Smart thinking on smart ships

ROUND TABLE The digital transformation in the maritime sector continues to progress and is taking on more and more concrete forms. While many companies can already demonstrate clear strategies and concepts, others are still looking for a suitable orientation. To find out what some of the main players in the industry have to say about their own and their organisation's view on the future of shipping, the first Ship&Offshore virtual round table, organised by freelance journalist Saul Trewern, brought together experts from DNV GL, Hapag-Lloyd, Kongsberg, MAN Energy Solutions and Wärtsilä.

In our virtual round table, five maritime "heavyweights" discuss the future of shipping

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› PARTICIPANTS

- Bjørn-Johan Vartdal, digital director and head of the Maritime Incubator, DNV GL – Maritime
- Jörg Erdmann, senior director Sustainability Management, Hapag-Lloyd
- Ketil O. Paulsen, technology general manager, Integrated Solutions, Kongsberg Maritime AS
- Per Hansson, head of Digital and Strategy, MAN Energy Solutions
- Andrea Morgante, vice president Strategy and Business Development, Wärtsilä Marine

How do you define the terms 'smart ship' and 'digital transformation'?

Jörg Erdmann: A smart ship is a vessel equipped with advanced automation and other digital features to improve analyses of data regarding vessel operation such as fuel consumption, energy efficiency and emissions control management, for example. Digital transformation is the opportunity to implement continuously agile working and learning frameworks as well as the increasing acceleration of our daily work thanks to digital tools and improved processes.

Bjørn-Johan Vartdal: A smart ship is a vessel equipped to generate and take advantage of digital information in order to make operations safer and ›

Bjørn-Johan Vartdal, digital director and head of the Maritime Incubator
Source: DNV GL – Maritime

»Digitalisation is the most effective way to quantify emissions from the shipping industry«

more efficient. As a classification society, we are looking at the effects of digitalisation across the board including ensuring that our own processes and services are more effective. For instance, we are using new digital processes to optimise the approval and assurance of designs as well as during ship operation. We also focus on new risks that come from a greater dependence on the sensors and software used in the digital technologies that enable smart ships.

Per Hansson: Digitalisation is about making life easier and business more effective and transparent for our customers, translating into bottom-line improvement. It is above all a cultural and mindset topic. Thinking digitally means for us to understand our customers' industry-specific needs and to rapidly deploy service and solution offerings addressing them, making use of the shorter lead times and exploiting availability of machine data that digital technologies enable.

Ketil O. Paulsen: For Kongsberg, smart ships are about the use of technological and practical solutions which allow businesses to harness data from diverse integrated systems and adopt the necessary corporate mindset to roll out constructive actions across entire fleets and workforces.

Andrea Morgante: A digital switchover is seeing computation power, advanced analytics and improved communications unlocking the full potential of our customers' businesses. We are re-fitting equipment to obtain data for diagnostics that allows for optimisation. Our products are being connected to each other – talking to each other – and the data is being aggregated to provide a matrix of actionable insights.

What are the main benefits of digital transformation in the maritime world and what stops us from reaching its full potential?

Andrea Morgante: Everyone waxes lyrical about shipping being the most efficient mode of transport, and indeed it is. But the data shows us that the maritime industry is not as efficient as it could be; for example, the commercial practice of 'first come, first served' provides the incentive for ships to sail at full speed to port – a major factor in congestion and excess fuel consumption. This waste constitutes an extremely large amount in untapped sustainable productivity gains and emission reduction potential. With big data analytics, we can optimise operations and energy management; intelligent vessels will enable automated and optimised processes, and smart ports will deliver smoother and faster port operations.

Bjørn-Johan Vartdal: Digitalisation enables support from computers and software to make processes more efficient and of higher quality, but a lack of standardisation means that we are still working in silos. If we are really to take advantage of digital information, we need to start to use it across the board, so you need a certain level of standardisation or implementation will not be efficient. I think we can learn a lot of best practice from the aviation industry where even the major OEMs have agreed on standards to work on that will ensure interoperability and ultimately increased safety.

Ketil O. Paulsen: The principal benefits lie in improved sustainability through emission reductions, allied with consequent substantial cost savings and enhancements to safety, productivity and reliability, delivered through automation. The only real barriers lie with companies reluctant to abandon traditional working practices that are slow to accept the advances which are revolutionising the maritime industry and nervous to invest in hardware and software. It is therefore imperative that such organisations are not only fully apprised of the options and advantages, but are also made aware of the potential consequences of being left behind.

Jörg Erdmann: The main benefits of digital transformation for us are continuous improvements and learnings with the help of new methods, planned scalability options and growth, and globally integrated and connected colleagues. It is a big change project, transforming our ways of working and our mindsets so it is even more important to take a comprehensive approach. However, technology is only one aspect of digitalisation. Even more important is the cultural change – in both how we work together and how we approach projects. In this context, we follow a build-measure-learn philosophy. We turn our ideas into products, measure customer feedback, and learn whether we need to change track or keep on the same one.

Per Hansson: The opportunities are almost endless, but safety, cost and reliability remain at the core. The data that can now be accessed enables an unprecedented optimisation of the whole maritime logistics system that will result in safer, more economical and environmentally sound operations. As the main challenges

we see complex industry structure, often tough cost pressure and diverse business models, which make both creation of integrated digital solutions as well as aligning economic incentives difficult. We are driving the development of digital interconnection and integration from our core – the engine room and propulsion plant – working together with other industry providers and our customers.

Specifically, how can digital technology and smart ships be leveraged to reduce the environmental impact of shipping?

Bjørn-Johan Vartdal: Before you improve something you need to measure it, and digitalisation is the most effective way to quantify emissions from the shipping industry. If you can achieve this, you can highlight the deficiencies, and when the data become transparent, everyone will agree on it and maybe do something to improve it.

Jörg Erdmann: This can be done by gathering and analysing a vast array of operational data. By having data in a usable format, correlations can be made, and computer systems are able to provide helpful analytics and advice to the master and allow improved decision-making. We collect this data using digital programs and calculate the optimal performance proposals, which can then be adjusted in real time.

Per Hansson: Digital technologies enable us to lower environmental impact by improving emission reduction and by increasing fuel efficiency. For example, the constant monitoring of data from the propulsion system and connected emission control technologies helps us to optimise performance of the emission systems and to prevent issues before they occur.

Andrea Morgante: Compared with many other greenhouse gas reduction methods, aiming for just-in-time arrivals is impactful, cheap, readily available, and able to improve operational efficiency if the industry is willing to adapt. The just-in-time concept optimises voyages so that unnecessary fuel consumption and emissions are avoided in the first place. Digital technology allows for pre-factum action. The combination of artificial intelligence (AI), advanced diagnostics, and deep equipment expertise greatly enhances the safety, reliability and efficiency of the equipment and/or systems installed.

Ketil O. Paulsen: With the IMO pushing hard to have the shipping sector's CO_2 emissions halved by 2050, we are implementing the necessary environmental measures through new propulsion technologies, allied to energy optimisation assets such as power management systems, as well as by developing unique solutions to ongoing challenges. These range from autodocking systems for ferries to our partnership with Jotun to develop a robotic and digital technology-based solution that provides a proactive, climate-friendly means of cleaning ships' hulls.

What is your experience of the impact of digitalisation on the seafarer in terms of benefits, and job security?

Jörg Erdmann: There are two major aspects of digitalisation on board. The first one is related to the job itself. Even though our vessels might look like steel giants, they increasingly resemble what you might call "floating computers". Recent years have seen significant changes when it comes to the technologies used on board. In addition, engine and performance monitoring is also largely automated and digitalised now. It's not only about technology, it's also about having a well-educated, competent crew that knows how to use it. And even though data granularity and our ability to consult with the ship have created new possibilities, the final decision in any voyage stage will always remain with a ship's master. Secondly, digitalisation has a social component as it allows our crews to stay connected with their families and friends 24/7.

Jörg Erdmann, senior director Sustainability Management
Source: Hapag-Lloyd

»Digitalisation has a social component as it allows our crews to stay connected with their families and friends 24/7«

Andrea Morgante: Contrary to many sensationalist headlines lamenting the demise of the sailor, the coming together of AI and connected systems will lead to demand for more jobs that have specialised roles. AI is already in use when it comes to monitoring machinery performance. We are testing AI capabilities for complex ship manoeuvres such as autodocking and collision avoidance. But you will always need humans in charge.

Bjørn-Johan Vartdal: Seafarers collect vital information, but if it is locked into manual reports it's not useable in a digital context. When collected digitally it can be used to improve processes on board relating to the operation of the ship, which will improve work patterns. It will change the job of seafarers, but if they are willing to embrace the changes, take advantage of the benefits, then they will have job security. We have been running several projects to evaluate the effect of relocating functions on the ship to the shore in terms ›

of machinery and navigational tasks. It doesn't mean the job disappears, just that it is done in a different way at a different location.

Ketil O. Paulsen: Digital, automated processes are making all manner of duties easier, safer and 'greener'. Vessel operators have more detailed data about their ships and voyages than ever before at their fingertips so decision-making is enhanced, and companies with a well-defined digital strategy are attracting the brightest personnel and reporting first-rate crew retention.

Per Hansson: The whole shipping industry and the technologies involved are becoming more and more complex. For example, all our engines are equipped with advanced control systems and hundreds of sensors that constantly transmit a stream of data. On the one hand, this enables the precise control and constant monitoring of the whole propulsion system; on the other hand it requires new skills of seafarers who need to learn how to cope with the new digital solutions. To bridge the knowledge gap and support ship operators with the help of digital monitoring and analytics, our experts in our remote operation centres all around the world can remotely monitor our customers' systems and proactively advise them how to practically address issues.

What can be done to unify and simplify digitalisation for the user?

Bjørn-Johan Vartdal: If as an industry we are successful in achieving the required standards, then it will be possible to develop platforms to distribute tasks to companies specialising in certain areas. The problem for the shipowner is that if you have few companies handling this, there will be a lock-in effect, and there may not be much choice in terms of system providers. At the extreme, if there is one provider then standardisation is not necessary, because they will have their own standards. But if you standardise to enable the exchange of information, then you can allow for more providers in an ecosystem.

Jörg Erdmann: More standardisation will happen in any case, and the technology behind the various protocols and interfaces in use is becoming easier and faster to adopt and integrate. Thus, rather than being a matter of protocols and interfaces, it will increasingly be about how well you can work with all the data and information to accelerate and grow your business. We are following a multi-platform approach, working actively together with other industry leaders in several digital initiatives, such as the Digital Container Shipping Association, the Global Shipping Business Network and TradeLens.

Ketil O. Paulsen, technology general manager, Integrated Solutions
Source: Kongsberg Maritime AS

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Ketil O. Paulsen: Integration is key. For instance our vessel-to-cloud data infrastructure solution provides fleet managers and operators with an easy, real-time fleet overview, including instant access to vessel-specific dashboards and data analysis tools. We have recently added a new performance app, which leverages contextualised ship data to reduce fuel consumption and unnecessary running of equipment while simplifying reporting to keep ship owners/operators compliant in the light of ever-more stringent emission regulations.

Andrea Morgante: It's all about interoperability whereby every vessel can connect to digital services that make shipping safer, greener and more integrated. For this, we work with shipowners, operators, ports and regulators to create an infrastructure that seamlessly integrates everything from the bridge systems down to the engine room, cloud data management, data services, decision support tools and access to real-time information.

Per Hansson: We have recently introduced an open platform enabling the integration of OEM data across the marine, power, and energy industries. It fosters the exchange of data in a controlled and secure manner and users will have the opportunity to access all their digital assets via a single interface, which integrates all their OEM data streams and enables a complete system view. This way, we can remove friction points and help the industry to operate more efficiently, ultimately saving resources and moving faster towards realising the full payback of digital technologies.

Finally, how have you seen maritime digitalisation and smart shipping develop over the last five years and what might be coming next?

Ketil O. Paulsen: Clearly, the industry is moving slowly but steadily towards a committed embrace of remote and digital technologies. This is both prudent and necessary in a business arena where safety, efficiency and cost-effectiveness are unavoidably intertwined with environmental responsibility. Automation will inevitably play a major part in both the immediate and long-term future of maritime digitalisation, as will IoT,

Per Hansson, head of Digital and Strategy Source: MAN Energy Solutions

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robotics and the leveraging of machine learning and big data.

Per Hansson: In the past years, the value of data and digital insights for the maritime business has become evident. But it is crucial to look at digitalisation from a shipowner's and operator's perspective. Instead of adding complexity by a multitude of OEM software applications, the industry needs to create a common ecosystem, which paves the way for the transition towards a data-driven business with performance that is more easily measured and managed. We have already created a comprehensive digital ecosystem to deliver value from data insights to our customer's business.

Jörg Erdmann: Going back further, in 1990, stowage plans for our vessels were done using coloured pencils for different ports of discharge, stowage instructions were transmitted to terminals by telex operators, and dangerous goods stowage instructions were done on a separate sheet. Remote monitoring of engines was unknown at that time. Today, most of the paperwork is handled digitally and we have a real-time view of the vessel's performance. Communications to the terminal and the ship's command have improved significantly, and the workload ashore has eased. We will see deeper integration here, and we will also see more standardisation across the industry. Looking at the customer side, we will most likely see holistic, intelligent products and services – both physical and digital – that meet our customers' needs using integrated and automated methods.

Bjørn-Johan Vartdal: What we have seen is very different depending on the ship type and trade. Some owners, especially in the offshore energy sector, have really embraced it and are forward-leaning in trying to do something useful by making processes more digital and using digital information more efficiently. When all stakeholders including cargo owners, charterers and even consumers understand that there is a possibility of transparency based on digital information, this will become the real driver for digitalisation in the sectors that aren't chasing it now.

Andrea Morgante: With the constant expansion of faster and more affordable satellite connectivity, we are witnessing an evolution in communication between smart ships and smart ports. As a result, remote condition monitoring and maintenance of shipboard equipment will only continue to improve too, resulting in the reduction of service technicians' visits to vessels in port and the associated lengthy coordination between owner and agent. If we get this right now, in the coming decade, vessels will be technologically smart, using cloud-based software and digital technology to optimise the use of energy, so that fuel consumption is minimised.

Andrea Morgante, vice president Strategy and Business Development Source: Wärtsilä Marine

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