


One Ecosystem. Every Insight.
A global leader in the digital
maritime sector.

A portrait of Casper Jensen, a middle-aged man with short brown hair and a light beard, wearing black-rimmed glasses, a light blue button-down shirt, and a dark navy blazer. He is smiling slightly and looking towards the camera. The background is dark and out of focus.

“With Danelec joining the GTT Digital division, we are building the leading digital platform in maritime, now serving over 17,000 vessels worldwide and empowering shipowners to achieve peak performance, enhanced safety, and ambitious decarbonisation goals.”

Casper Jensen, Executive Vice President Digital at GTT



NAVTOR

Smart shipping made easy

*Leading the way
in smart shipping
innovation*

NAVTOR Suite

NAVTOR  Tv Tr St Bx Fl Dl Re

*Integrated e-Navigation and Performance
solutions for sustainable shipping.*

Contents

- PEOPLE TECH MARITIME ATHENS REPORT

2 Companies can often find ways to make big savings on emissions from gathering and analysing data - you should look for well structured software and give support to your experts, we learned in our Athens forum

4 Much of the challenge of decarbonisation could be described as co-ordination, between activities, data and tasks - digital tools could provide much more help with this. Dimitris Lyras explained

6 Data about fuel consumption, engine and generator load, and navigation can be all you need to understand if the ship is operating efficiently. You may see ways to improve performance 10-25%, said Omur Karatas



7 Software customisations and data sharing - while current vessel performance software tools can be very effective, shipping companies may not feel software gives them exactly what they want, so ask for customisations

9 Thenamaris' experience implementing vessel data collection software - software "ThenaForms" to collect data about vessel operations and reduce the administrative burden. Maria Kartalou explained

9 Getting data out of e-mail, and better digital integration - it would be useful if we could have better ways to extract and use e-mail data, and have our digital tools better integrated, said Dimitris Lyras

10 Shipowners now want agnostic platforms says Danelec - tools which integrate easily with others, and which they are not tied to. Danelec is developing vessel performance tools accordingly

12 How to use AI to generate customised training materials - with the SMS or existing videos as a starting point. Konstantinos Agas demonstrated what is possible

13 How to future proof digital technology - we need to make it easier to maintain, easier to speak to AI systems, and more interoperable. Achilleas Mantzios of Dynacom shared ideas

14 How to reduce crew travel costs 17% - most seafarer tickets can be rebooked free. Exmar is taking advantage of this, together with advanced software, to save 17% on crew travel costs

17 A good relationship between operations and IT staff - makes the organisation function much more effectively. Nicolas Timpelis, IT projects support manager with IONIC explained how to get there

18 How can we align shipping companies and technology investors - when investors look for a straightforward software product with clear benefits and easy implementation. But the technology needs of shipping companies are very complex

19 Lloyd's Register's Digital Maturity Index - shipping companies can use to assess their digital transformation efforts. Are you foundational, emerging, mature or visionary? Eleanna Apostolidi explained

20 Maritime's biggest cybersecurity challenges today - seemingly pointless requirements, managing crew internet, and AI. Speakers from Hellas Confidence Shipmanagement and Threatscene discussed

- TECHNOLOGY DEVELOPMENTS

21 Cybersecurity risks, compliance and insurance - a panel organised by consultancy Dryad Global discussed current risks, the challenges of regulatory compliance, and what you can get insured for

22 Multi-orbit networks and cybersecurity - if you use more than one satcom network at once to your fleet, you have a back-up if one of them is hacked. iDirect explains what this means

24 Supporting seafarers with voice analytics - generate insights which can be used to support decision making and increase safety. SignalFusion explained how it can work

How to decarbonise shipping with data

Companies can often find ways to make big savings on emissions from gathering and analysing data. You should look for well structured software and give support to your experts, we learned in our Athens forum

You may be able to reduce emissions of a vessel from 10-25 per cent by gathering data, understanding how the vessel is being operated, and then seeing ways to do it better, we learned in our People Tech Maritime Athens forum on October 15, "Improving digital tools to support decarbonisation decision making."

Challenges include getting good data to start with, getting a good working relationship with your software provider, persuading people internally and externally to share data, being able to support work co-ordination.

Also persuading people that they can trust data as a basis for decisions, and making sure your company experts are able to implement decisions, both in the office and onboard. It will help if seafarers can see the same analysed data that the office staff see.

Common challenges with data sharing can be that some chief engineers don't want the office to know exactly how much fuel they have onboard; shipping companies don't want their software provider or anyone else to know what the vessel performance is, or may even want to falsify the data to avoid penalties.

Engine and equipment companies sometimes won't share data or provide it in standard formats; and software tools sometimes don't integrate easily with each other.



Giannis Papageorgiou, senior consultant and vessel performance expert, Perception Consultancy

Committing to decarbonisation

A first step is to commit to decarbonisation. Some shipping companies are still considering whether or not they should make an active effort to decarbonise. They may choose instead to look for ways to minimise the short term costs, follow compliance imperatives, or pay penalties, said Giannis Papageorgiou, senior consultant and vessel performance expert, Perception Consultancy.

Mr Papageorgiou first started working in maritime decarbonisation in 2014, working in Denmark for A P Moller Maersk and CMA CGM.

Many other companies see it is clear that the industry needs to follow a decarbonisation pathway. So they are making long term plans about how to do it.

These companies recognise there may be higher costs to being the first mover to try out new technology, when the technologies are unproven. But they also see they can gain a competitive advantage from being a first mover, because they can build up more expertise, and be better prepared for the future, he said.

When Mr Papageorgiou first worked with vessel performance in 2014 in Denmark, only a few companies were working with high frequency data, he said. Since then, the industry and its technology has matured a great deal.

Many new jobs have been created working in vessel performance and related data analysis. Companies are making big investments in IT staff to gather and manage the data. They employ staff to analyse products coming onto the market.

Data gathering and analysis

The best way to persuade people to change what they are doing is with solid numbers,

which means good data logging and good data analysis, he said.

Using automatic data logging tools, rather than relying on noon day data once a day, can help identify things like overuse of generators, he said.

Seafarers need to feel data logging tools are there to help them, not "big brother watching them."

You may see problems with connectivity, leading to data gaps, or mis calibrated sensors, he said.

By analysing performance data, you can see the best time to clean the vessel or do maintenance. You can make calculations such as about resistance made by the hull, wave, and wind. Data can be used to drive mathematical models and create digital twins.

AI can help with this analysis. "It has massively accelerated the speed of development," he said. For example, it made it easier to program the demanding mathematical equations involved in the analysis.

Sometimes, AI tools work so well, it encourages managers to ask for even more analysis to be done, he said.

Working with crew

"Many times, I've seen crews with good intentions to minimise consumption and be as clean as possible because they care," he said.

But crew have many daily considerations other than reducing fuel, including the stress to meet the required arrival time, or avoiding the safety hazards of a blackout. So, they may have two generators in operation when only one is needed.

Shipping company management could offer crew more support in cases like this, he said. For example, by making it formal company policy, backed up by analysis

PeopleTechMARiTIME
Digitalisation – Decarbonisation

Vol 1, No 2
DECEMBER 2025

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

SUBSCRIPTION

1 year (4 issues) - £195
Subscription hotline:
Tel: +44 (0)20 8150 5292
sub@tankeroperator.com

Digital Identity for Every Seafarer

Dualog gives every crew member a protected, traceable, and automatically managed identity for secure and seamless work onboard.



Single Sign-On
to all authorised services -
no multiple logins and less
manual work.



**Personal access to
each system** - no shared
credentials, all actions
are auditable.



**Crew Management
System integration** -
automated on-/offboarding,
reduced admin workload.

Scan the QR code to
learn more and get a
free trial for your fleet.



showing there is enough power produced from one generator.

On one occasion with a company Mr Papageorgiou was working with, a vessel had an automatic turbocharger cut-out, to stop the turbocharger from running when it was not needed. But it was not used by the crew.

Although the company had invested in this system and installed it, crew did not believe it was safe to use it. They had concerns it would restrict their maximum speed, and they did not feel confident they would never need their maximum speed. Or they felt use of the turbocharger cut-out could expose them to other issues, that would

increase their workload. The office was never informed that the system was never used.

It would be useful for crew to be able to see the same picture as people in the office. This would mean sending analysed data back to the vessel.

"It is an important part of the design of a performance system," he said.

There could be specialist crew training about how to handle different occasional events from an energy efficiency perspective. For example, how to handle parametric rolling, when the natural rolling of the ship synchronises with the time between the waves, leading to much bigger ship rolling,

and a higher demand on the engine.

A challenge when working with crew is that they are many steps away from the organisation which gains the most from reducing fuel consumption, the charterer. In between you have the shipowner, technical managers and crew managers, he said.

Choices about technologies

Shipping companies are considering investments in energy saving devices to improve vessel performance. There is a challenge decoding all of the promises that are made by technology providers.

A provider of wind assisted propulsion systems may promise energy savings of 20 per cent. If shipping companies invest and only see 15 per cent saving, that makes a big difference to the investment plan.

Companies might want to install something to see for themselves if it will work, and if their experiences in the trial will work on their whole fleet. Big companies can have an advantage, in that they have more scope to try things out and compare them, he said.

Shipping companies often do not have staff with time to process all the technical details.

Engineers need to be able to generate recommendations for their management, without the time to study things in depth, or on the basis of uncertain data. They may feel they risk getting fired if the technology does not turn out as promised. It would be better if they feel more support from management, that they recognise technologies may not work out as expected.

The problem needs to be simplified somehow, he said.



Co-ordination and decarbonisation

Much of the challenge of decarbonisation could be described as co-ordination – between activities, data and tasks. Digital tools could provide much more help with this. Dimitris Lyras explained

Decarbonisation touches many different areas of maritime operations – technical operations, crewing, purchasing, navigation, and commercial.

But when it comes to digital technology for decarbonisation, most of the tools developed to date are either transaction type (gathering data about emissions and making reports) or doing analytics and AI on data. We don't have many tools yet supporting co-ordination, explained Dimitris Lyras, director of Paralos Maritime and Ulysses Systems.

But big decarbonisation benefits could be seen from better co-ordination, such as the example given in the previous section, when the shipping company installed a turbo charger auto-cut out which the crew never used.

Co-ordination tools would give us earlier warning if there is a problem. Or they could ensure someone is not doing a task they are not authorised to do, such as go in the engine room when there is an ammonia engine running.

Consider that an important point in the chartering process, and the process



Dimitris Lyras, director of Paralos Maritime and Ulysses Systems

of allocating emissions to the charterer, is when the "Notice of Readiness" (NOR) is issued. This notice is sent by the shipowner to the charterer stating that the vessel is ready to accept the cargo, equivalent to a taxi driver turning the meter on. At that point, the charterer becomes responsible for paying for fuel and emissions related costs.

There are many complex co-ordination related reasons why issuing the NOR may be delayed. For example, a need to have a vessel survey before it is issued, and the surveyor is delayed attending the ship. It is important that the shipowner knows what is going on and the reasons for any delay, so mitigation methods can be put in place, such as finding a different surveyor.

While the vessel is held up, it will be consuming fuel for onboard use, while not carrying cargo, which will have a negative impact on its annual carbon intensity indicator (CII).

Another example of a co-ordination challenge affecting carbon emission calculations is GPS spoofing. This would make vessel position data inaccurate. Vessel position data is used for many calculations about vessel performance.

It would be possible to identify when GPS data may be incorrect and adjust accordingly. But this is a co-ordination challenge not captured in current vessel performance software.

"We've got a very complicated life ahead of us," he said.

Wireframing

Digital tools can be built to support complex co-ordination challenges, but they need to be built around a flexible structure, not rigid databases. This is



because the co-ordination challenge is continually evolving and no-one knows what all the elements are until they arise.

To build software in this way, Mr Lyras suggests building it around "wireframes".

This can be described simply as nodes (meaning events, activities or decisions) and lines connecting them together, showing what can lead to what. You can progressively add as many "wires," as you want, until the system reflects the complexity of a real world process and all of the different events which can influence activities.

Modelling software in this way is not a new idea, but it was previously used to understand requirements of software to be built, rather than as a basis for actually building the software, he said.

A wireframe is easy for someone else to read, and they do not need to be a coder. So engineers can see how the system works. It is the opposite of a "black box"

type system which just says yes or no, he said.

As an example of how big an issue this can be, consider that there have been aeroplane accidents due to sensors malfunctioning, such as Air France Flight 447 with 228 fatalities.

The aircraft could have had a system for detecting the malfunctioning sensor, disabling it and showing the pilot where accurate information about altitude was available. But the pilot would also have needed to understand how this back-up system worked. It could have been explained using a wire frame.

Easier to integrate

In theory, two software products built around wire frames should be easy to integrate, because we just draw new lines between the nodes.

Too often today, we see companies trying to integrate two database driven products together, and this rarely goes well. Companies may end up manually rekeying data into the second system, but finding that the second system uses different definitions. This is something you probably want to avoid.

For example, one client wanted its noon report spreadsheet to be incorporated into their ERP software, although all the data fields were different.

There were many disagreements, and many meetings had to be held to discuss technical details, such as what specific point a voyage is considered to have started in the ERP system. It became very complex, time consuming work involving many people.



Using ship sensor data to improve performance

Data about fuel consumption, engine and generator load, and navigation can be all you need to understand if the ship is operating efficiently. You may see ways to improve performance 10-25 per cent, said Omur Karatas

A shipping company had two similar vessels sailing on the same route, carrying the same cargo.

They were promised a 5 per cent fuel saving by a coating company, if their coating was used, with a promise that the coating would be free if the improvement was not seen. The company decided to put the coating on one vessel, so it could be tested.

The vessel with the new coating ended up consuming more fuel. The shipping company and coating company ended up fighting each other. Omur Karatas, Chief Ocean Engineer, Ortech Marine, a maritime technical consultancy based near Istanbul, was asked to investigate.

He found that the vessel with the higher fuel consumption had its propeller pitch settings at a different level. One was at 15 degrees; one was at 17 degrees.

Having the wrong propeller pitch is equivalent to running your car in the wrong gear, he said. The car will be less fuel efficient. And just like running a car in first gear, if you try to put more power through the engine, it will not increase the speed much.

"It was so silly," he said. "The paint company didn't check all the details."

The story illustrates the importance of gathering robust data about how the ship is operating.

It can often be possible to achieve a 10-25 per cent improvement in ship performance, just from having a better understanding of what is going on, Mr Karatas said.

He emphasized the importance of seeing digital technology as a tool to support human expertise, not a replacement for it.



Omur Karatas, Chief Ocean Engineer, Ortech Marine



Anyone can install sensors and AI systems, but without human experience, "it doesn't work."

Ideally, the captain and chief engineer should see the same things, and decisions can be made jointly with office and onboard, he said. This also prevents the chief engineer from being able to hide data about how much fuel is onboard, which has sometimes been seen.

Mr Karatas is a former maintenance manager with Arkas Maritime and Transport, and a marine engineer for 47 years.

Gathering and analysing data

To monitor a vessel for performance in real time, Mr Karatas suggests sensors on the engine and exhaust, and fuel flowmeters. Also gathering data about the diesel generator load, the fuel emissions, and navigation data.

You need an onboard server, sending data to a cloud server, and then tools for data validation, processing, and analysis. You can use software which provides metrics and alerts.

The engineering analysis can calculate "ship slip," defined as the difference between the speed you would expect the vessel to be at, given the engine speed, and the actual observed speed of the ship. No ship is 100 per cent efficient.

Causes of ship slip could be fouling on the hull creating frictional resistance, the ship propeller being at the wrong pitch (as above),

and resistance from the water current and wind.

An exhaust gas sensor can generate data telling you that the fuel is not burning very efficiently. You may see more NOx emissions than usual. This is a sign that something is set up wrong with the engine.

Analysing the fuel flowmeter may show anomalies, such as from engine overspeed, or the boiler overheating.

Engineers can check every day how much oil is being used, how much power is being generated, and if the pressure and temperatures are as expected. The same data can be checked in the office. AI can automate much of these checks. "It is easy to do that," he said.

You do not necessarily need to install expensive new sensors, such as to monitor emissions directly, he said.

A typical data analysis for a vessel may find that the fuel consumption for the vessel is divided up like this: Main engine 79%, aux engine 19%, aux boiler, 2%, emergency generation 0%.

The main engine emissions could be broken down into different tasks the vessel is doing, such as splitting the 79% to loaded 39%, ballasted 20%, passage sails 12%, berthed 5%, anchored, 2%.

The equipment emissions break down could be cooling pumps 47%, air conditioning 11%, refrigeration 24%, air compression 1%, winches 4%, ballast system 4%, lightening 9%, (total 100%)

Trusting data, software customisations and data sharing

While current vessel performance software tools can be very effective, shipping companies may not feel software gives them exactly what they want, so ask for customisations. Also data is often not shared very well



Panos Theodossopoulos, Chief Executive Officer, Meti

Adoption of digital tools for shipping, including for decarbonisation, has greatly increased over the past decade, said Panos Theodossopoulos, Chief Executive Officer, Meti, a maritime vessel performance software company.

With the help of data, “you can always optimise your operation,” he said. “Digitalisation helps in assessing what you do on a technical level.”

IMAGCurrent off the shelf digital tools can give you a “pretty good picture of what is going on,” agreed Dimitris Orfanos, partner with maritime technology consultancy Further and Further and former technical manager of Pavarotti Shipping.

If companies build software in-house rather than buying off the shelf, they can only access ideas of their own experts and may not change the way they work, he said.

Konstantinos Lourandos, senior technical consultant with maritime software company Ninety Percent of Everything, said that shipping people are often correct in saying that software does not meet their needs.

Mr Lourandos is a former technical manager of Delta Tankers and former fleet manager and local director of Wallem Group. He is a past member of INTERTANKO’s working group on performance monitoring.

For example, technical staff in shipping companies often mainly want straightforward information and recommendations from their software. But many software products on the market require them to log on every day to monitor performance.

Some software products expect users to be able to interpret power speed curves to work out whether the vessel should go faster or slower, he said, a task which might normally require a naval architect.

Many shipping companies may take some persuading to make decisions based on



Dimitris Orfanos, partner, Further and Further

data, he said. They may want to keep with their reliance on the chief engineer who can detect a problem from the change in sound of the engine.

Today our society is much more data driven. Many of us wear health sensors which gather data while we sleep, Mr Lourandos said. “We have to act in a different way than the past. You have to persuade conservative minds that this is the way forward.”

Gathering data which people feel they can trust as a basis for decisions can be hard. In one shipping company management role, Mr Lourandos wanted to find the daily fuel consumption of each vessel. The company tried out four different methodologies, and they all generated different answers.

You may get a more consistent picture if you look for trends in data, rather than the absolute values, he said. You may get different answers from different calculation methods, but all the methods should show the same trend.

Mr Lourandos believes that the noon day report data is still highly useful, because the crew need to be involved in putting it together. Someone needs to go around the vessel manually to have a look at what is happening, he said.

Customising software

Shipping company staff often do not feel that the software gives them exactly what they need, so they ask for customisation from the software company.

There are two schools of thought here. Some people say that software providers





Konstantinos Lourandos, senior technical consultant, Ninety Percent of Everything

should give customers what they want. Others follow Steve Jobs and say, 'people do not know what they want until you show it to them,' Mr Theodossopoulos said.

The right pathway falls between these extremes, and allows the shipping company to get the benefit both of its in-house expertise and that of the technology vendor, he said.

A technology vendor works with many other shipping companies and has collective knowledge from them fed back into the offering. But the software company should definitely listen and work with its customers, who are saying what they want, he said.

Metis may have done too many customisations in response to customer requests in the past, Mr Theodossopoulos said. "At some point we said, that has to stop. It is not good for customers; it is not good for the viability of the company."

"We said, we are going to develop something standard and offer that to every customer from now on. When the customisation request comes in, we will assess it. If the decision is made to build it, it will be made available to everybody."

a, noted that software products themselves can become degraded if the

provider makes too many customisations in order to satisfy a client request quickly.

For software to be easy to customise, it should have a clear robust model beneath it, he said.

Also if vendors have multiple versions of their software code, it can be very time consuming to maintain. It is better if you can provide all customisations to all customers.

When companies consider which software to purchase, they should consider how easy it is for the software to be customised or otherwise extended, such as if they need a different report format. They could ask existing customers what happened when they made customisation requests in the past, he suggested.

Data ownership and sharing

If multiple companies are involved in generating performance related data, it can be very challenging getting agreements in place to share it, said Mr Theodossopoulos of Metis.

For example, when shipyards and engine companies offer shipping companies to do predictive maintenance on the engine, they can be reluctant to share the underlying data.

Also, when data is shared, it is often not in standard formats, he said.

Ships can have thousands of pieces of machinery onboard, such as with scrubbers and ballast water systems, and it is very difficult for a software company to connect to them all.

In an ideal situation, all these systems would be able to provide data in a standard format, for example with pressure data tagged in the same way. This would mean that anyone could plug in and do whatever they want to do with it.

Another data ownership challenge relating to decarbonisation is shipping companies reluctant to provide their performance data to any cloud hosted software. Although they still control the data, they are concerned that the data may leak out. Perhaps the technology vendor is affiliated with other shipping companies or charterers.

There are commercial reasons for shipowners wanting to hide things. Mr Lourandos said. Shipowners may be penalised for overconsumption of fuel if it is considered in breach of their charter party terms. So, shipowners may be inclined to falsify the data and hide their calculation methods.

Making data available to crew

Many companies have sophisticated data visualisation systems in the office, but only basic systems to provide data to crew, noted Loukas Michalitsis, a naval architect and marine engineer, formerly with TMS group and Columbia among others.

It might be useful if crew could see the same as the office staff can see, so they can also continually monitor performance in multiple parameters.

Seafarers are often not aligned with efforts in the office to optimise the vessel, said Dimitris Orfanos of Further and Further. A chief engineer will happily start up a second generator to provide a safety margin.

Perhaps one way forward would be for the office to make clear to crew what they consider "good performance" to be, he suggested.

To support crew in decarbonisation you need to understand their perspective, Mr Lourandos said.

He told a story of a personal experience from 10 years ago, when he asked crew to save energy by switching off lights in cabins and corridors when they were not needed. He sent the vessel notices to put next to light switches. The idea was that it could be a first step to engaging crewmembers on energy efficiency, leading to persuading them to switch off generators they did not need.

The crewmembers did not like it, and instead left switches turned on to make their point, he said. They felt the office staff did not understand what it was like to live on a VLCC for 6 months, expecting them to walk along dark alleys.

The lesson is that it is very important to understand crew and the environment they live and work in, he said.



Loukas Michalitsis (left) a naval architect and marine engineer

Thenamaris' experience implementing vessel data collection software

Thenamaris (Ships Management) recently built and installed software “ThenaForms” to collect data about vessel operations and reduce the administrative burden. Company Planning Manager Maria Kartalou explained

Thenamaris (Ships Management) recently built and installed a new custom software system “ThenaForms” to collect data about vessel operations. The goal was to reduce the administrative burden and improve collaboration between vessel and office.



Maria Kartalou, Planning Manager, Thenamaris (Ships Management)

Maria Kartalou, Planning Manager, Thenamaris (Ships Management) explained, speaking at the People Tech Maritime Athens event in October.

The company Planning department is responsible for change management, including the optimization of business processes; the IT department is responsible for systems, she said.

Before implementing the ThenaForms system, crew were often required to enter the same data multiple times in different software systems and spreadsheets. For example, main engine running hours were entered both in planned maintenance software and noon reports. Sometimes there were inconsistencies in the data, and there was no way to know which was the correct value.

Thenamaris wanted a system that could make validation checks on data when it is being entered and then share it with other systems, including financial ERP systems.

Much of the vessel operations data

is used by multiple departments, so Thenamaris decided to look at the data collection process where there were many pain points already identified.

The company sought off the shelf software, but everything it saw “was very basic compared to what we wanted to have,” she said. So, a decision was made to build its own software. Considerations included the benefits of having full control over how the software was built, and the lifecycle costs of supporting custom software.

The company did not do the actual development work in-house but worked with external consultants to build it.

Ms Kartalou's team sought to identify data needs for every part of the vessel operations process.

Developing the system

The rollout approach was designed to start with one vessel, then expand to three and eventually to the entire fleet. This phased approach was a deliberate strategy to identify and resolve issues early allowing for needed enhancements to be made before full-scale rollout.

“Sounds great right?” she said. “It never works that way. In reality we were handling a lot of problems.”

When software was deployed on vessels, it had software developers available who could fix problems immediately.

Some things may have been “over digitalised”. For example, it digitalised the system for capturing safety inspection data. But then found that crew were still doing the checks on paper, and then retyping the data into the system later, so it was increasing their workload. As a result, we removed this feature from the application.

Thenamaris was building the software applications at the same time as building the supporting digital infrastructure.

“Ideally you would have a digital infrastructure before building the applications, because if you make any changes to the infrastructure it can create new problems with the applications. But to do the infrastructure first you would need to know in advance exactly what infrastructure you need, which is unlikely,” she said.

Another problem was a lack of clarity of people's roles, including business analysts and developers.

The business analysts assumed IT people would have tested the infrastructure before giving it to the business team for testing. The IT people assumed the developers would have performed the unit and integration testing and fixed any major bugs.

But in the end, the project enabled the company to get a better grip on its processes and get a better understanding of the work that seafarers actually do.

It was important to bring in relevant experts at the right time, she said. “For example, you involve experts from the bunker department as well as chief engineers from the vessels to be involved in systems relating to bunkers.”

Ideas for Thenamaris' next digital transformation projects are systems to improve data flow between vessel, office and partners; using AI and analytics for decision support and predictive insights; improving vessel-shore communication and onboard computing; improving cybersecurity; improving user experience by making tools simpler and more intuitive for crew and office staff; and digital tools to manage sustainability and vessel performance.

Maria was a consultant with Boston Consulting Group for 9 years and has a PhD in toxicology and bioengineering from Massachusetts Institute of Technology.

Thenamaris has 91 vessels, including tankers, dry bulk, containers, LNG, LPG. The diversity of vessels makes digital technology implementation more

challenging, she said.

The company has more than 3800 seafarers and over 300 shore employees.

General technology challenges

"The maritime industry's software needs are very different to other industries and not necessarily met by existing maritime software," she said.

When Ms Kartalou started in Thenamaris in 2014, the company was looking for a new safety management system. Working with a colleague, she found some "fantastic" solutions used by factories and legal firms. But quickly realised they would not work in maritime due to connectivity constraints.

Then they found a maritime specific software but realised it would not work with Thenamaris because the correct

infrastructure was not available onboard. So, the only option was to develop in house.

"A general challenge with maritime technology is that shipping can be resistant to change, and shipowners reluctant to invest in technology," she said.

"There is a gulf between business and IT people, with business keen to have new functionality as soon as possible, and IT people seeking security and stability."

Thenamaris believes technology can be a competitive advantage to a shipping company, but to get value, the people, systems and processes must "work together in harmony."

"When implementing new technologies, you need to make sure the IT team has capacity to deliver what you want to do, and executive buy-in is extremely important".

Sometimes external consultants and vendors can drive technology innovation, although it may not be aligned with business needs.

It should be possible for new software to be developed faster. There is still no software available that "fully supports our needs" for SIRE 2.0, despite it being running a year, and in pilot for a year before that," she said.

"With connectivity between ship and shore improving, it becomes possible to do more with digital technology systems. But you still don't have unlimited bandwidth. There are challenges particularly for real time applications.

Vessels often have old technologies onboard, which can be less cybersecure and harder to patch, and not designed to be connected."

PTM

Getting data out of e-mail – and better digital integration

Maritime industry staff still plan and discuss complex tasks over e-mail. It would be useful if we could have better ways to extract and use e-mail data, and have our digital tools better integrated, said Dimitris Lyras

The biggest value maritime software tools might be tools which can take useful data from e-mail and help us work with it, said Dimitris Lyras, director of Paralos Maritime and Ulysses Systems, speaking at People Tech Maritime in Athens.

For example, some of the highest avoidable costs in shipping operations could happen when we simply do not do a necessary task, which is easy to do when day to day activities are so complex, he said.

A company Mr Lyras was involved with once missed the maintenance survey of an exhaust gas boiler, which could have created a calamitous situation with a hydrogen fire. "We just missed it," he said.

We seek to have structured software which remind us of important activities, but it does not cover everything we do. The rest is discussed in e-mail.

In this case, there might have been e-mail discussions in the company about a previous exhaust gas boiler maintenance survey. Useful software could have taken data from these e-mails, put it into a structure, and then given us a reminder at

the right time, he suggested.

Meanwhile digital tools which support co-ordination, in a better way than e-mail, taking us through a process in a way which feels sensible, would be highly valuable, he suggested.

Consider how many shipping companies co-ordinate the tasks of identifying and fixing problems with a vessel. Someone



Dimitris Lyras, director of Paralos Maritime and Ulysses Systems

inspects a vessel, puts the observations in a spreadsheet, emails them to many people, who are involved in different areas of ship operations but not the inspection itself.

Each person reaches different conclusions about what action needs to be taken, the people hold a meeting, and then make another spreadsheet of tasks which is e-mailed around the company. It is a very inefficient process, he said.

Ideally we would have software which guides the process, which is aligned with the way common sense tells us the process should go, he suggested.

The way that shipping company software procurement processes are set up does not support understanding the benefit of software products like this, he said. Most of the focus is on the license fee, not the productivity gains which the software could help achieve. So we are left trying to co-ordinate complex activities by e-mail.

The data in our e-mail

While Enterprise Resource Planning (ERP) systems aim to capture everything that is

needed for our enterprise to plan its use of resources, typically ERP systems only capture 30 per cent of all the activities discussed on e-mail, he said.

For example, ERP software will include records of purchases which have been approved. But if we want to know why the company decided to buy one part rather than another one, this data is likely to only be in people's e-mails when they were discussing it, he said.

Similarly, maintenance software records which maintenance tasks were done. But if we want to know why the company felt there was an urgent need to do a certain task, that information may only be in people's e-mails.

Data in e-mail is likely to be more up to date than data in ERP systems, since people have discussions on e-mails about what they are going to do, and only update the ERP system after the decision has been made, he said.

For example, people may have discussions about deliveries to a vessel over e-mail. When an item is delivered, the supplier may issue a notice of delivery by e-mail. But the ERP is only updated a few days later with data, and only with data about the delivered item.

Challenges getting data from e-mail

There have been many efforts over the years to make it easier to get data out of e-mail, such as by forcing people to write in structured ways, or having systems to make them easier to categorise and search.

But they have largely been unsuccessful, due to the diversity of issues discussed over e-mail, he said. Many people sort e-mails into folders, but each folder will end up with emails on a wide range of issues.

Real world tasks can involve multiple complex steps, such as the task to understand something which is wrong with machinery, what the cause may be, what risks it will lead to, and how it might be fixed. People may be discussing all of these by e-mail.

And we don't choose the e-mails we receive, we only choose the e-mails that we send. So e-mails are more often about a matter important to the sender not the recipient.

We cannot always find the e-mail we want using word search. Consider a shipowner seeking to know why a ship's issuance of the 'Notice of Readiness' was delayed. The real reason was a delayed visit by a surveyor. But the e-mails would have



been discussing the surveyor's visit, and not contain the term 'Notice of Readiness'.

And urgent e-mails are not always labelled urgent. We may be discussing an urgent spares delivery with a supplier, but the supplier is not involved in the reason for the urgency.

Perhaps large language models can help us extract data from e-mail, together with an understanding of what is being discussed, into a structured form, he suggested.

Better component integration

Another way maritime digital technology could provide much more value is if digital components could be easier to integrate together. Good integration between systems is "highly underestimated," he said.

A decade ago, some companies would buy all their software products from a single vendor, partly to ensure that the products would integrate well together. But since then we have realised that no one vendor has the best software product for each individual task. Every software product needs to be refined over decades to get very good, he said.

A useful data integration could be one which integrates the system for tracking equipment deficiencies with a system to diagnose the problem, a risk management system to assess the risk of the work, a purchasing system to buy spare parts, and a

maintenance system to schedule the work, he said. All of these systems are used by different personnel.

"All these processes criss-cross. Where they cross, the software has to bring it together," he said.

Integration happens at the level of data and code. An integration is easily ruined by changing something, he said.

Some people say integrations are about APIs. But the API is best seen as a menu for what can be interfaced (as a digital version of the user interface), rather than an actual way of connecting together two software components, he said.

A big challenge is getting data management to the point where you can integrate one set of data with another. It requires full transparency from software vendors, so it is possible to see exactly how it works, he said.

A common approach to the problem today is to create data repositories, with the idea that data can be put in the repository by one software system and then made available to others.

But this is surely an inefficient way of doing it, since data in the repository may not be easily found, and may be difficult to understand, since it is taken away from the application which created it.

Ideally, it should be possible to bring software components together like Lego, he said, getting the information you need and taking it where you need it.

Danelec – shipowners now want agnostic platforms

Shipowners are showing a preference for “agnostic” software tools which integrate easily with others, and which they are not tied to, says Danelec. It is developing vessel performance tools accordingly

In customer surveys made around 2020, shipping companies typically said they wanted “best of breed” software – the best software tool to do any specific task, said Asbjørn Severin, VP marketing and communications Danelec, speaking at the People Tech Maritime Athens event.

This was a change from earlier surveys, when customers may have said they were happy to choose all of their systems from a single vendor.

In surveys conducted in 2024 and later, there was a further change, with customers saying they wanted systems which can easily integrate with the systems they already have.

Shipping companies are recognising the importance of choosing a system that “can tap into the situation you have in the organisation,” he said.

The average vessel is thought to be running between 40 and 60 digital applications today, and connecting systems together is a growing challenge for the IT department. It is better if the vendors make this easier.

Many shipowners often buy and sell vessels. A company IT department will be much happier if a vessel coming into their fleet has software onboard which is easy to integrate with other tools they have, he said.

Danelec has identified over 400 competitor companies providing vessel performance software. With so much choice, shipping companies can choose systems which do not tie them into anything.

Connecting with multiple equipment

The customer requirement for agnostic tools has driven Danelec’s product development philosophy, ensuring that customers never feel tied to use Danelec products or any others, he said.

This builds on Danelec’s background as a voyage data recorder (VDR) manufacturer, its principal line of business from 1995 to 2015.

VDRs are required to be able to receive data from multiple pieces of bridge equipment and software, including navigation systems, audio and sensor devices.

In 2021, Danelec acquired Kyma, a company which makes sensors for ship performance monitoring, including engine shaft sensors. This gave Danelec additional expertise in gathering performance data from multiple performance data systems, he said.

Danelec has developed an onboard data



Asbjørn Severin, VP marketing and communications Danelec

collection and communications tool called “Danelec Collect Switch,” which can pick up all forms of data onboard and send it to the cloud. It has UR E27 class cybersecurity approval.

From the cloud, it can be provided to many different software, including from competitors.

“As a technology provider, it is not our place to determine the full technology stack of a shipping company. “We are happy to support and provide some guidance on how you get started in the best way possible.”

Digital maturity drives integration

As companies gradually increase digital maturity, they are likely to want to integrate more and more digital systems together and use the data in more sophisticated ways. For example, to make use of remote support or do condition monitoring, he said.

Companies will also be working with data of increasing granularity. They will want to work with much more of the data which is generated on ships. Currently many shipping companies only process 10 per cent of data which is gathered.

All of this makes easy digital integration increasingly important.

Savings from performance optimisation

Danelec believes that vessel performance optimisation tools can enable shipowners



to save \$237k per year per vessel from reduced fuel and administration costs.

This breaks down to technical performance optimisation (\$120k), voyage optimisation (\$96k), emissions compliance costs (\$3k), general benefits from improved data quality (\$5k), and ease of data collection (\$13k).

You can start with noon day reports being pushed into the cloud solution, and then progressively add more sensors and data types, Mr Severin said.

In an example with ESL Shipping, it did a pilot project with ten vessels, initially only supplying noon day report data. High frequency data collection was installed on three vessels, and the data was used to build a digital twin. This could generate much more accurate fuel consumption predictions.

About Danelec

Danelec was founded in Denmark in 1995. Today it has over three hundred employees, 200 service and sales partners, over 700 certified technicians, and systems onboard 17,000 vessels.

Its initial focus was voyage data recorders. It was acquired by a Danish / Norwegian private equity firm in 2020, who saw further potential in its data capture expertise.



It acquired a company called Kyma in 2011 which produces vessel performance sensors, including a shaft power meter. It acquired a vessel performance software company Nautilus Labs in 2023.

In early 2025, Danelec was acquired by GTT, a company whose main focus is providing tanks and membranes for LNG vessels, and also provides a range of vessel

performance solutions.

PTM

Using AI to generate training materials

When training departments of shipping companies have to create customized training material, it can be done quickly with AI, with the SMS or existing videos as a starting point. Konstantinos Agas demonstrated what is possible

Most shipping companies have unique crew training needs, so they need to create their own training materials. AI tools make it much easier to do this, even for a small training department. And no specialist AI expertise is needed.

Training content should be engaging, and usable by senior officers delivering the training on ships, who are not educators themselves. It helps if it is in seafarers' native language. While video can be part of it, there should be activities which go along with the video.

Konstantinos Agas, training and development manager with Alpha Maritime Training Center explained how his company

makes training materials with AI, speaking at the People Tech Maritime event in Athens in October.

The training material is used by crew at Pantheon Tankers Management, Alpha Gas and Alpha Bulkers. Mr Agas is a retired officer of the Greek Navy and has a training and instructional designer background.

Mr Agas' training company has ten staff members, of which seven are doing actual training, and only 2 or 3 are developing material. So, it was very helpful for them to have a way to make training materials faster, he said.

Safety management systems

A common starting point for training material requirements is the company safety management system. These can extend to thousands of pages which crewmembers are expected to read and learn.

A good practice to address familiarization issues is to use ChatGPT to create test questions per section of the safety management system. The questions can be generated at different skill levels, for people in different ranks. Questions could be multiple choice or free text.

The tool can generate complex questions, such as "can you recommend a strategy to

achieve resilience,” or “can you suggest activities to improve resilience”.

Often, crew did not even realise that AI generated the questions, he said.

ChatGPT can provide model answers to its questions. It can assess a question someone has provided and say why it is right or wrong. So it is a training tool as well as an assessment tool, he said.

The procedure starts by identifying which chapters of the Company Management system need to be read by specific ranks and specialties. By doing that a familiarization tool that can assess if individuals are familiar with the chapters which their role requires. The system can operate both as an assessment, but also as a self-learning tool.

Even though the whole project is time consuming, AI capacities can make it feasible. “Nowadays AI makes it something doable,” he said.

Training from videos

Another starting point may be a training video, which could be something your company has used for a long time.

Mr. Agas introduced another AI tool called Magic School. With this tool you can take the transcript of any YouTube video and generate summaries or questions and answers based on the transcript imported. While summary and questions may not be

completely accurate, it is “fairly accurate,” he said. “You can always edit as you see fit.”

There are tools which can segment a video into different segments, so you can go to the part of the video you are most interested in.

Another interesting AI capability is embedded in the Zoom videoconferencing platform. Zoom can automatically create captions which can be easily translated via MS PowerPoint. Mr Agas showed an example of an English language training material which was being automatically

subtitled in Greek.

Mr Agas presented an example using a free training video from Shell about resilience. He also showed how the LLM can create a new training video based on the transcript.

Much of the software to do this is free, and where you have to pay, the prices are not large. It can be possible for a training department to create a “full spectrum of software” for just Euro 3-4k in software costs, he said.

PTM



Future proofing digital technology

To “future proof” our digital technology we need to make it easier to maintain, easier to speak to AI systems, and more interoperable. Achilleas Mantzios of Dynacom shared ideas for how to do it

Big challenges of today’s maritime digital technology are that it can be very difficult to maintain, it doesn’t talk easily to AI, and systems are not very interoperable in general.

Achilleas Mantzios, head of development at Dynacom Tankers Management, shared ideas of how to overcome these challenges, speaking at the People Tech Maritime – digital event in Athens on Oct 16.

He suggested having database structures which match real world entities; to have a disciplined approach to how we structure our software; and to integrate systems together using ‘events’ rather than connecting databases.

Mr Mantzios has been with Dynacom since 2001 and leads a team of developers. He also has contributed to a number of

open-source software projects.

Ease of maintenance

One reason that software tools get very difficult to maintain is because their underlying databases get very complex. They have fields added to them over time due to the needs of the software, and don’t necessarily reflect the real world, he said.

And the databases are influenced by people with different goals. We have database administrators who are mainly concerned about the data structure and governance, programmers who “want to re-invent everything”, and operational staff who want it to help them in their work.

Having a complex database means that making simple changes becomes a

“complex, risky endeavour,” he said.

It would be easier if the database was modelled around all of the actual real world business entities, shipments, containers and voyages, he suggested. The real world entities do not change over time.

This would also mean that shipping activities can be directly seen in the data. The software code could be generated directly from

the database schema, and then put together in a “class library” to build robust applications.

If you have a very complicated data structure, it may be better to treat it as unstructured data and use JSON data interchange format to share it. It makes it harder to query, but this is getting easier, he said.



THE LEADING PROVIDER OF STARLINK TO GLOBAL SHIP OPERATORS

- ✓ The most complete set of tools to manage & control how your vessels use Starlink.
- ✓ The broadest range of backup services including Ku-band, Inmarsat & Iridium.

A 3D rendering of a white, flat, rectangular Starlink satellite dish floating in space. It is positioned in the lower-left quadrant of the image, with a bright blue, glowing arc of light passing behind it. The background is a dark blue space filled with a complex network of glowing blue lines and dots, representing a global communication network.

STARLINK

Contact us on sales@navarino.gr

navarino.co.uk

For example, some companies have monolithic noon day report databases. They may have originally had 50 different fields, and then more were added over time. It may be easier to treat this as unstructured data rather than code other systems to work directly with this database, he suggested.

Speaking nice with AI

To get systems which “speak nice” with AI, we should first recognise that AI is not magic, he said. It is just a “new layer of intelligence”, such as using neural networks, which many people studied decades ago as part of computer science courses.

And all AI systems will work best with other software systems when the code is well structured and well written, he said.

It will also help if there are high levels of discipline in the data structures and file management, including in data naming conventions, methods and classes used.

“We cannot be anarchic and expect AI to be any use,” he said.

The most important AI tools are probably large language models such as GPT4, Claude and Llama. These tools can understand and generate human language, and work with other forms of data, including images, audio and video.

There are two common ways of integrating these LLMs with data – RAG (Retrieval Augmented Generation) and using data to fine-tune the LLM.

With fine tuning, you feed data to the LLM to “tune” it to respond in a certain way to requests. This can be very time consuming and expensive, he said.

With RAG, the LLM “talks” to data held in a conventional software system via its API. For example, you could use Claude to connect to your company document store.

This will be easier to do if your conventional software and its data are well structured, and the API is well documented. It will help if the company’s data and knowledge is stored in a centralised location.

A standard protocol emerged in 2024 was MCP (Model Context Protocol) which is a standard way to connect AI models with multiple external data sources.

Discussions in AI circles are now moving on from RAG to talk about “orchestration,” he said.

To get started on a project like this, you should do a pilot project, to see if your data and documents can be vectorised, and then see if these vectors can be interrogated by AI, he suggested.



Improving interoperability

Interoperability, the ease with which one digital system can ‘talk’ to another one, is very important in moving forward with digital technology overall, he said. This means both software components used within the shipping company, and software components used by other organisations, such as port authority cargo management systems.

Interoperability is hard because there are so many different formats of software and communications to put together.

One way to make interoperability easier is to build software with an event driven architecture, where a change in one software tool triggers an ‘event’ which can trigger something in another tool.

For example, an ‘event’ could be the start of a voyage, the discharge of a box container from a ship, or a failure of a refrigeration unit.

This is a much easier way to integrate software tools than trying to connect their underlying databases together, he said.

To trigger ‘events’, you can use Debezium, an open source platform which monitors databases for changes in data. It runs alongside the database, without burdening it with more processing tasks, and reacts immediately to a change.

For processing and managing the ‘events’, the open source Apache Kafka event streaming platform is the most well known system, he said.

Kafka can send the event information to other applications. This communication

can be made using GraphQL data query language, or REST, a system for web services to communicate with each other.

You can have AI agents which are “driven” or triggered by specific events, such as the receipt of a noon day report, or report about a discharge.

As a maritime example, say you have a vessel carrying meat from Argentina to China in box containers. If the temperature in the container is too high, the data change can be captured in Debezium, and an alert sent through Kafka.

This alert can be sent to the software of the company in charge of maintenance of the refrigeration unit, using REST or GraphQL.

Then, an AI agent can be triggered to try to understand the problem, such as by querying historical temperature data, and find similar patterns in data from other containers in the the past.

If we want to work with multiple AI tools at once, we can use Model Context Protocol to connect with them more easily.

There may be thousands of possible ‘events’ which can occur in the course of shipping life (defined by some change in one software component which someone or something else should know about).

But it will be much easier to arrange the software components to respond if the integration is structured as ‘events’ rather than database integrations, he said.

There are “orchestration tools” available designed to be used to co-ordinate complex events.

“Scalability is a topic by itself,” he said. “All this is the beginning.”

How to reduce crew travel costs 17%

Shipping companies often buy crew travel in a very ad hoc way, although most seafarer tickets can be rebooked free. Exmar is taking advantage of this, together with advanced software, to save 17% on crew travel costs

Any of us who has bought expensive personal family plane tickets is familiar with the stresses and annoyances involved, including being initially promised a low fare which ends up getting much bigger, or never knowing the best time to buy a ticket.

We go to a lot of effort to get the best deal for personal flight purchases.

Exmar's Ivan Renette, who is half Mexican, spends time during October and November looking for the cheapest flights for his family to go to Mexico at Christmas, with prices constantly changing. He tries to pick the best time to pay, then worries afterwards that he has paid too much.

But for business flight purchases, we are unlikely to go to so much trouble. This means a lot of savings get left on the table, Mr Renette said,

Exmar is a gas tanker operator with over 50 vessels. So there is a lot of crew travel.

In shipping, it is usual to pay for a flight for a crewmember as soon as you know when the vessel the person is due to join will arrive in port. Fragmented discussions about the arrangements are made over e-mail, telephone or WhatsApp.

People pay the price of the day, and have no time to check if prices are changing, or if they picked the cheapest option. The industry has worked this way for many years, he said.

Often companies do not even have a clear idea about how many crew changes they are doing, or whether they are doing more than they need.

Mr Renette's job title in Exmar is "business process manager," but most of the time he sees himself as an "electronic plumber," trying to keep digital systems working together to make life as easy as possible for employees.

Tilla

Exmar wanted a data driven platform to help optimise crew changes. It found one from a software company called Tilla.

Seafarer ticket purchases have a big advantage over personal tickets in that they normally allow free cancellation or rebooking.

The Tilla software takes advantage of this. The flight is originally booked through Tilla. Then it continually checks if a ticket



Ivan Renette, business process manager, Exmar

price has reduced. If a better price is available, the software will automatically cancel the original ticket and purchase a new one. Nobody needs to do anything.

"You will not believe the crazy numbers," he said. "A ticket of \$1800 got rebooked two days later for \$1000."

The system also provides advice about the best place to do the crew change. For Jamaican crew, flights from Le Havre to Kingston (Jamaica) tend to be much more expensive than flights from Antwerp to Kingston, although there is only 400km between them. So if you have a choice of where to discharge Jamaican crew, you should choose Antwerp, he said.

You can put parameters in the flight choice, such as the maximum number of flight changes. The flight can be changed up to 3 hours before check-in, to avoid people discovering they have been rebooked after starting their trip to the airport.

Altogether, crew travel cost was reduced 16.7 per cent from using the system. Administration effort was also much reduced. The time saving is estimated at 6 hours work of company staff and 4 hours work for the travel agency for each crew change.

There was some company resistance in rolling the system out, including from the company's internal travel agent and from its crewing department, who thought it was stealing their job. But now people are very happy with the improved transparency and with the cost savings, he said.



A good relationship between operations and IT staff

When operations and IT staff in a shipping company work well together, the organisation can function much more effectively. Nicolas Timpelis, IT projects support manager with IONIC shared ideas about how to get there

When a shipping company gets the relationship between operations and IT staff right, “we don’t just improve efficiency, we are making teams stronger and our deliveries more reliable,” said Nicolas Timpelis, IT projects support manager with IONIC, speaking at the People Tech Maritime Athens event in October. IONIC manages 11 bulk carriers and 8 tankers.

“Success doesn’t come from having the best tools or biggest teams, but by having a sustainable and seamless connection between [IT and operations], he said.

“That’s what every organisation wants, a balanced and sustainable system that can work under pressure.”

New developments with technology, including AI, automation and analytics, are changing the way that businesses run today. But the technology doesn’t create value on its own. It provides value when it supports operational staff and makes their life easier.

It makes a difference to how the company is perceived externally if it has well-functioning digital systems. If a company is managing complex activities with spreadsheets rather than software, that may raise questions about the company’s maturity, he said.

But IT departments would like to see more mutual respect with operations staff, with both recognising that each is essential.

“Operational teams need to see how technology simplifies their work and enhances it. Technology teams need to appreciate how complex daily operations are,” he said.

“Technology enables; humans deliver. When we keep that balance in mind everything falls into place.”

Most of the drive for new systems comes



Nicolas Timpelis, IT projects support manager with IONIC

from operational staff, although they often do not know how they will use any new tools, they just “come with an issue,” he said. But if people from the IT department suggest a new system, often they will find resistance from operations staff.

Ionc is seeking to get a good balance between operations and IT staff.

“We are trying to find a space, find a way to work. It isn’t easy,” he said.

Shared goals

The best way to bring people and technology together is to have a technology approach which is “open, flexible and focussed on shared goals,” he said.

The choice of the system should be made by operations staff as well as IT staff.

“The goal here is not perfection, it is a productive balance. When technology and operations share goals, problems stop being ‘someone else’s issue.’ Eventually, collaboration becomes part of the company’s culture.”

Operations staff

Operations staff in shipping companies are often former captains and former chief engineers, and other “hands on professionals.” They value stability and they want the job done right and on time. They may need to be persuaded that technology can help improve decision making and reduce errors.

Operations staff have to work with complex constraints in tasks such as managing demurrage. But if they are provided with tools that are too complex, they will probably be a waste of time, he said.

But it is very easy for people to reach the conclusion that a digital tool is too complicated, he said. Digital tools are meant to help not overwhelm.

IT staff

For IT people, “understanding the challenges help us design better services, better solutions,” he said.

IT departments need to choose software

solutions carefully, ensuring that they have something people are willing to use, not to “tick an IT checklist.”

“We need to provide tools that are useful, simple and reliable,” he said. “Tools that will become part of the business and not just another icon on the desktop.”

“Sometimes taking a few extra hours to explain the ‘why’ behind the solution might make a difference with adoption and trust,” he said.

“We need to show them how it helps with their work, with real benefits to their day-to-day operations.”

Business continuity and solving problems

Sometimes operations staff seem to believe the role of the IT department is to “manage PCs and cables,” he said. But really it is about maintaining business continuity and solving problems.

For example, communications systems are vital in all maritime activities. Charterers, port authorities and agents all request the vessel to be online constantly, to provide them with data.

IONIC held a cybersecurity drill, simulating what would happen if all the communications to a vessel were lost, apart from to the captain’s mobile device. In the drill, it was lucky that the vessel was close enough to land to get a mobile signal. This helped demonstrate to operations staff how reliant the company is on communications and the IT department, he said.

“Digital tools play a significant role in solving operational challenges, monitoring vessel performance, and meeting environmental requirements. These systems support us in maintaining high standards and delivering consistently on client expectations.”

But this requires that IT people are focussed on finding tools that solve real problems, not just adding features, he said. We need to “prove to the operations guys, applying software solutions will help them through to the next day.”

Once a solution is successfully delivered, it will be easier to implement the next one.

Aligning shipping companies and technology investors

Maritime technology investors look for a straightforward software product with clear benefits and easy implementation. But the technology needs of shipping companies are very complex. How can the two be brought together?

In the world of maritime digital technology, the interests of shipping companies and technology investors can be very misaligned.

Investors are looking for something that is easy to describe, can be sold to many people, and can be deployed quickly, not taking a number of years. They like something which does not need complex integration with other systems.

Shipping companies on the other hand have complex needs. Much of the work of running ships is a co-ordination challenge. The best software for shipping companies might be tools which support this co-ordination and integrate well with the software tools they already have.

So, we have something of a conflict between the needs of shipping companies and software investors in the digital technology space.

"Investors are looking for things that attract client attention," said Dimitris Lyras, director of Paralos Maritime and maritime software company Ulysses Systems.

But complex software such as ERP can have hundreds of thousands of different functions. While this can all be very useful, it is very hard to attract client attention with any one of these functions, he said. The more complex the software is, the harder it is to explain its value proposition.

Shipping companies are not particularly interested in a "point solution" which does one specific task, because they are more interested in having a seamless process. They want software which supports them in multiple activities, such as crew travel, vessel inspection, preventative maintenance.

And if shipping companies buy a software solution, they will want it integrated into the other systems they use, he said. "Companies want the best of breed, but you have to endlessly figure out how to join things up."

A further challenge for technology investors is that each shipping company may want to use software in 500 different ways. Another shipping company may have another 500 ways they want to use it.

Another factor is that the shipping

industry does not spend much money on software, perhaps a tenth as much as is typical in industry today, as a percentage of revenue.

Meanwhile many maritime technology investors do not have the ability to make a judgement about the product at all, and just look at the number of subscribers, he suggested.

Consider Constellation Software, the company which acquired maritime software companies SpecTec and ShipNet, through its subsidiary Volaris Group. It could be considered one of the most successful companies on earth in terms of their returns, Mr Lyras said.

But we can question if their main interest was the existing client base and its license fees, rather than its product, he said.

Thodoris Galanis



Thodoris Galanis, Head of Group IT, Latsco Marine Management

Investors are looking to get the easiest return on their investment, while shipping companies are looking for something they can get running on their fleet easily, said Thodoris Galanis, Head of Group IT, Latsco Marine Management.

Shipping companies have many specific things which need to be considered, and the infrastructure is hard. "In some cases, the makers of the solutions didn't pay that much attention."

Software companies often build a "proof of concept" which may look successful, but

it can be difficult to roll out to the whole fleet to get the expected benefits. And not all vessels are the same.

Shipping companies also want to be able to take the 'best of breed' approach to software selection, Mr Galanis said. We have a new generation of employees who are looking to see which solutions provides the best results.

But IT departments end up having to manage many different applications. "This increases the complexity, the maintenance we have to do, the resources, the delays which we will face in our business."

However software products for maritime are improving, partly as providers get experience from other industries, he said. Interoperability between systems is also improving. "Things are changing a lot. Some things were not changing that fast until now."

Integration challenges



Maria Kartalou, head of planning, Thenamaris Ships Management.

Integrating digital components together is "an issue for everybody who is working for an IT department," said Maria Kartalou, head of planning with Thenamaris Ships Management.

Companies want the "best of breed" rather than one system that has everything. This means they would like to be able to change different components without changing the whole system. And integrating different systems together is normally an in-house job.

There is an expectation that component integration will get better and better. "A

lot of players are coming out saying they offer direct integrations," she said. "This is something we evaluate."

Narayan Venkatesh, co-founder of crew logistics IT company Tilla, said that in other industries he has worked in, including airlines and retail, the customers often force vendors to make tools which integrate well with others in the market, and provide their data in interoperable formats, he said.

This leads the software sector to be more dynamic and better respond to changing market forces. So, it works well for both shipping companies and technology investors.

Another factor is that there is a lot

of diversity in how shipping companies operate, compared to other industry sectors he has worked in, he said. This diversity includes the choices companies make on what to do in-house and what to buy in.

A start-up software company needs to "understand all these variations and try to build around it," he said. Companies that cater to this can do well.

Recognising the complexity

The complexity of the maritime industry was hidden from many people until now, said Asbjørn Severin, VP Marketing & Communications with maritime technology company Danelec.

But it means it will be some time before we see a perfect integrated solution that can cater to everybody's needs.

Meanwhile, it is important to design systems from the start with a good foundation to support integration with other systems, he said.

"We're at a very early stage in this digital transformation. And the maritime industry is behind many other business sectors."



Lloyd's Register – assessing your digital maturity

Lloyd's Register has developed the Digital Maturity Index which shipping companies can use to assess their digital transformation efforts. Are you foundational, emerging, mature or visionary? Eleanna Apostolidi explained

While the maritime industry is making progress with digital technology, it is lagging behind many shore industries.

It may be useful for companies to measure how digitally mature they are, said Eleanna Apostolidi, Global Head of Client Enablement, Lloyd's Register (LR).

To help, LR has developed its Digital Maturity Index, a free, web-based platform based on real maritime use cases. It allows shipping companies to self-assess their digital readiness, compare themselves against industry competitors, and identify potential areas for investment in technology and skills. LR has worked together with a group of shipping companies, to ensure the model is helpful and useful.

The tool is used so far by thirty companies



Eleanna Apostolidi, Global Head of Client Enablement, Lloyd's Register (LR)

running 1000 vessels. 48% are bulk carriers, 35% are tankers, and the rest are gas tankers, container ships, and others. 9% of users have under 10 vessels, 67% of users have between 10 and 50 vessels, and 24% have over 50 vessels.

The framework is built around six main "enablers" for digital transformation, which can be considered the foundation for any digital initiative. These are digital strategy, culture and training, digitisation standardisation, connectivity, cloud storage / computing, and cybersecurity.

It has the form of a self-assessment questionnaire, which companies can answer, to assess how they perform with each of these enablers and benchmark their digital readiness.

Once you understand your level, you are in a better position to start thinking about the right next steps and to outline the journey and "milestones" ahead.

The system should help improve discussions in companies about digital transformation. "The human element is really key to a successful digital transformation," she said.

The four digital maturity levels were defined as follows.

Foundational "The organisation focuses on past analytics with little to no digital

infrastructure or data literacy"

Emerging – "The organisation uses analytics for future predictions, with some digital infrastructure and limited cultural integration of data processes"

Mature – "The organisation utilizes advanced simulations, with dedicated digital teams and a strong data-driven culture"

Visionary – "The organisation integrates cutting-edge technologies (AI, ML), with digitalization being a critical part of the business strategy and culture"

Results so far

74 per cent of respondents are at the "emerging" level, she said.

Being at an early maturity stage is not necessarily a bad thing- this isn't a test to pass or fail. But it can be helpful to understand your current position, so you have a clear view of the actions needed to reach your desired state. For example if you are at a "foundational" level and want to get to predictive maintenance, "a lot of things need to be in place first."

Integration between systems is "highly underestimated," she said. This means ensuring data flows easily between systems, rather than having multiple versions of the same data in different silos, with inconsistent

values.

Connectivity is also “important to get right,” including connecting systems to the cloud and managing cybersecurity.

Companies typically have higher scores for connectivity, cloud computing/storage, and cybersecurity than they do for “digitalisation strategy and culture.”

The highest adoption rates are for fleet tracking systems, performance monitoring, ERP, and crew training tools.

In the category “culture and training,” the average score was 2.23 / 4. This suggests that employees are “somewhat comfortable” with digital tools, and there is some experimentation with new technologies, but usually without any structure - more along the lines of “Yes we try a bit of that.”

Companies typically spend between 0% and 0.1% of revenues on digital training, she said.

What the digital maturity journey has made clear so far is that technology is not enough.



To close the gap, organisations must recognise that digital transformation is a human journey. Success depends on a structured approach to upskilling, to fostering a culture of experimentation and collaboration. The next step always relies on

understanding and supporting the people who drive progress.

You can assess your digitalisation efforts at <https://www.lr.org/en/knowledge/research/digital-transformation-research-programme/digital-maturity/>



Biggest cybersecurity challenges

Some of the biggest cybersecurity challenges are seemingly pointless requirements, managing crew internet, and AI. Speakers from from Hellas Confidence Shipmanagement and Threatscene discussed

The IACS cybersecurity regulations UR 26 and 27 are making a big impact on vessel deliveries, said Alex Stathopoulos, IT Manager, Hellas Confidence Shipmanagement, speaking at a cybersecurity panel discussion at People Tech Maritime in Athens.

In one example, Hellas Confidence took delivery of a vessel, with all its drawings secured by hash codes. So, for the superintendent to view the drawings, he had to have the hash code.

This proved very difficult to work with. And the drawings needed to be provided to many other companies and used to set up the planned maintenance systems.

The regulations themselves are written generically and do not specify this needs to be done, he said. The problem is in how they are interpreted. In this case, the decision to require a hash code to view a drawing was made by a Japanese yard. “They thought it was a good idea, they told us there is no way to go around it,” he said.

The regulations are creating complications, not providing solutions, he said.

And there is no auditing of whether a

company is cybersecure. “I have not heard of a single [cybersecurity] inspection from Port State Control or any stakeholder, apart from maybe class,” he said.

The challenge with cybersecurity is making it both practical and effective, said Charalampos (Harry) Ligoutsikos, Governance, Risk & Compliance Consultant with ThreatScene, and a former electronics senior engineer with Prime Tanker Management.

In this example, the shipyard probably never tried to evaluate how effective its controls were, such as by doing a penetration test or vulnerability assessment. It just interpreted the rules and forced people to follow its interpretation.

A vulnerability assessment plus a penetration test is a standard mechanism in many industries, he said. “You need to test to see where the weak points are, which means you need to test to the point where you see failures.”

Without testing, we are only working with theory. There also needs to be feedback systems for shipping company people to tell the rule-setters what is not working, he said.



Charalampos (Harry) Ligoutsikos, Governance, Risk & Compliance Consultant, ThreatScene

And a superintendent who finds cybersecurity controls obstructive may look for ways to get around them, so you create a “smart hacker”. This creates risks in itself. For example someone making a pdf copy of the drawings that they can share without any controls.

Cybersecurity should be about understanding and managing risks, not following rules, agreed Dimitris Lyras, director of Paralos Maritime. Testing if something can be penetrated is very useful, and this was not much discussed among the rules discussions. “Cybersecurity is not an

unknown risk. It is a risk you can simulate.”

People from some sorts of companies are used to only working with rules, processes, and approvals, not in assessing and managing risks, he said. And there are no pressures on regulators to be efficient.

Certain organisations have issued directives, like the Coastguard saying that “ships must be cybersecurity.” But there are many different kinds of ships, all with different risks associated with them.

“Common sense is missing, because it is passed to people to come up with rules, not come up with solutions,” he said.

Eleana Apostolidi, Global Head of Client Enablement with Lloyd's Register, noted that a key role of class is to help bring alignment when different stakeholders interpret rules or requirements, such as UR E26 and UR E27, in different ways.

When discrepancies arise, class societies can often engage with the relevant authorities and facilitate dialogue between parties to resolve differences.

Cybersecurity discussions are likely to become more complex if UR E26 and UR E27 are applied to existing fleets, she said.

Crew internet challenges

Providing secure crew internet access can be very tricky for an IT manager, Mr Ligoutsikos said.

They need to ensure enough bandwidth is available and comply with different regulations around the world about what can be downloaded. IT managers may need to monitor internet traffic. “This is a big change and a big challenge. It allows a lot of cybersecurity [threats] to surface.”

While IMO regulations now say crew should have internet access, they do not specify if it should be available free of charge, or available all the time, or if there can be download limits, Mr Stathopoulos added. So “this is becoming a struggle between the owners and the mariners.”

“The mariners of course want continuous connectivity, [but] it is difficult to maintain the same [connectivity] standards onshore and onboard.”

There have been occasions where seafarers have taken their own private Starlink antenna onboard because they could not get enough data speeds through the vessel system, and other restrictions in place on vessel communications.

Crew may want to connect their PCs onboard with the private Starlink antenna, so they can watch video on a 24-inch screen rather than a 7-inch mobile screen. But the PC may have various systems to protect hacking when connected to the vessel network, which will not be in place if you connect directly to a Starlink antenna.

Shipboard internet will never be as good as internet available on shore, and mariners should understand this when they choose the profession, he said.

AI cyber concerns

With AI “it is a race against time to use it before someone uses it against it,” said Mr Stathopoulos of Hellas Confidence Shipmanagement. “AI is a tool, and as with every other tool it can be used for good or bad purposes.”

AI can also help the threat actors. For example, it can be used to make code which can create programs which harvest data. There have been dedicated attacks on shipping companies and vessels, and it may get worse.

People need to be trained in it and understand basic rules, he said.

PIM

Cybersecurity – risks, compliance and insurance

A panel organised by consultancy Dryad Global at London International Shipping Week (LISW) discussed the current cybersecurity risks, the challenges of regulatory compliance, and what you can get insured for

We have seen many large companies damaged by cyberattacks on their suppliers, including their IT providers, said Phil Davies, Senior Systems Engineer, Arctic Wolf, a security operations consultant. It is something shipping companies also need to consider.

He was speaking at an event organised by security consultancy Dryad held during London International Shipping Week in September.

Shipping companies should make someone responsible for supplier cybersecurity. They may be in the executive department or the IT department, he said.

Mr Davies sees his role as a “professional storyteller,” helping his customers understand the risks they face,

so they can “face them in an appropriate manner.”

All employees will probably need to learn to avoid AI created threats, just as we have all learned to ignore the “traditional Nigerian prince email,” he said. “You can use AI to clone a website and email.”

Hackers today may try to extort a company three times, once where they say they have access to the network, second when they threaten to steal the data, and third when they threaten to tell a regulator you have been hacked, he said.

They often farm out tasks to different groups, for example one group gets into your network, another does a physical attack, another does the extortion.

AI makes it possible to do things faster. There are examples of hackers getting from observing staff to executing

ransomware in just an hour, he said. “Threat actors using AI will only increase as we move forward.”

There are also AI tools which can “detect movement of nefarious actors.”

We are likely to see regulatory frameworks for cybersecurity get ‘stronger’, he said.

Asked about the biggest threats specific to shipping, he cited problems related to the use of much older technologies, particularly in operations technology. Windows XP is “embedded in many devices,” he said. There are other embedded operating systems managing various controls on a ship.

You need to have a separation between the ship systems and the ship-shore communication systems, he said.

Arctic Wolf does provide a cybersecurity

monitoring technology that can work on Windows XP. It can recognise the 'blueprint' of a Malware, even if it doesn't have a signature of the specific file.

Another maritime specific challenge is that shipboard laptops often do not have the latest updates, because companies do not want to send the update files over expensive ship-shore communications.

Corey Ranslem, Dryad

Non state actors making cyber-attacks are typically looking for financial gain, such as to work out how to make a tanker operator be inclined to pay a ransom, said Corey Ranslem, CEO of maritime security consultancy Dryad Global.

State actors are typically more strategic. A cyber-attack could come before a physical attack, such as if a group such as the Houthis seek to incapacitate a ship from a cyber perspective and then launch missiles and drones at it.

While it may be possible for a hacker to take control of a vessel, maybe it does not need to be seen as an "actual threat", because there are means to stop it, bringing a vessel into manual control, he said.

The threat 'surface' is made more challenging by the increasing number of devices onboard. One seafarer person may bring a laptop, phone and iPad, he said.

Mr Ranslem recommends that you bring in an outside company every two years to do a cybersecurity audit. "When we talk to a new client that's the first thing we do."

A usual first check is to make sure the shipboard networks are properly bifurcated, he said.

GNSS jamming

"GNSS (global Navigation Satellite System) jamming and spoofing is getting more prevalent," said Drew Jackson, director of operations with Ground Control, a maritime satellite tracking company.

Jamming is a fairly blunt attack, analogous to "shouting louder", he said. This is drowning out the satellite's radio signal with a stronger signal created locally.

The state satellite positioning systems all use roughly the same frequency, so it is possible to jam them all at the same time. So having multiple systems may not help you.

An alternative is the Iridium satellite positioning system, which uses a signal "1000 times louder," so is much harder to jam, he said.

The position and time data generated by GPS also informs other systems onboard, including satellite communications systems.

"Spoofing", fooling the systems into thinking the vessel is in a different position, is more sophisticated, and getting cleverer all the time.

For example, if you spoof a signal so a vessel's position as shown on the GPS is gradually shifting from its actual position, it can be harder to detect.

It is possible to buy equipment online which will adjust someone's position as seen on their GPS by 10 km, he said.

If you are a hacker employed by a government, you may have resources to put your GPS jammers and spoofers in aircraft, where they can have more power. In future it may be done by satellite.

Ground Control first saw GPS spoofing in 2016, where it had satellite tracking devices installed on yachts in a race. The yachts suddenly appeared to be in St Petersburg on the electronic chart.

Cybersecurity compliance

Under regulations around the world there is an increased expectation on an organisation to manage cybersecurity, sometimes with personal liability on senior management to manage cybersecurity risk of the organisation, said Jonathan Ball, Partner for IP & Technology Disputes with Norton Rose Fulbright, who manages legal aspects of cybersecurity.

Legal language around cybersecurity can be vague. For example, you may be required to use "appropriate technology and operational measures," use something which is "state of the art," or to take "reasonable steps." What is meant by these terms keeps changing, Mr Ball said.

Companies can get sanctioned for not patching or not rolling out multifactor authentication, Mr Ball said.

Norton Rose often finds itself defending clients in breach of contract claims relating to cybersecurity or defend their actions to a regulator.

If you get a hack and there is a technology commercially available which would have prevented it, and you weren't using it, people may ask why not, added Dryad's Corey Ranslem.

Cybersecurity insurance

Cybersecurity insurance comes in two categories, said Tancred Lucy, Vice President, Acrisure, a cybersecurity insurance broker.

Firstly, coverage for real world business problems caused by the hack, such as a vessel running aground due to spoofing, or loss of hire during repairs. Secondly, for problems caused directly by the cyberattack, such as ransomware.

The wording of cyber insurance policies has been developed for healthcare and professional services industries, so may not be applicable for shipping.

The cybersecurity limits available may not be sufficient, since potential losses in maritime are enormous, he said.

And attacks by state actors are normally excluded under insurance policies as a "war risk", but with cyber-attack you may well have a state behind it. In any claim, it is crucial to be able to figure out who made the attack.

When the first ransomware epidemic happened in 2020, it took the insurance industry 12-18 months to ensure that companies it insured had adequate controls in place, he said.

Big marine insurance companies are "starting to put a toe in the water" with cyber insurance, he said.

Many vessel operators find the controls demanded by insurers quite onerous, he said. US cybersecurity regulations "will bring more vessels in line with minimum standards." This will increase confidence with insurers.

A major concern of insurers is that a hacker could find a way to hack multiple vessels at once. This would be similar to how the CrowdStrike software update incident brought down multiple airline services around the world (although that was not a hack).

Insurers may be less concerned about the threat of a ship itself being used as a weapon, understanding that remote access to a vessel can always be disabled if a hacker ever gets access to a vessel's control systems.

Insurers need to see that a minimum number of companies are willing to purchase any insurance product they put on the market, to ensure there is a pool of money large enough to cover any losses, he said.

Law firm Norton Rose Fulbright has many clients working in critical infrastructure, where the potential losses from a hack are so big they cannot be insured, said Mr Ball from Norton Rose Fulbright.

Shipowners may be reluctant to sign up for expensive insurance protection against cyberattacks if they later find IMO making regulations saying they want it done in a different way, said Dryad's Mr Ranslem.

Multi-orbit networks and cybersecurity

If you use more than one satcom network at once to your fleet, you have a back-up if one of them is hacked. iDirect explains what this means

By Nathan Gibson, senior director, DevOps & DevSecOps at ST Engineering iDirect.

As digital transformation accelerates across the maritime sector, connectivity is becoming more advanced at the same rate as malicious actors are finding more sophisticated ways to disrupt fleets.

Operators are no longer just worried about keeping a signal, they must also defend against increasingly sophisticated cyber threats that target ships' networks.

Vessels operate in remote locations, rely on complex interconnected systems, and face constantly evolving risks. These factors make them prime targets for attackers seeking to exploit weak points in traditional satellite communication infrastructures.

For decades, maritime operations relied primarily on geosynchronous equatorial orbit (GEO) satellites as their ability to provide broad coverage and stable links made them indispensable for global shipping.

Operators are exploring their options, as low earth orbit (LEO), medium earth orbit (MEO) and highly inclined earth orbit (HEO) alternatives come online.

GEO is evolving with advancements such as software-defined satellites and compact, modular designs, enabling faster

deployment cycles and new use cases.

On their own, none of these orbits fully solves the maritime connectivity challenge. But together, in a coordinated, intelligent ecosystem, they deliver the resilience, performance and flexibility that today's maritime industry requires.

Multi-orbit networks represent a powerful cybersecurity asset.

Redundancy across multiple orbital layers makes it far more difficult for attackers to compromise an entire system.

Intelligent routing technologies allow data traffic to flow through the most secure and reliable path in real time, rerouting automatically if congestion, disruption, or a cyber incident is detected.

This reduces reliance on any single link and prevents attackers from exploiting one weak point to gain broad access.

AI-driven observability adds another dimension of defence, monitoring all traffic across different orbits, flagging anomalies, and isolating suspicious segments before operators even recognise the issue.

Even if one pathway is compromised, the system can seamlessly shift operations elsewhere, ensuring navigation updates,

communications, and tracking continue uninterrupted.

Layered defence

True protection requires a layered defence strategy.

Data converges at both ends of the satellite link, meaning endpoints remain a critical target.

Implementing zero-trust policies, segmenting onboard networks, deploying endpoint protection and monitoring continuously are all essential.

Automation, powered by AI and machine learning, adds an extra layer of advantage by anticipating problems, optimising performance and quickly neutralising potential threats.

By integrating multiple orbital layers with intelligent routing, segmentation and built-in security, these networks enhance operational continuity and cyber resilience.

Combined with other security measures, they provide a robust defence capable of meeting the demands of an increasingly connected and contested maritime environment.

PIM

Supporting seafarers with voice analytics

Analysing seafarers' voices with digital technology can generate insights which can be used to support decision making and increase safety. SignalFusion explained how it can work

Voice analytics, using AI tools to analyse a sample of people's voices, has been maturing steadily in many industries over the past few years.

Healthcare providers use it to support remote monitoring and triage, working out how to prioritise distressed callers.

Security teams use it for speaker

verification and to spot synthetic audio.

In digital mental health, voice and language markers support ongoing check-ins.

In sales and coaching, they highlight moments of hesitation or fluency.

In defence, they assist with rapid stress assessment under pressure.

Can the same approach help crews at sea? SignalFusion, a US voice based AI behavioural screening company, believes it can. The analysis needs to be adapted to maritime routines, anchored to personal baselines, and paired with human oversight.

Voice analytics will not replace seamanship, supervision, or clinical

judgment. It does not diagnose illnesses or assign personalities.

What it offers is a non-invasive, evidence-based way to convert everyday speech into timely support, SignalFusion says.

By combining vocal and linguistic markers, personal baselines, and operational context, and keeping humans firmly in the loop, the technology can give maritime teams a practical, fair, and auditable instrument for managing readiness, SignalFusion says.

How it works

Voice analysis technology turns a short recording into two streams of evidence.

The first is vocal: pitch range, loudness, pace, pauses, and how sound energy spreads over time.

The second is linguistic: what was said and how it was structured, including fillers and repetitions, clarity and coherence, and adherence to protocol phrases.

These measurements are then compared with the individual's own baseline (how their voice normally sounds), rather than an abstract average.

How crew use it

On ships, seafarers complete brief, multilingual voicebot check-ins on their phones, using SignalFusion's software.

Simple, context-aware prompts capture verbal responses.

The system analyses how the person spoke and, where appropriate, what they said.

With seafarers, the goal is to spot meaningful changes that often accompany fatigue, stress, or heavy workload and to surface them as clear, actionable signals.

The system does not diagnose or assign labels. Instead, it provides explainable cues, such as "longer pauses than their usual," "reduced clarity versus baseline." These can help humans decide what to do next.

The system needs to be carefully designed to be most effective, connecting the signals to the person, and using informed human judgement to decide what to do.

Baseline first approach

Crews operate in shifting conditions and on varied equipment. They have different accents and languages.

By taking a baseline-first, human-reviewed approach, we are only comparing a seafarer's voice with how the same person's voice sounded on a different day, and using human judgement to determine if the insight is useful. It keeps decisions practical.

SignalFusion anchors to each person's normal range and tracks how their voice changes over time.

Because the platform learns both personal and team baselines, it can tell when a change is unusual for that individual and whether it is common across a watch team under similar conditions.

Comparing seafarers to a generic "average voice" would embed in bias across accents, ages, dialects, and microphones.

Three layers of insight

SignalFusion organises insights across three layers that map cleanly to shipboard decisions.

The first captures tendencies over time, such as how someone typically communicates and works. This enables company management to provide mentoring, training, and role assignments fit the person.

The second layer of insights looks at contextual shifts, revealing when the environment is the driver of risk. For example, how the person is affected by night versus day watch, heavy weather, complex port calls, or long rotations.

The third layer of insights focuses on momentary state: in-the-moment fatigue, cognitive load, or stress during a specific task.

Because the measurements are always compared with the individual's baseline, alerts are concise and explainable, guiding actions such as adding a second checker, shortening a watch, pausing a complex task until conditions improve, or scheduling recovery time.

That design reduces false alarms for

crew if their speech styles differ from the majority. It makes every alert easier to explain.

Because context is part of the model, managers can also see when conditions, not an individual, are the likely cause. This keeps interventions targeted and constructive.

Insights over three timescales

The assessment delivers insights to shipping companies which are applicable immediately, over the near term, and over the longer term.

For immediate use, it provides a readiness forecast for the upcoming duty period, expressed as a short trajectory rather than a single score, so supervisors can see whether risk is stable, improving, or drifting.

Over the near-term, it raises alerts when changes exceed a personal or team baseline, translated into plain language and practical steps, following policy-driven recommendations.

Over longer horizons, the system highlights emerging risks and likely drivers, such as fatigue rising across successive night watches, or communication friction within specific pairings of people.

Managers can see which interventions work and refine staffing, training, and procedures accordingly.

As data accumulates, the platform becomes more precise without becoming intrusive.

It detects cognitive overload on crewmembers, if they speak at a slower pace, take longer pauses, and make more 'repairs' to their words during heavy admin burdens. This is common when crews work in non-native languages.

It tracks fatigue trends over weeks, not just bad days, prompting earlier rotations and rest.

During drills, it reveals who maintains clear protocol phrasing and steady pacing under pressure, helping leaders assign roles that fit the moment.

For mariners themselves, private, plain-language trends provide a useful mirror for self-management.

Navigating towards a sustainable future



Marine Electrification

Lifecycle Services

Vessel Optimisation

Manta Marine Technologies is driving the future of sustainable shipping with smart technologies that cut emissions, reduce fuel consumption, and boost performance.

A cleaner, more efficient maritime industry starts here.

Greener shipping through intelligent technologies



**Manta Marine
Technologies**

mantamarine.com