

4. Impact of Change Factors to Maritime Risk

Change and Developments

The maritime risk picture has changed. On the whole shipping activities are more regulated, better managed and more closely monitored. The average age of the world fleet is lower, ships are more reliable and the subject of greater scrutiny wherever they go.

Conversely, ships are on average much larger and their technical complexity makes them more prone to single point failure. These changes mean that there is less likelihood of a maritime casualty occurring in the first place. When they do occur, they are more likely to have a greater impact although there are now a number of measures in place to protect society from their worst effects.

World Wide Context

The current context of shipping safety may be best expressed by the recent findings of a study into the causes of accidents commissioned by the MCA which took information from the International Union of Marine Insurance, Lloyds Register and the Standard P&I Club. The study found, amongst other things, that world wide;

- In the five years to 2005, an average of 18 ships collided, grounded, sank, caught fire or exploded every single day. Two ships sank every day;
- The International Union of Marine Insurance (IUMI) reports the average number of incidents involving the serious or total loss of vessels over 500gt has steadily risen in the 15-year period to 2008.
- In 2008, a maritime disaster¹ occurred nearly every week (on average). Each one involved an insurance claim of over US\$17m or had an economic impact of over US\$85m;
- In 2008, 1,600 people died or went missing due to maritime disasters. In 2008, more than three times as many people lost their lives at sea compared with 2007

Notes on Change Factors

Technological Advances

Technical advances in machinery design and control systems have produced improvements in the average reliability of vessel propulsion and steering systems although there has been an attendant increase in the prevalence of so called 'single point failures' within control systems and a corresponding reduction in the effectiveness of secondary or back up systems.

Secondary or back-up systems tend to rely upon a high degree of manual intervention and, as ships have become larger their associated manual systems have tended to become heavier and more labour intensive. By way of example the

¹ In 2008, the insurance company Swiss Re defined a maritime disaster as involving a claim of at least US\$17.2m or with an economic impact in excess of US\$85.4m.

emergency steering system that would have been applicable on a small ship twenty years ago would be capable of being operated by two people over many days and it would have allowed the ship to steer and manoeuvre quite satisfactorily.

It would have been fitted because there was a real risk that the steering system would fail and the crew could be expected to be reasonably practised in its use. The emergency steering system that is fitted to a large modern tanker or container ship will have a manual back up system because the classification society rules require although there is little expectation that it would be used in practice.

Because modern ships are more reliable and more automated they carry fewer crew. There is less expectation of need to use emergency or back up systems with the result that the crew will be less practised in their use, and when they do need to be used they are much heavier and require more manual input to provide movement, albeit being provided by fewer crew. In practice it is unlikely that a large modern ship could be satisfactorily manoeuvred on emergency steering for more than a few of hours. Similar considerations apply to other engineering systems including main engines, electricity generation, fuel and lubricating oils systems and pumps.

Globalisation

International shipping has followed the general trend towards globalisation over the last 10 – 20 years. In previous years the activities of ship owning and operating tended to be grouped together within one company, with the ships often flying the flag of the country where the company was based. This meant that it was easy to identify the owner who carried a reputation for the standards of operation and maintenance of their ships.

Changes in the balance of world trade, the development of capital markets and the tendency to separate capital ownership from industrial activity and a general desire to separate the economic benefit that can be derived from activities from their associated risks and liabilities mean that international shipping has tended to disaggregate. The activities of ownership, finance, operation, crewing, flag and commercial employment of a ship may be separate and the linkages between them only very tenuous.

Barriers to entry are very low and there are few, in many cases no, traffic agreements or route licensing arrangements.

Crew costs are an important financial driver in many sectors of the shipping industry and operators have experienced a relentless pressure to employ crews at progressively lower cost from less developed countries, with the inevitable result that they are less experienced and, in many cases, less well trained.

Navigation Systems

The development of satellite position fixing (GPS) means that vessels are now able to fix their position accurately, irrespective of weather conditions or visibility. GPS inputs have been integrated with other shipboard systems including radar, compass and in some cases with electronic charting systems allowing ships to be navigated solely by reference to their position on a computer monitor or radar display. When these systems work properly it means that unskilled people can navigate ships with great

precision although in many cases loss of GPS signal can represent a single point failure on a modern bridge.

Because there are few internationally agreed standards for the integration of the individual components or for the presentation of information equipment manufacturers apply differing, often proprietary standards to their systems. This means that there are no standards for the training or operation of these complex navigation management systems.

Operators will often place a high degree of reliance upon the system whilst being untrained in the interpretation of the picture being presented to them, unskilled in understanding systematic weaknesses and unpractised in verifying what the system is telling them in relation to their own situational awareness - they forget to look out of the bridge windows and lose the skill of navigating from first principles.

Vessel Tracking and Identification

Radio systems and satellite position fixing technology have been integrated to provide ship identification systems, analogous to aircraft transponders. Automatic identification systems have been developed to the point where they can be used to monitor vessel movements with great accuracy, and are used for ship to ship collision avoidance and identification.

Traffic Routeing Measures and Surveillance

Traffic separation and routeing measures have been developed at a number of locations around the coast of the United Kingdom, particularly in areas where there are high concentrations of traffic that would give rise to end on collision situations (Dover Strait), or where there is a need to organise and manage the flow of traffic as it converges and then diverges (Sunk and Seven Stones). Some of the routeing measures that have been adopted include special routes for deep draught ships and inshore routes for smaller or coastal vessels.

There is an emergent expectation within the EC and EMSA that Member States will adopt progressive measures to monitor and eventually to manage vessel traffic movements within coastal areas. For the time being UK government involvement is limited to radar/AIS traffic monitoring within the Dover Strait and Sunk traffic separation schemes from the Coastguard station at Dover.

The French also perform similar monitoring around Cherbourg and Ushant. Coastguard Operations Rooms around the UK perform passive observation of the AIS picture within their region. There are some examples where this has been used proactively to warn and inform mariners that they may be standing into danger.

Safety Surveillance

The loss of the mv ERIKA in December 1999 prompted the European Commission to conduct a detailed investigation into the systemic causes that contributed to the loss of the vessel. This in turn brought about far reaching developments in EC maritime policy and EC involvement in the maritime operations among Member States. The so

called Erika III package introduced seven EC legislative measures to improve maritime safety and to prevent pollution from ships. They are:

- Conformity requirements for Flag states.
- Conformity requirements for Classification Societies;
- Enhancements to the Port State Control inspection regime operating under the Paris MOU;
- Amendments to the Vessel Traffic Monitoring Directive to identify places of refuge;
- Harmonisation and standardisation of marine accident investigation;
- Clearer liability and enhanced compensation arrangements for passengers;
- A directive on the extra contractual liability of shipowners.

These measures are intended to:

- Improve ship safety by driving up technical standards, making ships more reliable;
- Encourage coastal states to take damaged ships inshore to deal with them, minimising the scope of environmental damage.

International Safety Management Code (ISM)

The ISM Code was introduced to establish internationally consistent standards for the operation and maintenance of ships. It requires the application of a codified safety management system and, in many cases the operation of a planned maintenance regime. Owners and operators need to subject their management systems to audit by accredited organisations in order to maintain their Document of Compliance. In addition the ISM system requires a company to nominate a Designated Person Ashore – somebody who can effect change to bring about safety improvements within the organisation and who is contactable by shore authorities to take decisions in the event of an emergency.

Marine Spatial Planning

Pressure on non-renewable fossil fuels is encouraging the development of renewable forms of electricity generation. In a maritime context these have been focussed on the development of large scale wind farms positioned in the shallow areas of sea around the coast of the UK. There are also a number of proposals for tidal and current powered systems although they are less extensive than the plans for wind farms.

The consenting process for offshore renewable energy installations has been divided into various 'rounds' and has included consideration of their impact on the safety of navigation. For practical purposes the process has treated each 'round' individually with the result that some sea areas are taking on the appearance of a contiguous barrier. Navigation within these areas is very limited and large ships will be expected to pass through narrow channels.

This is likely to mean higher concentrations of traffic within confined sea areas, with increased frequency of end-on situations within the scheme and more crossing situations in the adjacent areas of convergence and divergence. The consenting process for OREIs is managed by Crown Estates.

In the future overall marine spatial planning will be managed and coordinated by the Marine Management Organisation under the terms of the Marine and Coastal Access Act 2009. We anticipate that this will affect the areas within which ships will be able to navigate, anchor or take refuge taking into account the determination of any special environmental factors.

Human Factors

The application of the International Convention on Standards of Training, Certification and Watchkeeping has brought about a degree international harmonisation in relation to the quality of seafarers. In the case of seafarers from the less developed countries this has tended to raise their general standard of training and knowledge although it is debatable that the previous high standards applied in developed countries has been diluted. Two things are inescapable:

- Many of the established shipping companies would previously have regarded certification and qualification as a starting point for their Deck and Engineer Officers and they had their own internal programmes to develop more specific skills and knowledge relating to the company, their ships, cargoes and trades. The introduction of STCW with its requirements for refresher training places a high training (cost and time) burden on employers with the result that most of the pre-existing systems have been abandoned;
- There is more of a tendency for ships crews to be regarded as 'cabs off a rank' which means that they tend to have less experience in handling and managing the particular vessels upon which they serve and there is less likelihood that they will have previously worked as part of a team with their fellow crew members.

Economic pressures on ship operations mean that the work of the seafarer has become much more intensive – On average ships have fewer crew, they spend less time in port and proportionately more time at sea, and the crew onboard are expected to work longer hours. Evidence from marine casualties where crew fatigue has been found to be a causative factor points to internationally agreed standards of working hours and rest periods being observed more in the breach than as a matter of course.

Compulsory Insurance against Oil Pollution

The small number of large pollution prevention incidents that have occurred world wide, starting with TORREY CANYON have resulted in the adoption of a number of international conventions that require vessel owners and operators to insure against their liability for oil spill clean up costs. Initially this related to oil tankers although it has subsequently been extended to cover other types of ship that carry oil as fuel. These arrangements provide a limited amount of cover and might not be able to pay for the full cost and compensation associated with a large spill.

An international fund has also been established (IOPC Fund) to cover the gap.

Powers of Intervention

Following the grounding of the SEA EMPRESS in the approaches to Milford Haven in February 1996 Lord Donaldson of Lymington was invited to review the arrangements that were in place to deal with the command and control of marine casualties and to make recommendations about how the situation might be improved in the future.

One of Donaldson's principal findings was that, in times of maritime emergency, Government Ministers should vest their decision making powers in a nominated expert known as the Secretary of State's Representative (SOSREP), who would direct incidents on their behalf. The Minister would either back or sack the SOSREP. One of the fundamental aspects of the SOSREP role is that they have clearly defined but extremely potent powers to direct activities, including the Master of a vessel or its owners. In extreme cases these powers can be used to supervene the established customs and practices associated with maritime salvage. In practical terms they mean that there is no reason why a marine emergency needs to be allowed to get out of hand or out of control because of prevarication or indecision – if suitable assets or assistance are available they can be used to prevent a bad situation deteriorating further.

A graphic example of the SOSREP powers in action is provided by the decision to intentionally beach the container vessel MSC NAPOLI in Lyme Bay in January 2007 after she ran into difficulties in the English Channel.