



Staying relevant

2019: Next steps in evolving maritime related technologies

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Introduction: technology, regulation and industrial shipping

All industries are evolving and have done for centuries, shipping being no exception. The difference today with the so-called Fourth Industrial Revolution is that there are new industries that have the sole purpose of enhancing that evolution. When shipping saw the first oil-fuelled vessels make an intercontinental voyage in 1912, it heralded an era of diesel.

At the time, there was no communication industry, no satellites and no computing industry. There was no suggestion of touch screens becoming the key interface between human and machine, of a society based on digital connectivity. Newspapers of the day marvelled at the ability of a ship powered by a completely new fuel to sail from Northern Europe to Singapore and back again.

Things have changed and are still changing. Heavy fuel oil is fading as a fuel choice some 100 years after its introduction, and satellite and computing industries – as well as data and digital communications – have become industries in their own right; industries that have had, and will continue to have, a fundamental impact on the more traditional sectors.

This briefing paper examines changes that have occurred since the advent of modern maritime communications and the tools being deployed across other industries, seen as forerunners of technology – and the human interface with that technology – in maritime and shipping.

Finally, the paper will explain why regulation needs to follow technological development, not come before it.

The past: Preparation for the revolution

The first attempts to regulate the emergence of radio traffic started in the beginning of the 20th century. The sinking of the Titanic brought about the creation of the Safety of Life at Sea (SOLAS) convention in 1914, which predated the first IMO (then called IMCO) meeting by some 45 years. IMCO began its operations in 1959 and became responsible for SOLAS and other safety communication regulations, (one of its first tasks was to rewrite SOLAS), eventually leading to the creation of GMDSS and the demise of Morse code. Meanwhile space technology emerged and led to the creation of global ocean communications at a level terrestrial radio signals were unable to offer.

Inmarsat was founded in 1979, a year after Tototheo Maritime was founded. Originally known as International Maritime Satellite Organization, it was formed at the request of the IMO to help in maritime safety. It would eventually change its

structure and privatise, listing on the London Stock Exchange, expanding its services and investing in technology. While satellite communication in its infancy was voice calls and facsimiles, data soon emerged as a tool to save bandwidth and costs, at a time when satellite services for consumer usage also emerged.

Satellite communications, and even satellite navigation, which emerged at the same time with a different set of satellites, relied and still rely on significant computing power, the advances of which saw greater capabilities at increasingly favourable costs.

The present: Poised



Satellite communication is now predominantly data, even voice calls are VOIP (Voice over Internet Protocol), making the original voice call systems as redundant as Morse.

Greater bandwidth and more satellites on different bandwidths has seen the potential increase to a point at which shipping has connectivity at its fingertips, if it wants it.

A further parallel development onboard ships has been power stability, as electrical systems become

more reliable and robust. This, with the recent developments in energy storage, has led to advances in ship electrification. Electrification is another stepping stone to higher reliability, due to reduced mechanical risks. Electrification in other industries adds to the pressure on shipping to meet the expectations of change.

Electrical systems on board vessels are modern, reliable and safe. Data transfers between vessels and shore-based stations are rapidly increasing and vessel support centres are being built around the world, to provide the link between ship and shore, between the cargo and the supply chain leaders, between managers and the asset. Ships need reliable, secure and safe electrical systems that can meet the sensitivities of the digital age, yet be sufficiently robust to handle the oceans.

The future: 2019 onwards

These are the trends Tototheo predicts will emerge in shipping by the turn of the decade.

Blockchain

Blockchain will create public, private and consortium-based links in the transport chain. Blockchain has been tested in 2018 and shown to have a significant potential in a number of fields directly linked to shipping. Cool logistics providence, cargo finance chains, fuel supplies, emissions reporting and global freight contracts are all uses that have been demonstrated by various parties.

Benefits: Fast, secure and reliable. **Obstacles:** Too many separate blockchain systems or consortia not compatible may lead to confusion and complications for cargo owners and other supply chain end-users.

Cloud computing and edge computing

Centralised computing is a requirement for the Industrial IoT (Internet of Things). However, with many networks, the equally necessary requirement of edge computing, by which data and systems reside close to the point of data acquisition (sensors), will be a key part of the future maritime domain. Shipping and maritime sectors will need to find the right balance.

Satellites for the masses

Plans to launch thousands of microsattellites through high profiles companies will help global connectivity. While they will be mostly focused on remote land-based uses, particularly in developing countries, companies are already building teams to explore commercial opportunities in the maritime domain. More satellites will mean faster connectivity in many scenarios, offering new opportunities to use IoT services.

The evolution of modern satellite communication has already led to new customers, as shipyards, engine-makers and other engineering related firms grow their presence in the after sales and service industries.

Electricity storage improvements

Cost and weight improvements in modern batteries have seen a huge shift in electrical system investments on board modern vessels. With costs and other operational factors changing, the prediction is for increased, more reliable and widespread onboard electrical systems. These developments are necessary to ensure safe and reliable onboard systems. Road haulage is being electrified, following the example of automobiles. Some train lines have been electrified for many years. The aviation industry is also seeing the introduction of electric propulsion, with companies striving to keep modern technology relevant.

Automation and the Human

Automated systems follow on for increased IoT and connectivity, but the maritime sector has yet to understand where it will add extra value. With small unmanned coastal vessels already under development and with planned launches in 2019 and beyond, this will see those questions develop into proposed solutions. If such vessels evolve and grow in numbers, they will be in service alongside conventional tonnage for many years, leading to regulatory decisions that will impact the core principles of shipping, such as collision avoidance regulations. The key questions will be around the ability for manned and unmanned or automated vessels to operate in ever busy seas.

Security and cyber awareness

Industrial IoT is advancing in all industries, and the maritime sector will be no exception. Recent reports suggest shipowners will be investing in a range of IoT related solutions and services in the coming year, but mostly to reduce operational costs and facilitate more effective decision making, rather than secure more revenues. Yet, some of these solutions, such as asset tracking and monitoring, will see stronger connections with other links in global supply chains. These connections, whether satellite, wi-fi, or narrowband deployment, will see the industry faced with the need to invest in competent staff and increased levels of security on all fronts. In the coming years, shipping is expected to invest heavily in cyber security and awareness and education, particularly as ship managers and owners build advanced fleet operational support centres.

Regulation: The glue that brings the industry together

Despite regulations often coming after the invention and deployment of technology and systems in the maritime industry, rules will continue to play an important role in improving standards.

Technological developments are there for front runners – the more advanced businesses that invest in, and find, a competitive advantage. Regulations are there to be applied when those new technologies demonstrate safety and/or environmental benefit or risk, and thus rule-making can then provide an overall improvement.

Attempts to pre-empt technology with regulations have had unfortunate consequences. As technology, particularly digital technology evolves, regulations need to be well-considered and appropriate. Regulation cannot stop the industry advancing, and the successful technologies will be the ones that have an economic factor.

But technology must also remain considered and applicable. An ability to do something cannot be at the expense of our growing moral obligation to take care of humanity and the environment.



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