Maritime Emergency Preparedness and Management

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a large body of men ... in constant readiness to risk their own lives for the preservation of those whom they have never known or seen, perhaps of another nation, merely because they are fellow creatures in extreme peril.¹

Since time immemorial humans have had beneficial interactions with the sea—for food, transport, and pleasure. However, these interactions have not always been without cost—the risk of death has always been present. In the maritime fraternity, we tend to think of this risk in terms of ship incidents: capsizing, foundering, grounding, collision, fire, man-overboard. Over the past century improvements in technology, safety standards, enforcement of regulations, and education have reduced these risks for commercial vessels, and concurrently tremendous improvements have been made in rescue response. This article will focus on the improvements, past, present and future, in rescue response to maritime incidents.

In the 1820s there were about 1,800 shipwrecks each year around the British Isles alone. Amongst maritime folk the risks of going to sea were understood; significant loss of life was expected. Often in sight of a coastal community, a sailing ship would be blown aground, the crew would take to the rigging to try to survive, townsfolk would see the plight of the hapless sailors and often would put to sea, in whatever craft they may have at hand, at significant risk to their own lives. These occurrences eventually led to the first purpose-designed lifeboat, the Original, built on the northeast coast of England in 1789.

¹ Quote of Sir William Hillary, founder of the Royal National Lifeboat Institution (RNL1), 1823, in "1824: Our foundation," RNL1, https://rnli.org/about-us/our-history/timeline/1824-our -foundation, last accessed 13 September 2017.
Similar tragedies led Sir William Hillary to call, three decades later, for the establishment of a national organization to perform rescue around the coasts of the British Isles. The Royal National Lifeboat Institution (RNLI) was followed during the nineteenth century by similar organizations in many other countries, many private charities like the RNLI and some government funded organizations.

In the nineteenth century, lifeboats were propelled by sail and oar (with a few experimental steam-powered craft built in the latter years of the century). Shore-based apparatus, such as the ‘breeches buoy’ were developed and stationed with rescue crews. In some remote locations emergency huts, with supplies, were provided by the authorities for the shelter of shipwreck survivors who made it to shore. During this period the rescue of seafarers generally depended on visual contact with their rescuers. If a ship was grounded near a harbor, flares could be used to signal distress, but rescue depended on these flares being seen from shore. If the ship was in distress on the high seas, or near a remote shore, the odds of rescue were much smaller, and many ships were simply posted as ‘Missing at Sea with All Hands’.

In the early years of the twentieth century, things started to improve dramatically. Some experimental internal combustion engine powered lifeboats were built. In the period between the World Wars, most rescue lifeboats were fitted with engines, taking over from sail and oar, but speeds remained slow (approximately 8 knots, about 15 km per hour). Radio was used in the rescue of passengers and crew from the RMS Republic in 1909; more famously three years later it played a significant role in saving lives from the Titanic. After the Titanic disaster, the International Convention for the Safety of Life at Sea (SOLAS) was introduced, improving both ship safety and rescue response.2

Dramatic strides have been made in safety technologies since the Second World War. The Global Maritime Distress and Safety System (GMDSS) and emergency position indicating radio beacons (EPIRBs) allow the rapid alerting of shore-based rescue resources and other ships in the event of an emergency. Dedicated rescue resources have improved dramatically. The modern rescue lifeboats, and larger sea rescue cruisers, have speeds up to 25 knots, extended range, modern electronics for searching, navigation and communication, excellent sea-keeping for operation in heavy weather, and can operate in conjunction with other rescue resources. Aircraft can fly in extreme weather

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2 International Maritime Organization (IMO), “International Convention for the Safety of Life at Sea (SOLAS), 1974,” IMO, http://www.imo.org/en/About/conventions/listofconventions/pages/international-convention-for-the-safety-of-life-at-sea-(solas),-1974.aspx, last accessed 13 September 2017.
conditions, travel great distances to provide oversight, and possibly drop life rafts. Helicopters can provide rescue over reasonable distances (potentially being refueled in flight), and in areas where it may be risky to attempt a rescue by ship, such as near shore. Search and rescue (SAR) technicians, an elite group of primary care paramedics, can provide on-scene medical aid and evacuation: they can parachute from aircraft or be lowered from helicopters to assist survivors until recovery is possible.

The regulatory regime affecting maritime safety and emergency response also continues to improve. The International Maritime Organization (IMO) has continually updated SOLAS. In addition to improving ship safety, requirements mandate ships to render assistance to persons in distress when safely feasible to do so. The International Convention on Maritime Search and Rescue (the SAR Convention³), which entered into force in 1985, developed an international SAR plan, such that the rescue of persons in distress anywhere at sea will be co-ordinated by a SAR organization and, when necessary, by co-operation between neighboring SAR organizations. Concurrently with the revision of the SAR Convention, IMO and the International Civil Aviation Organization jointly developed and published the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual, with three volumes covering organization and management, mission co-ordination, and mobile facilities.

The International Maritime Rescue Federation (IMRF) represents over 100 of the world's SAR organizations—some private charities, others government organizations.⁴ The IMRF is focused on the prevention of loss of life in the world's waters. To achieve this mission, it works with its members, local governments, IMO and others to encourage and promote the formation and development of maritime search and rescue services throughout the world.

Despite these advances, new maritime risks are emerging. In the developed countries, pleasure craft have increased the demand on SAR management and rescue resources. For instance, in Britain only about 10 percent of the RNLI’s sorties involve commercial vessels.⁵ Some offshore races have required complex rescue responses. For example, the 1979 Fastnet Race (England to Ireland) resulted in the loss of 15 lives and five yachts; numerous vessels and aircraft

³ IMO, "International Convention on Maritime Search and Rescue (SAR),” IMO, http://www.imo.org/en/About/conventions/listofconventions/pages/international-convention-on-maritime-search-and-rescue-(sar).aspx, last accessed 13 September 2017.
⁴ "International Maritime Rescue Federation: An Overview," International Maritime Rescue Federation (IMRF), http://www.international-maritime-rescue.org/about-us, last accessed 13 September 2017.
⁵ RNLI, "Annual Report and Accounts: Operational Statistics," RNLI, https://rnli.org/about-us/how-the-rnli-is-run/annual-report-and-accounts, last accessed 13 September 2017.
were involved in the rescue efforts and a significant load was placed on the rescue co-ordination resources.\(^6\)

Terrible commercial shipping disasters have continued over the past decades. The world’s worst peacetime sea disaster took place in December 1987; the Philippine passenger vessel *Dona Paz* sank after colliding with a small tanker carrying gasoline.\(^7\) Only 26 people survived from the two vessels, while over 4,300 died. When the Senegalese ferry *Le Joola* capsized in heavy weather in 2002, nearly 2,000 died. The Worldwide Ferry Safety Association lists over 160 ferry incidents in the developing world during the first fourteen years of this millennium, resulting in 18,000 deaths. In general, there were common emergency response shortcomings in these tragedies, namely, lack of, or late, notification of the emergency, poor shipboard emergency planning and management, and lack of rescue response due to lack of resources and/or lack of rescue organization.\(^8\)

Modern ferries have introduced another dimension to rescue requirements—large vessels, with significant numbers of persons onboard, which may rapidly require assistance due to fire or capsize. This is called a ‘mass rescue operation’ (MRO), where the size of the rescue overwhelms the resources available. In 1994 the 15,000 ton ferry *Estonia* sank in a storm in the Baltic Sea; out of nearly 1,000 persons onboard only 138 survived.\(^9\) The ship rapidly capsized and then sank half an hour after the first distress message was broadcast. Although numerous vessels were at hand, it was difficult for them to rescue survivors from the liferafts in the water; about 40 were rescued by ship, the remainder by helicopter (often working in conjunction with ships). As a result of the *Estonia* disaster, the IMRF held a series of exercises to help rescue organizations plan for national and international MROs; IMO updated SOLAS requirements so that ships have plans and procedures to recover persons from the water.

In addition to passenger-carrying vessels, fishing vessels and commercial ships continue to suffer losses, some disappearing without notification thus

\(^6\) J. Rousmaniere, *Fastnet Force 10: The Deadliest Storm in the History of Modern Sailing* (New York: WW Norton, 2000).

\(^7\) “Flashback in history: Philippine ferry MV Dona Paz collision, sinking and death toll of 4,386 people—December 20, 1987,” Maritime Cyprus (3 January 2016), https://maritimecyprus.com/2016/01/03/flashback-in-history-philippine-ferry-mv-dona-paz-collision-sinking-and-death-toll-of-4386-people-december-20-1987/, last accessed 13 September 2017.

\(^8\) J. Dalziel et al., “Domestic Ferry Safety in the Developing World,” presentation to World Maritime Rescue Congress, Bremerhaven, Germany, 2 June 2015.

\(^9\) Joint Accident Investigation Commission of Estonia, Finland and Sweden, “7: The Rescue Operation,” *Final Report on the MV ESTONIA disaster of 28 September 1994* (Estonia, December 1997), http://onse.fi/estonia/, last accessed 13 September 2017.
hampering rescue efforts. When the 260,000-ton Korean bulk carrier *Stellar Daisy* sank in the South Atlantic in early 2017, the two survivors were picked up by fortuitous circumstance; a fruitless air and sea search continued for weeks for the other crew over thousands of nautical miles.\(^\text{10}\)

Not all rescues end in failure, as management capability and resources can alter the outcome. In 1980 the Dutch cruise ship *Prinsendam* caught fire 120 nautical miles off the coast of Alaska. The US Coast Guard quickly mobilized and co-ordinated American and Canadian air and sea rescue resources, as well as commercial ships; all 520 passengers and crew were rescued without loss of life or serious injury.\(^\text{11}\)

In coming years, many emergency response improvements will be an evolution of initiatives already in place. The IMRF and IMO, along with other agencies, are working to improve international co-operation. This is particularly important in areas such as the Arctic and Antarctic where the following can impact SAR response: large distances, harsh weather conditions, few local rescue resources, restricted SAR response management capability, limited facilities to receive (potentially thousands of) survivors, and increasing marine vessel traffic due to climate change. Ferry safety, and the associated lack of rescue response, in the developing world is recognized as an ongoing concern. The IMRF and IMO are promoting the development of regional emergency response capabilities.

New technologies may also bring about significant improvements, both for the persons being rescued, and for the rescuers. The IMRF Future Technology Panel is investigating the use of unmanned aerial vehicles (UAVs) to assist in maritime search and rescue, particularly in situations where direct human intervention may not be wise or possible. The application of unmanned marine vehicles (UMVs) to maritime SAR is still in its infancy, however it is easy to envisage their future application, ranging from small craft dropped from aircraft and remotely piloted, to stand-alone craft prepositioned in remote locations. Numerous hurdles remain; acceptance and understanding of the strengths and limitations of these technologies is needed (for instance, can a robotic vessel rescue someone who is incapacitated?). Other technologies, such as infrared cameras and improved satellite surveillance may assist with the search function.

\(^{10}\) “Update: Search Continues for Missing Stellar Daisy’s Crew,” *World Maritime News* (10 April 2017), http://worldmaritimene.ws/archives/217281/update-search-continues-for-missing-stellar-daisys-crew/, last accessed 13 September 2017.

\(^{11}\) United States Coast Guard, “Top Ten Coast Guard Rescues,” *OnScene*, COMDT&PUB P16100.4 (Summer 2007): 39.
Emergency preparedness and management requires an ongoing investment in training and resources. Simulated and live exercises develop skills and identify potential problems, and solidify working relationships with partners. This is particularly significant for mass rescue operations, which may overwhelm the resources normally available, and emphasizes the importance of management communication and co-ordination capabilities. Education, particularly for recreational boaters, is important. The usefulness of new technologies needs to be investigated on an ongoing basis.

Finally, and perhaps most importantly, are the competent and capable personnel who have the courage and dedication to be willing to assist their fellow human beings:

The loss of the Solomon Browne was in consequence of the persistent and heroic endeavours by the coxswain and his crew to save the lives of all from the Union Star. Such heroism enhances the highest traditions of the Royal National Lifeboat Institution in whose service they gave their lives.\(^\text{12}\)

\(^{12}\) Quote concerning the loss of the Penlee lifeboat Solomon Browne with eight crew, 19 December 1981, in “The Penlee Lifeboat Disaster,” RNLI Penlee Lifeboat Station, http://www.rnli-penlleelifeboat.org.uk/About%20us/PenleeDisaster, last accessed 13 September 2017.