to see that the radio operator showed signs of a lack of knowledge regarding the signals to be used, as well as a lack of understanding as to how important this transmission was, it had the potential to save hundreds of lives. In turn, this demonstrates the lack of training in regard to safety of crew and passengers in the early 1900's.

Conflict of Accountability

During this fateful voyage the owners of 'The White Star Line' allowed the Chairman onboard. "This was his normal practice for ships on their maiden voyage and the Titanic was no exception"²².

However, this voyage was far from normal and as we have already seen he made a comment that lifeboats would 'clutter the decks'²³.

With his presence onboard, this would have potentially undermined the captain's authority, or at least unnerved him. The captain of a ship is similar to one of an aircraft, as that they have ultimate control and accountability for everything that happens onboard²⁴. By having a senior member of the company onboard could blur the line of command and potentially create conflict and friction. With a prominent member of the company onboard would have had the staff nervous and wary of him and

²¹ Harris J, - Did SOS really stand for Save our Souls? 6 amazing facts about the SOS distress signal 15.3.19 www.bt.com

²² www.encyclopedia-titanica.org

²³ www.npr.org – "How to survive the Titanic and sink your name" – 15.10.11

²⁴ SOLAS Chapter 9 - Management of the Safe Operation of ships

the conversations that he had. During the hearing 'Mr. Ismay stated that he was onboard to consider passenger accommodation improvements for the White Star Line's next ship, the *Britannic*. However, other passengers stated that they overheard a conversation with the Captain and Mr. Ismay whereby Mr. Ismay stated "We will beat the *Olympic* and get in to New York on Tuesday," meaning they would arrive one day earlier than originally planned, and that they would be starting up extra boilers that evening'.²⁵ Ismay wasn't the captain and should never have even made a comment in making the ship go faster. This completely undermines the Captain as the crew would have now had conflicted information and who they would report into.

Public Pressure

This really was a landmark case, as it made the headlines across the world and with the public outcry, the international community were forced to address the issue of safety of life at sea. This was the first active "push" for an international conference to take place to specifically concentrate on the issue of Safety at Sea. This took place in early 1914, however, due to the outbreak of WW1 it wasn't formally ratified, although many elements were adopted by the various nations.

"At no moment of its voyage may a ship have onboard a total number of persons that that for whom accommodation is provided in lifeboats."²⁶

Overall it is clear to see that it took a major disaster to bring the serious issue of SOLAS to the forefront. Even though there had been previous incidents, the sinking of the Titanic was the instigator in highlighting safety at sea.

As we have seen there were various pieces of legislation in place, however, it took the sinking of a passenger liner to gain international attention and for the public to then demand a change in safety.

Since 1948, the International Maritime Organisation has been the custodian of the SOLAS conventions which regularly reviews and recommends amendments. 'The purpose of the SOLAS Convention¹ is to promote safety of life at sea by establishing rules which govern the safe

²⁵ Galvin, A & Zarr, C – They said it couldn't sink www.archives.org

²⁶ SOLAS Chapter IV 1914 Article 40

construction of ships,² the safety equipment with which ships are required to be fitted and the standards to which they should be operated in order to avoid accidents.³ It is the role of the IMO regularly to review the Convention and to draft any necessary amendments,⁴ but the responsibility for enforcement of the provisions of the Convention lies with the flag state.¹²⁷

²⁷ Baatz Y, & Lorenzon, F Maritime Law 4th Edition Chapter 9 pg. 353

Chapter 3

History of Colregs

As we have seen in chapter 2, SOLAS has a long history in how it developed and that it took a high-profile incident to trigger the change in mindset and legislation.

Collision Regulations (Colregs) isn't as high profile, nevertheless it is just as important as SOLAS. Generally, SOLAS and Colregs work as key conventions together purely due to the nature of events. If there is a collision of any kind, there is normally an incident involving individuals in some way.

However, if we consider the landmark case that was the instigator for change in SOLAS, that landmark case didn't have the same impact when considering Colregs.

Even though Colregs has a lengthy history too, its wasn't as clearly defined as SOLAS.

Parliamentary Select Committee

'The history of Colregs starts in 1836 with the appointment of a Parliamentary Select Committee to examine the causes of the steady increase in shipwrecks.'²⁸ Numerous findings were made by the committee ranging from "excessive loading, drunkenness amongst officers and crew to shipowners total disregard to safety.'²⁹ The importance of this is that with excessive loading, the ship can potentially sit too low in the water and in bad weather will take on water, causing the ship to become extremely difficult to maneuver and keep afloat in protecting life, ship and cargo. If there are drunk crew and officers onboard, in the same way that drink drive and also a captain flying a plane, judgement and reaction times are compromised. The last point is that shipowners are there to control a business and every business is there to make money. If implementing safety equipment or modifying the ship, this costs money and they are reluctant to reduce profit.

²⁸ www.imo.org – Safety at Sea

²⁹ www.imo.org – Safety at Sea

It wasn't until 1840 that the first rules on lights and traffic at sea came into effect. The whole purpose of this was to make ships visible to each other and similar to driving, make rules on shipping lanes. Knowing which side to enter port and which way to pass other ships especially near harbours and small shipping lanes. The sole purpose of this was to make shipping safer, by following these rules, it meant that there was less confusion and conflict as it added clarity. However, it should have reduced casualties, but as we will see not everyone was following the same rules and therefore accidents at sea still continued.

The aim of legislation was to prevent collisions and accidents in international and territorial waters. 'Territorial waters in international law, that area of sea immediately adjacent to the shores of a state and subject to the territorial jurisdiction of that state.'³⁰ Whereas international waters are determined by the United Nations Conventions on the law of the sea (UNCLOS), 'No state may validly purport to subject any part of the high seas to its sovereignty.'³¹ In territorial waters it is the responsibility of the coastal government and could introduce and enforce whatever standards they see fit. 'Every State has the right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles, measured from baselines determined in accordance with this Convention.'³² However, each state could and did set up different rules/laws and became a minefield for captains to know each law he was sailing from and to, to ensure that he didn't contravene any state laws. The issue was still with international waters, where the 'principle of freedom traditionally prevailed.'³³

It wasn't until 1850 that the 'most important advance came in with the Merchant Shipping Act 1850 (MSA 1850). This piece of legislation 'focused on safety of ships and working conditions of seamen.'³⁴ Working conditions were appalling for seamen until legislation protected them from being unwillingly engaged in being employed onboard a ship (press ganged)³⁵. This also gave them rights on payment

³⁰ www.britannica.com – Territorial Waters

³¹ www.un.org – Part VII

³² www.un.org – Section 2 Limitations of Territorial Waters – Article 3 Breadth of territorial seas

³³ www.imo.org – Safety at Sea

³⁴ www.imo.org – Safety at Sea

³⁵ Merchant Shipping Act 1894 – Engagement of Seamen – section 110 - 124

of wages, conditions (Inc. health), accommodation, and also what happens if they are off loaded in a foreign port or die during the voyage.³⁶

'Technological innovations that accompanied the industrial revolution encourages the development of maritime transport during the 19th Century. The most important developments were undoubtedly the introduction of steam-powered engines onboard ships and the construction of iron and then steel hulls. Iron and Steel hulls meant that they could carry heavier loads as they were stronger than wooden ones, however, with metal, the issue is that when they collide, the impact is greater especially when they hit a ship made of wood. These technical advances were accompanied , however, by an increase in risk at sea, corresponding to the greater number, size and speed of the vessels engaged in trade.'³⁷

Up until the MSA 1850 the ships had predominately been wooden, but it wasn't until a bill was passed in 1854 that it concentrated on the safety equipment on wooden ships. This implies that safety equipment wasn't important enough to have specific legislation prior to 1854. However, in this bill it also identified that iron ships were required to have collision and engine bulkheads fitted. A bulkhead is designed to keep the water out in the event of a collision, what it's not designed for is to act like a car bumper. 'The first water tight bulkhead in the forward part of the ship designed to keep out the water in the event of a collision.'³⁸

However, even though this was now part of legislation it had little effect, either due to poor quality of the fitting or ships being originally designed not have this fitted. The effect was still causing loss of life, and in '1867 there were 1313 shipwrecks causing the death of 2340 British Sailors and 137 passengers.'³⁹

³⁶ Merchant Shipping Act 1894 – sections 110 - 238

³⁷ www.imo.org – Safety at Sea

³⁸ www.marineinsight.com

³⁹ www.imo.org – Safety at Sea

Loading

Then eventually in 1873 an investigation of “seaworthiness” took place. The area that they were investigating was the conditions of loading. Even though most don’t regard loading to be a factor when considering collisions and incidents, a poorly laden ships could have a vast impact on how a ship performs, maneuvers and how safe they are whilst at sea.

The findings were that ships were being over loaded and making ships unseaworthy. The Merchant Shipping Act 1879 (MSA 1879) also known as ‘The Plimsoll Act, or the Waterline’ became part of legislation. It was named after Samuel Plimsoll a politician that was working in the Select Committee. The plimsoll line ‘is a reference mark located on a ship’s hull that indicates the maximum depth to which the ship may be safely immersed when loaded with cargo.’⁴⁰ ‘However, the position of the line was not finalised by law until 1894.’⁴¹

Even though there was legislation in place regarding how low in the water a ship could sit, in some instances these accidents still happened because the placing of the load line varied from ship to ship.

Navigation

Further amendments included navigation in fog and in 1862 the first joint rules (France and Britain) for routes at sea were laid down. For a period of time, it was Britain and in some cases France that was the dominant force in introducing rules on ships conduct at sea. This was the start of other nations adopting various rules with the aim of unifying rules and customs on safety at sea. Shipping wasn’t and isn’t a single nation but a global industry and by adopting rules it was an attempt to reduce the amount of accidents at sea.

It became clear to all nations that to ‘avoid anarchy⁴²’ there needs to have a communal interest in reducing dangerous conditions for maritime navigation. On the whole it raised few objections from countries that have territorial waters, but as we have discussed international waters was still an area

⁴⁰ www.oceanservice.noaa.gov & R (on the application of Fogg) v Secretary of State for Defence [2006] 1 Lloyds Rep 579

⁴¹ www.ukpandi.com – Load line rules in South Africa

⁴² www.imo.org – Safety at Sea

that needed addressing as at this time, there wasn't a single organisation that either controlled or set rules on how to operate in that area.

To all concerned it became clear that there was a need to have and agree on a minimum set of rules when it came to the basics of signals, traffic and navigation. These became the "common law of the sea, covering rules for navigation, rescue and collisions."⁴³

In September 1880 the first international convention documented rules on preventing collisions. However, it wasn't until the start of the '20th century that set rules on wireless telegraphy, this was part of the Berlin Convention 1906.⁴⁴ There were two other conventions that were signed in 1910 and one was on collisions and the second was on lifesaving and assistance.

Unified 'Rules'

Until now, it could be a misconception that the shipping industry had a unified set of rules, however, this was not the case as there was no real directive to implement these conventions into common law. There were several attempts to unify the rules with various conventions, the Brussels Convention 1910 being one. The issue being that only 24 states signed the conventions, but three didn't ratify this convention. 'Having recognised the desirability of determining by mutual agreement certain uniform rules of law with respect to collisions, have decided to conclude a Convention to that end, and have appointed as their plenipotentiaries, that is to say: Who, having been duly authorised to that effect, have agreed to the following 17 articles.'⁴⁵

In '1929 another conference was held in London to adopt a new SOLAS convention which basically followed the same format as the 1914 but had a few new regulations. One of the two annexes to the convention revised the international regulations for preventing collisions at sea (Collision Regulations).'⁴⁶

⁴³ www.imo.org

⁴⁴ www.imo.org

⁴⁵ www.admiraltylawguide.com – Convention on the unification of certain rules of law on collisions between vessels. – Brussels 1910

⁴⁶ www.imo.org – SOLAS: The International Convention for the Safety of Life at Sea 1974 – Published in Oct 1998

However, again not every nation was party to this convention as only 18 attended and so there were various rules and regulations with other nations, so this was still creating confusion and conflicting information to all onboard ships.

Finally, in 1948 a conference in Geneva 'under the auspices of the United Nations adopted a convention establishing the IMO (Inter-Governmental Maritime Consultative Organisation)⁴⁷ which was to assume the responsibility for safety. Even though this new organisation was set up in 1948 it wasn't until 1960 that over 55 member states (nations) adopted this convention, but it was already starting to become outdated due to technology moving at a faster pace than previous conventions. 'Unfortunately, it became increasingly apparent as the years went by that these efforts to respond to the lessons learnt from major disasters and keep the SOLAS Convention in line with technical developments were doomed to failure - because of the nature of the amendment procedure adopted at the 1960 conference. This stipulated that amendments would enter into force twelve months after being accepted by two-thirds of Contracting Parties to the parent Convention.'⁴⁸ The IMO realised that technology was advancing quicker than they could review and amend conventions. Mainly because organising member states to not only get together to discuss the new technology, but also understand what the implications are to the current conventions. This then became a "tail wagging the dog" situation in that they lacked control of keeping conventions current as industry were moving faster than they could implement new conventions. It was a disaster that was triggering the amendment to balance law with the event and not have the law in place to prevent such incidents happening in the first place.

However, it wasn't until 1972 when the 1960 convention was replaced with Colregs 1972. 'One of the most important innovations in the 1972 Colregs was recognition given to traffic separation schemes – Rule 10 gives guidance in determining safe speed, the risk of collision and the conduct of the vessels

⁴⁷ www.imo.org – SOLAS: The International Convention for the Safety of Life at Sea 1974 – Published in Oct 1998

⁴⁸ www.imo.org – SOLAS: The International Convention for the Safety of Life at Sea 1974 – Published in Oct 1998

operating in or near traffic schemes.⁴⁹ 'You need to comply with COLREGS at all times, being in a traffic separation scheme does not relieve any vessel of her obligation under any other rule.'⁵⁰

Flag States

As with all conventions that have been issued and then subsequently ratified by the member states, they then embed them within their own domestic law. As the IMO is the regulating body on safety in shipping it could be assumed that they will be the body in which any breach would be determined by them. However, this is not the case, as with conventions being ratified by member states it is that specific state or "flag state" that becomes the body that has the power to administer the relevant punishment.

A ship's flag status is the nationality in which laws and rules in whose laws are applied and to its operations. 'In practical terms, necessary to fly a flag which was a visible indication of the state under whose protection that ship operated, backed up with the papers which would be carried by the Master.'⁵¹

However, in 1920 the concept of a flag of convenience (FOC) was re-ignited when ships registered under a Panamanian flag to avoid prohibition. An FOC's attraction is that there are minimal legal restrictions, freedom from tax and political interference. This and still does create friction between other member states when trying to enforce harmonised conventions, FOC's were entirely focused on raising 'revenue from registrations and building their market share.'⁵²

'Flag states are provided with extensive powers of oversight and control of the safety of ships flying their flags, with specific obligations for the inspection of their ships, jurisdiction and administration of the owning entities, the Master and officers and crew of the ship.'⁵³ The flag state is also firmly in control of criminal and disciplinary powers with the duty to enforce penal jurisdiction where there have

⁴⁹ www.ukpandi.com – Conventions on the International Regulations for Preventing Collisions at Sea 1972 (Colregs)

⁵⁰ www.marineinsight.com – Common Mistakes that can occur whilst using traffic separation schemes on ships 5.8.19

⁵¹ www.seafarersrights.org – Flag states responsibilities and Seafarers' rights 29.9.14

⁵² www.seafarersrights.org – Flag states responsibilities and Seafarers' rights 29.9.14

⁵³ www.seafarersrights.org – Flag states responsibilities and Seafarers' rights 29.9.14

been breaches of regulations that have led to incidents such as collision, stranding or pollution. In such cases, it is required to respond to reports of violations involving ships flying its flags, institute proceedings and to inform the informing state of its action. Similarly, the Law of the Sea Convention, IMO conventions and ILO instruments all make the flag state responsible for inquiries into the circumstances surrounding casualties, which importantly are obligations and not “options”, that may or may not, be exercised.

As we can see, Colregs has gone through vast amounts of change over the centuries but it has been in the last 100 years that the most change has happened. It must also be said that Colregs isn't just used for ships but everything and anything a ship can collide with, which makes it unique in some respects. It considers collisions with ships, ports, harbours, marine life and cargo that has in one way or another “fallen” off of a ship.

It was originally designed and set in place to reduce the risk of collision and prevent it happening in the future.

Chapter 4

Did SOLAS and COLREGS work?

'The purpose of the SOLAS conventions is to promote the safety of life at sea by establishing rules which govern the safe consideration of ships, the safety of equipment with which ships are required to be fitted and the standard to which they should be operated in order to avoid accidents. It is the role of the IMO to regularly review the conventions and to draft any necessary amendments but the responsibility for enforcement of the provisions of the convention lies with the flag state.'⁵⁴

If as Lorenzon states SOLAS' sole purpose is to save lives, it raises the questions as to why every year lives are still being lost at sea.

'In the 1970's and 1980's bulk carriers were sinking at a rate of one ship was lost every three to six weeks, usually with the loss of all hands onboard. Many of these bulkers were older, often literally worn-out, poorly maintained, with ill-trained crews and operated by fly-by-night owners.'⁵⁵

MV Derbyshire

One of these ships was the MV Derbyshire which tragically sank in September 1980 taking all 44 lives onboard.

The Derbyshire was one of six sister ships and was registered in Liverpool (UK). At the time of loss this was "The largest British Ship ever lost at sea".⁵⁶

The official report that was issued in 1989 was that The Derbyshire was overcome by the worst part of Typhoon Orchid. 'The theory being it was overcome by a "rogue wave" and that the bulk carrier lost hatch covers, flooded and rapidly sank',⁵⁷ and also blamed the crew for the demise of the ship.

⁵⁴ Baatz, Y – Maritime Law Chapter 9 Safety and Compliance – F Lorenzon (4th Edition)

⁵⁵ Vishal, K – www.themarineexpress.com – The mystery of the MV Derbyshire 10.5.2019

⁵⁶ Sykes, A – www.theguardian.com – A New display commemorates the MV Derbyshire, the largest British ship ever lost at sea. 4.10.2012

⁵⁷ www.shipwrecklog.com - Derbyshire

This could possibly answer the how and possibly why it sank but it doesn't answer why there were no survivors, nor why did the crew sail her directly into a typhoon.

The relatives, understandably refused to believe the official report and petitioned the government to conduct a full investigation, after all this was a UK registered ship and should be investigated to ensure that other (sister) ships didn't fall foul of the same issues.

However, 'The UK government refused a formal investigation, because without evidence, a formal investigation was not warranted. They did, however, ask two independent bodies to conduct research into the loss.'⁵⁸ 'At the time, the Conservative government refused to launch a public inquiry into the loss, with the trade minister "Lord Trefgarne" telling the House of Lords in 1981 ' I have concluded that a court could not reasonably be expected to establish the cause of this casualty.'⁵⁹

With a "casualty" like this an investigation as to the cause is vital in prevention and education in saving life and assets in the future. In this case politics had an influence as to whether an investigation takes place or not implies that they are not interested in the 'why it happened' and some could say it implies that it is covering something up or that a UK flagged ship is a dispensable asset with no value. There lacked a complete empathy for finding out the truth, even if it was detrimental to the 'flag state' certification.

With the families of the crew and the Seafarers Union it took 20 years and a change in government to get the investigation underway. The issue with the investigation was that the ship was three miles below the surface of the sea and with sonar, identified that the ship had shattered into more than 2000 pieces. As the investigation took 20 years to get the go ahead, the investigators were unsure as to what evidence would be left for them to find. This shows that acting as swiftly as possible to investigate incidents preserves evidence in establishing what happened, taking 20 years means that any relevant evidence may have been destroyed by either the sea or the sea life. Generally, in law there is a period of time (normally 2 years) in which a case has to be lodged in order to protect and gain as much evidence as possible, this doesn't appear to apply to an investigation where there should be the same level of importance given.

⁵⁸ www.merchant-navy.net

⁵⁹ Sykes, A – www.theguardian.com – A New display commemorates the MV Derbyshire, the largest British ship ever lost at sea. 4.10.2012

The formal inquiry finally reported their findings in 2000. 'The inquiry concluded that a combination of a design fault in the ship and the atrocious weather conditions were responsible for the sinking, and no blame should be attached to the crew.'⁶⁰ As part of SOLAS and Colregs, the ships must be certified on a regular basis that the ship is seaworthy, has all relevant safety equipment onboard and that the crew have had the training required to sail on that ship. "These certificates are provided by the flag state of the ship and may be inspected by port state control officers."⁶¹

Even though the investigation highlighted an issue with the weather, the report states it was atrocious. There was in fact an issue with the information provided. 'A ship's captain will try and avoid the worst weather and position itself in a way to minimize exposure to wind and waves.'⁶² There were three reports issued⁶³ to the Derbyshire on that night, all giving conflicting information as to the position of the typhoon. With conflicting data, the crew altered course to avoid all of the "presumed" place of the typhoon, however, this didn't work as the Derbyshire was hit by huge waves and violent winds. As you can see this demonstrated that being far out to sea, it is vitally important to have accurate weather reports to protect the ship and crew and receive it from a trusted single source. Even though we cannot control the weather, we as an industry need to improve how we forecast and then convey that to the ships.

There was another reference made in a previous article that the accidents mainly happened to older ships or ones in poor disrepair, however the Derbyshire was only four years, well maintained and was designed to sail in some of the toughest seas, yet she still sank.⁶⁴

The report doesn't make reference to a previous incident relating to two of the sister ships, the Tyne Bridge and the Kowloon. Approx. 2 years after the Derbyshire, the Tyne Bridges' crew found a crack

⁶⁰ Sykes, A – www.theguardian.com – A New display commemorates the MV Derbyshire, the largest British ship ever lost at sea 4.10.2012 & Verkaik, R – www.independent.co.uk – Sunk cargo ship's crew cleared of negligence. 9.11.2000

⁶¹ www.imo.org – Forms and Certificates

⁶² Captain Scheer, H - www.seanews.com.tr – Sea captain tells why there is no safe port in a storm for box ships 9.11.2017

⁶³ Vishal, K – www.marineexpress.com – The mystery of the Derbyshire 10.5.2019

⁶⁴ Vishal, K – www.marineexpress.com – The mystery of the Derbyshire 10.5.2019

in the deck plate which is near to the “superstructure” of the ship. This is one of the fundamental structural areas on a ship and it was found to compromise the seaworthiness of the ship. The other sister ship, The Kowloon sank off the coast of the coast of Ireland in 1986. This time, the ship broke into three pieces with one section striking a submerged reef off the coast.

This evidence then added to the original theory that there was a fundamental flaw in the design of these ships.

‘Mr. Justice Coleman concluded that minimum strength requirements laid down by international convention for ships similar to the Derbyshire are “seriously deficient”. He called on the government to press ‘strongly and urgently’ for new standards.’⁶⁵

We have seen that it wasn’t just one factor that caused the sinking of the Derbyshire, the area that still needs to be discussed is the saving of life and why there was no distress signal.

Whilst we cannot know how the crew reacted there is a term “Agony in the Moment”. This is ‘where one ship has, by wrong manoeuvres, placed itself in extreme danger,’⁶⁶ where they had no time to think. If the ship sank as quickly as reported, there may have been no time to think about raising the alarm. It could also be that they weren’t aware of the severity and that the “best lifeboat” is still the ship itself. The notion to have a lifeboat/life raft in the South China Sea in a typhoon was too dangerous and it would have been the last resort.

Whatever their decision at that moment in time would only be supposition as there’s no recording of conversations unlike an aircraft where they have “black boxes”. In chapter 6 we will go into detail on how improvements have been made and whether further improvements need to be implemented.

⁶⁵ Verkaik, R – www.independent.co.uk – Sunk cargo ship’s crew cleared of negligence. 9.11.2000

⁶⁶ The Bywell Castle (1878) L. 256

The Stellar Daisy

However, this wasn't an isolated incident and in 2017, the Stellar Daisy which was in the South Atlantic Ocean sank taking 22 of the 24 crew that were onboard. There were two survivors and they 'reported that her hull cracked before she went down.'⁶⁷

'The investigation determined that the likely direct cause of the foundering was a rapid list to port following a catastrophic structural failure of the ship's hull that resulted in a loss of buoyancy and uncontrolled flooding.'⁶⁸

The Stellar Daisy was built in 1993 and was a 24-year-old, single hulled ship. 'In the late 2000's single-hulled tankers were being phased out in favour of double-hulled designs.'⁶⁹ Double hulls were seen to be stronger and in the event of an incident or collision, it should be able to still remain afloat protecting cargo and personnel.

'A new regulation banning the carriage of heavy grade oil in single hull oil tankers entered into force in April 2005.'⁷⁰ However, this amendment was for tankers carrying heavy oil, the Stellar Daisy was carrying 260,000 tonnes of iron ore. As demonstrated this ship was just as vulnerable to the sea, but MARPOL is the convention of marine pollution and protecting the environment, it completely dismissed the impact a structural defect can be on a single hulled ship like this.

Under SOLAS 'Ships should have adequate strength, integrity and stability to minimize the risk of loss of the ship or pollution to the marine environment due to structural failure, including collapse resulting in flooding or loss of watertight integrity.'⁷¹

⁶⁷ www.maritime-executive.com – Stellar Daisy found 17.2.2019

⁶⁸ www.gcaptian.com – Marshall Islands Releases long awaited Stellar Daisy Casualty Report.

⁶⁹ www.maritime-executive.com – Stellar Daisy Found

⁷⁰ www.imo.org – Revised phase-out schedule for single hull tankers enters into force. (Amendments to Annex 1 of the Marpol Convention.)

⁷¹ www.imo.org – Chapter 11-1 Construction – Subdivision, machinery and electrical installations.

Even though in both the Derbyshire and the Stellar Daisy weather was a factor it wasn't the only factor. The structure of a ship is vitally important to ensure it is seaworthy and can preserve life and cargo.

MSC Napoli

The MSC Napoli is testament that even in extreme weather, it is possible to save life and the environment.

In 2007 the MSC Napoli was in extreme weather conditions in the English Channel, and yet again the integrity of the ships structure was compromised.⁷²

Onboard the Napoli she was carrying 2,300 containers containing various cargo and loaded to ensure that the weight load was evenly distributed. Due to stormy weather and structural damage near the engine room which as rapidly flooding, the Napoli's engines no longer operated in keeping the ship mobile.

The damage became dangerous and large enough for the crew to issue a distress call and 'abandon ship in favour of a lifeboat.'⁷³ As mentioned in Chapter 2, 'the ship itself is a lifeboat'⁷⁴ for all of the crew to abandon ship into stormy weather they felt danger was real and felt that they had a physical threat to their lives. Thankfully on this occasion all 26 lives were rescued from their lifeboat by RN helicopters.

With no propulsion, the ship was left to the elements and making the damage to the hull worse. This was becoming an issue not only for other ships as it was in one of the busiest shipping lanes in the world, but there was issue on safety of life and to the environment.

As the Napoli took on more water, it was listing further, and containers were falling off of the cargo deck and into the water. Some of them sank, some floated but some were submerged just under the surface of the waves and a potential hazard to other ships in the area. It wasn't only containers that the Napoli was losing, it was also spilling oil from the fuel tanks which posed a danger to wild life.

⁷² www.ship-disasters.com

⁷³ www.ship-disasters.com -

⁷⁴ www.npr.org – "How to survive the Titanic and sink your name" – 15.10.11

To consider how best to tow the ship the UK Coastguard engaged a salvor to advise on minimising on the danger of this ship breaking into two and also preventing an environmental disaster. The decision was to run her aground off the south coast of England. A salvor is a person or company involved in saving ships that have been sunk or damaged, and the goods inside them.⁷⁵

The MAIB (Marine Accident Investigation Branch) investigation found various contributing factors as to why the Napoli started to break apart.

One of the findings was that the Napoli had a previous accident. In 2001, six years previously under a different name "The Normandie" the ship ran aground in the Malacca Straits at full speed. Following a hull survey and provisional repairs, the ship was able to continue in service."⁷⁶

The second finding was that paperwork on the containers had discrepancies. The MAIB stated "about 137 containers stowed on deck, which remained dry were on average more than 3 tonnes different from their declared weights. The largest single difference was 20 tonnes, and the total weight difference of the 137 containers was 312 tonnes heavier than on the cargo manifest."⁷⁷ This therefore meant that containers were in the wrong position onboard and a potential contributor to the accident.

The third finding was that without the engines the hull was exposed to 'slamming and hull whipping.' Slamming is where the hull impacts heavily on the waters' surface and whipping is the vibration that the slamming causes and this places additional stress on the structure.⁷⁸

MAIB calculated that the ship was at 99% of the maximum seagoing weight capacity with no safety margin. (Sailing capacity is cargo, crew, fuel and ballast water).

After the report was issued, the MAIB recommended an urgent review of over '1500 similar commercial ships. 12 were identified as requiring remedial action and a further 10 were identified as being border-line.'⁷⁹ At the forefront of every investigation, compliance of conventions is being examined. As we mentioned SOLAS is fundamental in preventing loss of life at sea. If ships are structurally hazardous, government agencies have a duty of care to raise this finding to the highest body within the Maritime industry.

⁷⁵ www.dictionary.cambridge.org

⁷⁶ www.asset.publishing.service.gov.uk – MSC Napoli

⁷⁷ www.asset.publishing.service.gov.uk – MSC Napoli 1.11

⁷⁸ www.asset.publishing.service.gov.uk – MSC Napoli 1.10

⁷⁹ www.maritime-executive.com – The legacy of the MSC Napoli 18.1.2017

COLLISIONS

As we have seen, the incidents we have discussed in this chapter have no relation to collisions involving another ship or an inanimate object. Since the incident with the Titanic and the implementation of Colregs 1973, there has still been collisions at sea and in some instances loss of life.

Costa Concordia

The one that has been a high-profile disaster was the Costa Concordia. This incident occurred January 2012 at 21:45 off of the coast of Giglio a Tuscan island.⁸⁰ Onboard was 3,206 passengers and 1,023 crew. The ship was only 8 years old at the time of the incident and tragically 32 people died because of the actions of the captain, crew and owners.

On this occasion, this ship was fitted with a Voyage Data Recorder (VDR⁸¹) which is similar to the “Black Box” on an airline. This only records data from the ships’ instruments and also audio, it doesn’t record visual. This helped the Italian Ministry of Infrastructure and Transport (MIT) in investigating this incident.

Firstly, we need to recognise that the Concordia was compliant with SOLAS regulations with being fitted with sufficient lifeboats and lifesaving equipment for all onboard. This demonstrates that passenger safety has come a long way compared to the Titanic. However, there has been some comparison between the two disasters, in that both struck a structure rather than another ship. There was a loss of life on both ships, which is beyond belief that the Concordia with sufficient lifesaving equipment onboard, why there was still a loss of life. Both Captains were to be either unaware of the events or that they were part of the chaos within the incidents.

⁸⁰ www.ifsma.org – Marine Accident Investigation C/S Costa Concordia 18.5.2015

⁸¹ Captain M Lloyd – Maritime Consultant – Voices from the Costa Concordia Pt 1 - 5

It had been a regular occurrence that the Concordia passed Giglio to carry out 'a diversion for passenger amusement' which was where the ship would perform a "sail-by" or "salute" to the island as it passed. However, the waters close to the island are relatively shallow compared to where the Concordia usually sailed. 'Moving closer to the small Tuscan island for a maritime "salute", a common practice that included the cruise ship sounding its horn. The Concordia had performed this several times in the past.'⁸²

However, a deviation or diversion in maritime law as per the Hague Visby Rules IV Rule 4⁸³ 'Any deviation in saving or attempting to save a life or property at sea any reasonable deviation shall not be deemed to be an infringement or breach of these rules or the contract of carriage.'⁸⁴ However, the Hague Visby rules don't give enough definition as to what is regarded as reasonable deviation and it is left to the judgement of the captain.

Prior to the collision, the captain ordered a change of course⁸⁵, but due to a language issue, the Indonesian helmsman steered the ship in the opposite direction.'⁸⁶

However, as with most ships the crew are from various nationalities and this voyage was no exception. This proved one of the contributing factors to the collision. In 2002 the 'IMO adopted standard marine communication phrases. It was developed for use by seafarers, following agreement that a common language – namely English – should be established for navigational purposes where language difficulties arise.'⁸⁷ 'In 1988, the IMO made 'Seaspeak' the official language of the sea. English was chosen as the principle lexicon for seaspeak.'⁸⁸

Language wasn't the only problem on the ship, onboard the Concordia was fitted with GPS, Radar and charts. The charts that they were using didn't have the correct scaling to see the correct depths

⁸² www.britannica.com - Tikkanen, A – Costa Concordia - 21.4.2017

⁸³ www.uncitral.org – Hague Visby Rules

⁸⁴ www.imo.org – Athens Convention 1974

⁸⁵ Davies v Mann [1842] 152 E.R 588

⁸⁶ Captain M Lloyd – Marine Consultant – Voices from the Costa Concordia Pt 1 - 5

⁸⁷ www.imo.org – IMO Standard Marine Communication Phrases & STCW 1978

⁸⁸ www.oceanservice.noaa.gov

of water around the island. 'The Costa Concordia had scale maps for navigation in open seas and not coastal sailing on which the rock that the ship hit was clearly marked.'⁸⁹

The captain had returned from a break when he noticed that they had sailed too close to the coast, however, ⁹⁰even with this evasive action, the ship still collided with the rocks on the left side. The initial assessment was that 5 compartments were flooding, one being the engine room.' This then meant that similar to the Napoli, the ship had no propulsion, was at the mercy of the wind and waves and unable to steer. Also, with the amount of water that was now inside the compartments, this made the ship extremely unstable. After 20 minutes of hitting the rocks the ship started to list, and within 3 hours it was completely resting on its side.

As we have already mentioned that the Concordia was equipped with sufficient lifeboats and this would have given everyone the ability to get away from the ship within 30 minutes of an 'abandon ship'.⁹¹ But as per SOLAS, there was lifeboats on both sides of the ship, the issue with this was that as the ship listed, it meant that very few lifeboats were operational. One side was almost completely submerged and the other almost 180 degrees from the water. SOLAS requires lifeboats to be able to be launched at a maximum list of 20 degrees, however, the Concordia exceeded this, leaving lifeboats either too far away from the side of the ship for use in evacuation or resting on the side of the ship unable to launch.

'We soon realised that there was a big problem – the inclination of the ship meant our lifeboats couldn't be lowered directly into the sea. The lifeboat was resting against the side of the ship.'⁹²

As with the Titanic, communication became a vital element to saving lives and Concordia was fitted with intercoms that meant the bridge could speak directly to the passengers.

For some reason, there was a delay in informing passengers and that led to them 'spontaneously putting on lifejackets and assembling at muster points.'⁹³ But for nearly 700 passengers who boarded

⁸⁹ Captain M Lloyd – Marine Consultant – Voices from the Costa Concordia Pt 1 - 5

⁹⁰ www.britannica.com - Tikkanen, A – Costa Concordia - 21.4.2017

⁹¹ SOLAS Chapter 3 Regulation 21.1.4

⁹² Captain M Lloyd – Marine Consultant – Voices from the Costa Concordia Pt 1 - 5

⁹³ Captain M Lloyd – Marine Consultant – Voices from the Costa Concordia Pt 1 - 5

in Rome, a muster drill hadn't taken place.⁹⁴ One of the findings with the Titanic was that people didn't know what to do when an evacuation was to take place. SOLAS 19.3.2 states that this should take place 'On a ship engaged on a voyage where passengers are scheduled to be on board for more than 24 h, musters of the passengers shall take place within 24 h after their embarkation.'⁹⁵ This in itself created a problem as the collision took place the same night that the passengers embarked from Rome.

The first announcement to the passengers was to inform them that there was a 'black-out due to an electrical fault. At this point everything is under control.'⁹⁶ The situation was far from under control. The announcement continued to advise 'We kindly ask you to return to your cabin or if you prefer you can stay in the lounge.'⁹⁷ Even though the ship was listing, taking on water and no power and yet the captain did not send a distress signal.

The first call to the Italian Coastguard was from a passengers' relative where they had called them from the ship. 'The local coastguard contacted the ship at 22:06 to be informed that there "is only a blackout" and still the captain didn't raise the alarm. The coastguard maintained contact with the ship and was receiving conflicting information, no new information and they decided to take proactive action and send search and rescue (SAR) to the Concordia.

Finally, the General Alarm was sounded at 22:48 over an hour after the initial collision. It could be said that the captain was in a state of shock, disbelief or fear of retribution as to what had happened, but he still had a duty of care to all of the people on board.

This has left the Maritime industry angry and shocked in the conduct of the captain and the company during the incident and afterwards.

⁹⁴ www.rina.org.uk – Cost Concordia – Passenger Evacuation

⁹⁵ SOLAS Regulation 19.3.2

⁹⁶ Captain M Lloyd – Marine Consultant – Voices from the Costa Concordia Pt 1 - 5

⁹⁷ www.rina.org.uk – Cost Concordia – Passenger Evacuation

Italian Maritime Investigation Team

The report was issued by the Italian MIT and the findings were that there was a serious human factor that led to the lead up to the collision, and also the events afterwards in abandonment and captains' actions.

There was an acknowledgement that 'the extent of damage is well beyond the survivability standard applicable to the ship according to her keel laying date.'⁹⁸ At the time of launch the Concordia could have survived this accident if only 2 compartments had filled with water, she was never an expectation of her surviving 5 flooded compartments.

It was recommended that 'double skin for protecting the compartments containing vital propulsions and electrical equipment.'⁹⁹ When we examined the recommendations for tankers transporting 'heavy oil', in that from April 2005 they would need to be double hulled, in the recommendation for the Concordia was that compartments containing vital equipment should be double hulled/skinned.

In operational matters the recommendations is for 'bridge management for an enhanced collective decision making process and "thinking aloud" attitude.'¹⁰⁰ However, if there is a language barrier, this will still create confusion and no matter how sophisticated the instruments are, if the crew cannot communicate this, this point is just "lip service" which on a ship with more than 3,000 people is a fundamental failing and will have a similar issue again.

For '¹⁰¹evacuation drills to be carried out at the early stage of a project' and not within the first 24 hours of embarking.

We cannot completely ignore the fact that the company (Carnival Corporation), who owned Costa Concordia knew that this "salute" took place on a regular basis and turned a blind eye to it. This was not the first incident that had happened to one of their ships. 'In June 2005, the Costa Fortuna was navigating along the western coast of Italy passing the island of Capri, the ship performed a "salute".

⁹⁸ www.ifsma.org – Marine Accident Investigation C/S Costa Concordia 18.5.2015

⁹⁹ www.ifsma.org – Marine Accident Investigation C/S Costa Concordia 18.5.2015

¹⁰⁰ www.ifsma.org – Marine Accident Investigation C/S Costa Concordia 18.5.2015

¹⁰¹ www.ifsma.org – Marine Accident Investigation C/S Costa Concordia 18.5.2015

During one particular salute, the Fortuna ruptured its hull on rocks off of Capri and started taking on water. The official report was that the ship had hit a whale!¹⁰²

SOLAS and Colregs

As we have seen, with SOLAS and Colregs the sole purpose is to prevent loss and save life at sea, however, as demonstrated, by just applying conventions lives and ships have still been lost.

The area that SOLAS and Colregs cannot control is the human factor. Humans behave differently when there is a crisis, or an unnatural event happening that they have never been in before nor been trained to combat. If SOLAS and Colregs was the 'holy grail' of safety at sea then the IMO have done their job and everything will be 100% safe from now on, but as we saw on the Concordia, even up to date technology could not prevent the incident that happened. Similar to pilots, captains have to maintain their training and meet the required standard, however, nothing can prepare them for a real life incident that involves a vast number of people with no training on ship operations. However, as with all training foremost concern should always to maintain the safe transportation of cargo, whether it is goods or people.

¹⁰² Captain M Lloyd – Marine Consultant – Voices from the Costa Concordia Pt1

Chapter 5

Limitations with SOLAS and Colregs

As we can see today's ships have vastly changed from the Titanic. These are bigger, faster and more technologically advanced and yet as we saw in chapters 2-4 SOLAS and Colregs have predominantly remained the same as they were in 1914. However, if ships today are more sophisticated and more compliant than ever there must be a reason why lives are still being lost at sea. This, therefore, indicates that there are limitations in SOLAS and Colregs that have either not been thought of or "everyone thinks it will never happen" as it's not been documented. This chapter is to explore and discuss several of the limitations within these policies and to explain how with amendments to them, the number of lives lost at sea will decrease over time.

IMO

Since 1948 when the IMO was formed vast improvements have been made. However, since 1968 ships have 'increased by almost 3 times in size and 20 times in capacity'¹⁰³ and yet there hasn't been a major review of SOLAS to ensure that the larger ships fit within current conventions. The current convention appears to be a "one size fits all" but this isn't necessarily the case. As with larger ships, technology has advanced quicker than the conventions have. 'The fact is that the size of ships has enlarged significantly (large crude oil carriers/large container ships).'¹⁰⁴

The IMO are the ultimate custodians but have no power. They are reliant on 'Flag States' policing and enforcing the conventions which should have been adopted by domestic governments. Currently (2019) there are 173 member states (nations) forming the IMO. With this number of member states, political views and associated domestic government pressures adds to the time it takes in an amendment being ratified, in that period of time, assuming there are no objections lives and ships are being lost.

¹⁰³ Cowles, J – Commercial Technology Sales Manager L3 ASV – Seaworks 2019 Unmanned vessel conference.

¹⁰⁴ www.un.org – Seikimizu, k – Director of Maritime Safety – Overview of current issues and future challenges in Maritime Safety.

However, some of the member states have shipping as an influential industry when it comes to agreeing or disagreeing with the conventions. Depending on the amendment, this can be processed quickly or have objections raised. The IMO recognised that their process was taking ‘too long for these amendments to become international law that they would be out of date before they did so. As a result, the IMO decided to introduce a new SOLAS convention which would not only incorporate all amendments that the 1960 convention so far adopted but would also include a new procedure which would enable future amendments to be brought into force within an acceptable period of time.’¹⁰⁵

There has to be a minimum number of states before it will become part of the IMO’s suite of conventions. An example of how long a convention can take is the Cape Town Agreement ¹⁰⁶and this convention is on preventing loss of life. This was adopted during the International conference that was held in South Africa in 2012. For this to come into force there needs to be at least 22 states, as of 26th October 2017 only 7 states had ratified this, and this does not include the UK. So, this demonstrates that the states are reluctant to agree to the variety of proposed conventions and it takes a long time to obtain the minimum. The additional issue for the UK is that to include this as part of various Acts, they need to be passed in Parliament. The bill has to be passed not only by the House of Parliament but also the House of Lords, and then formally agreed by the reigning monarch.¹⁰⁷ This is a long drawn out process to enforce something that is extremely important and designed to prevent loss of life at sea.

Expecting 173 members to agree was an almost impossible task. Every member state has its own political or industry specific pressure that could and did slow the approval process down. To combat this the IMO ‘introduced a new process in which the 1960 convention would only enter into force when it was accepted by two thirds of the contracting members.’¹⁰⁸ However, even with a “faster process” for ratifying and adopting conventions, the IMO is still powerless over member states to actually enforce any convention, and are technically observers of the conventions rather than the true custodians. We need to add it would be extremely unwise for member states not to enforce. By

¹⁰⁵ www.imo.org – SOLAS 1974 Convention.

¹⁰⁶ Cape Town Agreement of 2012 of the implementation of the Provisions of the Torremolinos Protocol of 1993 – IMO – Safety for fishing vessels.

¹⁰⁷ www.parliament.uk

¹⁰⁸ www.imo.org – SOLAS 1974 Convention.

enforcing the conventions gives the flag state kudos and demonstrates that they operate within the IMO guidelines. 'The problem is that some countries lack the expertise, experience and resources necessary to do this properly. There is a demonstrated statistical evidence that a highly significant difference exists between the performances of States with a substantial and organised maritime safety administration, manned with experienced ship surveyors and other ones that are not in a position to properly fulfil the different tasks and responsibilities of the flag state in relation with safety certificates of ships. The IMO is concerned about this problem and in 1992 set up a sub-committee on Flag State Implementations (FSI) to improve the performance of Governments.'¹⁰⁹ The IMO recognise that there is a problem and is using the sub-committee to audit flag states to ensure that the standard of the convention is maintained and consistent.

'As expected, the "tacit acceptance" procedure has greatly sped up the amendment process. Amendments enter into force within 18-24 months generally. Compared with none of the 1960 SOLAS convention amendments between 1966 -1973 received sufficient acceptance to satisfy minimum requirements.'¹¹⁰

In order for the IMO to help speed the process up they then decided on a tacit approach, which shows that they understand the need for making things happen quicker, but some could say silence is not necessarily acceptance. 'Under tacit acceptance, a resolution is accepted on an agreed time interval from adoption unless it is objected by a number of contracting governments.'¹¹¹

Whilst one of the main purposes of SOLAS was to respond to a public outcry on improving safety, on the surface it appears to address the major issues like, lifeboats, training, navigation and communications, it is apparent that it ignores the smaller accidents and incidents that happen at sea on a regular basis. These could be regarded as occupational hazards like slips, trips and falls. However, some of these "occupational accidents" can have serious implications¹¹².

¹⁰⁹ www.imo.org – Implementation of IMO instruments.

¹¹⁰ www.imo.org – Adopting a convention, entry into force, assentation, amendment, enforcement, tacit acceptance procedure.

¹¹¹ www.myseatime.com – Capt. R Jassal – Understanding IMO Conventions, resolutions and circulars 26.1.16

¹¹² www.oem.bmj.com – Hanson, L, Frydenberg, M, Nielson, D - Occupational accidents aboard merchant ships. 2002

Conventions are only part of the system in ensuring that ships are safe while at sea. In the UK there is a plethora of Acts that overlap the IMO conventions. They can also create some confusion. As an example; whilst on dockside and working on the ship, the individual must abide by Health and Safety at Work Act 1974 as this is a place of work. The confusion then is whether this act applies when working onboard ship. ¹¹³ The ILO has a convention on occupational safety and health, but this is dated 2006, so the UK have had an Act in place for almost before a robust convention was implemented. In that time ship workers have been trying to adapt and ensure that they maintain a safe working environment.

For the IMO to be the guiding force in maritime conventions they need to have the ability to not only review the conventions but also have the ability to draw on national laws to ensure that best practice is being applied internationally. In the UK it would be easy to become confused as to which piece of law they are meant to follow, adhere to and put into practice. If International and national laws complimented each other it would be a constant process that would be standard across all flag states.

Lifeboats

Under SOLAS 1974, lifeboats have to be maintained, inspected and training given on how to use them as there are now a variety of lifeboats onboard ships. However, 'from 1994 – 2004, marine insurer "Gard" recorded 32 cases of accidental release of lifeboats. Five of those cases were without injury but were reported to the P&I club, other cases have resulted in 12 deaths and injury to 74 people.'¹¹⁴

These lifeboats have accidentally released itself and injured people in the process.

SOLAS 1974 Chapter III states 'The International Life-Saving Appliances (LSA) Code gives specific technical requirements under Regulation 34, which states that all lifesaving appliances and arrangements shall comply with the applicable requirement of the LSA Code.'¹¹⁵

¹¹³ Implementing the occupational safety and health provisions of the Maritime Labour Convention (MLC) 2006 - ILO

¹¹⁴ www.gcaptain.com – Yatsenko, N (Master Mariner) – Why are lifeboats killing seafarers? 25.5.17

¹¹⁵ www.imo.org – SOLAS 1973 Chapter III

Prior to 1996 the LSA code was separate to SOLAS 1974, so could quite easily have been overlooked. However, the LSA states that 'the mechanism shall be so arranged that all hooks are released simultaneously.'¹¹⁶ But 2.2 of the same code states ' The release capability shall be adequately protected against accidental or premature use.'

This doesn't give a definition of what the IMO deems "adequate protection", one person's definition of adequate can be vastly different to another person's definition. Without this definition being specified and outlined within the policy, it could lead to confusion and accidents could occur if due care is not present surrounding the adequate protection. This is a vital piece of equipment and yet its open to interpretation.

As we saw demonstrated in the Costa Concordia accident deployment of lifeboats safely is only possible when the ship is either completely vertical or at a 'maximum list of 20 degrees.'¹¹⁷ However, the likelihood of a ship sinking vertically is rare as it is dependent on the ship evenly filling with water and therefore sinking evenly. Most incidents occur when the water enters the ship either due to a collision, poor maintenance or failure to close water tight hatches.

If the ship is listing to one side at a greater than 20 degrees a high proportion of lifeboats cannot be used and the equipment that should be saving lives will actually hinder the reason for saving life.

This is a limitation or failing in the SOLAS 1974 convention even with this one issue alone there can be vast implications for future ship's crew and passengers.

After this accident, there should have been a review of how lifeboats operate and the need as to when and how a lifeboat is deployed. Too soon and ship abandonment could put lives at risk, as a lifeboat in the open sea when unnecessary is just as dangerous as leaving the decision too late. The decision too late as demonstrated on the Concordia, means that lives are also put at risk as lifeboats may be unable to be deployed due to the ship listing.

¹¹⁶ www.imo.org – Resolution MSC – Adoption of the International Life-Saving Appliance Code Chapter IV – Survival Craft 4.4.7.6 part 1

¹¹⁷ www.imo.org – SOLAS 1974

Ships in Service

Earlier we discussed that ships had increased in size and capacity but SOLAS and Colregs have not addressed the issue that with the increased size is also relevant weight associated with this. Ports have been modified for larger ships and are still being modified to accept them to unload and reload around the world.

It looks like industry has recognised that ships are now bigger, and can carry heavier loads, but the IMO hasn't addressed the issue that current conventions may need updating to accommodate changes to ships currently in service. Ship owners are doing their best to ensure that their ships are compliant with current SOLAS and Colregs, but this may not be enough and without guidance from the IMO they are in a state of limbo until conventions have been updated and published.

Colregs states that 'every vessel shall at all times proceed at a safe speed so that she can take proper effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions.'¹¹⁸

With larger ships in a similar way to road freight, lorries take longer and a greater distance to stop than a car. Ships also take longer to stop compared to ships 50 years ago. Today 'It may take a container ship or oil tanker as much as five miles to stop. The solution is simple "stay out of their way".¹¹⁹ This could be seen as a flippant statement but there could be a reason for Lt Golkin stating this. With ships becoming bigger and the bridge so far off of the deck due to the cargo height (especially containerships) and ships length being longer the need for look outs becomes more vital today than ever. Regulation 22 of SOLAS states 'The view of the sea surface from the conning position shall not be obscured by more than two ship lengths, or 500 m, whichever is the less,¹²⁰ But that's a distance view and not directly in front of the ship. So, if a ship was to sail in front of the ship there is no way the team in the bridge would be able to see the ship.

¹¹⁸ www.assets.publishing.service.gov.uk – MSN 1781 – Merchant Shipping Regs 1996 Part B Rule 6

¹¹⁹ www.usps.org – Lt Golkin, L – 20 Tanker tips

¹²⁰ www.imo.org – SOLAS 1974 Regulation 22

'Rule 5 of Colregs requires that "every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions as to make a full appraisal of the situation and the risk of collision.'¹²¹

What rule 5 doesn't account for is what happens in poor weather or how many look outs are needed and where they need to be placed on a ship. If we consider that the Titanic was 269m compared with an oil tanker Seawise Giant was an enormous 460m long, the bridge team would have had to have had lookouts all over the ship to ensure that it was safe to be sailed around the world, and to come to a halt this ship took 5 miles. But there were only '40 crew members on board to sail 24 hrs. a day 7 days a week.'¹²²

There needs to be a review on large ships with regard to lookouts. Ships will continue to grow and there needs to be a review as to the importance of lookouts when steering, manoeuvring and docking.

All commercial ships have radar, GPS, charts and navigational equipment and yet when they are in areas like the English Channel that not only has commercial ships, but also pleasure craft, this becomes an extremely dangerous stretch of water. Even though with technology, if a smaller ship sails in the path of a containership, the likelihood of them avoiding them or stopping before they collide, is nigh on impossible. By the time the ship sees the sailing boat, it will be too late, as the containership is less agile to avoid a collision.

Colregs addresses various circumstances like head on situations, give way, overtaking but it doesn't have a rule on large ships. This then fits with an earlier statement that it's a "one size fits all", but this needs to be addressed with more and more larger ships at sea.

¹²¹ www.imo.org – Colregs 1972 – Part B – Rule 5

¹²² www.largestshipintheworld.com

Age of Ships

Ships on the whole are expensive to buy, maintain and operate and to make buying a large asset like this repay itself, the shipowners keep them in service for as long as possible. But with ships made of steel and sea water corrosion is as common as a tyre required for a car. However, an asset may be regarded as long-life if it is reasonable to expect that it will have a useful economic life of at least 25 years when it is new.¹²³ But what tends to happen is that ships will be bought and sold in its life and this happens even when the ship is damaged.

If we consider the Seawise Giant, the largest ship ever constructed was built in 1979 and was decommissioned in 2010. This ship was over 30 years old and was at sea for most of this. The reason we say most of this was that in 1988 she was sunk in the Iraq war and was declared as unusable. But in 1991, she was sold, and the new owners repaired her and then continued to use her until she was decommissioned.

The SS Marine Electric was constructed in 1944 and was used in WW2 before being refitted to be a bulk cargo carrier. In 1983 tragically in a storm, this ship sank, but one of the findings from the investigation was that the maintenance was of poor quality and the hatches that had been replaced were due to rust and corrosion. It was also found that during maintenance periods either the work wasn't carried out or it was "patched" to make her seaworthy. 'The investigation revealed that although the Marine Electric had been recently inspected several times by both the American Bureau of Shipping and the Coast Guard, marine inspectors had failed to note several discrepancies or recommend needed repairs. Investigators concluded that the casualty had most likely been caused by inadequate cargo hatches and deck plating, which allowed the crashing waves to flood the vessel's forward spaces.'¹²⁴ This indicates that older ships need greater inspection, more time for repairs and the cost will be greater. Ship owners are there to run a business and make a profit, so this becomes a heavy burden on them and the schedules.

¹²³ www.shipmanagementinternational.com

¹²⁴ www.gcaptain.com – SS The Marine Electric – The shipwreck that changed the American Coastguard.

Again, SOLAS and Colregs isn't accounting for aging ships with additional issues or that the flag state carrying out the inspections are as diligent as the conventions state. Because power has been given to flag states, it's almost as though they have no-one to bring them to task, until the incidents go to court and then it becomes a blame game as to who was responsible for "negligence". However, as with negligence, it is difficult to prove¹²⁵ who was at fault especially on a ship where there are hundreds of crew, but ultimately it is the captain who is control of that ship.

There are more ships at sea today than 20 years ago and they are aging. As you would expect with a car, the older the vehicle the more it costs to maintain. Ship owners want bigger, faster ships but until they can raise the capital, they are reliant on the 'Flag state' to be diligent in their inspections and maintenance companies to do what is required to maintain SOLAS and Colregs at all times.

Technology

Over time, industry has developed technology to improve seafarers experience at sea and make their jobs easier in navigation, communication and operation. However, at the speed that technology has advanced, SOLAS and Colregs have always been behind the curve. In some instances, they have ensured that it is compliant by stating 'When equipment, for which performance standards have been developed by the Organisation, is carried on ships in addition to those items of equipment required by regulations 19 and 20, such equipment shall be subject to approval and shall as far as practicable comply with performance standards not inferior to those adopted by the Organisation.'¹²⁶ This implies that the equipment has to have been endorsed by the IMO to be used at sea.

However, ships are becoming more sophisticated it would be difficult for the IMO to keep up with every nations technology especially when most companies developing this will keep any developments as trade secrets until sold to the markets.

¹²⁵ Scott v London & St Katherines Dock Co (1835) 3 H&C 596

¹²⁶ www.imo.org – SOLAS 1974 Regulation 18

Human Element

This is an area in which SOLAS and Colregs cannot control, what they can do is ensure that all crew have sufficient training on a regular basis. This will keep technology at the forefront by using state of the art simulators to try and give seafarers experience in how to react to situations that are extraordinary.

For most seafarers they will encounter extreme weather, demanding seas, and challenges that they could never predict i.e. collisions and freak waves.

The best that can happen is that they have constant training in all types of eventualities, but training comes at a cost in time and money. Something that a ship owner is aware of but with ships being in demand, they will want to turn the ships around as quick as possible to maximise revenue.

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978 was introduced to ensure that all seafarers that sailed on a ship of greater than 24 metres in length had a standard level of training to promote and ensure safety at sea.

In '2010 amendments were primarily aimed at keeping seafarers current with new technology and also added security training due to the increased problems with the hijacking of ships by pirates.¹²⁷

The IMO might see themselves as doing the “best job” they can but is it enough in keeping the mariners safe whilst at sea. As we saw with the Titanic and Concordia, both captains were either unaware as to what was happening, not following procedure or in shock as to what had occurred. Captain F Schettino was arrested for negligence¹²⁸ as he “allegedly” abandoned ship prior to all onboard evacuating and failing to captain a ship correctly¹²⁹. However, no amount of training or conventions could have predicted how he would react with the decision to abandon ship.

¹²⁷ www.maritimeskillsacademy.com – STCW Convention Explained – History and Overview.

¹²⁸ Donoghue v Stephens [1932] A.C 562

¹²⁹ Burns, M – Maritime Risk International – March 2015

We need to consider that even though member states hold the power to prosecute when things go wrong, no-one is policing them in ensuring that they are doing the job they are supposed to do.

Devolving power, has its benefits in that it gives the member states, the ones close to the problem the ability to administer the relevant penalty. However, what this does mean is that the IMO are too far removed to see the impact that the conventions are doing.

Industry is being relied on to deliver goods faster, more frequently and to anywhere in the world, to achieve this they see that bigger, faster and more technical ships are required. However, the IMO are behind the “curve” where industry is moving a rapid pace. We as consumers can see how fast technology is advancing and yet the IMO are slow in reacting to this. Amendments to the conventions only go so far as they are a patch to a problem but as we have seen not all flag states have the expertise to implement the conventions or amendments to their full capacity. Without implementing them, casualties onboard will remain at the level they have. However, we should never forget to look at history and what was needed to make this industry safe for all seafarers. As industry moves towards unmanned or autonomous ships, if the IMO doesn't review SOLAS and Colregs they could have a situation where there are ships that will have limited or no crew onboard and safety at sea could be compromised.

Chapter 6

What is industry doing to tackle the lack of guidance on safety or is it purely for conventions to fix?

As we have already discussed, the IMO is slow in reacting to changes in technology and also in recommendations from investigations into incidents.

What we are seeing is industry taking the lead and the IMO then assessing the relevance and suitability of the actions that industry has taken.

Technology

Voyage Data Recorders

Since the early 1960's the air industry has fitted aircraft with what is called a "black box". This was in response to several serious plane crashes in the 1950's. The purpose of this piece of equipment was to give investigators an insight as to what happened prior to an air accident. 'Since the 1950s, the data inside black boxes has helped accident investigators, airline manufacturers, and aviation professionals improve flight safety for everyone.'¹³⁰ It was felt that with such devastating accidents, the ability to have an insight as to what happened, how the instruments performed and also the crews reactions helped understand and also prevent those incidents happening again.

However, ships have been in existence for significantly longer than aircraft and yet with so many incidents it is surprising that Voyage Data Recorders (VDR) hadn't been fitted to all ships irrespective of size.

It was an incident in the 1970's that gave rise to the idea of a possibility of a data recorder for maritime. However, it wasn't until the tragedy in 1987 when 193 people died when the Herald of Free

¹³⁰ www.insider.com – Swain-Wilson, S - 14 things you never knew about airplane black boxes. 12.12.2018

Enterprise RORO Ferry capsized that the owners P&O commissioned a company to research and develop a VDR. However, as with all new technology not all 'major operators immediately embraced the concept, while others shunned it.'¹³¹ Despite some operators shunning this, P&O Ferries installed 10 to their fleet of ships. This was a very bold action and expensive one; one that proved industry was taking safety seriously and wanted to have quality data in the event of something going wrong. Then in September 1994 the sinking of the ferry Estonia taking 852 people, added weight to call for mandatory VDRs. Finally, in 1995 the IMO requested that the Maritime Safety Committee (MSC) develop relevant operational requirements and performance standards and consider VDR requirements.¹³²

'Performance standards for VDRs were adopted in 1997 and give details on data to be recorded and VDR specifications.'¹³³ This was almost 30 years after the original possibility of an idea of a VDR on ships.

As we have seen, it takes a period of time for a convention and or amendments to come into force and the implementation of VDR's was no exception. It wasn't until July 2002 that Regulation 20 (VDR's) came into force with stipulations on which ships were to be fitted with VDR's.

This has proved to be a vital piece of equipment and data record in understanding how a ship performs and also the conversations on a bridge during a voyage. The data recorded was used in the prosecution of Captain F Schettino in the case of the Costa Concordia, the data from the VDR gave the court valuable information on what was said, who said it and also what the instruments were doing.

Without the VDR, the investigation may never have known what had happened and why the ship sailed so close to the rocks.

The way in which technology has advanced, it may be beneficial to have visual data of the bridge too. However, as with everything, it's not as easy as just installing the equipment. This is due to the varying data protection laws, confidentiality and human rights differences across the world.

¹³¹ www.rivieramm.com – A short history of VDR – June 2009

¹³² www.rivieramm.com – A short history of VDR – June 2009

¹³³ www.imo.org – Voyage Data Recorders

Communications

Even as far back as the Titanic in 1912, we have seen communications improve and have greater uses. In a similar way the passengers on the Titanic were seen to monopolise the radio, in some respects, cruise passengers today still want to keep in contact with everyone back home. But the difference being that most communications are now via satellite and multiple users can operate at the same time.

However, since 1999 the IMO has implemented 'essentially a worldwide network of automated emergency communications for ships at sea. It means that all ocean-going passenger ships and cargo ships of 300 gross tonnage (gt) and upwards must be equipped with radio equipment that conforms to international standards as set out in the system'¹³⁴. They need to be equipped with terrestrial and satellite radios. This then ensures that communications to all ships can be heard and sent, as any ship under 300gt may not have both sets of communication equipment. This has been a development driven by the IMO in keeping ships in communication with other traffic and also coastguard stations.

AIS (Automatic Identification System).

As we have seen having the ability to know where a ship is or last position was has become vital to maritime, especially in the event of a ship getting into difficulties. This data has become important not only to ship owners but also governments, Search and Rescue (SAR) and port authorities. At any point, a ship can be tracked or traced to see where she is, 'it is capable of providing information about the ship to other ships and to coastal authorities automatically.'¹³⁵

¹³⁴ www.imo.org - Shipping Emergencies - Search and Rescue and the GMDSS

¹³⁵ www.imo.org – Regulations for carrying AIS – SOLAS Chapter V – Regulation 19-1

However, this information is open to everyone and that also means pirates. But the dangers for not having this on a ship outweighs the possible immoral use of the data. The knowledge of knowing where a ship is important to ship owners and port authorities in that they can adjust ETA's or advise ships of delays.

'It's not entirely clear who it was that came up with the first AIS vessel tracking and identification system, but like so much other technology that we take for granted these days, it came out of the introduction of GPS for civilian purposes, which achieved global coverage in the early 1990s. It was then the integration of GPS time and position data with long-standing VHF radio technology that enabled the development of AIS.'¹³⁶ Even though it's not clear who instigated the change it is clear that there was a need to have this on board. In its early guise, it was used as an 'anti-collision in poor weather, in support of radar and traditional ships watch.'¹³⁷

The IMO mandated this in its 2002 convention stating 'that all passenger ships and other commercial vessels over 300 GT should carry Class-A AIS transceivers. At the time this affected around 100,000 ships, but since then use has expanded as the unit cost of transceivers has fallen and both compulsory and voluntary adoption has increased.'¹³⁸

However, as we have mentioned, this information is open to everyone and with pirates becoming more technically minded it is a challenge for ships to be more vigilant in the areas that they operate. As we are all aware, we are all open to hackers and people that are either trying to steal data or manipulate it. Maritime is not unique in this and as we will have more sophisticated technology the need to protect it is becoming greater as this not only affects operations onshore, but also offshore and it's the offshore that needs the greatest protection as they are miles away from port without significant IT support.

Even though we have all this technology, we still have untrained people using this and sending "false distress signals."¹³⁹ This is no different to the experience on the Titanic, which had radio operators that weren't familiar with the equipment. There is also an issue that some of this technology isn't

¹³⁶ www.bigoceandata.com – A brief history of AIS 14.7.2016

¹³⁷ www.bigoceandata.com – A brief history of AIS 14.7.2016

¹³⁸ www.bigoceandata.com – A brief history of AIS 14.7.2016

¹³⁹ www.imo.org – Shipping Emergencies – Search and Rescue March 1999

user friendly and is creating delays in sending messages out. It then becomes important to ensure all who will use the radios are trained and know the basics, it may also be wise for those to also know “old school” techniques, i.e. Morse Code, and knowing the International code for distress.¹⁴⁰

There is still a question as to what all of this technology is doing as there are still collisions on ships that have radar, navigation systems, GPS tracking, AIS and radio Communications¹⁴¹. So, it now raises the question as to why SOLAS Chapter IV isn't keeping seafarers safe, maybe this will be addressed with the new age of maritime, in Autonomous Vessels.

Equipment

Lifeboats

As we have seen, one of the fundamental pieces of equipment is the lifeboat. Over the past 100 years, the lifeboat has been modified and brought up to date. Today's lifeboats are now partially enclosed to protect those using them from the elements. Some are also motorised, but these are also used as tender boats to bring passengers on board where a ship cannot come into port due to her size. All lifeboats still follow the same regulation as written in the 1974 SOLAS convention.

However, as there have been many updates to the equipment, there has been a need for an updated Life Saving Appliance Code. The list now includes all types of life saving craft.

Even though the convention was sufficient before motorised lifeboats, it needed to include all kinds of lifeboats to ensure that all was compliant and safe. However, this still doesn't address the issue of there being a maximum degree in which a lifeboat can be deployed.

With industry developing new lifeboats and life crafts, it is trying to make evacuating a ship less of a traumatic experience, nevertheless we still need to emphasise that this is still a frightening situation for all involved. However, the Royal Institute of Naval Architects reported that ‘a recent philosophy of

¹⁴⁰ www.imo.org – SOLAS Chapter 4

¹⁴¹ www.bbc.co.uk – Baranuik, C – Why it's not surprising that ship collisions still happen 22.8.2017

passenger ship design has now returned to the idea of regarding the ship as its own best lifeboat capable of providing a “safe area” for passengers until “return to port” or adequate rescue services arrive. IMO has set out Safe Return to Port requirement in the 2009 International SOLAS treaty, which are applicable to passenger ships built on or after the 1st July 2010. These new requirement were prompted by the increasing size of passenger ships. The more passengers a vessel has the longer it takes to evacuate. The requirement defines minimum limits on how long the vessel should remain safe for evacuation. It defines threshold where ships should be able to return to port without requiring passengers to evacuate.¹⁴²

Even though it is probably safer to remain on a ship, there needs to be constant evaluation of the situation as it may become unsafe in a short space of time.

Immersion suits

With many ships now sailing in Arctic waters it has become more important to protect those seafarers against hypothermia. ‘Hypothermia is a major cause of death at sea, resulting in about 800 casualties annually, most of which are reported as drownings.

Cold water immersion suits have become an important safety component on board commercial vessels and offshore platforms, protecting accident victims from open flames, high impact jumps, hypothermia and drowning.’¹⁴³

Immersion suits in one form or another have been in operation for several years but have never formally entered into a convention until 1983¹⁴⁴. The 1983 convention included requirements for improved personal life-saving appliances, including immersion suits (protective suits which reduce the body heat-loss of a person in cold water) and thermal protective aids (a bag or suit made of waterproof material with low thermal conductivity). Prior to 1983, suits didn’t have the same level of protection to ensure that seafarers survived the extreme cold of the sea. However, it was during the investigation of the SS Electric Marine that the National Transportation Safety Board (NTSB) recommended that ‘ships’ owners provide crews with cold water survival suits.’ This recommendation

¹⁴² www.rina.org – Passenger Ship Lifeboat

¹⁴³ www.maritime-executive.com – Immersion suit adds 10+ hours survival time. 26.06.2015

¹⁴⁴ www.imo.org – SOLAS 1983 Reg III/32.3

pushed the responsibility back to the ship owner to provide the correct suit and ensure training was given. 'Each person on board the ship must have his/her own personal immersion suit. Also, extra immersion suits should be provided for the watchkeepers.'¹⁴⁵

The issue was that it wasn't specific as to who or what this was relevant to as there are more than just ships at sea. The NTSB recommended 'Ships owners' but SOLAS is there to address all vessels at sea this included oil platforms.

In the Piper Alpha disaster, an oil and gas platform off the coast of Scotland tragically exploded and killed 167 people. There were 61 survivors but even in 1988, these survivors didn't have the immersion suits that the convention states that they should have. These survivors were lucky in that rescuers were close by and they were rescued in a short space of time. In the Cullen report which was published in 1990 'each person on board an installation should be provided with – a personal (immersion) suit'¹⁴⁶

As we can see, this is not specifically an industry led improvement but a collaborative action in improving survival rates for seafarers. The area in which industry have still led the way is improving the amount of time it takes for an individual to don the suit. The aim is under 90 seconds and keep a person warm for over 6 hours. Industry has also reviewed the possibility of cruise passengers to have survival suits. 'In 2014 the Sewol sunk in less than three hours. This ferry was taking over 300 school children down with her. The coast guard arrived within 40 minutes, but by the time they arrived the ship had listed to 60 degrees and made deploying lifeboats impossible.'¹⁴⁷

If survival suits were available to those that had no means of 'escape, they may have had access to a safe, alternative escape route.'¹⁴⁸

This could be a future improvement on longer routes for cruise ship passengers but will take greater training and management. It's easy to suggest this to companies, but passengers that sail are for

¹⁴⁵ www.marineinsight.com - Bhattacharjee, S - Immersion Suit, Anti Exposure Suit, Thermal Protective Aids – 8.8.2019

¹⁴⁶ www.hse.gov.uk – The Public Inquiry into the Piper Alpha Disaster – Volume 2 section 85

¹⁴⁷ www.maritime-executive.com – immersion Suit adds 19+ hours survival time. 26.06.2015

¹⁴⁸ www.maritime-executive.com – immersion Suit adds 19+ hours survival time. 26.06.2015

some a once in a lifetime and it can be daunting to even attend a muster practice. No-one ever goes onto a ship thinking the worst, but ship owners and operators need to prepare and if immersion suits are the way forward, then maybe this needs to be explored further.

Training

With everything, training is vitally important to everyone at sea, and for training to be refreshed on a regular basis. With technology and industry changing and improving the need to maintain and update training is important when operating a ship.

It's not just upgrading systems, it's also about multi-skilling crew in the ability to cover each other. Obviously senior roles take time and intense training, but the areas like medics and fire-fighters becomes important in the day to day operation of a ship. The increasing issue is that over time the need to cut costs and maximise profit, crew have predominantly been the area which has been reduced.

With new conventions and regulations coming into force, it is easy to lose track of them yet most employers are still streamlining their workforce to become more efficient and cost effective. In previous years, most ships would have had crew to cover all roles and additional to maintain safety standards. In today's business practice, the individuals that used to maintain safety have now been consumed and absorbed within the decreased workforce. Most crew members will now need to be experts in not only their own primary role, but also an expert on safety and security. This puts immense pressure on the team to be able to multi-task and maintain qualifications and certifications¹⁴⁹.

The reason for all of these certificates, regulations and conventions, is to ensure that all ships that are out to sea are seaworthy and can give assurance to the passengers, crew, owner, insurance companies and suppliers/customers. They all need to have confidence that they will have safe passage and by adhering to all of the conventions, regulations and certification is that assurance.

¹⁴⁹ ISM – Art 6

However, failure to comply and crew's incompetence, in broad terms negligence is still the responsibility of the captain, he/she has the overall authority of that vessel and needs to ensure it is safe and compliant including the crew.^{150 151}

¹⁵⁰ The Eurasian Dream [2002] 1 Lloyds Rep 719

¹⁵¹ The Journal of International Maritime Law 16, pg. 102 -131

Chapter 7

The Future of Maritime

With technology improving the way in which shipping operates, it's not surprising that ship owners are looking at bigger, faster and more sophisticated ships to transport goods all around the world in the shortest period of time. However, conventions need to be inclusive of any new ships that are to be operated on the sea to protect crew, passengers and goods.

Autonomous Vessels

The aim for the future of maritime has been researching the ability of operating a ship with either limited crew or no crew (remote), however, the IMO have yet to fully distinguish between what is meant by autonomous and unmanned and what the implications of these ships will have and how they will integrate with current shipping.

Sir Bernard Eder wrote 'The issue of unmanned vessels will be at the centre of the future of shipping and provide an important challenge to all parts of the shipping community. It is therefore of paramount importance to ensure that the existing international regulatory framework is reviewed, understood in its actual and potential application to unmanned vessels and, as necessary, update to accommodate this new technology and allow it to operate safely.'¹⁵² As we can see there will be some challenges around unmanned or autonomous ships.

In 2018 the IMO "commenced" work to look at how safe, secure and environmentally sound maritime autonomous surface ships (MASS) operations were and how they may be addressed within the IMO instruments (conventions).¹⁵³ However, working with and also independently to the IMO are various

¹⁵² Sir Eder, B - Unmanned Vessels: The Challenge - LMCQ 2019 Qtr. 1 pg. 47

¹⁵³ www.imo.org – IMO takes first steps to address autonomous ships – 25.05.2018

member states with the aim of improving their own domestic laws to incorporate new technology onboard ships.¹⁵⁴

Even though the IMO have limited this to ships, there are other craft that use national and international water that may be classed as an unmanned ship. 'In the Merchant Shipping Act 1995 (MSA) section 313 (1) provides that "unless the context otherwise requires 'ship' includes every description of vessel used in navigation"¹⁵⁵. The requirement for used in "navigation" has been of important case law but there is no clear reason why a ship either remotely controlled or is autonomous in operation may not fall in with the MSA 1995 definition of ship purely because of its unmanned status.'¹⁵⁶

'The state of technology is such that unmanned ships are now a realistic prospect.'¹⁵⁷

Since 2016 Rolls Royce has engaged with the Finnish Universities to research the prospect of autonomous ships. However, the IMO have recently engaged the Maritime Safety Committee (MSC) to 'endorse a framework for a regulatory scoping exercise, as work in progress, including preliminary definitions of MASS and degrees of autonomy, as well as methodology for conducting the exercise and a plan of work.'¹⁵⁸

However, as we can see the date of that the IMO article is dated May 2018, but Rolls Royce have been sea trialing a remote controlled ship since June 2018 where she was docked using technology rather than human intervention.¹⁵⁹ 'At no time during the tests did the captain need to take manual control.'¹⁶⁰

So, with the development of this technology, industry is now realising that this is a viable option.

¹⁵⁴ www.gov.uk – Maritime 2050 – Navigating the Future & www.amsa.gov.au – AMSA's Operating Environment 2017-2027

¹⁵⁵ R v Goodwin [2005] EWCA Crim 3184; [2006] 1WLR 546

¹⁵⁶ www.bmla.org.uk – CMI questionnaire: Unmanned ships Q1. National Law (2018)

¹⁵⁷ Tsimplis, M – The Integration of unmanned ships into the Lex Maritima – LMCQ 2017 pg. 303

¹⁵⁸ www.imo.org – IMO takes first steps to address autonomous ships – 25.05.2018

¹⁵⁹ www.sciencebusiness.net – Finland trials Autonomous Ship – 5.9.2018

¹⁶⁰ www.sciencebusiness.net – Finland trials Autonomous Ship – 5.9.2018

Vicarious Liability

If industry is going to be using MAS ships, there needs to be a discussion on vicarious liability and with whom ultimate control and accountability lies. As we've already mentioned, the captain has the ultimate accountability however, 'Vicarious liability'¹⁶¹ refers to a situation where someone is held responsible for the actions or omissions of another person. In a workplace context, an employer can be liable for the acts or omissions of its employees, provided it can be shown that they took place in the course of their employment.'¹⁶²

However, if autonomous ships have no crew and are controlled by software, the dilemma is who then owns the software. With software, a company will generally buy the licences to operate the software and not actually own the software itself. So in the event of a collision or incident, if there were crew onboard and they had carried out an act that had repercussions, so long as it wasn't willful neglect¹⁶³ then the ultimate responsibility lies with the ship owner or company, so if there's no crew but an error in the software, it would seem harsh if the ship owner was then held responsible for that as this is not his area of expertise.

As the whole purpose of vicarious liability is that the ship owner is liable if they are an employee but not a contractor. This will need to be extensively explored with the IMO and then in turn the member states as this could change domestic law and how it is administered.

Cybercrime

Unfortunately, cybercrime has become headline news for at least a decade and has impacted some high-profile industries i.e. NHS and NatWest. However, even though these are high profile companies, they are all on land and can still operate without the use of computers and the software attached to them. If at sea and software is hacked or compromised, we could have ships that are

¹⁶¹ Mersey Docks v Coggins [1947] A.C 1 (HL)

¹⁶² www.acac.org.uk – Understand what vicarious liability means for employers

¹⁶³ The Druid (1842) 1 W Rob 391

completely powerless or at the mercy of terrorists if they override the integrity of the software. If powerless, as we have seen demonstrated in ships where the engine rooms have flooded, they are then prone to being taken off course and become a danger to other shipping traffic in the area and not forgetting that this will also take its toll on the welfare of the crew. In July 2017, the IMO stated that their guidelines were at a high-level and 'detailed guidance on cyber risk management, users of these Guidelines should also refer to Member Governments' and Flag Administrations' requirements, as well as relevant international and industry standards and best practices.'¹⁶⁴

With 'technologies being used for essential operations and management of systems that are critical to safety and security of shipping. In some cases, the implemented systems have been installed to comply with international standards and Flag Administration requirements. However, there are vulnerabilities in creating access to interconnecting or networking systems that can lead to cyber risks that should be addressed.'¹⁶⁵

If the IMO are reliant on member states to set standards, this then gives rise to different standards and are therefore open to interpretation and conflict in how these are implemented.

Cost

In 2008 in the height of the recession, the shipping industry found themselves in extreme commercial crisis. Ships that had been ordered were left in shipyards as credit had been either reviewed and reduced or withdrawn altogether. With ships costing millions of Dollars to construct, there could be that with all this technology, an autonomous ship could be too expensive for ship owners to own and operate.

However, to keep up with market demand the prospect of not having a fast or large enough ship to meet the demand could push some ship owners out of business. This then becomes a big financial gamble for them and one that could be detrimental to the strategy for the business. But as we have

¹⁶⁴ www.imo.org – Jul 2017 – Guidelines on Maritime Cyber Risk Management.

¹⁶⁵ www.imo.org – Jul 2017 – Guidelines on Maritime Cyber Risk Management. (2.1.1)

already discussed a ship would on average have the life span of approx. 25 years, so the return on investment won't be immediate, but would eventually repay the intimal outlay.

Current Fleet v Autonomous Ships

The ultimate issue will be with current fleet and them operating with current navigational systems, against new technology that may not have the ability to manoeuvre out of the way of each other. As Colregs states, giving way and not impeding If the COLREGs require you 'not to impede' or 'give way to' another vessel, then you must take very early action to make sure risk of collision does not develop. ... Always do something positive and timely to avoid a collision.¹⁶⁶ However, if one ship has no crew and is being controlled remotely, the responsibility to avoid is passed back to ships that are operated in a conventional manner. This gives an unfair bias on whose fault it is. There needs to be robust conventions in place to ensure that every party is an equal and not at an unfair advantage.

One of the key actions in an investigation is the ability to take statements from eyewitnesses or people that were in the incident. If we have no eyewitnesses as they are both crewless or limited crew, the requirement to have sophisticated VDR's as well as sufficient visual recordings becomes more relevant especially in establishing what happens during an incident at sea. This is for both ships and not just autonomous ones.

As we can see, technology is working at a pace and as an industry they are reliant on conventions being in place to protect and ensure that everyone is operating within the law. However, conventions need to be inclusive and not exclusive as there will be conventional ships and autonomous ships operating at the same time.

With current conventions that are apparently of an acceptable standard, the introduction of more sophisticated ships could potentially make an all-encompassing convention either too large for

¹⁶⁶ www.nepia.com – IMO Colregs Rule 8 – Action to Avoid a collision.

anyone to read and understand or be too high level that it will be left to the member state national laws to interpret and enforce.

IMO

The IMO have been an organisation for over 50 years and in this time, they have seen a considerable amount of change. Change that has been driven by an event rather than keeping up with a change in technology and industry. They are leading a steering group into autonomous ships and how they will impact the current conventions and industry, however, without power to enforce they are mainly a facilitator and overseer, they really need to be more “hands on” to give the importance to the work that they do.

This is the IMO’s opportunity to completely review SOLAS and Colregs to ensure that all newly designed ships are considered within the conventions. As ships become more sophisticated, bigger and faster it has never been more important that the conventions are there to set a standard for all member states to operate within. However, they will need to ensure that no shipping group is missed and is given equal importance when writing the next generation of conventions.

Chapter 8

Conclusion

At the start it was easy to agree with the statement that the standard conventions are appropriate and there's no need to review and or update them. However, that has been proved to be completely the opposite in that there are several issues with the current conventions in that they haven't moved with the times and the ever increasing speed in which technology is being used and being relied upon to carry out some of the navigational tasks. Technology is and will continue to replace some of the human interventions and reduce the risk that ships are exposed to. This is not without its difficulties as the more we remove human intervention the more we expose the ship to cybercrime or software 'glitches'.

To also ensure that conventions have the gravitas behind them, the IMO should take back some of the control, even if it is to 'police' the member states more. As we saw with the SS Electric Marine, the American flag was allowing unseaworthy ships to sail, this put lives at risk when this could have been prevented if the IMO had audited either the paperwork or inspection of various ships. It would be foolhardy to think that an audit may have saved this ship, but it may have been a big enough deterrent for them to pass a ship when it was in fact unsafe.

Without a review and update of the conventions we could possibly see history repeating itself. Crew operating ships in a reduced capacity, could mean that they have no hands on the controls and training will only be relevant to manual tasks. Operating a radio or any type of communications would mean confusion and time wasted when help and assistance is required.

The sole purpose of SOLAS and Colregs is to preserve life and yet, the IMO are slow to react, and it appears to everyone, they wait for a disaster to then fix the convention (tail wagging the dog). That as ships are becoming more sophisticated and industry are taking a step towards autonomous vessels, SOLAS and Colregs need to pre-empt any incidents from occurring rather than responding. Even though this relates to autonomous ships, this needs to also include current ships as they need to be able to react to each other without causing incidents involving each other.

It needs to be an all-encompassing convention without any exceptions or exemptions as conflict will arise. They need to break this cycle and be proactive if they want the SOLAS and Colregs convention to do exactly what everyone thinks it does.

As we have seen, history has molded SOLAS and Colregs to a degree where most ships operate in a safe environment, however, there have been instances where those standards have been ignored and incidents have occurred. In the instance of Costa Concordia there were numerous errors made, with the Captain showing off, failing to issue communications on the situation to either the passengers or the Italian Coastguard. With all of the confusion, and lack of due care, diligence and attention, this meant that the Captain was prosecuted for negligence.

Even though the incident with the Costa Concordia it was majorly linked to human error, if there had been a study on lifeboats and life rafts being deployed at a great degree of list, then more lives would have been saved. Therefore, SOLAS and Colregs needs to be amended and enhanced in order to provide an appropriate standard of safety.

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