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Digitalisation – Decarbonisation

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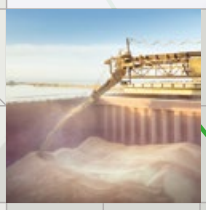
STAR ALASKA - 225641



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M/V Star Alaska 10:13

RE: M/V STAR ALASKA – UPDATED ETA AT PILOT STATION

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Odfjell – improving data architecture, governance and business integration

Tanker operator Odfjell has been making improvements to its data architecture, governance, and business integration as part of a broader digitalization journey.
Alena Pedersen, Vice President for Corporate IT and Digitalisation, explained more

"Smart growth" requires aligning people, processes, and systems toward common objectives, and ensuring that data is treated as a strategic asset across the business, said Alena Pedersen, Vice President for Corporate IT and Digitalisation, Odfjell. It cannot be achieved with technology alone.

She was speaking at the Digital Ship Oslo forum held during Nor-Shipping on June 4.

Progress depends on the willingness and ability of company employees to learn and adapt to new processes as well as technological investment.

"The goal is to have an efficient and future-ready data platform", she said. "We are building the right foundation so that we can reach our strategic goals, including operational efficiency and decarbonisation."

"It is a journey, and we are not there yet.

Odfjell's experience can act as a reference to other companies striving to do the same, she said.

Connectivity

Connectivity is a key driver behind the journey to digitalisation at Odfjell.

"Connectivity used to be the big issue when I joined the maritime industry three years ago. That is no longer the case," she said. "Our vessels can now have better internet than our offices."

Alena Pedersen, Vice President for Corporate IT and Digitalisation, Odfjell SE.

With Starlink installed across Odfjell's fleet, its vessels operate with the same IT systems as it has in its offices. This allows easier data communication and synchronisation.

Data and sustainability

Good data plays a vital role in enabling Odfjell's sustainability strategy.

The company recently completed a nearly zero-emission transatlantic voyage by combining biofuels and wind-assisted propulsion using Bound4Blue suction sails.

"We could not have done this without data," she said.

"Performance monitoring, consumption tracking, weather routing. Every element depends on data to operate efficiently".

With traditional weather routing, vessels were routed to avoid high winds. With wind assisted propulsion, vessel routing must change to exploit the wind. "That requires also a mindset shift," she said.

Data challenges

The challenge is maintaining the quality, structure, and utility of data generated across our operations, she said.

There has been a huge increase in data volume within the company since 2020. "We are well on the way with digitalization and see the need to accelerate."

A growth in data volume does not always equate to value for the business. Without proper structure, governance, and integration, data can quickly become a liability.

Odfjell needs to use and manage the data smartly, "otherwise, we end up with overwhelming data swamp, instead of efficient data lake".

To make smart decisions, there needs to be one source of truth for the whole company. If everyone has their own version of the truth, then the data can be misunderstood and misused, she said.

In seeking to improve its data, Odfjell faces the same challenges as many other shipping companies, including with siloed data systems between departments such as commercial operations and ship management.

There can also be data duplication, inconsistent business logic across reports, and limited data integration from vessels due to physical and network constraints.

Many of Odfjell's data processes are manual and resource intensive. Business rules can be hard to share or reuse.

Odfjell recently engaged an external consultancy who assessed its data platform strategy. The results of the assessment identified the need to improve data architecture and to establish formal data governance structures, she said.

Company improvement initiative

Odfjell now has a companywide project to improve digitalisation and data governance, including digitalisation goals integrated into broader business development activities.

It will improve the company's digital foundation with clear ownership, reliable data flows and scalable infrastructure.

"You cannot fix broken data with fancy technology. You need architecture,

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governance, and ownership."

Rather than relying on a small group of data specialists, Odfjell aims to expand data usage within and across departments. It will do so by ensuring data can be reused and trusted by different users.

It is by establishing clearly defined data ownership roles across departments. This governance model being implemented is business-led rather than IT-led, with responsibilities assigned across the entire organisation.

This approach is essential if digitalisation is to support core business operations, she said. "Data ownership needs to be part of people's job descriptions. It is not enough just to say, 'you are responsible for this data now'. You have to train and equip people for the role".

"Data is at the end everyone's responsibility, just like cybersecurity," she said.

Odfjell is also seeking to centralise business logic around data and implement more structured data flows.

It will also be important to have flexibility and accessibility in its new model, she said, to accommodate future needs which are not yet known. "As we are preparing for the future, the foundation has to be right," she said.

"We're moving to a well-designed house where everyone knows their room and the shared space rules, rather than just piling more stuff in the messy garage."

Spare parts logistics

On their data journey, Odfjell has also experienced failures. One of them was to try to apply machine learning to optimise spare parts logistics.

Although the project was backed by a strong maintenance system and a large volume of historical data, the model failed due to gaps in data contextualization and integration.

"The physical processes are in general easy to understand for humans. It starts with a requisition, then ordered, stored in a warehouse and delivered to a ship. But machines just see disconnected data points," she explained. "Without context, they cannot generate insight."

Audience at the Digital Ship Oslo forum held during Nor-Shipping on June 4

Even if the project as such has failed, it has been a very valuable learning experience and important momentum for gaining support for the broader investment in data management.

"It is good to fail sometimes. We believed we had mature data, but the project helped to reveal what was missing. That failure helped us to acknowledge the need for improvement."

Westfal-Larsen: regulations, connectivity, fleet software

Much of the maritime industry's digital developments are driven by regulation, said Are Andersen, ICT Manager at Westfal-Larsen Management. He also described the company's plans for software, connectivity, navigation and vessel performance sensors

Understanding and complying with regulatory frameworks, such as the IMO's Maritime Single Window and the upcoming S-101 navigational standard, is very important for successful maritime digitalisation projects, said Are Andersen, ICT Manager at Westfal-Larsen Management AS.

He was speaking at the Digital Ship Oslo forum held during Nor-Shipping on June 4.

Westfal-Larsen's digital journey has been shaped by international regulations in this way, he said. This includes evolving port-state requirements, internal modernisation, and improvements in ship-shore working relationships.

WestfalLarsen is based in Bergen and owns 16 open hatch ships and 8 chemical tankers.

"Digitalisation does not start with a platform. It starts with understanding the [regulatory] frameworks that govern your operations," he said.

"Some of these frameworks, from IMO, from the IHO and individual port states, are not just important, they are mandatory."

"You need someone who observes closely any framework constraints or barriers that dictate which direction your digitalisation should take."

In doing this, you should seek digital solutions you will be happy to use for many years. "This industry doesn't move at Silicon Valley speed," he said. "We don't build for two years and throw it away. A ship lasts 25 years. So, the digital tools we choose must be built to last just as long."

Maritime Single Window

Under IMO's Maritime Single Window (MSW) initiative, as of 2024, all IMO member states are required to implement a single digital portal for port clearance.

This mandate has altered how vessels and operators handle port-state documentation, he said.

"If you're digitalising without thinking of how you interact with that portal, you are doing it wrong," he said.

"The United States has had a single window for more than ten years and other countries are catching up. We need to be prepared for that across our operations."

Singapore – digital port interactions

National authorities are pushing digitalisation with specific requirements. Mr Andersen used Singapore's Maritime and Port Authority (MPA) as an example of this.

"MPA Singapore is moving at full speed, they want all port interactions to be fully digital," he said.

"The first requirement, which is already in force, is the electronic bunker delivery note. From there, they are expanding to cargo information, port services, and full e-trade."

Requirements from MPA Singapore will affect the entire supply chain of suppliers, service providers, and agents. If a vessel docks in Singapore, the entire vessel port communication system will need to operate digitally.

Are Andersen, ICT Manager, Westfal-Larsen Management

S-101 for charts

Another new regulatory driven digital factor is the S-101 standard for Electronic Navigational Charts (ENCs). By 2029, supporting the S-101 standard will be mandatory for new ECDIS systems, he said.

Many current bridge systems are running on standards that were introduced in the late 1980s or early 1990s.

A maritime company investing in bridge equipment needs to plan for at least a 10-year lifecycle, he said. If investments are made, then they are only worth it if they are compatible with upcoming mandatory standards. "If you are investing in bridge equipment in 2025, you'd better be sure it's future-proof and compliant with upcoming standards."

Connectivity

At Westfal-Larsen, connectivity between ship and shore is the backbone of each digital project.

"If we want to use tools like real-time performance monitoring, cloud-based fleet management, or remote collaboration platforms, the connectivity has to come first."

"Our ambition is 24/7/365 high-speed connectivity across the fleet", he said. "We can't unlock real-time cloud tools, structured data transfer, or tight ship-shore collaboration without it."

To achieve effective and reliable communication, Westfal-Larsen is implementing a hybrid communication model, equipping each vessel with two long-range LTE antennas (devices which improve the 4G cellular signal) as well as LEO and VSAT satellite systems.

"We are partnering with local providers to ensure we get low-cost, high-speed bandwidth near shore," he said. Starlink has become the primary communication link for us, and the challenge now is to find the optimal supplementary constellation to Starlink in order to ensure uptime also where Starlink is not operational. LTE-based system can be an important supplement in this respect.

"At some point, we need to rationalise. We can't operate with six or seven antenna systems. Three or four is the max," he said.

Onboard culture

Having a good digital culture within an organisation can be essential to achieve success. "To gain speed, you need more than a budget and a roadmap," he said. "You need the organisation, the people, to come with you."

An example of the company's digital culture is the way staff use collaborative tools like Microsoft Teams in everyday workflows. Systems like this are used across their entire fleet, rather than by just onshore workers, he said.

"If a chief engineer is unsure about a digital task or a new procedure, they just ping one of my guys. Five-minute call, screen-share, problem solved."

"We see a massive difference in our digitalisation speed and project success when the communication flow is tight and human-centred," he said.

Fleet management software

Westfal-Larsen is planning a total renewal of its fleet management software. At the time of the conference in June 2025, it was in the process of choosing between two final candidates from the list of potential vendors with implementation of a new system planned for 2026.

"We have been running on legacy systems, different platforms for maintenance, procurement, safety, manuals, you name it," he said. "Now, we are consolidating into a single integrated suite."

The new system will provide a single source of truth, a centralised workflow, improved analytics, and more efficient internal communication. "Right now, data is scattered," he said. "The goal is one platform, one truth and one ecosystem for the fleet."

The bridge

Westfal-Larsen is working towards reducing the complexity on the bridge.

"Our navigators currently use three separate tools, one for passage planning, one for ENC updates, and another for admin and publications," he said. The aim is to consolidate all of this into one centralised software suite.

Camera-assisted navigation is already in use on many of the company's dry cargo vessels. The technology has improved in recent years, and he believes it will be a standard element of future bridge operations.

"The bridge of the future won't just be digital, it will be integrated, camera-assisted, and regulation-ready," he said.

Vessel performance sensors

Another focus area for Westfal-Larsen is using sensors for vessel performance data, moving away from traditional noon reports. This allows continuous, accurate tracking of vessel efficiency, supporting better decision making.

"Today, we rely on manual entries. That is still valuable, but it's limited," he said.

"We are testing structured sensor-based data collection from key systems to create a more continuous view of vessel performance."

"Ideally, we will move to a blended model in the short term, combining manual and sensor data and then to full automation fleet wide."

The company has been running pilot projects with several vendors and hopes to conclude its selection process by the end of 2025.

Maritime digitalisation panel at the Digital Ship Oslo forum. From left to right: *Alena Pedersen, Vice President for Corporate IT and Digitalisation, Odfjell; Tore Lybekk, Head of IT at Torvald Klaveness; Paal Lohne, VP Digital, Grieg Star AS; Are Andersen, ICT Manager at Westfal-Larsen Management*

Torvald Klaveness' AI strategy – knowing whether to build or buy

A key question with AI is knowing whether to build, buy, support start-ups, or walk away from projects. Tore Lybekk, head of IT at Torvald Klaveness advocates a "curious but cautious" approach

With AI in shipping, a key factor in success may be knowing when to build, buy, or walk away from projects, said Tore Lybekk, Head of IT at Torvald Klaveness.

He was speaking at the Digital Ship Oslo forum held during Nor-Shipping on June 4.

The journey to AI is long-term and resource heavy. It requires technical knowledge and effective planning, he said. A clear decision-making framework is very important.

"We don't just own and operate ships," he said. "We are also a digital product house and an investor in maritime AI startups."

Torvald Klaveness owns Klaveness Digital, the tech company behind CargoValue, its flagship maritime supply chain planning platform. They are also currently developing new solutions for chartering decision support.

With Torvald Klaveness being both a traditional shipowner, operator, and digital innovator, it has a balancing act to make between curiosity about innovation and caution when adopting new AI processes, he said. If companies get carried away pursuing curiosity and fail to do their due diligence, then it can have undesired long-term effects.

Tore Lybekk, Head of IT at Torvald Klaveness

Buy or build?

AI is best seen as a journey, with a long road ahead, he said. Companies need to be prepared for change, know when to build or buy, and be ready to walk away from a project if required.

"We always start with the use case," he said. "What is the problem we are solving? Where do we see potential value?"

"We are building a strategy where we buy when there's no need to differentiate and suitable solutions already exist," he said. "We don't see any reason to build something that already exists in the market. Our position to compete with [established] vendors is probably very poor. That is not where we want to put our effort."

When there is no viable solution available on the market, or when there is the potential for improvement on market solutions, Torvald Klaveness considers investing in building its own solutions. It will also do this if there is proprietary data, deep integration needs, or it involves domain expertise that cannot be easily replicated.

Working with start-ups

"Sometimes there is a gap in the market, and we look for early-stage AI startups to partner with," he said.

This option comes with "very real challenges," due to the uncertain nature and potential instability of startups. "We partner cautiously."

Companies often have "maturity gaps," in areas such as security, compliance, and contractual frameworks.

"These vendors often don't fully understand your standards, so you need to educate them."

Predictions about how long it will take to build something can be wildly over-optimistic. It is common for projects to take four years where people expected it to take one.

As well as time constraints, the commitment in business terms is considerable. "It requires so much business involvement," he said. "Testing the models, giving feedback, and working side by side with the vendor. If [business] are not driving the case, it simply does not work."

Lybekk advised that companies should look out for early warning signs when working with startups. "If a vendor is vague on contractual terms or has poor security documentation, that's a big red flag," he said.

Despite the risks, there are positive signs as well. "If a partner is proactive and shows a real understanding of these core enterprise needs, data governance, privacy, system integration, which is a green light for us."

If these positive signs are displayed then a startup is often mature enough to work with long-term, he said.

Danelec and the GTT acquisition

GTT of France has acquired Danelec, valuing the company at Eur 194m. We spoke to Danelec about its focus on high frequency data for vessel performance, its data platform and its approach to digital integration

In July 2025, GTT of France announced that the acquisition of maritime data collection and analytics company Danelec was completed. Danelec focusses on maritime safety and vessel performance solutions. The purchase price means Danelec is valued at €194 million.

GTT is a technology and engineering company incorporated in France. It is a leading manufacturer of cryogenic containment systems for LNG.

Through the acquisition, GTT said it was taking a "decisive step forward in the

digital sector."

The acquisition follows GTT's acquisition of Ascenz Marorka, a company providing data about vessel fuel consumption and operational activities, in 2017. GTT also acquired Vessel Performance Solutions, a company providing vessel performance management services, in February 2024.

Danelec, Ascenz Marorka and Vessel Performance Solutions will together form GTT's Digital division.

The three companies' products will be brought together to make a "unified digital offering," covering operational performance, safety and decarbonisation.

The Group now supports an installed base of more than 17,000 vessels worldwide.

Casper Jensen, current CEO of Danelec, has taken the role of Executive Vice President Digital at GTT, and joined GTT Group's Executive Committee.

GTT's Digital division is to be structured into two business units, "Performance and Monitoring Solutions" and "Safety & Equipment."

Anouar Kiassi, current CEO of Ascenz Marorka, becomes Senior Vice President (SVP) of the Performance & Monitoring Solutions business unit. Christian Kock, current Executive Vice President Safety at Danelec, takes on the role of SVP of the Safety & Equipment business unit within GTT's Digital division.

Danelec was previously acquired by European private equity company Verdane in 2020. Since then, it increased revenue 250 per cent and increased its installed base by 180 per cent, including making acquisitions of ship performance monitoring company Kyma and voyage optimisation company Nautilus Labs.

High frequency data

Danelec is a strong proponent of the use of high frequency data from ships, such as fuel consumption data from fuel flowmeters. Vessels traditionally sent this data once a day in the "noon day report."

High frequency data means that vessel performance management can be done with much more granularity.

A report available for free download from the Danelec website ("From Data to Action") includes a story about how Emirates Shipping Line moved five of its ten vessels from using only noon day reports to collecting high frequency data. This led to "more accurate consumption calculations and real-time monitoring of vessel performance," according to Willem Bekooy, VP of Operations.

The upgrade cost $25k per vessel, which was a high enough price to be a large deterrent when the return was not obvious. But the investment was justified when the company saw the performance improvements the vessels with HF data were achieving.

On another vessel with a different operator sailing across the Pacific, office staff used high frequency data to determine that the vessel was being operated at 17.3 knots during the day and 15.6 knots during the night.

The crew were reporting an average speed of 17 knots on noon day reports, which was expected. But the higher daytime consumption meant higher fuel consumption than if it was sailing at 17 knots consistently. This could only have been identified with the high frequency data.

"The vast majority of the owners are still operating heavily on noon day reports. We want to change that by showing the benefit of going more and more digital," says Casper Jensen, CEO of Danelec.

Digital infrastructure

"It is not just a matter of collecting data points and providing a calculation in terms of fuel savings and CO2. It is also a matter of having a digital infrastructure," Mr Jensen says.

Once the data is gathered onboard, there are tools for the captain and chief engineer to review it before it is sent to Danelec's cloud.

Danelec's cloud software builds an accurate digital twin of the vessel, which can be used to manage vessel performance and optimise voyages, then provide recommendations to crew.

Today, recommendations are based on a combination of automated reporting and expert insights, with naval architects and marine specialists reviewing the data to provide tailored guidance. Looking ahead, Danelec aims to further automate the recommendation process to complement expert analysis.

Danelec acquired Kyma in December 2021, a Norwegian specialist in digital ship performance monitoring, with a strong footprint in LNG shipping.

In November 2023 it acquired Nautilus Labs, a US company focussing on AI driven vessel and voyage optimisation, and the voyage data recorder business of MacGregor (Germany).

Through these acquisitions, the company developed an "end-to-end maritime data and analytics platform" focussed on high frequency, high quality data, which can be used to improve safety, vessel performance and operational efficiency.

Casper Jensen, CEO of Danelec

Digital integrations

Many customers want to put together systems from different providers. Danelec's digital infrastructure can be connected with systems of other companies via APIs.

As an example of a digital integration, it can work together with StormGeo, where Danelec can do data collection and StormGeo does the optimisation. Danelec enables secure and automated sharing of vessel operational data with various third-party verifiers to ensure compliance with fuel emissions regulations.

Danelec's digital integration capability began in the early days of the company, when it was exclusively focused on manufacturing voyage data recorders. It was essential to be able to collect data from any device and share it with other software systems.

"When you are a VDR manufacturer, you don't have the luxury of saying 'no' to data from a ship's sensors, no matter the manufacturer," Mr Jensen said.

"There are certain sensors that are mandated by law, that you need to collect data from. That approach has been basically designed into our data collection."

"We have had dialogue with other equipment manufacturers about how they can utilise our [digital] infrastructure on board the vessel."

Cybersecurity at Marlink

Maritime comms and IT company Marlink has a new dedicated cybersecurity company with 150 experts. Maritime president Tore Morten Olsen explained

Maritime comms and IT company Marlink launched a dedicated maritime cybersecurity division "Marlink Cyber" in April this year. It has 150 cybersecurity experts in its staff.

Marlink Cyber provides managed cybersecurity solutions, detection and response services, vulnerability assessments, penetration testing, phishing and awareness programs, compliance and gap assessments and risk management.

Also, in April 2025 Marlink launched an "External Attack Surface Management" solution to identify and anticipate digital security threats.

It will identify weaknesses in your external facing digital infrastructure, by mapping exposed digital assets (digital assets connected to the internet but without security controls); unpatched systems and configuration issues.

The service includes scans of the dark web to see if any of your data has been stolen and placed there. You can also access insights from global threat information feeds.

Customers can start scanning their assets as soon as they sign up.

Marlink also operates several Security Operations Centres (SOCs) around the world. They help customers understand where they are with cybersecurity.

Cybersecurity acquisitions

The launch of Marlink Cyber follows Marlink's acquisitions of cybersecurity companies Diverto (July 2024) and Port IT (October 2024).

Diverto provided IT and OT security solutions for enterprise and critical infrastructure. It is based in Zagreb, Croatia. Diverto operated a Security Operations Centre (SOC), including providing incident management and forensics, and covering both IT and OT.

Port-IT supported 7,000 vessels, with its Security Operations Centres (SOCs) in Rhoon, Netherlands, where the company is based, and in Bangkok.

Critical mass of talent

Tore Morten Olsen, president of maritime with Marlink, says that having 150 cybersecurity experts in its staff gives the company a "critical mass."

It means Marlink is an attractive workplace for cybersecurity experts. "You need to have a certain scale to be relevant in that domain," he says.

"We are able to create a unique offering, taking the talent and the competence that these people bring, combining that with the expertise that we have on the market."

Market expertise is a key differentiator. "We find a lot of cybersecurity companies are very generic in their approach with little understanding of the operating environment, of the maritime community," he said.

For Marlink, "it's a continuous evolution in the portfolio, both in terms of technology to protect the assets of our clients and the IT infrastructure, and in terms of training and education to the people on board."

Cybersecurity training

It has taken time to get many seafarers accustomed to taking cybersecurity seriously, he said.

"For many seafarers, this [seems] a bit peripheral to the world they used to operate in. But when you put the vessel on the internet, the importance of awareness and cybersecurity training for people becomes obvious."

"Gen-Z [seafarers] basically have that [digital first] mentality from the beginning."

Marlink provides online training classes through its "Marlink Training Academy.

The service

Marlink offers consulting services to help customers assess their cybersecurity protection and compliance.

When shipowners seek to review cybersecurity on individual vessels, Marlink staff assess the vessel and advise the owner what to do, including which services it needs to buy.

It takes care to stress they do not necessarily need to buy these services from Marlink. "We take an advisory role in the beginning. It is up to the client to choose whether to plug those gaps with our services or by other vendors," he said.

Tore Morten Olsen, president of maritime with Marlink,

Typically, bigger shipping companies are more proactive with cybersecurity, he said.

Marlink has developed a platform called Xchange for managing onboard IT and cybersecurity. It includes all the cybersecurity infrastructure, and is fully integrated with Marlink's network.

Marlink has developed what it calls a "honeypot service," a way of simulating a ship on the internet, to see how it gets attacked by hackers. "By doing that, we also learn a lot about [hackers'] evolution, how they are trying to infiltrate the ships," he said. "We can then build a more resilient solution on the other side. It is an interesting learning method for us."

Evolving regulations

On the compliance side, shipowners want their cybersecurity providers to generate documents stating that the vessel is compliant which can be provided to class.

There are still many discussions going on in the industry about how the IACS "UR" cybersecurity regulations should be applied.

For example, there are discussions about how many firewalls are needed on a network. Some yards and class societies argue that two are better than one, he said.

"It's being followed differently by different people."

There are also discussions about whether shipowners should be prepared for the same regulations to apply to their existing fleet, which would be a more complex retrofit topic.

Starlink and Marlink

Marlink says it is now the world's largest enterprise partner of satcom company Starlink. Marlink's maritime president Tore Morten Olsen explained how the offering is evolving

Marlink has a close relationship with satcom provider Starlink. "We made a bold decision when Starlink entered the market to partner with them," said Tore Morten Olsen, maritime president at Marlink.

"I think that it has paid off both for Starlink and us. Today we are the largest enterprise partner of Starlink worldwide."

"We understand the operating environment of the market we serve, so we were able to maximise the value of the Starlink service to the client base."

"Because of regulatory limitation, Starlink cannot be used everywhere," he said.

"If you are doing a lot of business in the Middle East, there are several areas where Starlink is blocked from a regulatory perspective. It cannot be used in Chinese waters."

"And the regulatory situation may also change, both positively and negatively."

"So, it is important to build a resilient solution for the clients, where Starlink typically is the primary carrier of traffic, but it cannot be the only one," he said.

We typically provide the traditional method of comms that they used to have in combination with Starlink. We are increasing the bandwidth and the service quality of VSAT in the areas where Starlink is blocked."

"We can anticipate, and we can predict where it will not work."

"Starlink still seems to be the [service] that brings most value for money. I think the life of crew has been improved tenfold. Most companies today are giving crew 20, 30, 40, 50 times more data allowance than they used to do in the past."

"It basically makes life - work balance much better. They can stay on their social networks. They can stream Netflix."

"It has become a key criteria for crew to select which vessels to go on."

"It also gives owners an opportunity to get away from bespoke maritime applications, use more cloud-based services, get more transparency into the business, and thereby improve their own operational efficiency. We see a lot of that happening."

Other satcom companies will be entering the market with similar services soon. But "Starlink has a great head start, it's going to be hard to catch up in some markets and some niches," he said.

The video streaming enabled by faster satellite communications can also be useful for safety reasons.

"Communication used to be much more costly. It used to be a limiting factor for life on board. And that has now been removed."

"That does not mean that you can open everything. You need to have policies because you need to make sure that people sleep. There are other parameters that need to be taken into account."

PTM

StormGeo – moving to "voyage intelligence"

StormGeo's weather routing and voyage optimization services have evolved from providing the best and safest route to also encompassing emissions, fuel availability, port congestion, regulatory requirements and navigational compliance

StormGeo's weather routing and voyage optimization services have evolved from providing the best and safest route taking weather into account, to also considering emissions, fuel availability, port congestion, regulatory requirements and navigational compliance.

StormGeo is headquartered in Bergen and offers weather intelligence and decision-support services for the global shipping and energy industries.

The company provides what it calls "voyage intelligence" through a mix of AI, expert advisory, integrated platforms, and domain knowledge, says Petter Andersen, Senior Vice President of Shipping Services at StormGeo.

StormGeo seeks to provide a "comprehensive operational toolkit" for operators and fleet managers to support decision making. It provides data including emission cost forecasts, impact of ECA (Emission Control Area) boundaries, and port waiting times.

Petter Andersen, Senior Vice President of Shipping Services at StormGeo

"The world for our customers has become significantly more complex than it was even just a few years ago," he says. "It is not enough to just optimise a route from A to B. Optimization becomes far more effective when you take into account context, emissions impact, fuel availability, port congestion, and regulatory zones."

"It is also about the fuel type and availability, port ETA windows, and carbon pricing. That is a lot for an operator to balance," he says.

StormGeo combines AI-based tools with the insight and judgement of human experts. This "augmented intelligence" strategy acknowledges both the promise and limitations of automation.

"AI is improving fast, especially weather models and predictive routing," Mr Andersen says. "But weather is inherently

unpredictable. When uncertainty is high, you also need the expertise of a seasoned route analyst."

This is a key differentiator for StormGeo, he says.

StormGeo's "s-Insight" platform provides the optimised route to both ship and shore operators, whether generated by an analyst or the AI.

"When both ship and operator see the same weather data, the same fuel curves, and the same route recommendations, it creates trust. It makes communication easier and decisions faster," he explained.

EU carbon pricing data can be brought into the Voyage Calculator, so it can be taken into consideration when planning voyages. Buying carbon credits "can be a substantial cost," he says. "It makes sense to factor it in during the decision-making stage, not just after the voyage is done."

While traditional weather routing services typically deliver 1–3% fuel savings, the company says, its "Strategic Power Routing" service, which enables vessels to operate at a constant power level over the full voyage and thereby prevent sudden spikes in fuel use, can often deliver 3-6% savings.

For example, a system to optimise the full voyage may suggest waiting for a storm to pass rather than pushing through it or increasing speed to avoid bad weather, he said.

The company has a partnership with Awake.AI of Finland, which uses AI to predict port congestion, and integrates with its service. "It helps us get accurate, high-value insights to our customers faster," he said.

It often allows customers to combine its services within a broader partner ecosystem. "Customers expect flexibility. We actively work with partners and combine our offerings to provide stronger solutions together," he says.

How V.Group's "ShipSure" software supports operations

V.Group's in house software "ShipSure", with AI components, is used to predict how well a ship will perform in inspections, and identify problems with certification, and more. [Former] CIO Stephen MacFarlane explained

V.Group has developed its own software in-house called "ShipSure" with AI components, to support shipboard and office decision making.

The software covers operational, technical and financial decision making, including procurement, safety, fuel data and crew management.

ShipSure is used for "over 95% of what the company does digitally", said Stephen MacFarlane, CIO of V.Group (as of June 2025) and managing director of its "ShipSure" digital "arm."

V.Group has responsibility for 600 vessels including tankers, bulk carriers, and gas carriers, to cruise, offshore, passenger vessels and containerships, according to its website. It also manages 28,000 to 30,000 crewmembers.

The system scans 200 to 300 data points every day to look for issues and create alerts.

For example, making sure certain onboard training tasks are completed, or identifying certification which will shortly expire, so you can make sure you do what is needed for renewal.

This has led to improvements in how the company manages its crew certificates, closure of defects and resolution of findings from past inspections.

Where a person may spend time looking at one problem, Sentinel can look at another fifteen potential problems, he said.

Reviewing such documents and data manually could be possible for one ship, but not five hundred ships, and would be hard to do on five ships, he said.

The system also identifies errors or inconsistencies in the data. It means that staff can work on the outliers, rather than spend time chasing data.

There is a system to "score" vessels, aggregating various data factors into a rating 1 to 5 for each vessel.

"People become used to looking at the ship, looking at their score, and seeing if their score is changing," he said.

Scores and the reasons behind them are reviewed at management meetings, including looking at the reasons one vessel may be worse than another in a particular area.

For vessel performance, the system predicts daily which location the ship should have reached, and what emissions it should have made. It can generate alerts if the vessel has reached a different position, or is making different levels of emissions, to what was expected.

Improving inspection results

The system has an AI model to predict the results a ship is likely to get in an external inspection, based on data about the ship and how ships with similar data performed in past inspections.

V.Group provided its data science team with a historical set of vessel data and inspection data. It asked the team to develop a model to predict what inspection results a vessel with a certain set of data would achieve.

It took a long time, but eventually data scientists managed to build an algorithm which could make a correct prediction 80 per cent of the time and be close on much of the other 20 per cent.

The algorithms are continually being improved, checking their predictions against actual outcomes.

Once crew have a prediction about the results of a future inspection if nothing improves, they are motivated to pay attention to the weaker areas and fix the issues, he said.

Development of AI

V.Group started employing data scientists in 2019, initially looking for ways it could use AI on its data to analyse risk.

The second iteration of ShipSure, currently being rolled out, includes what Mr MacFarlane calls "pervasive business intelligence" and an AI tool called Sentinel.

It started developing the "Sentinel" AI system, which works within ShipSure in 2021-2022.

The system was trained mainly on data from the past 2 years, sometimes data going

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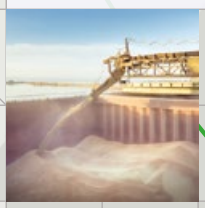
STAR ALASKA - 225641



GUSTS 6.2KN

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A strength of Sentinel, compared to other maritime AI projects, is the wide range of data it works with, he said.

"We can look right across the organisation, from financial to procurement to people to maintenance to inspections.

"We are not aggregating different systems together. We have that single system."

It means data engineers and scientists can better focus on the outcome from the system, rather than just the incoming data set, he said.

Data quality

For AI, you need to have a data set which is large and clean enough to get insights from.

One of the building blocks is to get data "normalised" (in a standardised structure). Then you can build data models and look at ways to extract value from them.

The system has tools to measure data quality and completeness. "If we can't stand by the data, we can't justify and support the platform," he said.

It can compare the data quality from one vessel with another. It can identify if vessel crew are commonly not filling in all the fields, or not providing requested supporting evidence.

Training to use the platform

When rolling out the software, the company ran seminars to explain to staff what the system does.

"I think it always takes a bit of time for people to understand how the algorithms are working," he said.

"But compared to other projects I've done over the years, I found it reasonably smooth."

"We're finding that the ship staff are some of our best adopters of the technology, they're waiting for it, they're thirsty for more technology driven solutions."

Sentinel (the AI tool) is part of ShipSure, which staff are already familiar with.

"We're putting a lot of time into training our seafarers how to handle what I call Sentinel events, so they understand how to deal with them."

Future developments

One of the next projects is to include "agentic AI" in the system. It will seek to fix problems, not just identify them. It may also automatically alert ship staff to problems, rather than alert an office worker who makes the decision about whether to contact the ship.

Perhaps in future, when someone logs in on their phone app in the morning, they will be told what the system has done overnight, what is lined up to approve, and what the person should prioritise in their work today.

"We're already piloting that," he said.

The best advice for sihpping companies is to "explore the opportunity technology gives [you]," he said. "Look at opportunities to see how [you] can extract the best value from the data set."

Identity management and cybersecurity

One of the hardest parts of cybersecurity is managing identities, to ensure that only the right people have access to your network and devices. A DNV webinar reviewed the issues

Securing digital identities in the energy sector is getting increasingly critical, said Veera Relander, Vice President, Service Unit Lead, IAM, DNV Cyber.

It is about who has access to what, and what system has access to what, since many digital 'identities' are also with machines, she said.

There have been a number of successful cyberattacks on the energy industry around the world, where digital identities have been used to access networks, added Carl Christopher Kiønig, Business Community Lead at DNV Cyber. "Sometimes it has been fairly easy for the attackers."

Company boards are increasingly prioritising digital identity governance, he said. "It is seen as a business critical issue."

It is pushed by regulations, such as the European Union's NIS 2, and companies seeing cyber-attacks caused by weak identity controls,

Many companies are being asked to demonstrate that they have governance over their cybersecurity including digital identities.

Suppliers

"Many companies don't have control over their suppliers' accounts and privileges related to those," he said.

"We are helping a lot of companies when they enter contracts where cybersecurity requirements are mentioned," he said. "Demonstrating good control especially in digital identities could be a competitive advantage."

Visibility

When managing digital identities, it is important to have visibility over who has access to what, and then the ability to control it, he said. You also need to be able to audit how your supply chain companies manage identities, if they have access to any of your systems.

Asked about the biggest challenge organisations face when managing identities, Stein Ove Røv of Skagerak Energi said that it is "getting visibility of what is going on and then getting control over it."

Mr Ove Røv is Strategic Advisor & Head of Crisis Management, Digitalization and IT at Skagerak Energi, which is a Norwegian electrical supply company.

Managing identities can be better done by company HR departments as part of their standard processes, he said.

If you ever need to choose between user experience and security when managing identities, "you shouldn't have to compromise security, security is first priority now," he said.

Software developers doing 'agile' development processes also need to know about the threats of badly managed identities, because the pressure to build things quickly can lead to security being compromised.

Companies often buy new products as "cool stuff for the management" but are not aware of the identity management challenges that come with it, he said.

You need to view all your hardware and software as "assets" which need looking after."



Screenshot from webinar. From left to right: *Veera Relander, DNV Cyber, Carl Christopher Kiønig, DNV Cyber, Stein Ove Røv, Skagerak Energi*

End of passwords?

One way to make it simpler to manage is if we have a digital environment which does not need separate passwords for each software or web application. Instead, security can be managed holistically.

Using passwords for identity management is "old fashioned," Mr Ove Røv added.

Requiring people to insert USBs as a security device to gain access to certain software did not prove particularly effective, because people would lose them or go home leaving them plugged into the computer.

But there can be better ways to do it, such as a system which requires users to tap something with a key card to gain access.

"Solutions are coming quite fast," he said. "In a couple of months there will be others. There is a change coming."

Audience survey

DNV's webinar audience was asked where they see the greatest challenge for managing digital identities.

41 per cent said it was managing the balance between maintaining user experience and achieving security; 22 per cent said working out how to use automation and AI; 19 per cent said ensuring visibility and control; 18 per cent said compliance and auditing.

The audience asked what they thought is the biggest identity related blind spot in organisations. Thirty-six percent said unmanaged identities; 32% said third party vendor access; 18% said legacy OT systems; and 14% said "service and machine accounts".

Understand vs acknowledge

When people say they "understand" threats, that does not seem to necessarily mean they "acknowledge" them to the point where you take sufficient action, Mr Ove Røv said.

"I have been to meetings where everyone says, 'we understand,' but it hasn't come to the point where we acknowledge, because that means action."

As an example of an unacknowledged threat, China may have hacked "assets" stashed away, which can be activated in the event of a cyber war, he said.

Much of the increased awareness of top management is driven by the tightening regulations, he said, rather than acknowledgement of the direct threat.

But the push from regulation can be welcome. The energy sector can be "quite behind" other industries, he said. "Legislation is going to get us up to speed."

DNV Cyber perspective

It is a mixture of regulations and the geopolitical threat landscape "driving the tension high up in organisations," said Carl Christopher Kiønig, Business Community Lead at DNV Cyber.

"Slowly it is getting more and more attention," he said. But companies have still not "really acknowledged the risk,"

Much of the risk is driven by the convergence of IT and OT in his view.

Another challenge is balancing the quality of the user experience with achieving security. If the user experience gets difficult, users will find ways to work around your security controls.

There are still companies unaware of which regulatory requirements apply to them.

"My suggestion is to look at standards and best practises for your sector

[to see] what they say about access and access management."

For example, all information (IT) systems have the ISO 27001 standard for information management security. For operations technology there is DNV's recommended practise G108 "Cybersecurity in the oil and gas industry" and IEC 64223 for industrial automation and control systems.

You can do a "maturity analysis" to find out how good you are, and there are lots of tools online to help you do that, based on best practise, he said.

Asked whether EU's NIS 2 regulation will help the industry mitigate cyberthreats, he replied "absolutely."

There will be fines for not complying with the standards. This can lead to companies allocating budgets for fixing the problems.

People seek increased connectivity, which leads to higher efficiency of operations, but also new kinds of risks, added Veera Relander, Vice President, Service Unit Lead, IAM, DNV Cyber.

Digitalisation will continue accelerating, as the world is getting more connected, IT and OT are converging, and AI is introducing new kinds of threats, she said. Companies are integrating more of their supply chain partners into digital systems.

Meanwhile, geopolitical tensions are growing, and state sponsored actors are getting more involved in hacking.

DNV cybersecurity survey

DNV's cyber security survey for 2024-5 interviewed 1100 professionals over Sept 2024 to Jan 2025 from energy and the maritime sector, of which 375 were from the energy sector. Of these, 43 per cent were in oil and gas.

In the energy sector, 65 per cent say, "leadership views cybersecurity as the greatest current risk to business". This is a big increase from the previous survey conducted in 2023, where only 36 per cent described cybersecurity as one of their top three business risks.

The biggest drivers for cybersecurity investments are wishing to avoid reputational damage and penalties associated with compliance failure, respondents said.

79 per cent said focus on cybersecurity has increased because of growing geopolitical tensions over the past year.

The greatest threat actors are seen to be organised cyber-criminal gangs,

foreign powers and state sponsored actors. Also, unintentional threat actors (human error), hacktivists, and malicious or former insiders.

PTM

You can view the video this article is based on, on the DNV website. Go to **https://www.dnv.com/cyber/** and navigate to **insights / on demand webinars /** then see **"Who or what has access to what?"** from June 17 2025.

Norway's Green Shipping Program developments

Norway's Green Shipping Program has projects to decarbonise the defence sector, use ships as power stations, supply ammonia in Stavanger and hydrogen in Bodø, use liquid organic hydrogen carriers, and explore nuclear

Norway's Green Shipping Program has projects to decarbonise the defence sector, use ships as back-up power stations supplying land, operate emission free vessels on the Norwegian coastline, supply ammonia in Stavanger and hydrogen in Bodø, use liquid organic hydrogen carriers, and explore nuclear power in ships. The projects are at various stages, from desktop to realisation.

Green Shipping Program is a collaborative program for Norwegian companies, supporting the Norwegian government's goal to cut its greenhouse gas emissions by 55 per cent by 2030, compared to 1990 levels, including shipping and naval activities. It was established in 2015 and has around 130 partners.

It supports many desktop studies, pilot programs, and scaling up of pilot programs. The work is facilitated with the help of DNV. There have been 60 pilot programs planned since 2015, of which 19 are under realisation so far. See https://greenshippingprogramme.com/

Defence sector

The defence sector is included in the program, although with the additional challenge that any decarbonisation efforts must not degrade defence capability.

A challenge is that alternative fuels have a lower energy density, meaning that you need larger fuel tanks to go the same distance. This takes up space which could be used for weapons, said Jon Inge Stensrud, Commander Senior Grade, Ministry of Defense.

The Norwegian Navy is currently upgrading its fleet to vessels with a standard basic design, and this may be an opportunity to move to systems with lower emissions.(To read more see www.greenshippingprogramme.com and navigate to pilots / Sustainable solutions for the standardized vessels of the future.

At the end of the conference, a panel of defence specialists were asked if they thought it was possible for the Navy to reduce emissions without degrading combat capability, and they all agreed that it was.

Ships as a power station

Plug of Bergen (www.plugport.com), which develops shore power systems for ships, is involved in a research project to see if ships could function as power stations for onshore users, said Camilla Neumann-Berg, Business development manager.

Ships could provide emergency power to land users, and support "peak load," providing electricity at times of maximum consumption. The power from ships can potentially be generated at zero emission, if it is using a zero-emission fuel. To read more see www.greenshippingprogramme.com and navigate to pilots / Flexible power preparedness along the coast.

Emission free cruising

Norwegian cruise company Hurtigruten, together with shipyard Vard, have a project to develop a coastal cruising ship design which can sail entirely emission-free during normal operation along the Norwegian coast.

This would be achieved with large batteries, sails and more. Energy would be provided by land electricity supplies, and total energy consumption would be reduced by 40-50 percent.

The project team estimate energy consumption benefits from sails can be 10-15% of total energy use; from solar panels, 2-3%; from having a more aerodynamic structure, 5-7%; from foils, 3-5%; from air lubrication, 5-10%; from a better hull design, 3+%.

The benefits from having contra rotating propellers (two propellers on the same axis moving in opposite directions) 5-10%; from better design of the heating and aircon system, 5-10%.

Altogether, the benefits could be 40-50%. The maximum benefit add up to more than 50, but there can be some counter-effects, such as sails negatively impacting aerodynamics.

Further information is on the Vard website in an article "The ground breaking Sea Zero project hits key milestone."

Ammonia bunkering in Stavanger

Equinor, Aker BP, Altera and Yara Clean Ammonia are involved in a project that investigates opportunities to provide carbon neutral ammonia fuel in Stavanger port.

Further information is on greenshippingprogramme.com navigate to pilots / Ammonia bunkering in the Stavanger area.

The project found no technical barriers to supplying ammonia to ships, and ammonia is able to distribute it. The initial distribution cost could be 40 per cent of the total purchase cost, but this could come down with scale.

In their market analysis they developed three scenarios, said Yang Zhang, Product Manager, Yara Clean Ammonia. "Low demand" is 6 ships bunkering a week needing 400 tonnes; "medium" is 15 ships a week with 1060 tonnes; and "high demand" is 45 ships a week with 3200 tonnes.

One infrastructure option is to use a floating barge, he said.

Hydrogen fuel

GreenH of Oslo is constructing a green hydrogen facility for ships in Bodø, which is between Trondheim and Tromsø on the Norwegian coast, said CEO Morten Solberg Watle.

The facility will be in operation in 2026 and be able to supply 8.5 tonnes of hydrogen a day (3 tonnes initially). It will create hydrogen from zero emission electricity with electrolysis of water. The hydrogen can be supplied to ships.

It is planned to use the hydrogen on two hydrogen-driven ferries that will operate from Bodø to the Lofoten Islands, a crossing which take 3 hours.

Liquid organic hydrogen carrier

There are chemicals available which hydrogen can bind to, and so which act as a hydrogen carrier.

Hydrogen chemically bound in this way can be transported at normal temperature and pressure, rather than the cryogenic temperatures needed for transport pure liquid hydrogen. It can also be stored for multiple months at normal temperature and pressure. The hydrogen can be released by a chemical reaction.

Hydrogenious LOHC Technologies of Erlangen, Germany is developing this as a maritime fuel. It uses a material called Marlothem.

It can be re-used several hundred times, said Thorbjørn Hareide, business development manager, Hydrogenious LOHC. It has a high flash temperature of 112.5 degrees C.

The project is being trialled by Edda Wind, a shipping company with service operation vessels for the wind industry. The vessel will install a 2-3MW power system with fuel cells using hydrogen as fuel.

Nuclear power

25 companies are involved in a project to explore nuclear power as a fuel, including ship operators Altera and Shearwater.

The advantage of nuclear power is that one kilogramme of uranium has the same energy as 2.7 million kilos of coal. A vessel could sail 10-20 years before needing refuelling.

"Interest in the project was tremendous," said Torbjørn Lie, business development manager at EVIGO – an OSM Thome company, the leading partner of this project

"The Norwegian maritime industry is cautiously optimistic," he said. "More individuals support it than oppose it."

The research only considered fourth generation nuclear reactors, and not pressurised water reactors.

A study with Maran Tankers demonstrated it could be retrofitted. 14 major banks have expressed their support. But regulations are not yet in place, and there is not yet any insurance coverage available.

"It seems we're on the move, but a lot of issues have to be cleared," he said.

Further information is on www.greenshippingprogramme.com navigate to pilots / Every stone must be turned. Nuclear power cannot be excluded

Onboard CCS

Maran Shuttle Tankers has a project to understand how carbon capture systems can be retrofitted onboard tankers, said Christian Fjell, sustainability director of Maran Shuttle Tankers.

The group studied the Wärtsilä and IONADA shipboard carbon capture and storage systems.

Whilst it did not find any technical "showstoppers", making the total business case work proved challenging.

Storage facilities will not realistically accept maritime CO2 volumes captured onboard vessels until 2028 to 2030, he said.

Shipping companies are reluctant to commit to projects while it is unclear what benefits onboard carbon capture will get under the EU Emission Trading Scheme and IMO regulations, he said.

Retrofitting a system to a vessel would involve taking it out of service, so the business case is better for systems fitted at the same time the ship is being built, he said.

Shuttle tankers could be well suited for onboard carbon capture, if they always 'shuttle' between the same locations, provided those locations have CO2 reception facilities, he said.

Full scale CO2 storage facilities such as Norway's Northern Lights are unlikely to "open the door" to a shipping company with 20,000 tonnes CO2 a year to discharge. "It is simply too little," he said. (Northern Lights is built to handle 1.5m tonnes CO2 a year, so 75x this much). But it could work if CO2 from multiple vessels could be aggregated.

Maran Shuttle Tankers was formed after the purchase of Altera's shuttle tanker division (itself formerly part of Teekay Offshore) by Angelicoussis Group of Athens. The shuttle tankers are managed from Stavanger, Norway.

Improving OSV performance with an "efficiency loop"

Opsealog of Marseilles, France, has developed an "efficiency loop" process to help operators of Offshore Supply Vessels (OSV) improve fuel consumption / emissions and utilisation. Here is how it works

Opsealog, a company based in Marseilles, France, has developed an "efficiency loop" process for working with operators of Offshore Supply Vessels (OSV).

It involves gathering data from ships, integrating, and cleaning it, analysing it with various algorithms and models, and generating improvement suggestions.

Then Opsealog holds a monthly meeting with the client to go through the suggestions and see how suggestions made in previous meetings have worked. 95 per cent of the efficiency loop solution is digital, the rest is based on expert recommendations.

The company calls its offering "efficiency as a service."

Two of Opsealog's focus areas are the reduction of fuel consumption / emissions and improving fleet utilisation – making the most of the vessel's cargo carrying capacity.

The ROI from using the service are, on average, over 250 per cent including savings on fuel costs and from fleet optimisation, says Arnaud Dianoux, Founder and Managing Director, Opsealog.

There is an emerging ecosystem of technology which can be used to help improve efficiency and utilisation, including devices to measure fuel consumption of each engine, and software to improve logistics management, he says.

Companies increasingly recognise that they need to measure if they are to improve.

Opsealog has gathered data for over one thousand vessels over the past 10 years. The more data it has, the better the algorithm gets. It has over two hundred fuel models.

The operating cost of an offshore vessel including fuel can be USD Dollars 10m a year, so savings are well worthwhile.

The financial incentive to reduce emissions on OSVs is large in the European Union, where companies need to buy emissions

credits under the EU Emissions Trading Scheme.

Companies want to have a 360-degree view about how effectively the vessel is being utilised and its operating costs minimised.

However, for vessels outside Europe, the main regulation putting costs on maritime emissions is IMO's Carbon Intensity Indicator (CII), and this does not apply to offshore vessels.

Mr Dianoux is a former captain, with 10 years sailing experience on offshore vessels. In this work, he recognised that there was plenty of scope to improve logistics efficiency and reduce fuel costs, leading to him setting up the company.

Opsealog's main customer base is Offshore Supply Vessels (OSVs) used by oil and gas and wind farm operators.

Opsealog has customers in Europe, West Africa, Middle East, and Asia.

The efficiency loop

To gather data from vessels, Opsealog installs sensors which collect data every second, including engine load and weather.

Most vessels today send the data in batches, not in real time, Mr Dianoux says.

The data then needs to be sent to cloud hosting systems, integrated and cleaned, to get it to the highest quality possible. To get something useful from the algorithms, it is important that the data is collected in a standardised way.

Then the data is analysed by data scientists and automated algorithms to determine if there are ways to improve efficiency and achieve operational excellence. Its algorithms are put together by both marine experts and data science experts.

Opsealog has multiple models, covering fuel and emission reduction, fleet optimisation, reducing waste from vessels and delivering what was agreed in customer contracts.

The algorithms generate key performance indicators. The data is shared through its decision-making portal, providing recommendations to masters and logistics management staff. It can be accessed both onshore and offshore.

The software suggests best practises that the company can follow to reduce emissions, cost, and risk.

For example, fuel consumption can be reduced by optimising the number of engines and generators in use and reducing the speed.

The customer meeting

The final step of the efficiency loop process is conducting regular meetings with the customer, reviewing best practice application and planning performance improvements. Frequency of these meetings depends on client's needs and objectives associated.

Opsealog will share the latest KPIs for the vessels, classified into green (OK) or red (a problem).

Not every company has the same goal, for example some companies may want to focus more on utilisation, some more on emissions.

The discussion typically follows the "Pareto Principle," the idea that 80 per cent of consequences come from 20 per cent of causes. So instead of focussing on all emission causes, you focus on the ones with the biggest impact. Or perhaps it is best to focus the effort on one poorly performing vessel in the fleet.

For a company with multiple vessels, it is helpful to find a method which can be repeated on many ships.

The meeting also reviews decisions made in previous meetings, to see if they led to improvements in performance.

Not every recommendation will work. And there are legitimate reasons vessels may use more fuel, for example if there is an urgent delivery needed to avoid downtime on a rig, or to avoid greater emissions elsewhere.

But it is always very useful for offshore shipowners and charterers to have full "visibility" on emissions caused by different areas of their maritime operation.

Fleet utilisation

When it comes to fleet utilisation, the theoretical optimum is where every vessel carries the maximum cargo for all of its voyages and has the least non-productive or idle time.

But offshore vessels should not expect to be continually occupied. A 50 per cent nonproductive time does not mean that half of the fleet could be released, Mr Dianoux says. But it may mean logistic flow can be improved.

Opsealog is also helping companies maintain contract performance. For example, the contract may include a required number of maintenance days, and the software can check these are being done.

Considering emissions as part of ship design

It is possible to go much further to consider vessel emissions at the time of designing the ship, including data from existing vessels, making digital twins, and considering future alternative fuels. Deltamarin explained

Considering fuel consumption as part of vessel design is not new, but today's designers are going further with it.

Deltamarin, a Finnish ship design and offshore engineering company, is developing a new design discipline, which it calls "energy engineering", which treats energy systems and emissions as core design parameters.

"This is a new era, one where energy and design are inseparable," says Mia Elg, R&D Manager at Deltamarin.

Deltamarin aims to incorporate real-world data from existing vessels into their modelling processes. This helps ensure that each new build or reflects real usage patterns.

Data taken into consideration includes voyage profiles, loading conditions, fuel use, propulsion demand, and onboard electrical loads.

This data is often provided by owners. Otherwise, Deltamarin builds an "operational profile" using satellite tracking data.

It is about building a complete picture of how the ship behaves in real life", she says.

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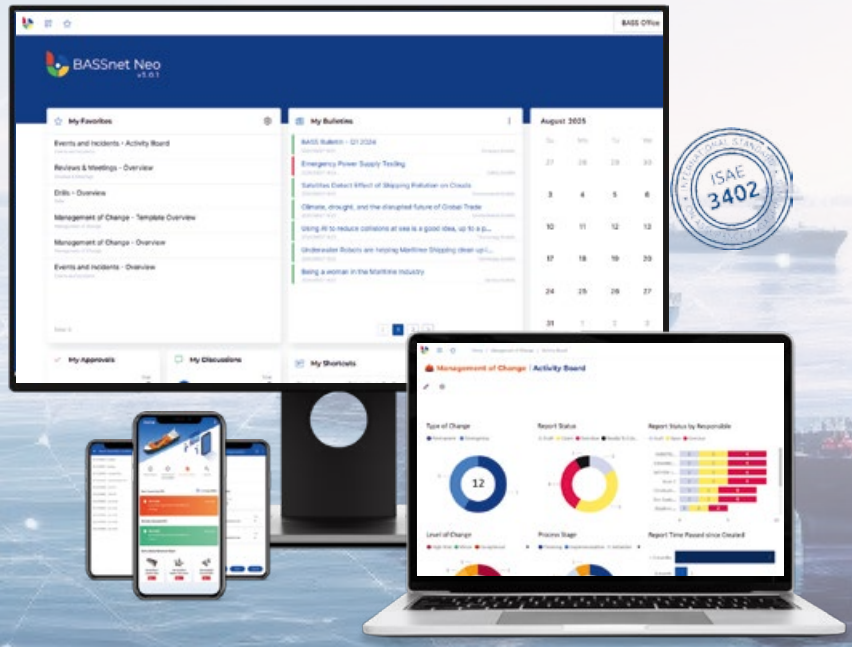

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Mia Elg, R&D Manager at Deltamarin

Hurtigruten

Deltamarin worked together with cruise company Höegh Autoliners, in the design of its "Aurora Class" vessels, in this way.

"Höegh Autoliners approached us not just to design a new ship, but to evaluate what it would mean for their whole fleet", she said.

Deltamarin calculated the expected carbon intensity of its new designs, using a combination of real operational data from Höegh Autoliners existing ships and simulation modelling of the future Aurora Class vessels. It simulated how the vessels would operate on typical routes, including their energy use and emissions.

"It gave Höegh Autoliners a clear picture of how the Aurora Class would improve their overall carbon profile", she says.

Balancing goals

Modern vessel design must now balance performance, operational efficiency, economic feasibility, and regulatory compliance.

Deltamarin does this through simulation and lifecycle cost modelling, giving clients the tools to make decisions with long-term impact in mind.

"We're not just simulating energy usage. We are looking at carbon tax implications, emissions trading, and futureproofing", she said.

"Our models can project a vessel's emissions over decades and show how different fuel choices or system configurations affect the total cost of ownership."

Deltamarin also performs lifecycle assessments, considering carbon footprint of materials, construction, and electricity sourcing, to help owners compare different options.

Digital twins

Deltamarin's process involves digital prototypes, with detailed, simulated models of a ship's entire energy system.

"We simulate the vessel's performance under realistic conditions: how much energy it uses, how efficient the systems are, what the emissions look like", she says.

"These are not digital twins in the strictest sense, because the vessel has not been built yet. But they are robust digital representations that let us test ideas, evaluate technologies, and optimise design choices very early on."

It allows vessel owners to see what their ship will look like and how it performs under certain conditions.

Future fuels

Future fuels have become a major design consideration, she said.

Each fuel brings its own technical challenges, from storage size and tank configuration, to ventilation, heat management, and safety requirements.

When vessels require larger fuel tanks to go the same distance, that has an impact on vessel layout, cargo capacity and range.

"It is not just a machinery question. It is about the whole ship, how it stores, uses, and recovers energy and how safe it is," she said.

With many future fuels not yet available to use, Deltamarin often designs vessels to be future fuel ready. Their vessels are designed to accommodate future upgrades without major structural changes.

"That can mean reserving space, preparing utility connections, or designing safety systems in advance", said Ms Elg. "It is more costly upfront, but much cheaper than retrofitting later".

Deltamarin follows a hazard identification (HAZID) and hazard and operability (HAZOP) process to evaluate every system design from a functional and safety-first perspective.

"When you introduce new technologies, you often have to interpret or challenge them based on the functionality and risk", she said.

"Just following today's IMO rules is not enough. Companies need to understand what your carbon intensity means in terms of long-term commercial and environmental viability."

Alfa Laval's new ballast management system PureBallast 3 Ultra

Alfa Laval has launched the "PureBallast 3 Ultra" ballast water management system, designed to be easier to install, easier to operate, better at dealing with sediment rich water, and more energy efficient

Alfa Laval has launched a new ballast water management system perfectly suitable for tankers, "PureBallast 3 Ultra." The first deliveries will be made in Q3 of 2025. It uses UV light to kill organisms or render them unable to reproduce combined with filtration to remove larger organisms.

It can take ballast water flows between 32 and 3000 cubic metres an hour, so is suitable for most vessel types

It promises to be easier for shipyards to install, being supplied in modular form.

The installation is also simplified by the integration of the Cleaning-In-Place (CIP) unit and pressure monitoring device into the UV reactor module.

It is supplied ready to connect to the internet, for remote monitoring and troubleshooting as well as supporting in the automated VGP reporting required by the US Coast Guard

Tobias Döscher, Head of Global Sales, Business Development and Marketing with Alfa Laval's PureBallast business

The UV system is designed to only draw the energy which is needed for the current flowrate and water quality, allowing for up to 50% reduced power consumption. Shipowners are increasingly interested in system energy consumption, as it is included in the CII calculation.

It is designed to be easier to operate by crew, with a simple touch display with buttons to "ballast," "deballast," "stop."

People who had never run a ballast system before were able to use it "without any introduction," says Tobias Döscher, Head of Global Sales, Business Development and Marketing with Alfa Laval's PureBallast business. They were for instance able to test it out at Alfa Laval's test and training centre in Istanbul.

PureBallast is seeing its biggest sales from tankers, container ships, gas carriers and multi-purpose vessels, Mr Döscher says.

Changing BWMS market

The ballast water management system (BWMS) market looks very different today compared to the peak of the retrofit market, where there were about fifty type-approved suppliers. Around 30,000 vessels needed systems installed by September 2024.

But now many suppliers have exited the market, and many shipowners are finding themselves with equipment which is no longer properly supported or may not be working properly, Alfa Laval says.

Already, Alfa Laval has replaced more than three hundred systems from over thirty manufacturers.

As a specialist in many types of maritime equipment, Alfa Laval has "hundreds" of service engineers around the world who can support a shipowner with a problem. "If you have a problem with [your BWMS] you need a partner who is locally available, who reacts fast, has spare parts in a short period of time," Mr Döscher says.

Alfa Laval offers a free service to send its experts onboard vessels and assess the systems they currently have, to see how it can be best replaced.

But the biggest focus is now on the newbuilding market, with 2,500 new vessels every year that need systems, of which 90 per cent are built in China, South Korea and Japan.

Energy efficient UV reactors

Another factor which was improved was the UV reactor, to make it more energy efficient, and improve the company's CII score.

The PureBallast UV reactor has a specially designed quartz lamp sleeve, which transmits light over an extended wavelength spectrum. So, there is more UV light going into the water for the same energy consumption.

The reactor is designed to create high turbulence in the water, which means that more value can be made from the UV light.

There is an automatic power management system. In many situations, power consumption can be reduced to 50 per cent of the maximum, but with maximum power available for challenging waters.

The reactors are made available in eight different sizes, so it is easier for companies to match the system size to their ballast pump size. This means the system uses only enough energy to treat the water delivered by the pump through the UV reactor.

Peter Nordström, head of R&D department for PureBallast.

UV vs EC

PureBallast 3 Ultra uses ultraviolet light (UV) rather than electro-generated chemicals (EC) to neutralize the organisms.

The company cites research made by Mevlüt Yılmaz as part of a Master's thesis at Istanbul Technical University in Turkey, where ship going personnel with experience of both UV and electrochemical type ballast water management systems were asked what they prefer.

The study interviewed fifty seafarers (24 deck and 26 engine) working for the same company on six different tankers, of which two had electrochemical BWMS and four had UV based systems (manufacturer was not disclosed).

Of the deck seafarers, 53 per cent of respondents preferred UV, 13 per cent preferred electrochemical, and 33 per cent said it did not matter.

Of engine department seafarers, 83 per cent preferred UV, 6 per cent preferred electrochemical, and 11 per cent said it did not matter.

The study was published in September 2023 and is available online https://www.researchgate.net/publication/374087663_Evaluation_of_ballast_water_treatment_systems_from_the_perspective_of_expert_seafarers'_ship_experiences.

Shipyards increasingly prefer UV systems, because EC systems require a tank of salt water to be carried onboard in case the vessel needs to ballast in fresh water (such as a river), says Mr Döscher.

The salt is needed to supply sodium and chloride ions, which are used to form sodium hypochlorite, which kills the organisms. The vessel has less cargo carrying capacity, because space is taken up by this tank,

Another reason for shipping companies to prefer UV systems is that the water can be processed equally well on loading and on discharging the water. So, if the water for some reason is not processed properly the first time, you have another opportunity, he says.

A further concern about EC systems, which was raised at the last IMO MEPC meeting by Denmark and Australia, is that the sodium hypochlorite can react further to create nasty chemicals, including bromides and halogenous acids (so-called "disinfection by-products, or "DBPs"), which can be carcinogenic, he says.

This leads ports to have concerns about discharge of treated ballast water in their waters. This would mean ballast water treatment is fixing one problem (invasive species) but creating another.

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