SMART SHIPPING AND THE SUPPLY CHAIN

EVOLVING WITH IOT CONNECTIVITY

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Throughout the maritime industry, a digital transformation is under way, one that is reshaping smart shipping and the smart supply chain. On land, the adoption of machine-to-machine Internet of Things (IoT) data communications has made transportation smarter than ever, as logistics businesses have connected all containers and devices across a centralized cloud network and share mission-critical data for real-time visibility of their operations. On land, the result has been a focus on maximizing supply chain efficiency.

This same logistics transformation is beginning to happen at sea, as the maritime industry enters the era of smart shipping—namely, performance management and condition monitoring via digital technologies such as maritime IoT. Whether it is the vessel operators, ship managers, port personnel, equipment manufacturers, or the end customers, all are beginning to leverage connectivity as the key to unlock IoT for business efficiency and customer satisfaction.

MARITIME IOT

Unlike on land, where LTE is sufficient, maritime IoT is dependent on satellite connectivity, given the vast distances involved in global transport. Maritime IoT can only truly be deployed with fast and reliable connectivity, data speeds that support real-time monitoring and intervention, standardization of common platforms, and secure connections to the cloud. Traditionally, IoT solutions have either been slow and expensive L-band or short-term LTE in port. A revolution of VSAT connectivity for IoT is now making smart shipping between vessel and shore a true reality. Three key ways that smart shipping and the smart supply chain can benefit from maritime IoT include Knowledge, Transparency, and Action.

1. Knowledge Transfer to Shore: The first step in IoT is monitoring data. Historically, noon-reports and weather data have been the only sources of data. Now, vessel operators are using real-time data over VSAT to optimize voyage planning, fuel consumption, and port arrivals. From a macro supply chain point of view, vessels can now also order supplies or parts in real-time to be ready at their next port arrival. There is a long way to go before autonomous vessels are deployed at a large scale, but there are many automation opportunities that are also happening. Vessel autopilot, auto docking, route planning, engine performance optimization, and many other technologies will only improve with more sensors being monitored and machine learning starting to grow.

2. Transparency of Performance: With knowledge, comes insight. When all

parties have visibility to the data, there is a shared understanding of cost drivers or performance issues. For example, data on fuel consumption by charter parties greatly reduce the opportunity to dispute events. This will affect the whole supply chain to reduce warranty claims, insurance claims, or cargo claims, and associated penalties, premiums, and litigation costs. Data on equipment performance is also very valuable to understand if the engines, scrubbers, or generators are operating at full efficiency or require maintenance. With real-time data, the supply chain keeps getting smarter, and all parts of the shipping logistics process can benefit.

3. Action to Optimize Business Results: Once an issue is understood, crew on the vessel or experts on shore can take action that can translate into significant business results. Vessel performance optimization companies may promise 5% fuel savings but that requires using data and insight to change speed or course based on weather, water resistance, and port availability. As machines get more intelligent and need less hands-on attention, expertise will be transferred to shore where experts in the shipping companies or at the maritime equipment manufacturers' offices can more cost effectively remotely control the systems and guide the people onboard. This can dramatically reduce field service and warranty costs.

The result of 'Knowledge, Transparency, and Action' will be a transformation of the maritime business model. There are two beneficiaries to this transformation: vessel operators and equipment manufacturers.

1. For vessel operators, they can benefit from IoT solutions and applications through their traditional VSAT solutions, but the business model will change to one of predictable costs for connectivity rather than huge peaks of capex. The adoption of smart shipping will also be driven by regulatory requirements: The International Maritime Organization (IMO) has ruled that starting January 1, 2020, the marine sector must reduce sulphur emissions in international waters by more than 80%. To meet IMO 2020, vessels are utilizing exhaust-gas cleaning scrubbers onboard, and these scrubber systems are monitored in real-time with sensors and machine-to-machine IoT. Ships with approved scrubber systems will be allowed to continue to burn heavy fuel oil after January 1, but other vessels will need to bunker with low-sulphur fuel at a price premium. This will drive further acceleration of the adoption of VSAT as more and more vessels are upgrading from slow L-band.

2. For equipment manufacturers, one of the most dynamic changes in smart shipping has to do with real-time monitoring of the complex equipment onboard today's modern ships. Vessels are filled with mechanical and electronic systems that need to be monitored for business and regulatory performance objectives. The major onboard systems found across every type of commercial vessel today include propulsion engines, turbochargers, fuel pumps, boilers, water generators, refrigeration, engine control systems, cargo control systems, cranes, CCTV security systems, and more.

A given vessel type will employ at least 30 of these systems, and in total there may be 1,000 devices connected to one or many of these systems, whether operational or personal. The ability for equipment manufacturers to have real-time monitoring of these systems can result in real cost savings; for example, leading maritime equipment manufacturers have reported that they budget $5,000 for each service visit to a ship.

When they have high-speed connectivity and maritime IoT in place, the picture changes dramatically: They can monitor equipment performance and instruct the onboard crew to take preventative actions, or they can even conduct video chats to solve real-time issues on the vessel. Keeping the vessel operating efficiently has big benefits in smart shipping and smart supply chain.

Those equipment manufacturers may in turn evolve their business from product into services, as they will deliver better results for the fleets. Rolls-Royce has delivered 'Power-by-the-Hour' engine maintenance management to the aviation industry for more than 50 years already, and the big transformation in shipping will now begin to happen with this new connectivity that is available to provide the needed visibility for manufacturers. Benefits will be lower capex, higher equipment uptime, more efficient equipment operation, a smarter supply chain, and increased customer satisfaction.

For smart shipping to continue to evolve, maritime IoT must see wide adoption. At the moment, maritime IoT is still at its infancy. Maritime IoT adoption falls on a spectrum beginning with vessels that utilize the noon report to satisfy basic regulatory requirements, and progressing through increasing levels of IoT adoption, such as: vessels using real-time weather data to improve voyage planning; ship owners using real-time data to achieve fuel savings; and vessels conducting remote equipment monitoring to drive the P&L. But achieving true profit-and-loss from machine-to-machine IoT will require overcoming several barriers.

There are signs that maritime IoT is gaining wider adoption. First: commercial ships have become 24/7, always-on, office environments with complex and expensive equipment that benefits from being monitored at all times. Second: Data speeds provided by advanced VSAT systems enable IoT applications that create cost-saving benefits for vessels and equipment manufacturers. Third: Standardizing the collection, transmission, and storage of data securely to the cloud is underway. Fourth: All parties in commercial shipping that are mindful of profit and loss are seeing the benefit of IoT, where data flows freely and securely and drives decisions that impact the bottom line.

Whether the focus is on smart shipping, smart supply chain, or smart ports, the common denominator is satellite connectivity. The 100,000+ vessels that make up the shipping industry today, carrying more than 80% of the world's goods are accelerating their adoption of VSAT connectivity in order to provide real-time information and thereby improve every step of the process.

ABOUT THE AUTHOR

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Elizabeth Jackson joined KVH in November 2017 and has been instrumental in advancing KVH's position as the leader in global maritime VSAT. She is part of a team within KVH spearheading initiatives for smart data tools, an IoT platform, and other value-added services to enable connectivity subscribers to realize the potential of maritime digitalization.

ABOUT THE ORGANIZATION

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KVH is a global leader in mobile connectivity and inertial navigation systems, innovating to enable a mobile world. A market leader in maritime VSAT, KVH designs, manufactures, and provides connectivity and content services globally. Founded in 1982, the company is based in Middletown, RI, with offices around the globe.

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