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Digitalisation – Decarbonisation

- REPORT FROM OUR OSLO FORUM
- IMPROVING CHARTERING PROFITABILITY WITH SOFTWARE
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MAY 2026

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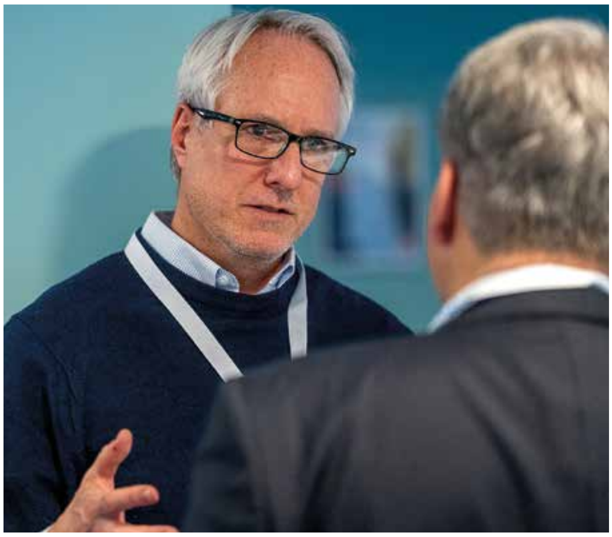

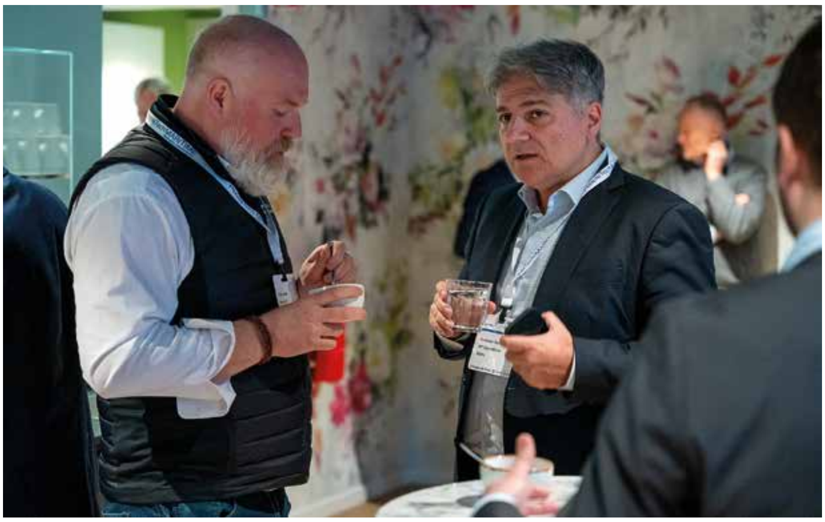

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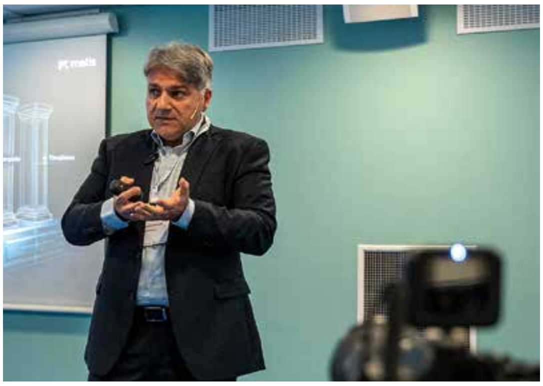



# Wilhelmsen - how AI will help us at work

**AI may not make us redundant, but it may take over aspects of our roles and tasks, and enable us to achieve more. We are likely to see AI tools combined with traditional software, said Kristoffer Bjerkelund**

We are likely to see AI take over aspects of people's jobs, rather than eliminate their jobs. One person may be able to get more done, said Kristoffer Bjerkelund, VP Digital Solutions & Customer Journey at Wilhelmsen Ship Service, speaking at the People Tech Maritime event in Oslo in February.

"Everyone is doing some task today that they don't want to do," he said. "A vessel manager can send and receive up to 200 emails per day. That is not necessary in the future."

AI may help reduce the amount of manual data work and reporting required by our various processes and systems.

People e-mail many pdfs and spreadsheets. "We send them around like they are the answer to everything."

"These are some of the things that make maritime applicable for AI," he said.

Ultimately we may see benefits in improving operational efficiency, supply chains, energy management, cybersecurity, and getting to autonomous ships, he said.

We may see autonomous agents, which involve having a bot running on your computer which can do tasks with your software. "These kinds of solutions try to put AI to work. They read emails, send messages," he said.

But when Wilhelmsen tried it out on one of its computers, "our security department flared red, because it tried to do crazy stuff immediately," he said. "These things don't work that well right now."

The lack of data standardisation may not be such a big problem as in the past, because AI tools can help convert data from one standard to another. Connecting data together will make it easier to analyse and support more people's decision making.

"We are on a path somewhere; we don't know exactly where it is going. There is a lot of funky stuff going on, it may not [all] be that good."

*Kristoffer Bjerkelund, VP Digital Solutions & Customer Journey at Wilhelmsen Ship Service, speaking at People Tech Maritime Oslo*

## Supporting experimentation

Wilhelmsen seeks to discover problems which people encounter every day and see if AI may be able to assist with them. "You wouldn't call us the 'frontier generative AI company,' but we are trying to find those pockets where we see it makes sense. We want to learn from successes and failures to figure out how to use it in a good way," he said.

Companies have to find ways to support exploring and exploiting AI, using people's curiosity, while maintaining safe operations.

Wilhelmsen has assigned 100 departmental leaders in the company with responsibility for testing AI out on their problems to see if it may be able to contribute to solving them.

Wilhelmsen also has an Technology department to help them make it work. When experimenting with AI, "typically your motivation will fall very quickly when you don't manage to [make it work] immediately and don't know what you're doing wrong," he said. "There is a risk that people try it out, it doesn't work, and so they think, 'this AI is not for me'.

*"So you need someone to help you through the barriers a little bit."*

If this dedicated Technology department is sitting far away from the business people, it may not work, he warned. "You need the [AI] technical people available to people who sit with problems every day."

The company generated around 100 different ideas, of which only 2 or 3 were good enough to be implemented

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Future Energy Publishing Ltd, 39-41 North Road, London N7 9DP
**www.peopletechmaritime.com**

**EDITOR / PUBLISHER**
Karl Jeffery
Tel: +44 (0)20 8150 5292
jeffery@d-e-j.com

**ADVERTISING SALES**
David Jeffries, Only Media Ltd
Tel: +44 (0)208 150 5293
djeffries@onlymedia.com

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in production. "You could argue that we wasted a lot of time, but I don't think we would come [this far] without this," he said. Many of the ideas that did not need to be implemented in production resulted in giving people existing tools and upskilling on using the associated AI features.

Mr Bjerkelund was asked if Wilhelmsen's practise of selecting "AI champions" in different departments and asking them to take the initiative is an indication that companies do not yet know what to do with AI. "Absolutely, 100 per cent," he replied.

## Future digital architecture

The future digital architecture is likely to include multiple software and data components combined together.

So we will have the hardware / physical world, our data, traditional software, and some kind of 'orchestrator' connecting to a large language model, which has its own training data.

The future focus for companies like us is likely to be more on the data, hardware, software, and orchestrator, than on the large language model, he believes.

All software is generating data which can be used to feed the AI. "LLMs don't magically solve anything on their own," he said.

Mr Bjerkelund believes that the improvements people are seeing from the output of LLMs is not so necessarily due to LLMs themselves getting better. It is also due to people getting better at using them and providing them with access to more data.

In shipping, we have lots of old software and data captured in isolated systems. To get the benefit of AI, it needs to be opened up to the AI in some way, he said.

Someone still needs to "own" data provided to AI systems. "You typically have someone who ensures the data is good and exposes it to other types of systems," he said. "If you don't have clear ownership you have a long-term problem."

This data owner will have a better idea of how accurate it is, and whether it is a safe basis for decision making.

## AI for coding

Software developers are proving to be the first industry users to adopt AI tools, he said. Anthropic research has found that across their users, 50 per cent of actual usage of AI is in development of software. AI coding tools can work very well in a test environment and will get better.

However, big software companies are still writing most of their code manually. "They say 90 per cent of code is written by AI, it is not."

Or where they do use AI generated code, they "apply a lot of human on top of it."

But in future, it may be possible to get cheaper software built with AI. The software will also be tailor made.

## What LLM do you need?

Currently the US companies may have the best LLM models, but you may not need to have the best model, he said.

"I don't think the 'ahead-ness' is the critical component. It is a mistake to think, 'it has to be a frontier model'. You don't need a Ferrari to get to the store."

"We have European and Chinese alternatives for people who want to use those, and they are very good."

"Building a LLM today is open knowledge. Most companies with enough money can do it, he said. "Building it very good is closed knowledge."

You can watch Kristoffer's talk on YouTube here **https://youtu.be/9ESydDygSrM**

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# LLMs can communicate like people do – Dimitris Lyras

**A person with "common sense" can communicate something to another person in a way that is easy for them to understand. The best way to understand LLMs may be to see that they do the same thing, said Dimitris Lyras**

LLMs may have their biggest strength in that they can communicate with people in a way that they understand, said Dimitris Lyras, director of Paralos Maritime, speaking at People Tech Maritime in Oslo in February.

This is similar to how people communicate with each other, if they have good common sense, he said. "Someone who is operating in a common-sense way knows how to convey something in a way that people around him understand. You know where he's going with things. He's not suddenly going to go into jargon and confuse you with something not in your daily life."

Mr Lyras has a shipowning background, and started working in the software business in 1996. His software company, Ulysses Systems, was built around the idea that the role of software is to serve people.

Maritime communications technology was originally designed to serve people by saving their lives; digital technology should serve people in the same way. Mr Lyras also looks at LLMs in terms of what they can do to help people.

You could see a LLM like a wise person capable of giving you all the answers, or like the secretary of a powerful person who knows what is going on.

Or you could see a LLM like a mother who is able to speak to and co-ordinate multiple children at once. Someone else might want to communicate with the family just by talking to the mother.

Or you could see a LLM like a newscaster on TV, who presents all the information which is going on in the world.

A LLM can summarise the views of multiple people or tell you what they all agree on, like the chairperson of a meeting.

## Understanding complex software

A LLM can tell us what is happening in complex software packages, describing it in a common sense way, he said.

LLMs make it possible for someone to talk to their applications in natural language, rather than through a complex interface. For example, applications for inventory, email, purchasing, and crewing.

You can ask a LLM what's in your system and it can respond to you. You don't need to understand the system design, he said.

Inside conventional software, data is stored in various databases. It is very hard to make sense of the raw data without the software which put it there. "This is not a common-sense environment," he said.

It is analogous to a physical warehouse containing multiple goods in different boxes, and you need the software to know what is inside them.

Someone may developed some kind of a system to organise information or the contents of the boxes, but it is hard for anyone else to understand.

The system designers mainly wanted a system which could function, he said.

When data is kept in silos, it is because the designer thought the user was going to come to the silo to get the information. The software was built to provide answers to people who know where to look.

## Chat / text interface

Neuro AI tools may be used to provide a chat-based interface to complex software. "This means you don't need a user interface anymore," Mr Lyras said.

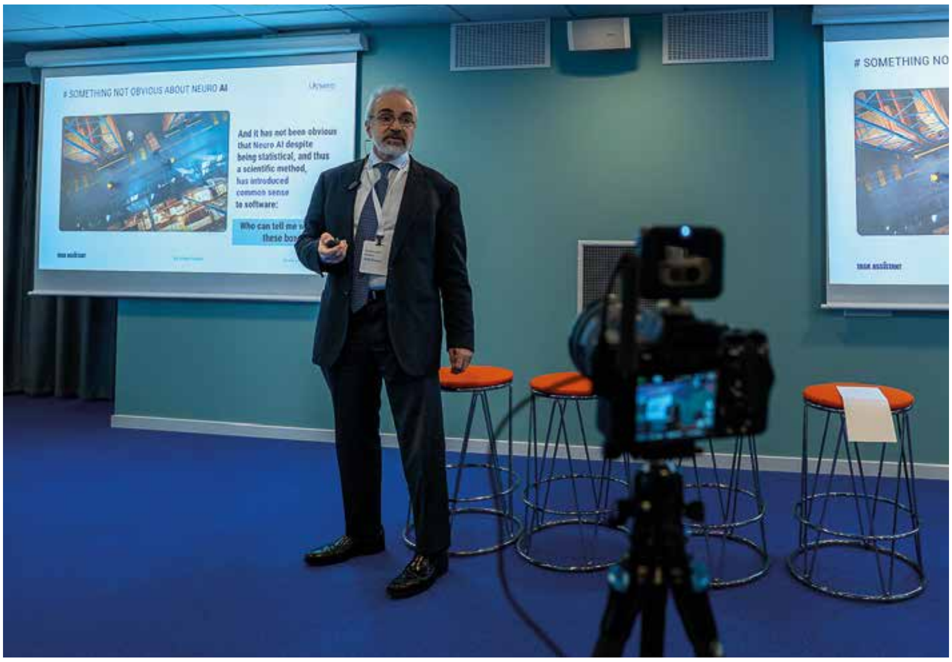
Software user interfaces are designed around someone's perspective on how to present the data so it is most useful, but this may not align with the perspective of the person using it.

For example, tax return software will have various sections, but they may not align with the different ways the user has prepared their tax data.

Or when buying airline tickets, you may find you can only buy tickets by selecting single or return ticket, selecting your destination and date. You may be searching for the best way to get to multiple places. To get the best deal, you may find yourself trying to understand how the ticketing system works. "It is an endless pain, this can be avoided," he said.

Text interfaces are not automatically better than other interfaces. But overall, we may see user interfaces change dramatically, with some text interface added, he said.

The LLM cannot work directly with the databases behind the software, because it will be too hard to understand. You need to have some kind of intermediary model




*Dimitris Lyras, director, Paralos Maritime*

between the software and the LLM. This is sometimes known as a "semantic layer".

If you talk to the LLM, the LLM can talk to the model, and the model can talk to the database, such as in a SQL query.

This intermediary model would need to have domain knowledge embedded in it, so it knows how the domain works.

## LLMs with no domain knowledge

You should be very wary of promises by AI companies that they can connect their LLM AI tools directly with your software. This is an absurd concept, because the big tech company building the AI tool has no idea how your world works, he said.

It is analogous to letting a person come into your office and work with your private issues who does not know anything about your working environment.

The tech company may assume that everybody works in the same way to some degree. This is like someone thinking that because they know how to write an e-mail for someone in one role, they know how to write an e-mail for someone in a completely different role, he said.

Products from big tech companies do not have any domain expertise embedded in them. And you need domain expertise for many every day tasks.

For example a bus driver might want to know what is happening with the passengers, what the car driver in front is going to do next, why there is a traffic jam. "These are domain issues," he said.

## Do we need common semantic layers?

We are probably always going to have different vendors creating their own semantic or intermediary layers, because the data structures in every niche of business are different, he said.

Every vendor's software has slightly different logic, such as about how purchases are assigned to different departments. Aligning this logic may take more work than anyone wants to do, he said.

There may not be much need to connect different software systems together. For example, a crewing system does not need to integrate with a voyage optimisation system, he said. And where integration is needed, LLM tools could make it easier to join together different data sources, just as they can bring together reasoning from two different people in text form.

One audience member from DNV noted that many other industries have created common semantic layers, such as when airlines connect their systems with airports, or when public transport companies share data with online routing tools. And maybe shipping can do the same.

Mr Lyras replied that this will happen if the benefit from standardising is more important than the benefit from progressing, because standardisation can inhibit progress. "We have to agree on how to interpret something," he said.

You can watch Dimitris' talk on YouTube here **https://youtu.be/5kPAsb5XWx8**

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# Metis: the right data foundation for vessel performance

**A data foundation for vessel performance should include a resilient IoT infrastructure, a data health framework, a semantic layer, and finally AI / analytics. Andreas Symeonidis of Metis explained**

The quality of the AI analytics in vessel performance largely depends on data integrity, said Andreas Symeonidis, VP of Operations, Metis. So, it is important to build a solid data foundation. This is what Metis provides.

He was speaking at the People Tech Maritime event in Oslo in February.

Metis describes itself as a telemetry first, fleet performance management company. It is based in Greece. It has more than 500 vessels on its data platform.

A good data foundation for vessel performance could be seen as a series of layers, he said.

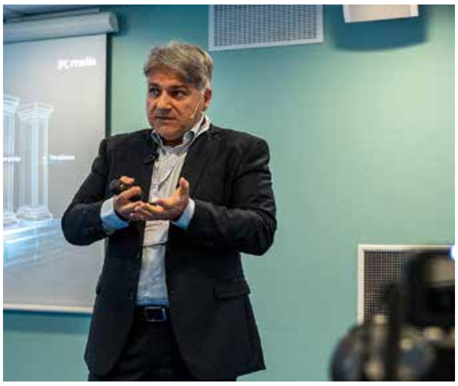
The base layer is a resilient IOT infrastructure, taking high frequency data.

Metis installs an automated data acquisition system onboard vessels that collect signals from existing sensors and critical equipment. This data is enriched with other data such as weather, GPS, noon report, ERP, voyage and bunkering related information.

The layer above that is a data health framework. You need this because there are often problems with data gathering, such as systems breaking, sensors drifting, and communications failing. You may never get a complete set of accurate data.

Data systems are not something to install once and forget. "You have to take constant care of it," he said.

You need a centralised management system, monitoring the equipment, updating sensor firmware, detecting faults, and ideally finding ways to fix them remotely.



*Andreas Symeonidis, VP of Operations, Metis*

"This might sound quite sophisticated, but some simple things can do the job," he said.

For example, sometimes people in the office need to ask crew to reboot a sensor. This task is probably not a priority for crewmembers, and it may take several days before someone does it. If a sensor can identify its state and initiate its own re-boot, this is an example of self-healing.

The Metis data health system also assesses data validity in a number of ways, such as whether the data seems to make sense, is it in the expected range, does it fit with the context, what is happening around the data and if it makes sense.

Then, the Metis system looks at data completeness, to see if there is a continuous data flow. Finally, it looks at timeliness, ensuring the data is delivered fast enough to the analytics platform to be useful.

Metis provides KPIs about data quality, so you know how confident you should be in it. "Transparency brings trust," he said.

Above the data health layer you have a semantic layer. This is where the data is organised and put together so an analytics system can understand it. This "is probably the most important layer," he said.

The semantic layer can identify which data is connected to other data, and so what is driving any changes. For example, it can detect that fuel consumption is increasing, and that may relate to hull condition or performance of the main engine.

Metis' semantic layer is only for its own systems, but it recognises there may be a need in future to have semantic layers for multiple software products and data sources at once.

Finally, you have an AI / analytic framework on top. With Metis, the data is analysed on Metis' cloud-based platforms, to get insights in four domains – emissions, operations, performance and machinery.

"Resilient IOT, healthy data and semantic context is the foundation for trustworthy AI," he said.

you can watch Mr Symeonidis' talk on YouTube at **https://www.youtube.com/watch?v=9uPijcxT_DE&t**

# Danelec – better vessel performance from integrated tools

**Maritime software company Danelec has a philosophy of finding better ways to connect multiple hardware and software tools in vessel performance, leading to big improvements for its clients. Christian Treu explained**

Maritime software and hardware company Danelec believes in finding better ways to combine hardware and software. To get value in domains such as vessel performance, you need both good sensors onboard which work together with good software. "One cannot stand alone," said Christian Treu, VP revenue, Danelec.

Danelec specialises in maritime data collection and analytics, including providing voyage data recorders (hardware) and ship performance monitoring (software).

"We strongly believe that in order for this industry to survive we need to work


*Christian Treu, VP revenue, Danelec*

together, be better at collaboration," he said.

Danelec works with many other companies, including Navtor, StormGeo and other competitors in the voyage performance space.

Customers are increasingly asking for a "fully integrated platform," rather than point solutions, so it makes sense for software companies to enable integrations of their products with others, he said.

"Why should an operator login to 8 different systems if they could have one with good integration?"

Shipping companies should force their vendors to work together to connect data silos together, and share KPIs. And it is not helpful when certain technology vendors will only agree to implement their software with others on payment of a fee, he said.

One challenge is that many people don't have a clear idea of what they want, or what other people want. If different parties could sit together and get a clearer idea about where they want to go, that could be very helpful, he said.

## Success stories

Mr Treu mentioned a number of ways to measure success when operating your vessels both for high frequency data capturing as well as using AI in your voyage optimisation.

One Middle East container ship operator had 5 vessels sending performance data by noon report, and 5 sending high frequency data.

When using voyage optimisation software, it was able to achieve much better cost savings on fuel with the vessels which also had high frequency sensor data, he said,. Over 9 months the vessels with high frequency data saved $399,900, the other vessels saved $30,100.

A container operator in Brazil with two vessels doing coastal shipping was able to reduce fuel consumption by 2.4 per cent with one vessel over 363 voyage days. On another vessel, it could reduce fuel 5.9 per cent on over 76 voyage days. Combined savings were $410,000.

A dry bulk operator operating from Australia to Asia was able to save $50,500 on a single voyage by optimising its route. "Everybody else was suggesting a different route," he said.

In total, these 13 vessels saved $1m. There are number of optimisation paths to explore for the maritime industry, he said.

## About Danelec

Danelec was acquired in May 2025 by GTT, a large French company. GTT is best known for its LNG containment systems, but it also has many digital solutions, some catering for a future with multiple fuels.

GTT also acquired software companies Ascenz Marorka and Vessel Performance Solutions. It brings these products together with Danelec in its digital business unit, which now has around 330 people.

Danelec provides voyage data recorders and shaft power meters. Ascenz Marorka has solutions for monitoring fuel consumption. The companies have various software products for working with the data.

With these companies' products combined and integrated, it has a platform covering vessel and voyage optimisation.

Danelec has been working with AI for a number of years, both internally on its work processes, and in its vessel / voyage optimisation projects.

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You can watch Mr Treu's talk on YouTube here **https://youtu.be/PZpkxwE1F3Q**

# How we move towards AI maturity

## Getting to AI maturity involves understanding the biggest benefits from AI, driving internal AI roll-out, finding the best approach to data management, giving best advice to CIOs, and the right approach to LLMs, panellists said

Panellists from Torvald Klaveness, Wilhelmsen Ship Services, Paralos Maritime and Danelec discussed the best way the maritime industry can mature in its use of AI, speaking at People Tech Maritime in Oslo.

First, they addressed where the biggest benefits currently are, and will be.

Wilhelmsen Ship Services is seeing benefits in being able to provide better answers to customer questions about its many products, said Kristoffer Bjerkelund, VP Digital Solutions & Customer Journey, Wilhelmsen Ship service.

Wilhelmsen provides services to 30,000 vessels and gets many operational questions about its products. These can be very hard to answer by any single individual, because they require knowledge of different parts of the vessel and how they work, he said. Instead, the questions can be answered by technology, with people with subject expertise checking them.

Wilhelmsen would also like to use AI to summarise multiple enquiries, to get a generalised picture about what customers are asking about, where customers are having the biggest problems, he said.

It would also like to use AI to provide faster responses to requests for quotes from customers. These arrive in thousands of different formats, even multiple formats coming from the same company. AI tools can


*The AI maturity panel*

be used to structure these and automatically bring them into the ERP system. "I think this is a very strong part of what AI does," he said.

The biggest benefit from AI over the next 1-2 years could be that shipping companies may be able to make much better use of the information in people's inboxes, he said.

Dimitris Lyras, director of Paralos Maritime, sees that AI could make it much easier for people to communicate with their data and systems. "AI has the capability to understand what we are saying and formulate [responses] in a common-sense way.

That means that you can communicate with your data and your systems in the same way that you communicate with your colleagues," he said. "You will get more information about the world than ever before."

Christian Treu, VP Revenue, Danelec predicted that digital tools may make some administration tasks easier, such as claims support, demurrage management and chartering administration. Tools like CoPilot and Claude are helping put reports together much faster. This will also mean people's jobs are redesigned in some form, he said.

One example of this is how Danelec is working with Maersk and Danish state piloting organisation DanPilot to see if it is possible to have remote pilots, where the pilot guides the vessel without actually going onboard. It will do tests in Danish waters.

"That will completely change that job, probably not in the next 12 months, but in 2-3 years, if we can agree on how it is done."

Over the longer term, it is possible that some software tools could be developed with AI by the users, at the expense of the current software as a service industry, Mr Treu said.

## Building AI in the company

When building AI use in the company, you need to find the right balance between experimenting and getting business benefits. "We need to be innovative and do a bit of trial and error, but at the same time have a clear eye on the business outcome," said Danelec's Christian Treu.

At Wilhelmsen, "the process was more or less bottom up," Mr Bjerkelund said. "Everyone is free to come up with their ideas."

Ideas were evaluated by technology specialists together with the people who have responsibility for the problem the technology promises to solve, to try to determine whether the technology offers a feasible solution. Although lots of questions proved difficult to answer, he said.

There can be a piloting phase where you let people try out their own things, but it needs to lead to the "industrial version," where you use AI as a company. For example, the company has developed an AI tool which can correctly answer 70 per cent of customer questions.

Tore Lybekk, VP & Head of IT at Torvald Klaveness, chairing the session, noted that when people from company business units want to talk about AI, they don't necessarily want to talk about their business problems. "They come with lots of ideas and expect AI to solve all of them."

## Data quality management

The panellists discussed the best way to make good quality data available to AI systems.

Tore Lybekk of Torvald Klaveness, who has a background in the oil and gas industry, noted that oil and gas had a big challenge freeing data from vendor software systems. "Software vendors thought the data was theirs, we claimed it was ours."

So oil and gas companies got together to develop an open-source data model as a means of structuring information so it can be moved from one application to another. Then they could push their suppliers to use it.

But it may be harder for the same thing to happen in shipping, he said. Oil and gas companies are typically large, so have more leverage with suppliers, and are more accustomed to collaborating, he said. Shipping companies are typically smaller and accustomed to keeping things private.

Dimitris Lyras said that the best way to get a sense of data quality is to understand what is happening around it. Then you can see what is right or wrong with it. "It is all about context," he said.

It may be better if we orientated ourselves around "information" rather than data, if information is defined as data points in context with each other and our goals, he said.

If we are talking about large language models (LLMs), they are designed to work with a mass of data, not multiple data points representing specific points in time, he said.

The maritime industry is not necessarily looking for "big data", this may be a concept better suited to other industries, Mr Lyras added. For example, a retailer which wants to find factors correlating to people buying soap in one colour rather than another.

In contrast, the shipping industry operates with sequences of cause and effect. "Anyone could tell you two or three causes which could lead to a problem," he said. We don't need to know about correlations.

"My gut reaction tells me clean data is still king," Danelec's Mr Treu said. "With new tools it is perhaps easier to do the cleaning and cleansing of data."

An easy starting point with noon report data is to discard the biggest outliers, or data outside a certain threshold, he said.

Wilhelmsen's Mr Bjerkelund noted that


*Dimitris Lyras, Paralos Maritime, with Kristoffer Bjerkelund, Wilhelmsen Ship service*

industry data can be wrong most of the time. If a domain expert thinks that reality is different to what the data says, it may be better to go with the domain expert, he said. "Don't give data to someone who doesn't understand what is going on to make a decision."

## Too much genAI?

There is perhaps too much focus on generative AI. Discussion about generative AI "takes up a lot of bandwidth," Mr Bjerkelund said. "If we expect [generative AI] to solve problems which should have been solved in other ways, we are overdoing it. It is not a silver bullet."

"You have to balance the exploration going into genAI, and actual exploitation in other areas, which is probably a shorter time to revenue."

The answers being provided by large language models are getting much better, Danelec's Mr Treu noted. But we don't yet have a clear idea of what we are looking for from it. "Right now, it is all over the place. I love the innovation, I love new ideas [but] it is difficult to find a way forward."

## Advice to a CIO

When advising a shipping CIO on how to move on AI, Danelec's Mr Treu suggested you should start by looking for something which serves a business purpose, or which has the biggest impact on revenue or spending.

Wilhelmsen's Mr Bjerkelund suggested you should recommend that the CIO keeps systems open, because you don't know how they are going to evolve. "If you close doors now you may find yourself stuck later."

You should also suggest the CIO makes AI a people initiative, not an IT initiative, he said.

Mr Lyras suggested that you start your discussion with the CIO by asking what is the biggest problem the company has.

*Tore Lybekk, VP & Head of IT at Torvald Klaveness*

For example, one person in an LNG shipping company said he had seen a problem in the purchasing process for 10 years which no-one had fixed. Or maintenance staff are struggling to understand why non-conformances are happening and what the trends are.

You can watch the discussion on YouTube here **https://youtu.be/8E4qVwWvPeA**

# Energy efficiency at Torghatten

## Norwegian ferry operator Torghatten reduced fuel consumption 6.5 per cent over 7 months, getting crew personally motivated to reduce consumption. Project manager Anders Sjåholm Rimehaug told the story

Norwegian ferry operator Torghatten managed to reduce fuel consumption by 6.5 per cent over September 2025 to March 2026. Anders Sjåholm Rimehaug, Senior Project Manager, explained how it was done, by supporting crewmembers to set and achieve goals. He was speaking at the People Tech Maritime event in Oslo in February.

Torghatten spends NOK 800m (USD $82m) every year on fuel, resulting in 160,000 tonnes CO2 emissions a year. That is equivalent to emissions from the 24 flights a day between Bergen and Oslo, for 3 months.

*Anders Sjåholm Rimehaug, Senior Project Manager, Torghatten*

Torghatten operates 47 ferry and high-speed passenger boat routes. It operates Norway's longest ferry connection (Moss-Horten) as well as the country's shortest ferry connection (Svelvik-Verket).

Torghatten's five ferry routes in the Bjørnafjorden, near Bergen, use a quarter of this fuel.

Mr Sjåholm Rimehaug says he is personally "quite obsessed with energy efficiency," with smart controls on his car charger, home hot water and heating.

"I like this topic because it is in between technology, business development, and psychology."

## Culture more than measurement

You need to measure fuel consumption in order to reduce it, but data gathering alone will not achieve results, he said.

Torghatten is owned by Nordic Ferry Infrastructure, which also owns Danish ferry operator Molslinjen. Both companies were using software from Blueflow Energy Management of Sweden to measure fuel consumption and manage the data. The captain can see the current fuel consumption and speed on a graph, and a comparison with the consumption on the previous voyage.

But after installing Blueflow in 2024, Torghatten did not save much fuel.

Mr Sjåholm Rimehaug asked the sister company Molslinjen what benefits they were getting from Blueflow and they said they were doing very well, he said. "So, I went to visit."

He found that Molslinjen had gone further than Torghatten to develop a culture of energy efficiency, including giving awards to crewmembers who had generated useful fuel saving ideas, with a certificate stating how much had been saved.

Going back home to Bjørnafjorden, Mr Sjåholm Rimehaug set up monthly meetings with crewmembers to discuss the performance of the previous month, measures which were being taken, and goals for next month.

It was important that the crewmembers

themselves set goals. A typical goal could be to improve fuel performance 1 per cent in the next month.

This is how it achieved 6.5 per cent reduction over Sept 2025 to March 2026.

Direction from senior management alone will not help, if crewmembers are not motivated, he said.

Mr Sjåholm Rimehaug also warns against trying to create a competition between vessels. There are 5 identical vessels operating in Bjørnafjorden, and it is possible to compare them.

But one time, efforts by a vessel to outperform another led to a near accident, he said.

The company stresses that the priorities are first safety, second to maintain the schedule, and only to focus on energy efficiency after that.

## Data analysis

Mr Sjåholm Rimehaug also wanted to work out which ferry routing is most efficient.

He built an AI model for this, feeding it data about the specific routes taken on each voyage and how much fuel was consumed. The AI could generate a generalised route which typically achieves low energy consumption, and another which typically creates high energy consumption. The high energy consumption trips can use 23% more fuel.

He found that the higher consuming route took turns a little more sharply than the lower consuming route.

He also wanted to try to find the difference between the vessels. This was done by looking for data about trips where external factors are identical (such as in weather or current) but fuel consumption was different, so the reasons driving the fuel consumption could be identified.

The AI could generate interesting illustrations, but not useful ones. "It didn't get me anywhere. I felt like I was on my way down an AI rabbit hole. AI was encouraging me to go further into the hole without me getting any smarter," he said.

"I sat back and said, 'let's try to use the brain again, I'm getting lazy using this AI.'"

When you use AI, it is important to think carefully about what you want to achieve before using the tools, because otherwise AI may guide you towards a different goal, he said.

Maybe a factor with bigger influence on consumption is whether or not the captain is adjusting the controls. So, Mr Sjåholm Rimehaug looked for sections of voyage data where no adjustments were being made, and the speed is constant (the vessels typically operate at 16 to 16.5 knots).

It showed a big difference between the 5 vessels, with one of them being 6 per cent worse on fuel. Since this is clearly not due to how the vessel is being operated, "We can tell there is something inherently wrong with the vessel."

All the vessels had the same levels of biofouling. They had all had a dry dock with a hull cleaning within the last year.

For this analysis, the consumption was compared over voyage data of 6 month periods, so any impact of the current would be cancelled out by current having the opposite impact in the return journey. "That was the way I simplified it," he said.

# Replacing bottled water with filtration machines

Ships can stop using bottled water, and instead use shipboard water filtration machines.

A typical ship purchases 30,000 plastic bottles of drinking water every year, in sizes between 0.5 litres and 5 litres, providing 18,000 litres of drinking water, said Mikael J. Karlsson, chairman and founder of IMPA SAVE.

IMPA Save is a venture to bring knowledge of sustainable solutions to maritime procurement. It is part of the International Marine Purchasing Association (IMPA).

Mr Karlsson is also Head of Business Development with Northern Marine Group, part of the Stena Group of companies.

These 30,000 bottles use half a tonne of plastic, and their manufacture creates 4.4 tonnes of CO2 emissions, he said.

Shipboard water filtration machines can be used instead. These use reverse osmosis (involving membranes) to filter salt and anything else from the water. Then they sterilise it with UV light, and add minerals, just as with domestic tap water.

The cost savings are typically $5k per ship per year. The energy used to manufacture 357 bottles is the same as the energy needed to operate the filtration machine for a year. So, you quickly reach negative terms in carbon emissions.

Additional benefits are avoiding the risk of empty bottles ending in the ocean, and avoiding the administration associated with 20,000 line items in purchase orders, he said.

Shipping companies pledging to reduce their use of plastic drinking water bottles as part of IMPA SAVE include A P Møller-Maersk, Albatros Shipping, Algoma Central Corporation, Anglo Eastern, Awilco, Berge Bulk, Bernhard Schulte, Bulkship Management, BW LPG, Charterwell Maritime, CSL Group, D'Amico, DOF, Fleet Management, Fred Olsen Windcarrier, GEN PRO, Grieg, John Samonas, John T Essberger, Lauritzen Kosan, Lomar, Marshal Ship Management,

Navigator Gas, Newport SA, Northern Marine, Oldendorff Carriers, OSM Maritime, Roll Group, Scorpio Group, SEA1 Offshore, Seaspan, Star Bulk, Stena

*Mikael J. Karlsson, chairman and founder, IMPA SAVE*

Bulk, Stena Line, Solstad Offshore, Stolt-Nielsen, Swire Bulk, Swire Shipping, Synergy Maritime, Teekay, Thome, TORM, TP Shipping, Tsakos Columbia, Uni-Tankers, Utkilen, V.Group, Vroon, WECO, Wilhelmsen Ship Management and ZEABORN.

Their fleets total 9000 ships, meaning they would save $45m a year.

You can watch Mr Karlsson's talk on YouTube at **https://youtu.be/oe-Pq5MpYAA**

# Measuring maritime Scope 3 emissions

## Indirect emissions are currently calculated mainly as a factor of spending, not by measuring emissions of the actual activities. This should change. Scorpio, Wilhelmsen, IMPA Save and ReFlow discussed

In greenhouse gas data terminology, Scope 1 emissions are those made directly by the company, such as when fuel is combusted in a ship engine. Scope 2 emissions are those involved in creating electricity or steam inputs, and do not apply to vessels (except when taking shore power, or power to buildings).

The non-direct emissions of a company are known as "Scope 3". These include emissions made in producing anything that the company buys. For a shipping company, this includes emissions in making steel, shipbuilding, maintenance, providing food onboard, manufacturing vessel equipment, any other purchases, and dry docks.

Under this system, the same emissions are counted both as the "Scope 1" by the manufacturing company and as "Scope 3" of the shipping company.

"Scope 3" also include emissions made in using a company's products (this does not normally apply to shipping).

Because most suppliers do not calculate the emissions made in their activities, Scope 3 emissions are typically estimated as a factor of the volume of spending. This is known as "spend based".

### Spend based vs activity based

An "activity based" emissions calculation looks at all the activities involved in providing the item and what emissions they made. For example, a calculation of the emissions providing bottled water to ships would look at where the raw materials come from, how the plastic is produced, how much energy the bottle forming machine used, and how much energy was used in transporting everything from raw materials to the filled bottle.

*Mikael J. Karlsson, chairman and founder, IMPA SAVE, with Anne-Julie Jøssang, ESG Director, Wilhelmsen Ships Service*

Companies have typically found a higher value for emissions when using "activity based" compared to "spend based," said Rasmus Elsborg, CEO & Founder of ReFlow, an emissions software and engineering company.

This suggests that the emissions factors used for the "spend based" assumptions are very wrong, he said. But there is also high uncertainty.

There are hazards to making too much reliance on "spend based" data. Since emissions are estimated as a factor of your purchasing amount, if the price of items you purchase increases, your calculation of emissions will also increase.

Also, if you buy a major capital item, such as a turbocharger, your emissions will go up because of the major spending, even if the equipment itself did not have much emissions involved in its manufacturing. A turbocharger may mainly be composed of "400kg of aluminium and some cast iron".

If you go to a more environmentally friendly supplier, such as a rope manufacturer using sustainable material and electricity from renewables, it may be a more expensive product. So the 'spend based' calculation of your emissions goes up, when the emissions in producing the rope went down.

And if the emissions factor for the spend based calculation is accurate, it still means you are working with the world average for that product, added Paolo Magonio, Head of Group Procurement & Services, Scorpio Ship Management. If you go to a supplier which actually has lower emissions, your emissions calculation will not go down.

This means that unless manufacturers give activity-based data, buyers cannot make an informed decision in environmental terms, he said.

### Background

One of the first shipping companies to consider Scope 3 emissions seriously was Maersk in 2022, Mr Elsborg said. It was building new vessels in the "Equinox Class" with a plan to run the vessels on low carbon fuel.

The Maersk vessels are 17,480 TEU and able to run on methanol fuel. The first vessel in the series was named in June 2025.


*Rasmus Elsborg, CEO & Founder, ReFlow*

Maersk understood that if emissions from fuel combustion are eliminated (from using zero carbon fuels), then all the emissions made by a ship would be those embodied in the building of the ship or manufacturing the items it consumes.

For example, if Scope 3 emissions are 10 per cent of a vessel's total emissions and fuel emissions decrease by 50 per cent, Scope 3 emissions are now 20 per cent of all emissions. As the proportion of all emissions which is Scope 3 increases, shipping companies will increasingly be looking for better ways to manage them.

IMPA has a project "IMPA Maritime Environment Footprint" to develop standard ways to calculate and share Scope 3 emissions. Many shipping companies and manufacturers are involved.

### For suppliers

Many suppliers are working to reduce the emissions in making their products as part of general environmental efforts. They should make sure shipping companies can get a commercial benefit from this, by providing emission data with their products, Mr Elsborg said.

For a manufacturer, reduced emissions often means the company is taking more care over their products overall, and it goes together with making a higher quality product. A better product will typically also produce lower emissions over its lifecycle.

And the premium segment of shipowners will typically seek premium suppliers.

Scope 3 could also be monetised if there was a trading system based on selling avoided emissions. For example, a shipyard could sell "avoided emission" credits for

*Mikael J. Karlsson, IMPA SAVE; Karl Jeffery, People Tech Maritime; Paolo Magonio, Scorpio Ship Management*

manufacturing a vessel with lower emissions, he said.

Developing Environmental Product Declarations (EPDs) for one product using an external consultant can cost NOK 200k ($21k), a major cost for a smaller manufacturer, Mr Elsborg said. And some companies can make thousands of different products.

This is a big challenge with environmental reporting. "The ambitions are bigger than what suppliers can deliver."

## For shipowners

Buyers like Scorpio would like suppliers like Wilhelmsen to be able to collect actual emissions data, said Paolo Magonio, Head of Group Procurement & Services, Scorpio Ship Management, a council member of IMPASave, and also chair of the Global Maritime Procurement Council.

For now, 99 per cent of suppliers do not provide the data, so their emissions are calculated on a spend basis. But in time, we may get to the point where the majority of suppliers provide the data, so pressure can be put on the others. This is seen as a "ramping up process," he said.

Shipping companies may soon have to pay a tax or fee based on their Scope 3 emissions, as they do with their Scope 1 emissions in Europe under the Emission Trading Scheme. "That will incentivise companies to think differently," Mr Elsborg said. "Suddenly it could be worthwhile for everybody to put their thoughts into this".

There are many complexities in the calculation. For example, if an item is recycled, the new product is made with less emissions than it would otherwise. But this emission saving can only be 'banked' by the company purchasing the new item, as a reduction in its Scope 3. It cannot be included in emissions of the original owner, because the saving has not happened during its ownership.

Another issue to consider is the emissions made in producing fuels. For example, methanol has lower emissions than heavy fuel oil from the vessel exhaust, but has higher emissions in the production process, if made from fossil fuels. In this case, the emissions are being moved rather than reduced.

In the Greenhouse Gas Protocol, emissions in manufacturing fuel are allocated in their own reporting bracket, not covered as "Scope 3", he said.

## Anne-Julie Jøssang, Wilhelmsen

Wilhelmsen Ship Services provides an Environmental Product Declaration for some of its products, based on a scientific method of calculating emissions from the original manufacturing to the end of life, said Anne-Julie Jøssang, ESG Director, Wilhelmsen Ships Service, a company which provides chemicals, ropes, gases and other supplies to ships.

The cost of creating the EPD can be significantly reduced by selecting the right partner that enables re-using aspects of the calculation, where different products use some of the same input materials and processes.

Wilhelmsen has reduced the cost of making its EPDs to around Euro 1k each, she said.

To make Scope 3 emissions actionable, buyers must be able to compare between alternatives so they can make an informed purchasing decision. To do so, more industry actors need to create and provide product-specific scope 3 emissions. "It needs to exist, first and foremost."

Once we have better data available about emissions associated with products, buyers can more easily compare what is available, she said.

You can watch a video of the discussion on YouTube here
**https://youtu.be/ALhlUxlmqTg**

# JJ Ugland Companies – duplicate systems, ISO27001, and its experiences

### Halvor Ribe, CFO of shipowner JJ Ugland Companies describes how it manages digital risk with duplicate systems, its logic for getting ISO27001 certification, and its experiences

JJ Ugland Companies is a medium sized shipping group with the main company established in 1930. "Being an old company, we are a bit conservative, it is maybe not a surprise to you," said Halvor Ribe, CFO. He was speaking at the People Tech Maritime event in Oslo in February.

2025 turnover was 3.5bn NOK ($370m). It has around 800 employees. Its main office is in Grimstad, Norway.

JJ Ugland also owns an offshore construction and engineering company, Nymo, has investments in fish farming and real estate and has also invested in technology development for floating offshore wind and is looking at hydrogen projects.

The company does commercial and technical management in house, with the ICT, finance and management in the same building. "We think it is an advantage for collaboration across departments."

"When we look at digital solutions, we want to get the benefits and broadly understand the risks involved," he said.

For example, it was early in using cloud computing, but this was first informed about in the executive committee. The company wanted to know where in the world the data was stored and processed, and with Norway or Northern Europe being preferred..

There are limits to how much resources Ugland can put into cyber risk, and it has to find the right balance.

"We spend more resources than we did 10 years ago, it takes the time of more people," he said.

## Crew internet

Most of Ugland's vessels are bulk carriers, manned by Filipino crew who spend long periods at sea. It also has offshore vessels with Norwegian crew, who do not stay so long at sea.

Digital connectivity is a welfare factor onboard and JJ Ugland Companies have always had a focus on this. In the past,

*Halvor Ribe, CFO, JJ Ugland Companies*

however, with slow and very expensive satellite communication crew internet availability was limited, and sometimes crew tried to use the company systems, leading to a cybersecurity risk.

By providing crew with better internet, particularly using Starlink, we hope to have resolved that issue, he said.

The crew systems are segregated to the ship systems onboard.

## Duplicate systems

Ugland used to be a shuttle tanker owner. A shuttle tanker is built with systems redundancy. Ugland once had a shuttle tanker with 2 main engines as well as 2 rudders, and several other systems duplicated. With the vessel operating close to offshore installations, it was very important that it would continue to be safe even with one failed system.

This “duplicate systems” philosophy was taken into its ICT systems. The company has two separate server rooms, so it can continue operating if one fails. The data is backed up multiple times, to immutable storage systems. The office has two fibre optic cable connections, going in opposite directions out of the office. It has a diesel generator for backup power supply.

## Cybersecurity processes

Ugland employs a dedicated information zsecurity co-ordinator. It has many procedures for work both on board and in the office, and guidelines for employees.

The standard and procedures need to be clear and easy to understand.

“We have to make sure that these procedures do not become overwhelming,” he said.

It works with expert cybersecurity companies and was a founder member of NORMA Cyber.

As a shipping company it is accustomed to working with quality systems and certifications, such as ISM.

It decided to be ISO 9001 certified in 2006 for its maritime operations, partly because it was involved in shuttle tankers at the time and had many oil company customers.

“We have taken more certificates and standards as time has gone by.”

Many years ago they looked at the ISO 27001 standard. At the time very few companies were certified. Ugland took some of it as input for its ICT work.

More recently DNV advised that as a shipping company, Ugland may be required to comply with EU NIS2 regulation, and ISO27001 would help a great deal.

So it asked DNV to do a gap analysis comparing its current cybersecurity system with an ISO 27001 certified system. “The conclusion was that there is quite a lot of work to do but [we were] not so far away,” he said.

In the process of getting ISO 27001, the company needs to improve its data processes and categorizations, including defining what is confidential. This helps prepare for future AI systems.

The systems do not solve everything. “People in the end are the crucial part,” he said.

The company puts a lot of emphasis on training, including having a “cybersecurity month” every October where all employees are asked to complete microlearning courses. “Hopefully it gets into the heads of all of us that we stop and think before we click.”

## Email fraud attempt

Close to 15 years ago Ugland had an eye-opener. The company was about to make a large payment to Japan as instalment on a new-building contract.

The payment was authorized internally in the company, but it turned out that the recipient of the invoice had been spoofed. An e-mail that seemed plausible due to the detailed information had requested that payment should now be made to a different bank account in another bank. And this was put into Ugland’s payment system.

Thankfully this was discovered in the last minute – but after the payment order had been sent to the bank, he said.

After having identified the fraud attempt the company was saved by the fact that the destination bank was in Japan and was closed at the time the payment was approved.

With the help of the Nordisk Defence Club and their Japanese lawyer, it was arranged for Japanese police to attend the receiving bank’s office, waiting outside when it opened, to ensure the payment was not processed.

“We were very thankful. We then made new procedures and made them fairly elaborate to make sure this cannot happen again. It can be a bit time consuming, but all the people in the office know why.”

You can watch Mr Ribe’s talk on YouTube here **https://youtu.be/lIF-HooVygs**

# Cybersecurity tips from DNK and Ugland

## Cybersecurity advice from insurer DNK and operator Ugland include to think first about the risk, second about the appropriate measures; and your measures need to be tight enough that you are not the easiest target

Shipping companies should first think about cybersecurity by considering where the biggest risks are. Your biggest risks may lie more in office activities than the vessels, such as with invoice fraud.

You don’t necessarily need absolutely watertight cybersecurity procedures, which may be very onerous to operations. You mainly need to make sure you are not the easiest target for a hacker.

Some useful advice shared in a panel discussion about cybersecurity at the People Tech Maritime event in Oslo.

Some people define cybersecurity

maturity in terms of outcomes, such of a lack of incidents. Others define it by how much certification you have, said Erlend Erstad, Member Relations and Business Development Manager, NORMA Cyber, moderating the session.

"For me the maturity is based on how you approach risk," said Morten Mjaaland, Cyber Product Manager, DNK. Companies who are mature with cybersecurity have a good understanding of their own risk.

Companies who are mature with cybersecurity understand that you have risks other than your digital systems not being available, he said. There can be big costs if your confidentiality is breached, with data being made public by a hacker, for example. This can damage the company's integrity.

Insurers like DNK recognise that there are some risks which can be mitigated, and some which can't. Insurance is for risks which can't be mitigated.

What counts as "cybersecurity maturity" is continuously changing, said Halvor Ribe, CFO, Ugland Marine Services. "Tomorrow, there will be new demands."

## Invoice fraud

The best way to combat invoice fraud is to be very careful when you are asked to pay to a new bank account. "If we paid a bank account previously, we feel relaxed," said Mr Ribe. "Most payments go to an existing bank account."

For payments to new bank accounts, Ugland has routines to call the company and check the details, using a different medium of communications.

"It is something we can probably not be absolutely sure about, but we try to be as sure as possible," he said.

Mr Mjaaland added that having systems which make it impossible to pay to a hacker's account could be very onerous, you do not necessarily need to go that far.

Hackers "are quite lazy, they want to do their job as efficiently as possible," he said. "If someone is a little bit less cybersecure, they will [go for] them."

"You don't have to be the best in the world at cybersecurity, you have to be better than the average. The slowest fish is the one that gets eaten by the shark. You don't have to be the fastest swimmer, but you have to keep up."

"There is still residual risk, but you have mitigated a lot of risk."

## Spending on cybersecurity

"A cyber incident is more expensive than cybersecurity [measures]," Mr Mjaaland said. So, it makes sense to give a solid budget to organisations like Norma Cyber.

It can often be "a constant ongoing battle between top management and cybersecurity people [deciding] how much to spend," he said. Bringing in outside companies to give a perspective can be very helpful.

Meanwhile at JJ Ugland, Mr Ribe has a role setting the ICT strategy and budget as company CFO but leaves ICT experts to make decisions on how money should be spent. "I spend more time on finance than on ICT since my background is as an economist," he said.

## Seafarers and staff

Providing internet onboard is a very important welfare factor for crew, Mr Ribe said. And the internet availability has improved greatly with Starlink.

There have been cases of seafarers using the ship system to transfer personal files, transferring data with USB sticks. "that's a big cybersecurity threat," he said. If crew have better personal internet provision, that should mitigate the problem.

Ugland has many company procedures and maybe it is getting close to the limit of how much procedures people can handle, Mr Ribe said. Adding more procedures may not work. Instead, the focus should be on "trying to make things as simple and understandable as possible."

DNK is keen to see companies running cybersecurity training courses or having a "annual cybersecurity month" where there is a high focus on cybersecurity.

"We see a lot of incidents come from people making mistakes," Mr Mjaaland added. "That contributes to the loss rates that we see."

## Do we need ISO 27001?

Of all DNK's clients, perhaps only one has the ISO 27001 cybersecurity certification for the entire organisation, he said. There are multiple clients which have ISO 27001 certification for parts of the organisation, and this is not necessarily a factor which drives DNK's assessment of its risks and the premium it has to pay.

"There's elements outside ISO 27001 we deem important and elements in scope that we are not necessarily as 'risk driving' for us," he said.

"Generally, we would never say 'you should get a certification', but having one is a great thing."

Other insurance companies may demand ISO 27001 because they are not so good at assessing maritime cyber risks themselves, he said. DNK only provides maritime insurance and so has much better ability than some other insurers to assess maritime risks, including cybersecurity.

***Morten Mjaaland, DNK; Halvor Ribe, Ugland Marine Services; Erlend Erstad, NORMA Cyber***

## Managing risk better

Most of the efforts shipping companies make around cybersecurity are focussed on the vessel, "which is completely understandable because you are vessel owners," Mr Mjaaland said.

But hackers may not actually be targeting the vessels, they are looking for an easy target among all companies. So the onshore / office risks may actually be bigger.

But onshore risks can be typically cheaper and easier to mitigate than vessel risks, he said. "There are a lot of measures that everyone puts in place – multifactor access, firewalls, training."

Companies which are deemed by DNK to manage risk best are usually companies which start out by actually looking at their risks, rather than starting with the cybersecurity measures, he said.

Also, the companies which are more risk driven "turn out to use their budgets more efficiently," he said.

Assessing risk may start by looking at which functions are most important to company operations, which suppliers and which data. "Then you start to understand where risks lie and where you should prioritise your work."

Sometimes risks may be best mitigated by changing the way different functions of the company are managed, rather than taking IT specific measures, he said.

You can watch the panel discussion on YouTube at **https://youtu.be/7yRC2ABsLLM**

# Seaber - chartering profitability depends on the schedule, not the fixture

**When assigning vessels to cargoes, you can lose a lot of value on the full vessel schedule, even when individual voyages look profitable. Good scheduling software can help you avoid many issues. Robert Bewick of Seaber explains**

*By Robert Bewick, commercial director, Seaber*

If you run a fleet with a heavy COA (cash on affreightment) book, the core scheduling challenge is familiar. 80% of your cargoes are committed, the program is set. The question is how efficiently you sequence them.

Then, the question is what you do with the capacity left over. That remaining 20%, the spot cargoes your team picks up to fill positioning gaps and boost utilization, is where the real scheduling leverage lives.

It's also where the most value quietly leaks away.

The committed program is only the starting point. A COA book gives you baseline revenue and planning certainty. But certainty of cargo isn't certainty of schedule.

## Many options

Every planner working a fleet of twenty or thirty vessels against a dense contract program knows that sequencing options are vast.

Small differences in vessel assignment and port rotation compound across the quarter.

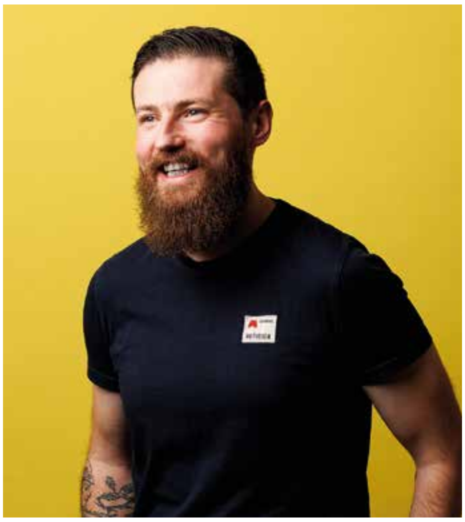
Assign the wrong vessel to a contracted cargo and you've burned two days of bunkers and closed a window that a better spot fixture could have filled.

It is not the wrong vessel because it can't do the job, but wrong because it creates a longer ballast leg to the next commitment.

The individual voyage still looks profitable. The schedule, taken as a whole, underperforms.

Multiply that across 40 or 50 committed voyages a quarter, and the drag on fleet-level Time Charter Equivalent revenue becomes significant.

Not because anyone made a bad call, but because the optimization problem is simply too large to hold in your head or in a spreadsheet.



Robert Bewick, commercial director, Seaber

## Evaluation speed

Two hundred spot cargoes. Which twenty matter?

On any given week, there might be a hundred or two hundred cargoes in the market your vessels could technically lift.

The problem isn't supply, but rather the evaluation speed.

To properly assess whether a spot cargo is worth pursuing, you need to understand how it interacts with your existing committed schedule.

Does it slot cleanly between two COA voyages? Does it reposition a vessel toward its next obligation, or pull it away? Does accepting it create a conflict three weeks out that isn't visible today?

These aren't questions a planner can answer quickly for two hundred cargoes against a live fleet schedule.

What happens in practice is triage by instinct. The team eyeballs the list, filters by region and laycan, runs estimates on the ones that look promising, and makes a call.

The shortlist might be reasonable, but reasonable is not optimal, and a cargo screened out in the first 30 seconds might have been the best option.

## Complexity multipliers

If your fleet moves breakbulk, project cargo, or multi-purpose cargoes, the challenge is harder still.

It's not just about matching cargo to vessel to laycan. It's stowage constraints, crane ratings, multi-parcel voyages with complex port rotations, and the interaction effects between cargoes sharing the same hold space.

In chemical tankers, the complexity increases by another order of magnitude.

A single vessel might have 30 or 40 tanks, each with its own coating type, heating capability, and cleaning requirements.

Every parcel loaded impacts what can go in the adjacent tank. Every cargo carried previously determines what can be loaded next.

The scheduling involves choosing a tank, sequence, and cleaning regime. You must determine whether the combination of parcels across a ten-port voyage is even physically and chemically compatible.

A consolidation opportunity across six parcels and four discharge ports might deliver significant savings on freight and port costs. But it only becomes visible when you can see every hold, every tank, every restriction, and every port call across the full voyage simultaneously.

Layer in bunker optimization, port cost allocation, and the financial impact of frameworks like EU ETS, and you're looking at a decision space that grows exponentially with every additional tank and port call.

The best a planner can do manually is find an answer that works. The question is how far that answer sits from the one that works best.

All of this leads to a particular kind of loss that never shows up on your P&L. It accumulates quietly, voyage by voyage, in the gap between the schedule you're running and the schedule you could have been running.

## Scheduling technology

What if your team could evaluate all two hundred options against the full forward schedule and have a ranked shortlist of the 20 options worth serious consideration in minutes?

That's what scheduling technology built for fleet-level optimization actually does.

It doesn't replace the planner's judgment on which cargo to fix, it simply ensures their judgment is applied to the right shortlist.

The real value of fleet-wide scheduling visibility is that it changes the quality of the questions your planning team has the answers to.

When you are planning manually, "does this cargo work for this vessel" is a reasonable question for a planner to ask.

With fleet-wide optimization, the planner can quickly answer more detailed questions.

For example, "which of these spot options positions our fleet best for the next sixty days, given our COA commitments, current bunker prices, and the ETS implications of each routing?"

With manual planning only, the planner has all of the same questions, but no ability to quickly answer and act on them.

You are making decisions that keep the entire schedule, contracted and spot, together. It is performing at a higher level over time.

The planner still makes the call. What changes is what they can see when making it.

At Seaber, it's the problem we've built our platform to solve. Giving fleet operators the visibility and speed to optimize a large fleet against a complex COA program, and to find the spot cargoes that make the whole schedule work harder. PTM

# Getting spare parts created on demand

**With the help of additive manufacturing and designs available through Pelagus' digital inventory, it is possible for manufacturers to create spare parts "on-demand", making it much easier for shipping companies to access trustworthy parts, faster. Pelagus explains**

*By Haakon Ellekjaer, CEO of Pelagus*

In the maritime and energy sectors assets are built to last, with many now exceeding 20 years of age. Continuing safe and efficient operations often relies on the availability of legacy parts.

These may be difficult to source as original equipment manufacturers (OEMs) discontinue production in favour of newer components.

So OEM / genuine maker lead times for parts production are continuing to extend. This leads to delays for shipping companies.

It also leads to increased reliance on "grey-market" alternatives. These can offer faster availability, but carry significant risk.

*Haakon Ellekjaer, CEO, Pelagus*

The problem can be solved with on-demand manufacturing (making parts in low volumes, and only as needed). This is supported by availability of up-to-date data about the spare parts stored digitally.

On-demand manufacturing is an umbrella term for a range of production processes, commonly referred to as 3D printing.

When a vessel needs the spare part before it can sail, the cost of waiting can far exceed the cost of the part itself.

Meanwhile, shipyards are increasingly requiring suppliers to provide digitised designs for parts - particularly for systems used for handling energy.

On-demand manufacturing, enabled by these digital designs, allows parts to be produced closer to the point of need. This reduces lead times while maintaining control over quality and specification.

Rather than relying solely on centralised production and physical stock, OEMs can access distributed manufacturing capacity when and where it is required.

## The Pelagus platform

Providers such as Pelagus enable this model by providing a platform with secure inventories of data for both current and legacy parts, combined with access to a global network of verified manufacturing partners.

This approach allows OEMs to retain control of design, quality and traceability, while significantly improving responsiveness.

For example, if a company in Brazil urgently requires a replacement pump component, but the OEM cannot meet the end-user's delivery schedule, the OEM can request that one of Pelagus' manufacturing suppliers based in South America fulfils the order.

Using the digitised design, that supplier can seamlessly create the part to the OEM's exact specifications.

For OEMs, it presents an opportunity to reduce lead times, maintain control, and respond more effectively to the realities of critical assets in operation.

## Maintaining integrity

For this model to succeed, trust is critical.

OEMs must have confidence that their intellectual property is protected, that manufacturing partners meet the required technical and regulatory standards, and that every part can be fully traced from design through to delivery.

This requires engineering expertise to define and digitise parts correctly, alignment with classification societies to ensure certification readiness, and full accountability across manufacturing, testing

*Retrieving spare part designs from Pelagus' catalogue*

and inspection.

Once a part has been digitised and validated, repeat production can be executed with minimal intervention, enabling consistent quality alongside reduced lead times.

Traceability underpins the entire process. Digital files must be approved and controlled by the OEM, and every stage of production must be documented to ensure compliance with industry requirements.

The objective is not simply faster production, but controlled, repeatable and certifiable manufacturing at scale.

Pelagus provides continuous updates on rigorous testing and inspection results to ensure that the finished part meets or exceeds the required quality standards.

Pelagus has a global network of verified manufacturing partners, and a foundation built on the industrial expertise of Wilhelmsen and thyssenkrupp. It enables OEMs to deploy on-demand manufacturing across regions while maintaining control over quality, specification and traceability.

The focus is on delivering consistent, certifiable outcomes at speed, using the most appropriate manufacturing approach for each application.

Pelagus expects adoption of its approach will follow the precedent set by CNC (Computer Numerical Control) machining in the 1990s.

It was slow initially, then accelerated as early adopters report the benefits.

Pelagus' digital inventory solution turns manufacturer legacy part portfolios into a secure catalogue of digital assets, ready for additive manufacturing and other forms of on-demand production. It is backed by industrial technology company thyssenkrupp and marine services company Wilhelmsen. It is based in Singapore and Norway.

# Manta Marine – making vessel performance easier to manage

## Manta Marine's "FuelOpt", now on 550 vessels, is making propulsion control easier for seafarers, part of its mission to make vessel performance easier to manage

Manta Marine's FuelOpt system for automatic propulsion control is now installed on more than 550 vessels worldwide. It is designed to allow operation based on two simple objectives: setting a desired vessel speed, setting a fuel consumption target, or balancing both simultaneously.

When the objective is to minimise fuel consumption, FuelOpt can stabilise engine power around a selected operating point, even as wind and current influence vessel speed. By reducing unnecessary fluctuations in engine load, the system supports more consistent engine operation and predictable daily fuel consumption.

If the crew instead aims to maintain a constant speed, FuelOpt automatically adjusts engine power up or down in response to environmental conditions. This is particularly relevant when operating in combination with wind-assisted propulsion, where available wind power can vary significantly and needs to be integrated safely into the propulsion strategy.

Some vessels may want to maximise the use of wind while also avoiding engine operation at very low loads. At low engine loads, combustion efficiency typically deteriorates and additional air supply systems may be required to ensure sufficient airflow to the engine cylinders. FuelOpt can therefore be configured with a minimum engine power limit, ensuring the engine continues to operate within defined and efficient boundaries, regardless of wind contribution.

Some crew may mainly care about ensuring that fuel consumption per day does not exceed a certain level. Or they may desire a higher speed, such as 15 knots, but only if the vessel consumes under 30 tonnes of fuel a day.

FuelOpt helps reduce cognitive load on crew, by automatically making many small adjustments during the day, so crewmembers do not need to do this themselves.

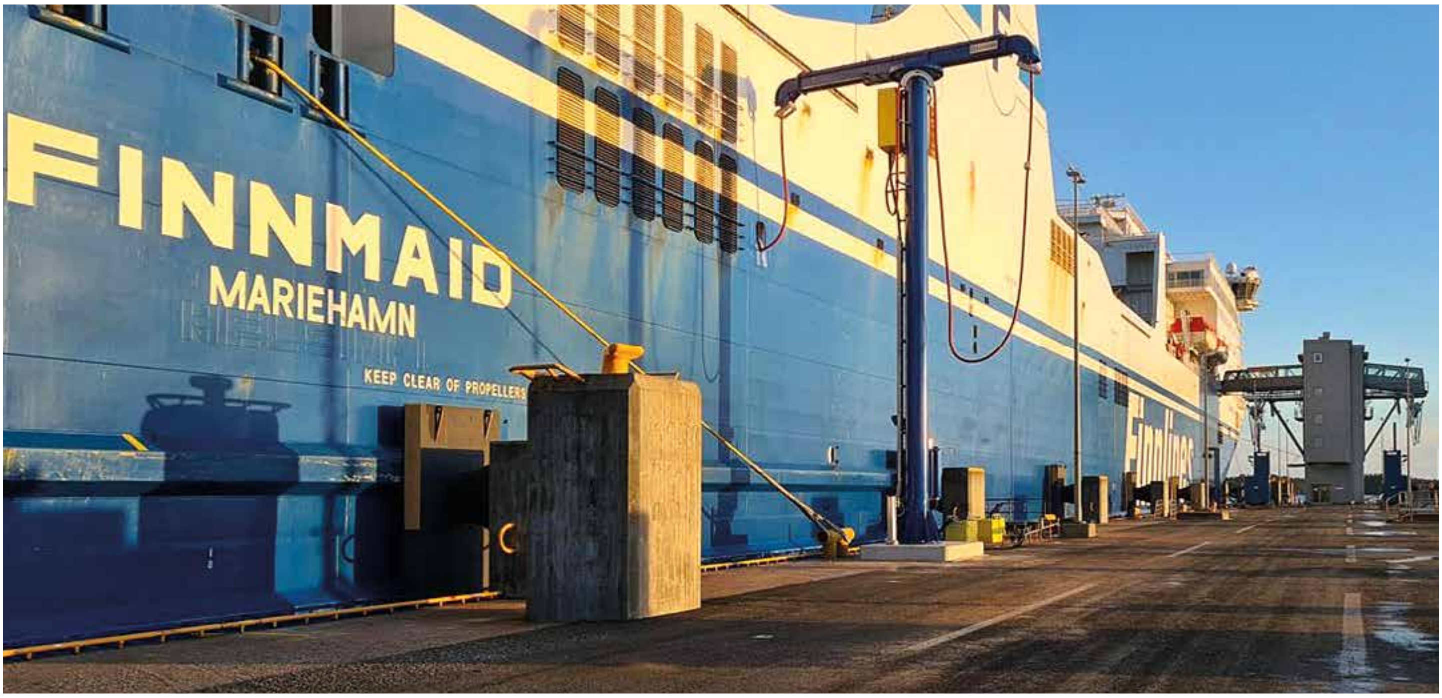
It can monitor the exhaust gas temperature, to ensure the engine is not overloaded.

It can send vessel performance data, such as fuel flow and shaft power, to a cloud platform. The data can be analysed, to see if the sensors are performing correctly, and if there are ways to run the vessel more efficiently.

Manta is developing 'digital twin' services which can run a model of the vessel on the cloud, to see what the ideal operating parameters are, and then send instructions to FuelOpt to adjust the engine accordingly. So the vessel is automatically following the company's performance models.

### Making performance decisions easier

Manta Marine's toolbox of solutions is designed to improve vessel performance, while supporting decision making, helping emissions reduction become a practical reality for shipowners and operators.




***Manta Marine is installing systems for ships to accept shore power***

Many companies say they already did the "easy" things  for vessel performance, such as to install variable frequency drives and LED lighting, says Mark Tresch, head of innovation, Manta Marine Technologies. 37 per cent of the world fleet has at least 1 energy efficiency technology, he says.

These companies are now looking for bigger CAPEX items, but they at times find it is not clear what the best investments are. There is still low penetration of more expensive technologies like air lubrication &wind power he says. This is in part due to technology barriers that need addressed.

For example. it can be very hard to evaluate data about energy savings. Even the savings from a variable frequency drive may not be obvious, and if this is supposed to be an easy investment, the bigger ones get much harder to justify. Manta Marine is addressing such challenges through innovative product design and their in-house fleet performance team, to provide support on improving and understanding performance and savings

## Company background

Manta Marine's background was initially manufacturing scrubbers, founded in 2010 as "Green Tech Marine".

Green Tech Marine was acquired by fertiliser manufacturer Yara International in 2014 and changed its name to Yara Marine Technologies.

It acquired Lean Marine in 2021, a company which made the "FuelOpt" system. In 2024 it was acquired by Okapi Supply Trading Advisory SA of Geneva and changed name to Manta Marine Technologies.

Today it makes a range of hardware technologies, including  FuelOpt, shore power systems, fleet analytics, and variable frequency drives.

It also provides software and services, such as Fleet Analytics, for decision support,fleet performance management and reporting.

## Shore power

Manta is installing systems onboard ships to accept shore power, including the intake room, high voltage switchboard, transformer, automation system, utilities and cabling.

Shore electricity for ships is typically supplied at high voltage, such as 11 KV. On the ship, the voltage needs to be reduced to match the ships main switchboard voltage, which means when the voltage goes down, the current goes up, and a very thick and many parallel cables are needed to carry the current.

There are already standards for shore power for many ship types, although not yet for tankers. It is in progress and is currently out for comments and our expectation is that it will be published later this year.  says Christoffer Ahlström, Head of Marine Electrification at Manta Marine Technologies.

A ship side shore power installation does not have to be done during dry dock or shipyard stay. With good planning and an experience team Manta have many examples where installation has been done with the vessel alongside for three days only.

## Variable frequency drives

Manta has delivered over 1500 variable frequency drive systems (VFDs), which can adjust the electricity delivered to rotating equipment, such as engine room fans and cooling room pumps.

These typically provide a return on investment in under 2 years, Mr Ahlström says. If you reduce speed of a pump by 20 per cent, you can save close to 50 per cent of power.

Much of the installation of the systems can be done by crew.

## Lifecycle service

Manta provides comprehensive lifecycle services for its products.

The biggest installed base is scrubbers, sold by its predecessor companies Green Tech Marine and Yara Marine Technologies. These remove SOx from the exhaust, turning it into a stable sulphur compound which can be neutralised by the salt in seawater. The oldest installation is 15 years old. The peak time for its scrubber installations was 2020.

The scrubbers maintain their condition so well that some companies have chosen to remove them from vessels being scrapped and install them on other vessels, said David Gundén, head of lifecycle services with Manta.

Manta also provides lifecycle services for its shore power systems. variable frequency drives and other products.