An Interview Andrew Faiola, Director of Mobility at ST Engineering iDirect

IoT, Big Data and AI: Maritime's Race to a Digital Future

In ST Engineering iDirect's recent webinar, *The Devil and the Deep Blue Sea*, panelists explored the maritime industry's quest for digitalization, its challenges, and its ultimate benefits. Digitalization is a critical topic for the shipping industry as its never been more important to control costs and improve efficiency at sea, especially in a sagging global economy.

To explore the topic in greater detail, SMW prepared a list of questions and caught up with ST Engineering's Andrew Faiola, one of the webinar's panelists.

SMW: While maritime IoT, combined with Big Data Analysis and Artificial Intelligence, offers significant advantages for the maritime industry, the adoption of these technologies has not yet been widespread. What do you believe is holding back their adoption? Note that Kongsberg has been very active in this area but has only been able to equip a relatively small number of vessels.

Andrew Faiola (AF) The industry is historically conservative and tends only to adopt new technology when forced to by regulations or enticed by a clear profit-making opportunity. Milestones like compliance with Maritime Labor Convention 2006 for crew welfare, International Maritime Organization (IMO) 2020 for reduced sulfur content, and IMO 2021 for cyber-security, along with de-carbonization, have all catalyzed the demand for satellite technology.

It is also worth noting that the shipping industry is incredibly fragmented. Even when the name brands start to adopt digital technologies, tens of thousands of other vessels are ill-equipped to confront digitalization and will struggle to justify adoption.

SMW: Digitalization appears to be a somewhat-complex IT-driven project involving many stakeholders, consultants, and high economic cost. Can you give us some actual examples from shipping companies who have gone through the digitalization process? What are the steps in the implementation of a digital strategy? How long does it take, and how much does it cost?

AF: I can provide a good example of a shipping company that has engaged in the digitalization process. P&O Logistics partnered with Baker Hughes to implement VitalyX. This lubricating oil monitoring platform utilizes enhanced algorithms and machine learning to create a picture of a machine's health and prevent asset loss.

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The main driver behind the decision to digitalize was to improve up-time by 10%. Partnering with Baker Hughes, P&O Logistics co-developed the solution over 12 months, and enabled them to gain great insight into their equipment's health on board their vessels.

The monitoring of lubrication oil levels was previously a very lengthy process, involving a sample being taken and sent away for analysis. It could take weeks to get the results. Today, the VitalyX solution runs checks on the levels every 15 seconds, giving up to the minute analysis and improved operations transparency.

The adoption of VitalyX has led to the implementation of other types of monitoring, such as engine data and vibration analysis. It is a case of putting the pieces of a puzzle together to give a complete and improved picture. With more insight into the health of on board systems, P&O Logistics can increase operational efficiency. The solution was affordable, and the ROI took about a year and a half.

SMW: In the containership industry, a relatively small number of very large operators control a substantial percentage of the vessels. While these companies have substantial resources to implement

a digitalization strategy, small operators find implementation difficult due to limited budgets and manpower. Will there ever be "off-the-shelf" digital solutions that will make it easy and economical for small operators to adopt digitalization?

AF: There is a vibrant start-up scene for various digital solutions with many ports, service providers, shipping companies, and equipment vendors launching incubators or garage-style environments for innovation.

However, both large and small shipping companies mainly want to work with known quantities, so gaining traction for some of these "off-the-shelf" solutions is a challenge. That said, I think, large well-established companies will acquire truly valuable start-ups and their solutions and incorporate into their established offerings.

We are also seeing many traditional connectivity service providers moving toward full-spectrum IT services. This integration should reduce the risk of working with small, less established companies and remove the burden of managing multiple vendors' systems.

SMW: In the "Devil and the Deep Blue Sea," several

use cases demonstrated digitalization's value. Can you recap some of those examples? Are voyage optimization and the associated fuel savings still the primary driver of adoption, or are there other major economic benefits emerging?

AF: As long as bunker fuel is the largest OPEX item, and it is typically at least two-thirds of a vessel's running costs, the first applications will reduce fuel consumption. These include voyage optimization, trim, and hull monitoring applications.

Other cost-saving applications such as predictive maintenance and condition-based monitoring programs will also be popular since they can lower repair bills and reduce the frequency of unexpected breakdowns, and even lower insurance premiums. Augmented reality (AR) and AI-based collision avoidance systems can result in further savings through crew size reductions.

SMW: As you know, collecting sensor data alone is not enough. The data needs to be transmitted and analyzed. How has the analysis and interpretation of data progressed?

AF: Multitudes of companies base their business models on the delivery of actionable data. Ultimately, many users want to transmit it back to shore, where multiple users can access it.

However, what needs to be transmitted in real-time, near real-time, or not at all, is yet to be resolved. In the future, under 5G, some data may be processed and analyzed at the edge rather than transmitted via satellite to the Cloud.

SMW: One of the critical questions relating to sensor data analysis is "who owns the data?" For example, can a vessel owner gather and analyze data from an engine manufacturer's engine sensors, or is access proprietary?

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An age-old question! I believe it is generally recognized, that the vessel owner owns the data generated by it.

But this is largely useless if it is sitting un-formatted in a database somewhere. In that state, it is of no use to the vessel owner, fleet manager, or OEM. Once that data is manipulated somehow, that output is usually owned by the company doing the analysis.

To definitively resolve the "property rights issue," there need to be rules around data ownership and a much greater willingness to make some level of standardized data available to a larger community.

SMW: What new benefits does 5G bring to the maritime sector? How will 5G improve IoT services in the future, and how is ST Engineering iDirect participating in its implementation?

AF: I am working closely with my colleague, Semir Hassanaly, our Head of Cellular Backhaul, where the maritime environment intersects with the world of cellular technology, especially 5G.

Semir and I believe that 5G will facilitate in-vessel communication services and also enable communication with external entities. Applications and entertainment information will be delivered using different types of satellite constellations and access technologies.

Maritime has the potential to capitalize on all of 5G's capabilities, including virtualization, but also to leverage a very dynamic allocation of resources resulting in the ability to accurately streamline requests based on latency, cost, and throughput as an example.

Implementation of Virtualization with Software-Defined network architecture provides scalability, dynamic capacity management, and the integration of multiple access technologies such as the 5G NR, 4G, IoT, and Wi-Fi

ST Engineering iDirect has been actively contributing to 3GPP standards and has been developing IoT services across our range of platforms.

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AF: 5G lends itself towards standardization and integrating multiple access technologies, which could be satellite networks using different hub and modem infrastructure.

Another way to look at it is the concept of a universal modem. We believe there are markets for universal modems which will ease interoperability between multiple systems, and we are contributing to the cross-industry related initiatives. However, universal modems cannot meet the demand for very high performance, scalability, and efficiency.

SMW: Vessels generate increasing amounts of data, and the need to efficiently transmit it to the Cloud is becoming more and more important. What is ST Engineering iDirect doing to minimize latency and increase transmission speeds, especially with the trend toward relying on cloud-based applications?

ST Engineering iDirect takes Quality of Experience for the end-user extremely seriously. Of course, we all have to obey the rules of physics, but by enabling acceleration and compression, we can improve that overall experience.

We have also been working with numerous NGSO constellations to ensure that our systems support those applications that truly need lower latency. Our existing modems, suited to extreme bandwidth applications, will complement a next-generation series of Non-Geostationary Satellite Orbit (NGSO) capable modems.

SMW: The COVID crisis has disrupted supply chains, extended crew contracts, and put a significant number of cargo vessels out of service. Have these disruptions heightened the interest in using IoT, Big Data, and artificial intelligence to improve efficiencies? When the industry recovers,

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do you believe that the demand for digitalization will accelerate?

AF: The COVID crisis has emphasized the need for digitalization across many industries, including shipping. It has served as a stark reminder of the world's dependency on ease of movement of goods and people and what happens when parts of that ecosystem start to break down.

Digitalization's benefits could be as simple as ensuring that there is toilet paper on the shelves of your local grocery store or as severe as mitigating the humanitarian and economic crises of seafarers stuck at sea.

But, like in any crisis, the most successful companies will be those who have the data and tools to observe the world around them, make educated decisions based on insightful analysis, and accelerate out of the downturn. An important part of this will be the developing strategic and technological partnerships that will help make this a reality - and we are here to help enable that recovery. ★

About Andrew Faiola

Andrew is Director of Mobility at ST Engineering iDirect.

Prior to IDirect, Andrew lead Intelsat's Mobility Solutions sales teams in Europe, Middle East, Africa and Asia Pacific.

Andrew was also European Sales Director at New Skies Satellites in the UK, and held various sales and marketing roles at ESATEL