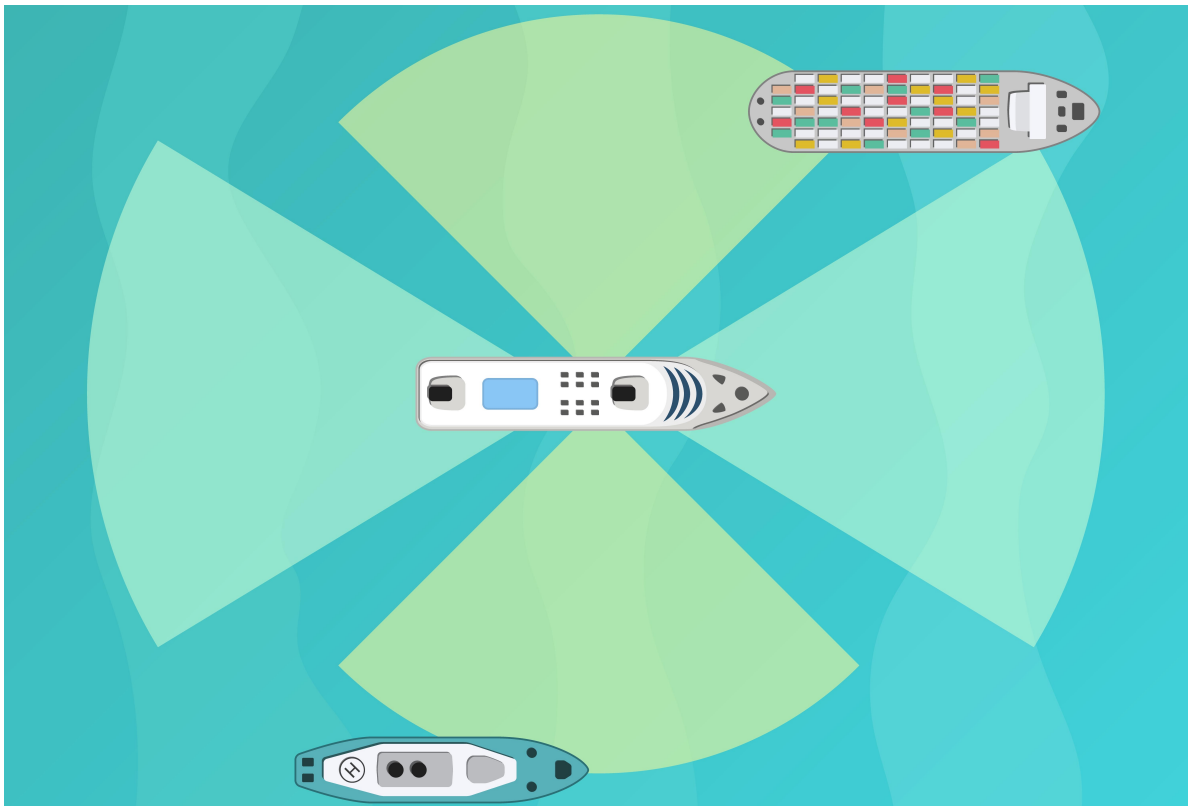

Maritime autonomous surface ships – identifying and covering the risks

Our [previous article](https://gard.no/insights/maritime-autonomous-surface-ships-on-the-horizon/) highlighted the development of Maritime Autonomous Surface Ship (MASS) in Norway and Finland with the YARA BIRKELAND and FinFerries' FALCO projects. In this article, we focus on the challenges of adapting the existing regulatory regime and traditional marine insurance policy wordings to autonomous vessels.

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What do we mean by ’autonomous’?

The International Maritime Organisation (IMO) recognises that autonomy is a 'spectrum' yet, for the purposes of examining regulatory changes, it has defined a MASS as a ship which, to a varying degree, can operate independent of human interaction. For present purposes the IMO has established the following four degrees of autonomy:

• Degree one: Ship with automated processes and decision support:Seafarers are on board to operate and control shipboard systems and functions. Some operations may be automated and at times be unsupervised but with seafarers on board ready to take control.
• Degree two: Remotely controlled ship with seafarers on board:The ship is controlled and operated from another location. Seafarers are available on board to take control and to operate the shipboard systems and functions.
• Degree three: Remotely controlled ship without seafarers on board:The ship is controlled and operated from another location. There are no seafarers on board.
• Degree four: Fully autonomous ship:The operating system of the ship is able to make decisions and determine actions by itself.

In this article we look at unmanned ships – either remotely controlled or fully autonomous, i.e. degree three and degree four.

What about seafarers?

The International Chamber of Shipping (ICS) estimates the current global demand for seafarers at over 1.5 million persons including officers and ratings. Nonetheless, seafarers may see the drive toward the various levels of automation as a threat to their livelihood. According to a study prepared by the Hamburg School of Business Administration on behalf of the ICS, "few vessels will be entirely autonomous in the next decade or two. With an overall increase of the world fleet, at least the number of officers on board will remain stable. At the same time the number of ’crew‘ on shore in supporting functions will increase , possibly significantly". The study concluded that there will be no shortage of jobs for seafarers in the foreseeable future yet there will be significant training needs because in the future the type of work available on board may differ from that which they do today.

Magne Nilssen, Gard Chief Underwriting Officer, Speciality (far right) part of the Norwegian delegation presenting the Yara Birkeland project to the IMO during MSC99 on 21 May 2018

Changing risk landscape

Although there are no clear statistics on the benefits of the presence of humans, for example the actions they may take to avoid potential accidents or to mitigate the consequences of them, human error is the most frequently reported cause of marine casualties. If we agree, therefore, that human error causes marine casualties, a question we often face is whether taking humans away will achieve lower insurance premiums. Gard believes that the human element will not disappear. It will shift from ship to shore, where the remote operator exists and from where the software design and updating takes place. Cyber gains prominence via this shift, given the communications link between the ship and humans ashore. Uncertainties connected with ship values, regulations, jurisdiction and all other risks in shipping will still be in play. Therefore, although there may be a shift in the way a risk is rated, much will depend upon the yet-to-be-seen direction of the shift.

The human element is embedded in the international regulation of shipping

Most international conventions, including those under the IMO's or Comité Maritime International (CMI)'s purview, envisage manned ships. The International Regulations for Preventing Collisions at Sea 1972 (COLREGs), for example, require a lookout by sight and by hearing. The International Convention for the Safety of Life at Sea (SOLAS) refers to manning levels and the actions required of a master. And, quite clearly, unmanned ships represent a major challenge to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). From an insurer's perspective, these are, however, not the most problematic issues. It would be possible, by way of illustration, to issue a policy treating personnel operating a ship ashore as 'crew' although, of course, so far as cover is concerned, if there is no crew there would be no need for crew cover. The point is that insurers can do a lot using bespoke wordings and we do not necessarily need to wait for regulations to catch up with technological changes.

Fault-based liability

International conventions concerned with liability are the more pressing issue, however, from an insurer's perspective. The 1910 Collision Convention, for example, is a fault-based regime envisaging liability in proportion to a ship's causative fault. What, then, happens when there is a collision between two autonomous vessels – can artificial intelligence (AI) be 'at fault' and therefore to blame? What would be the position if there were a collision between a manned and an autonomous vessel? On the assumption that computers do not make mistakes, will the manned vessel alone be to blame? If a ship cannot, of itself, be 'at fault', is it now necessary to extend the circle of persons who could be held liable for the actions of an unmanned ship? Should a regime of strict liability be introduced? Some quite knotty issues arise when the detail is tackled. Is it not right, for example, that AI should be held liable for any mistake it should make – this being the position adopted by some autonomous vehicle manufacturers ashore? As an example, on 1 December 2015, Volvo's CEO announced that it will accept full liability if any of its cars crash while in full autonomous driving mode. While there may be more questions than answers, Gard is evaluating some of these questions to offer practical solutions.

Financial limitation of liability

Regimes providing protection by means of a right to limit financial liability (usually by reference to the tonnage of a ship) muddy the waters even further. The Convention on Limitation of Liability for Maritime Claims (LLMC) 1976, for example, in the context of breaking the right to limit liability, refers to "a person" and the "personal act or omission, committed with the intent to cause such loss, or recklessly and with knowledge that such loss would probably result". These words are of course difficult to reconcile with an unmanned vessel using AI – who would be 'the person' and where lies the requisite intent or knowledge of probable consequences of a reckless act? Will this be by reference to the owner of the autonomous vessel or might he, quite reasonably, argue that he was entitled to rely entirely upon the software engineers who designed the AI? Therefore, the test should be by reference to *their* acts or omissions and knowledge, and not the acts or omissions and knowledge of the shipowner.

Cyber risks

Cyber is perhaps the most disruptive component in the sea change underway, although it is an existing risk to all vessels given the technology currently onboard. Most marine property wordings contain an exclusion for losses resulting from cyber threats although Hull and Machinery insurers may provide coverage for an extra premium. Standard P&I club cover does not exclude cyber risks *per se* except in the context of the general exclusion for war and terrorism. See Gard P&I Rule 58.1. The war and terrorism exclusion does not apply where the claim is made against a certificate of insurance provided by the club under certain international conventions. See Rule 58.2 .

There is a separate facility, within the International Group of P&I Clubs (IG) for war risks which would include cyber as a means of inflicting harm but this operates only up to an aggregate limit of USD 30 million in respect of crew and personal injury claims. See Gard Rules, Appendix 1 – Additional insurances .

In summary, a cyber terrorist attack would not be covered under many marine property wordings, but there could be some cover under IG club wordings and the additional limited war risk insurance. These IG P&I club arrangements might be enough to cover a one-off cyber-attack involving, say, a virus affecting one ship resulting in it suffering a casualty. With the appropriate buyback, so that cyber risks are covered, the marine property insurers would cover the physical damage and the club might, within certain limits, cover the liabilities. The situation would become much more strained, however, if several ships were attacked within the same incident. What would happen, for example, if the remote-control centre operating multiple ships encountered a terrorist cyber-attack resulting in multiple ship casualties? Gard is looking at scenarios like this. We have, for example, called for discussions on an international marine cyber fund, perhaps combined with an international cyber limitation regime, to tackle aggregation issues. In the meantime, we offer a multitude of products lessening the existing uncertainty.

Product liability

The existing suite of international instruments funnels third party liabilities towards the shipowner. In the example above, the shipowner is responsible for the consequences of a collision arising from the fault of those on his ship. Liability for pollution from persistent oils, bunkers, hazardous noxious substances and the removal of wrecks rests with the shipowner. The entire structure of marine insurance is designed, therefore, with this funnelling in mind. The property insurers cover the hull, with the clubs covering liabilities towards third parties for damage including pollution. This is on the basis that, traditionally, the 'buck stops' with the shipowner, save in cases where there might be recourse against a manufacturer or software maker. Recourse cases are, however, the exception rather than 'the norm'.

This will likely change as autonomous vessels gain prominence. Autonomous marine systems involve hardware, i.e. spatial sensors, software, algorithms, communication and integrated components. Whilst the industry has a reasonable understanding of how today’s electronic navigation systems work, the same cannot be said for complex navigation algorithms and the systems underpinning AI. EU product liability laws, through EU Directive 85/374, generally envisage protection in a private use context and it may be difficult to bring claims where the defect is due to compliance with mandatory regulations issued by public authorities or where the state of scientific and technical knowledge at the time of circulation hampered discovery of the existence of the defect. It may also be difficult to establish product liability in tort. The product liability route may, therefore, offer only limited comfort.

Gard’s part in this

The insurance industry is working hard to be part of the problem-solving force behind autonomous vessels and continues to be a leader in this innovation. Beyond our internal research and legal workgroups, we are active in industry collaboration, a concept we view as critical to safe implementation of autonomous vessels. We participate in the Autonomous Vessels Working Group. This group examined instruments and regulations to identify potential barriers to the introduction of autonomous vessels. It examined the Pooling Agreement, through which members of the IG pool their claims and through which the IG's reinsurance is purchased. The result is that the IG feels confident that the present arrangements are suitable for autonomous vessels. The substantial limits of the IG reinsurance program, over USD 3 billion, provide additional comfort.

Furthermore, through this group, Gard participates in the CMI's International Working Group on Unmanned Ships which take part in the IMO's Regulatory Scoping Exercise (RSE). Over the next couple of years, the RSE aims to identify IMO instruments affected by autonomous vessels. A process of establishing solutions will begin after this. Gard's view is that, ultimately, the industry may see a mixture of new and revised instruments, or perhaps even an overarching amending instrument, with interim guidelines being introduced over the next 3 to 5 years. Whilst this may seem like a long time, it is worth keeping in mind, for example, that current autonomous projects envisage only domestic trade, approved by Flag State and Class. The IMO instruments falling within the RSE envisage international trade, into which autonomous vessels have yet to be introduced.

What does the future hold?

Although technology is, as usual, ahead of regulations, this is not yet an issue here because there is, so far, no serious talk of an international autonomous vessel. Gard's view is therefore that, before the industry experiences changes in international, i.e. IMO, regulations, we will experience changes to domestic laws, and the creation of guidelines, applying primarily to domestic trade, to be enforced by Flag State and, indirectly, Classification Societies. Where nations are hesitant to make changes until the RSE is concluded, legal interpretation of existing laws allowing for domestic trade should continue to be the norm. Since club rules, and indeed the Pooling Agreement, require compliance by a shipowner with Class Rules and Flag State regulations, Gard is now focusing on insurance solutions designed to cover the domestic needs both of owners of, and those considering an involvement in autonomous vessels. This is in addition to the solutions which Gard provides to meet the changing risk landscape consequent upon the increasing shift in focus to cyber and product liability risks. It's in this area that we see the greater scope for change, because presently cyber and product liability risks don't sit as comfortably as they could within the normal marine property and the club/liability suite of insurance wordings.