

Enhancing Fleet Performance Management using Big Data Analytics

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The Maritime Industry is looking to explore new business models through digitalization. Companies are increasingly recognizing the need to overcome data quality issues and manage the ownership, security, sharing and use of big data. These data analytics are encouraging fleet management and commercial operation to innovate and explore opportunities for driving cost efficiencies and new revenue streams through digitalization.

Every maritime asset, every maritime system is producing a wealth of data. The challenge is to unlock that data, to get it out of its silo and turn it into a productive asset in its own right. But how can openness be balanced with quality, security and control?

The maritime industry is looking to boost their profitability and explore new business models through digitalization. However, companies are increasingly recognizing the need to overcome data quality issues and manage the ownership, security, sharing and use of data. To facilitate friction-less connections between different industry players, domain experts and data scientists, DNV GL has launched a industry data platform. As an independent technical assurance and classification/ verification company, DNV GL already manages an enormous amounts of asset and industry data on behalf of many different maritime stakeholders and data owners. By combining our asset data and other data with your data we can unlock data silos and provide a friction-less, quality assured data market place that releases the value in data. Owing to their potential for a major transformation and disruption of current businesses, digitalization and advanced data analytics are among the top priorities for all industries, including shipping. While shipping has access to a greater volume of data than ever before, it faces challenges assessing its potential. This is mainly due to data arriving from disparate streams, in dissimilar formats and at varying speeds and quality. In light of these challenges, companies are increasingly building their strategies around digitalization opportunities. They are encouraging operation, fleet management and commercial departments Creating value from data in shipping DNV GL is trying to innovate and explore opportunities for

driving cost efficiencies and new revenue streams through digitalization.

For the ship owner or manager of ships, staying competitive is paramount. A survey conducted by DNV GL in 2016 indicates that industry leaders believe a 10% to 25% reduction in total vessel OPEX (including fuel costs) is possible through broad efforts in operations, technical management and considering interfaces to commercial activities. Customers have identified several measures leading to cost reductions. These include thorough improvements of all fleet management activities, such as voyage execution, as well as engine, system and hull performance, in addition to the commercial side of the business. They recognize that in so doing, they will need to embrace the full variety of digital solutions. The term "digital solutions" in this context may factor in everything from auto logging systems to state-of-the-art, sophisticated logistics planning systems, as well as advanced analytics of data and the respective tools. In our opinion, the future will be guided by six technologies which will impact vessel operations; they are 1) Sensors and Internet of Things (IoT) 2) Connectivity 3) Handheld devices (mobiles and tablets) 4) Big Data and analytics 5) Platforms and 6) Cloud computing.

Vessels built or designed today have more sensors and better communication systems than the vessels operating today. Components may come fully equipped with sensors from the manufacturer. We expect this trend to only increase with time. Key questions for a new unit will be: what are the sensors monitoring? How can the data they provide be used? With fully or partially sensor-equipped components and

systems, monitoring and simulations can be taken to the next level. Data logged from various equipment can already today be put into models simulating system behaviour. This data logging will lead to a rapid increase in the statistical learning curve for maritime equipment, including failure events. Machine-learning algorithms will gradually become available for this purpose. Proper use of data contribute with substantial value towards more efficient operations, but prerequisites are effective tools and analytics. With regulation becoming more data centric, forward looking data strategies need to consider efficient compliance with these in the context of other, value creation activities. There are a few issues to consider when planning for how to create value from data:

1) Collect the right data: Voyage, engine and environmental data from a vessel has value when it is analyzed and presented in a format that matches the maturity level of the organization. There is no need to collect an excessive amount of data unless you can make use of it. Or if the data quality later turns out to be insufficient for sensible use. When defining data collection scope, start with defining what you want to achieve with it. For example, for basic compliance or for making decision to save fuel and opex, or as inputs for a strategy process.

2) Integrating different data sources: A system should be able to integrate and present data from different on-board sources to avoid that this must be done manually. A typical situation aboard many vessels today is that some information is collected manually through 'noon' reports, engine logbook, environmental reports, while other data may be collected automatically through sensors. For proper fleet performance management, the different data sources should be combined onto one platform or portal. Solutions exist in the market today that deliver this functionality.

3) Complement with industry data: Some commercially available systems enrich vessel data with industry data to enhance understanding of performance, for example by using satellite wind data, sea state data, vessel position data (AIS), fuel quality, fuel price information.

4) KPI monitoring: Data should be presented in a format that enables monitoring of key performance indicators on vessel/fleet level,

whether this is technical, operational, environmental, safety or commercial.

5) Benchmarking performance: A visualization system should enable benchmarking against suitable baselines and reference lines. E.g. how is my vessel fuel performance compared to last quarter (own benchmark), compared to fleet average (fleet benchmark) or compared to my peers in the market (industry benchmark).

6) Sharing of data within the company: There are different users of the same data within one company (technical, operations, commercial, management) that may have different needs. Dashboards can visualize relevant information related to safety and compliance records, as well as technical and financial performance and statistics, customized to the needs of the different users. An effective data visualization system must be flexible in how it presents data to meet these needs, e.g. 'Management Dashboard', 'Operational Dashboard', 'Technical Dashboard'.

7) Data output and integration with other systems: A flexible system for data analysis and presentation should be able to link to other in-house systems, i.e. link between technical performance systems and in-house commercial BI (Business Intelligence) systems. BI systems provide features such as calculations and analysis. To make the right decisions, it is key that data is provided in a format that enables transformation into useful knowledge in the BI system. Given the profound shift towards mobile user interfaces and given the fact that staff of ship owners or managers spend a substantial amount of time travelling, mobile access to data and insights will increasingly be demanded. Considering the limited space on screens of smartphones and similar devices, content and presentation of data and insights have to be completely re-thought, eventually resulting into a "mobile-first" approach to all user interfaces. Most systems are not prepared for this today, respective strategies and concepts need to be developed.

8) Commercial off the Shelf (COTS) vs Customer Specific Systems: A customer specific system for handling and visualization of data can be designed to meet the exact company needs. At the same time this can be complex and expensive to build and maintain over time and will

create challenges in the future when requirements or underlying technologies change. A commercially available system may be less flexible in detail design, but often has more advanced functionality that has been proven and enhanced, often through the experiences of hundreds of users. Development, new releases and maintenance are taken care of by the system provider, and bugs are removed continuously. There are commercial decisions around building a system vs. using one as a service. Plus every owner / manager needs to decide if a bespoke system will create a sufficient competitive advantage or if the resources would be better invested in monitoring the insights generated through a commercially procured system and managing the resulting improvement activities.

Digital technology is not new to the shipping industry. However, following major advances in sensor technology and data storage capabilities, the industry is now faced with new opportunities for utilizing data, arriving from all parts of the value chain. The ability to connect and analyze these disparate data streams has not kept up with the pace at which the sheer amount and complexity of data has increased. This growth provides new opportunities for data to play a larger role in many areas like integrating operations across assets and system barriers, improving efficiency of operations, identifying new business opportunities and optimizing commercial performance. Things are moving fast in the digital arena, and we need to accept that today's perspective might soon be rendered obsolete.

CONCLUSIONS

The exact next steps are still not fully evident, but the pressures to reduce costs, increase efficiency and improve safety will play a dominant role in driving speedy implementations of new digital solutions.

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Players in the shipping industry may benefit from opportunities for efficiency gains and cost reductions if it can better address the data that are already collected today and continue to explore, utilize and share new sources of information. And while different companies and players within the industry are at varying stages of digital adoption a few early adopters are emerging. Those at the early stages of maturity are increasingly facing the challenges and opportunities and are taking steps to understand the implications to their daily businesses. The exact next steps are still not evident, but the pressures to reduce costs, increase efficiency and improve safety will play a dominant role in driving speedy implementation of new digital solutions. Through collaboration and investment on innovation, the industry can start to overcome the challenge of extracting value from data. To replicate a sharing paradigm as seen in other industries, more trust and assurance in how the data is managed will be required. Trusted partners who can provide the required infrastructure, secure data quality and access protection will be important building blocks to unlocking the gains possible in a collaborative, data centric future. The digital transformation is challenging the traditional business models employed in the shipping industry, and will introduce new forms of interaction between stakeholders. Players who are quick to embrace the transition will gain a unique competitive advantage as they gain better control of their operations and keep costs down in an increasingly demanding industry.”