The shipping industry's first Virtual Personal Assistant

Taming the data monster

by Mike Konstantinidis, *CEO, METIS Cybertechnology*

The immense amount of data produced by ships can improve the safety, efficiency and competitiveness of their operations, but decision-makers must first be equipped to interpret and act on the results. Shipping has struggled to get to grips with big data, but the tide is turning. The advent of reliable, rapid, high-throughput satellite connectivity at sea means transferring the vast quantities of data generated by the various equipment and systems on a modern container ship or tanker is no longer the problem it once was. The challenge today is sifting through this stream for insights that can make vessels safer and more fuel-efficient – or, in short, better overall.

For vessel owners, these attributes can add a competitive edge in a commercial environment that is often as unpredictable as the oceans themselves. Buffeted by daily fluctuations in commodity prices and freight rates, as well as longer-term shifts in the global economy, an advantage that can be relied upon can be used to maximise profits or minimise losses. Shipowners and managers are also contending with a rapidly evolving regulatory landscape – particularly in terms of environmental performance – and vetting requirements from charters and cargo owners that are ever more demanding.

Data is increasingly regarded as holding the key to navigating these turbulent waters. Fortunately, the advances seen in Artificial Intelligence (AI), machine learning, and related analytic techniques are now as available to shipping as to any other industry.

The hampering abundance of choice

At our company, these technologies have been deployed to create a platform for capturing, processing, and analysing data, with particular attention paid to making the outcomes of these analyses of most relevance to and easily accessible for those using them. The user benefits from shipping's first Virtual Personal Assistant, an AI-powered 'agent' which – like a seafaring Siri or Alexa – can help seafarers, shore-side technical colleagues, and boardroom executives alike to perform day-to-day tasks.

Creating such a potent solution relies on addressing a major obstacle facing digitalisation in shipping that does not block the route of other industries, namely lack of standardisation, in terms of equipment specifications and configurations found onboard. Boarding any modern vessel offers a chance to find devices from innumerable manufacturers, most of which opt for proprietary interfaces. The situation contrasts starkly with aviation, where airlines largely choose between just two makers. Shipping's apparent abundance of choice has, in reality, hampered efforts to achieve integration. Finding a way to deliver these data in a form that can be pooled, accessed, and manipulated for multiple purposes as 'big data' has therefore become something of a Holy Grail for maritime digitalisation.

Data capture for better decision-making

The solution developed by METIS is to deploy a collection of smart devices, called Wireless Intelligent Collectors (WICs), which are meshed in a robust wireless network. The data collected is transmitted back to a cloud-based hub where it is stored securely alongside information from other sources, like weather providers and traffic monitoring services (including the Automatic Identification System), as well as corporate resource and maintenance planning systems. This means everything is immediately available to the micro-services and the 'agents' providing the functionality and interacting with end-users. The ability to gather data around the clock provides a much richer, high-resolution picture of vessel performance than would be possible through trying to join the dots using incomplete, patchy datasets obtained from daily noon reports or ad-hoc manual readings.

Moreover, WICs don't just function as a dumb relay, forwarding data unchanged as it arrives. They contain enough embedded processing power to carry out local pre-processing, cleansing, and performing a preliminary analysis of incoming data, analogue or digital, before it is transmitted back to the hub. By intelligently removing unimportant 'background noise' and focusing only on the salient signal, the architecture reduces the load on the hub and improves the system's overall resilience and reliability.

The system can also support what we call data-driven decision-making by helping staff to generate various operational scenarios quickly and easily. Based on the current condition of the vessel and dynamic parameters, such as speed, estimated time of arrival, draft, destination, etc., METIS can help shipping companies decide on the optimal course of action, without captains or superintendents having to resort to hunches or guesswork. This qualitative approach contrasts markedly from the one-size-fits-all model seen in the maritime space until now, where everyone was presented with the same unfiltered data, leaving it up to the individual user to manipulate or interpret it.

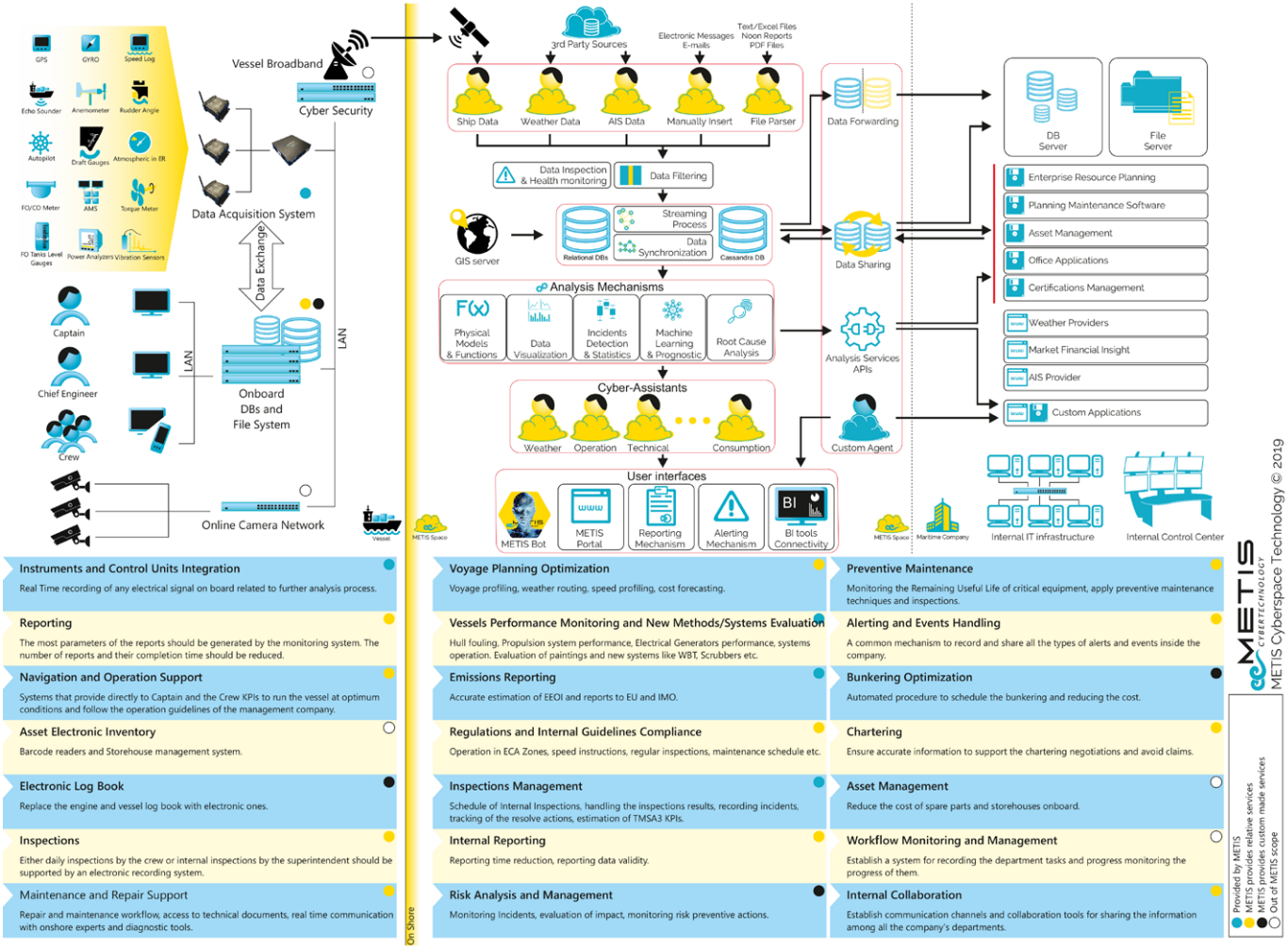
Recently we had a case of a real vessel faced with heavy weather on a passage from Malaga to Rotterdam. The normal course of action in these circumstances is to slow the vessel down and let the storm pass before proceeding. But when we ran multiple scenarios on METIS, a counterintuitive result emerged: less fuel would be burned by speeding up and outrunning the weather.

Intelligently fit-for-purpose

Against this background, agents can be created to perform specific tasks. They can carry out weather analysis, monitor hull fouling, measure fuel consumption, track on-board energy usage, or keep an eye on the main engine's operating efficiency. In a nod to the design of smartphones, agents can also adapt intelligently to their immediate environment, selecting the best available data source for the job at hand, whether that comes from sensors built into equipment, manual readings keyed in by ship personnel, or external information.

Because no two ships are identical, agents are also highly configurable and can be set up to detect and act on significant events based on thresholds specific to an individual vessel. They have both diagnostic capabilities that can help engineers pin down the likely cause of a deviation from expected behaviour or other problem, and prognostic capabilities for predicting future outcomes so that corrective actions can be planned in advance rather than dealt with in a reactive manner.

Thanks to their predictive capabilities, agents can raise alerts and forewarn crew of potential impacts on vessel operation



caused by variations in equipment status or expected changes in the external environment. They help in the investigation of unusual behaviour, assist in scheduling maintenance tasks and aid voyage planning, while also monitoring and evaluating machinery performance for optimisation purposes. However, the ability to intervene before an issue escalates not only benefits vessel operators financially; more importantly, it enhances safety by reducing the risk of catastrophic machinery failure.

In exceptional cases, where more rigorous investigative work is necessary to diagnose the root cause of a problem or make a decision, our company can prepare and provide data in a format suitable for tools like Tableau, Power BI, and MATLAB.

Tireless helpers

The way in which agents convey information to vessel crew and shore-based staff also represents a sharp break with traditional industry norms. Instead of vessels and shore facilities installing another standalone application that complicates existing workflows, the default output channel for METIS is through the shipping company's existing collaboration platform – think Teams, Skype, or Slack.

If necessary, the Virtual Personal Assistant can reach personnel more directly by sending text messages to alert them of critical events. Such updates and alerts are presented in Plain English as opposed to indecipherable error codes. Crucially, METIS won't spam everyone in the organisation about, say, a broken fuel pump. It knows who needs to know what, and, depending on the event's seriousness, when they need to know it.

What is more, communication with the agent is interactive: recipients can respond, requesting more information or selecting a course of action – again in natural English, in much the same way they would chat with a human colleague. This lowers the learning curve, allowing anyone in the company to utilise the system and take advantage of data in their work, without having to undergo training on how to code or query a database directly. A side benefit of this ease of access is that it opens up the possibility of far greater collaboration between different teams or departments within a shipping company.

In this way, agents assume the role of an extra pair of eyes for personnel in the engine room or act as a personal aide to staff tasked with preparing regular performance reports. Against a backdrop of shrinking crew numbers and growing administrative burden on those who are left, the value of such additional 'helpers' quietly and tirelessly supporting seafarers cannot be understated. ■

METIS CYBERTECHNOLOGY

The Athens-based METIS Cyberspace Technology was established in 2016 and specialises in the field of data acquisition, real-time performance monitoring, and intelligent analytics for the maritime industry, to that end utilising machine learning and AI techniques. The company's data acquisition service has received Type Approval Certification by Lloyd's Register for marine, offshore, and industrial applications. Head to **www.metis.tech** to learn more.