Lloyd's List

# DIGITALISATION UNCOVERED: WHAT'S NEXT FOR SHIPPING?

inmarsat | Research Programme

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# METHODOLOGY

The data collection and analysis was carried out by Informa Engage, on behalf of Inmarsat.

Data was collected from April 8th, through to May 31st, 2020.

Methodology conforms to accepted marketing research methods, practices and procedures

On April 8th, 2020, Maritime Intelligence emailed invitations to participate in an online survey to members of the Lloyd's List Intelligence database.

By May 31st, 2020, Informa Engage had received 368 survey responses, and delivered the results and analysis.

Only respondents who had a role in the purchase and application usage of digital solutions qualified to participate in the survey.

**INFORMA ENGAGE HAD RECEIVED 368 SURVEY RESPONSES, AND DELIVERED THE RESULTS AND ANALYSIS**

## Responsive motivation

To encourage a prompt response and increase the response rate overall, a live link to the survey was included in the email invitation to route respondents directly to the online survey. Banner ads and appcues were also placed on the individual product websites.

The invitations and survey were branded with the Lloyd's List Intelligence and Inmarsat names and logos, in an effort to capitalise on user affinity for these valued brands.

Each respondent was afforded the opportunity to enter a draw for one of four €/$/£100 Amazon gift vouchers.

Follow-up email invitations were sent to nonrespondents.
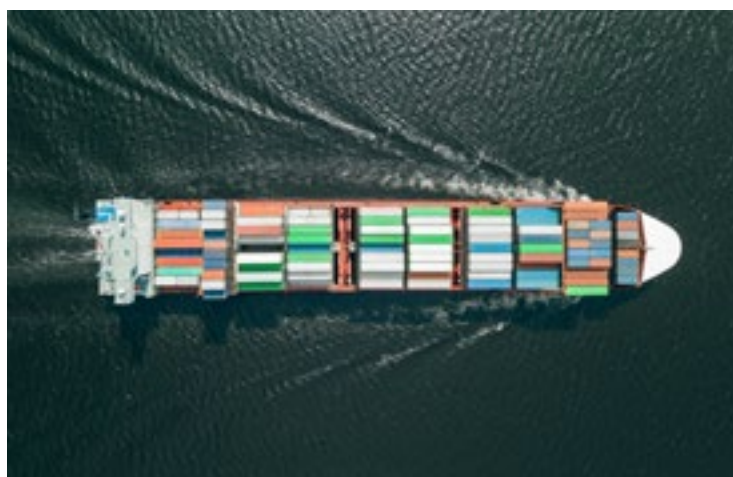
# EXECUTIVE SUMMARY

**Digitalisation Uncovered** captures insights from shipowners and ship managers in a period of technology transition. Increasing commitment to IoT-enabled solutions and a broadening range of applications in use signal a clear acceleration in maritime digitalisation, but challenges remain.

Drawing on responses to a survey conducted in May 2020, the report sees owners/managers giving their primary drivers for digitalisation as cost reduction and operational efficiencies (Top 3 ranking, 71% of respondents), followed by regulatory compliance (Top 3: 60%).

In the case of compliance, the frequency with which owners/managers select digital safety management/incident reporting and cybersecurity solutions *(p28)* aligns with IMO 2021 requirements to enhance reporting under the revised  ISM Code.

Seven out of ten owners/managers specify cost control as a top 3 concern. Overall, vessel performance monitoring and fuel optimisation/monitoring were the most widely deployed solutions, with engine performance monitoring and analysis, and emissions monitoring, not far behind. Looking ahead, 83% of those planning to deploy more Fleet & Vessel performance solutions want to deploy fuel optimisation and fuel monitoring applications within 24 months.

The findings also point to a rapidly increasing need to get data off a vessel in real-time as opposed to using more manual methods such as noon reports; high frequency data delivery supports more meaningful insights and creates the potential for greater savings.

Digital navigation solutions proved to be a close second, accounting for between one fifth and one quarter of the applications deployed or under test *(p4).* "Respondents who have deployed or tested Navigation applications were most likely to have deployed weather information (81% use it fleet-wide or commercially on some ships), followed by ECDIS updates (77%) and route optimisation (71%). Within two years, demand for route optimisation (79%) would equal weather information (79%), with new ECDIS implementations at 78%.

Of the respondents willing to quantify (80%), 91% said they expected some kind of saving - ranging from marginal (1-5%) to substantial (*see p16*). Of those talking hard cash, 49% estimated savings upwards of $1m, with 15% predicting savings of $10m or more.

Despite these encouraging findings on digital adoption, where owners and managers were asked to identify challenges to implementation, 37% of 186 respondents included 'lack of or little evidence of value for money' as a 'top 3' reason.

However, it is also fair to note that only 6% of respondents suggested that they felt so challenged because their "existing systems are good enough", while the linked issues of lack of data standardisation (27%) and disjointed data and systems (27%) were counted separately. Other reasons for resistance were identified as expectations of a risk of cyber attack and lack of staff training.

Evidence from **Digitalisation Uncovered** nonetheless identifies the direction of travel. Today, 42% of respondents use five or fewer applications on board, while 42% use 5-10. In 24 months, only 25% of respondents expect to be using 1-5 applications, with 38% expecting to use 5-10 and 28% envisaging 11-30.

In the same way, while 59% of owners/managers expected to spend less than $500,000 on digital solutions within the next 12 months, that figure falls back to 37% 24 months later, with the number expecting to spend $500,000-$1m rising from 16% to 31%. Beyond 24 months, 22% of respondents predict spending $1m-$3m on digital solutions.

If there are changes occurring in demand patterns, the same can be said for supply. With big data, AI and IoT sensors seen as delivering the largest digitalisation benefits, 66% of respondents were using solutions from existing OEMs and suppliers *(p39)*. However, 40% were using smaller, innovative companies, while 36% were co-creating or entering partnerships with early stage companies. Many owners and managers also said they were likely (29%) or very likely (19%) to work with a start-up within 12 months *(p40)*.

Where the current report is concerned, crew training and management appeared as the most important digital application for fleet-wide adoption among owner/manager respondents with a focus on crew matters.

However, it should be acknowledged that Covid-19 has prompted a significant increase in the use of video-based connectivity by crew, for social and welfare reasons. It is highly likely that repeating the research behind **Digitalisation Uncovered** over the next few months would find far more than 17% of respondents identifying crew welfare issues as a top 3 driver for digital adoption *(p15)*.

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# Digitalisation in real time

*Developments in wider society mean there is no going back for the maritime industries' digital revolution, says Ronald Spithout, Inmarsat Maritime President*



## Ronald Spithout
### President
## Inmarsat Maritime

There has been no escaping the maritime impact of Covid-19 during 2020 but it is also fair to acknowledge that connectivity, digitalisation and the IoT have provided critical support for shipping as a whole and the people who work in it at a time of need.

With crew travel restrictions leaving hundreds of thousands of seafarers 'stranded' at sea on extended contracts, connectivity to loved ones, colleagues and the world outside has proved to be a necessity for well-being. In direct response, Inmarsat introduced a series of crew calling discounts through the height of the crisis.

However, with more than 40 years of serving the maritime market worldwide and over 160,000 vessels relying on our satellite communications in some way, it is fair for Inmarsat to take a longer view.

The profound shift in attitudes seen across society as 'working from home' which became routine is also accelerating a maritime digital journey that had already covered significant ground and is highlighted in this report with significant proof points. In the space of just three months at the height of the first wave of the pandemic (March to June 2020), Inmarsat logged average daily data consumption by merchant ships using Fleet Xpress increasing from 4gb per day to 6gb per day, driven by an increase in both crew usage and the need for remote applications.

At the same time, other aspects of digitalisation have come of age as we have seen a rapid growth in the applications and digital solutions highlighted in this report. For example, together with healthcare specialist Vikand and software developer FrontM, Inmarsat developed a free of charge Covid-19 video call advisory service, whose uptake by around 1,200 vessels suggests shipping may be ready to embrace telemedicine as never before.
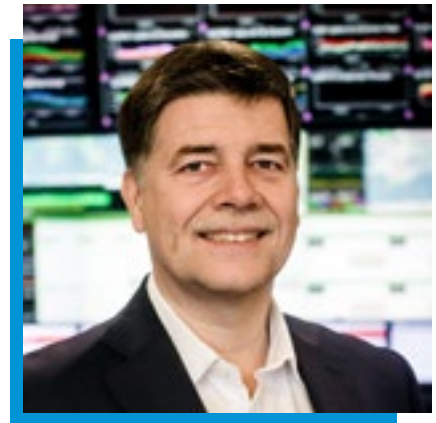
Going forward, the change in attitude is likely to be reflected in expectations of continuous connectivity on all types of vessels, while it is reasonable to expect video conferencing to be widely adopted on ships of all types for training, surveillance and crew connectivity.

But to reach its full potential, the shift in attitudes will need continuous support, investment and financially robust service providers. For its part, Inmarsat has developed a roadmap for enablement through its investment in the Global Xpress satellite network, its Fleet Data IoT platform, its Certified Application Provider programme, and Fleet Secure cyber protection. These and other parts of the Inmarsat service portfolio have been helping to shape the digitalisation that benefits ship safety and cost efficiency, the environment and crew welfare. With its ability to separate passenger internet access from business channels, the new 'Fleet Hotspot' wi-fi portal supporting Crew Xpress also represents a step change in seafarer connectivity.

Before Covid-19, a survey of 125 shipowners showed 51% citing difficulties in getting data off ships in real-time as their biggest obstacle to IoT adoption. Accordingly, Inmarsat is also ramping up its enablement efforts further and, more importantly, working in collaboration with an ecosystem of partners to provide digital solutions in real-time.

Exemplary is its active involvement in encouraging start-ups, most recently symbolised in an initiative with Shell Shipping and Maritime and consultancy Thetius to launch an 'Open Innovation Challenge' to incentivise solutions that help seafarers' safety, health and mental wellbeing.

In another development, Inmarsat will soon deploy Fleet Xpress in combination with 'server virtualisation', opening the way for applications to be stored onboard so that data rich packages can be deployed without having to send excess data by satellite. With its debut due in the offshore space, where data consumption is high, shipboard IT expertise can be scarce and the need to 'do more for less' is pressing, server virtualisation will be especially effective in delivering the full benefits of digitalisation to smaller vessels.

Inmarsat is also investing heavily in shipping's digital future. Its GX5 satellite will be in service before the end of 2020 to offer enhanced Fleet Xpress coverage in the Mediterranean and Northern Europe, for example. By the end of 2023, the GX network will have expanded to 12 satellites, including new generation satellites that can aim additional capacity at areas of sea, ship clusters or even individual ships if necessary to ensure that vessel data demand is met.

I hope you enjoy this report and would like to thank *Lloyd's List* and Informa Engage for carrying out the extensive survey, research and analysis that uncovers the truth of digitalisation in the maritime industry and how it will develop in the next few years.

**Ronald Spithout,** President, **Inmarsat Maritime** •

# CORE RESPONSIBILITY & VESSEL TYPE:
## TESTING/DEPLOYING DIGITAL APPLICATIONS – PRESENT

### Presently Testing/Deploying Applications

**Question:** In which of the following business areas is your organisation presently testing / deploying digital applications, and in which areas are they planning to deploy applications in the future?

| | Ship Owner /Manager | Ship owners | Ship managers | Tanker ships | Container ships | Bulk carriers | Passenger ships | Offshore ships | Fishing vessels | Gas carriers |
|---|---|---|---|---|---|---|---|---|---|---|
| Crewing / crew welfare | 18% | 17% | 19% | 16% | 14% | 14% | 14% | 15% | 14% | 15% |
| Insurance | 7% | 5% | 8% | 7% | 9% | 9% | 13% | 11% | 16% | 9% |
| Other fleet operations | 14% | 14% | 14% | 13% | 12% | 15% | 12% | 14% | 14% | 11% |
| Risk and safety management | 18% | 19% | 17% | 19% | 19% | 19% | 18% | 19% | 19% | 20% |
| Fleet and vessel performance | 23% | 24% | 22% | 24% | 23% | 23% | 19% | 22% | 18% | 23% |
| Navigation | 21% | 21% | 20% | 21% | 23% | 20% | 25% | 20% | 20% | 22% |

**Legend:**
- Crewing / crew welfare
- Insurance
- Other fleet operations
- Risk and safety management
- Fleet and vessel performance
- Navigation
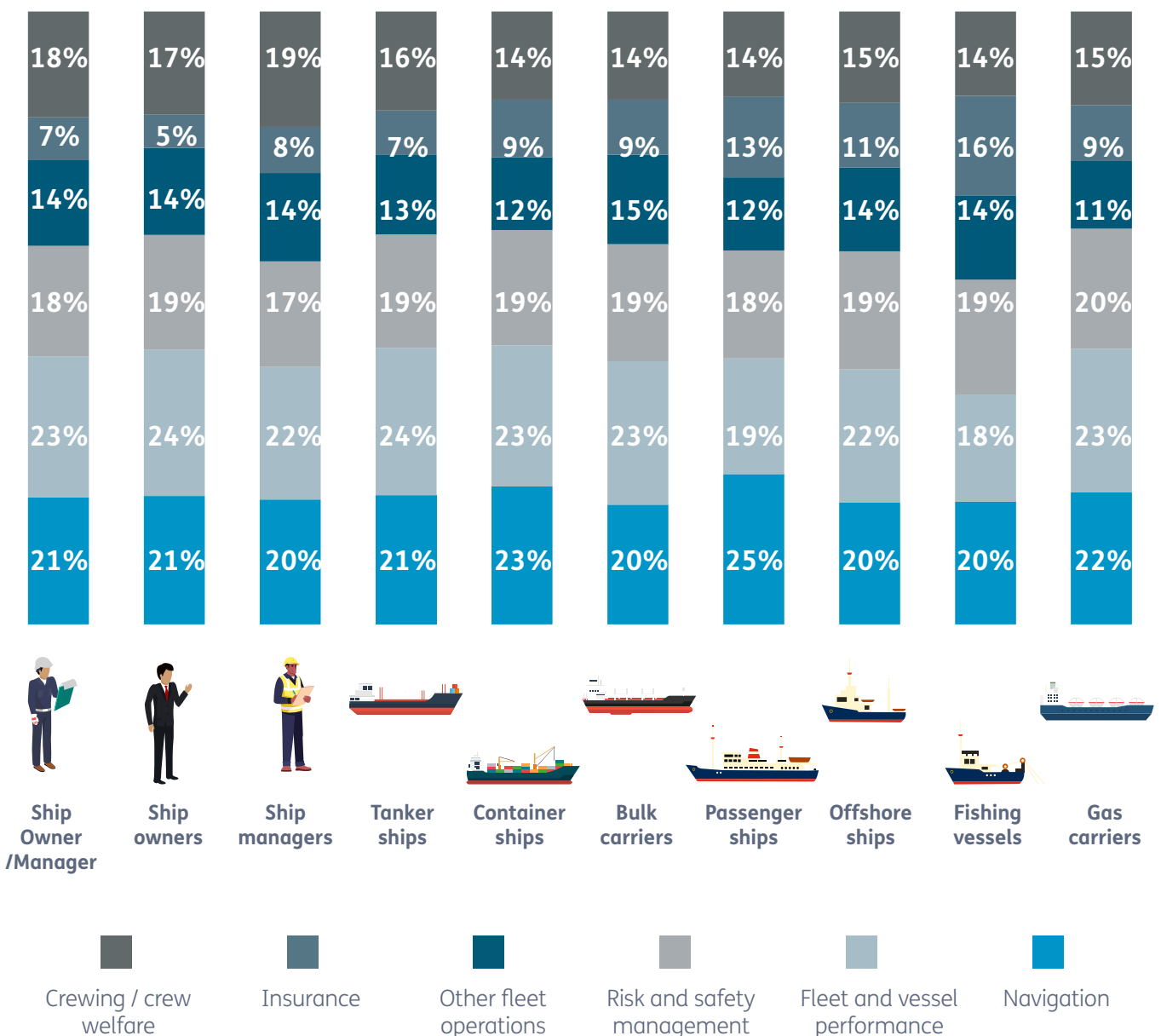
Base: All respondents - Present testing / deploying; multiple answers permitted (Ship Owner/Manager= 629 / Ship Owner=310 / Ship Manager=319 / Tanker Ships=470 / Container Ships=404 / Bulk Carriers=445 / Passenger Ships=159 / Offshore Ships=161 / Fishing Vessels=80 / Gas Carriers=209). Note: Testing/deployment digital application percentage calculations are based on the individual vessel type or the individual core company responsibility.

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# CORE RESPONSIBILITY & VESSEL TYPE:
## TESTING/DEPLOYING DIGITAL APPLICATIONS – FUTURE

### Future Implementations of Additional or New Applications

**Question:** In which of the following business areas is your organisation presently testing / deploying digital applications, and in which areas are they planning to deploy applications in the future?
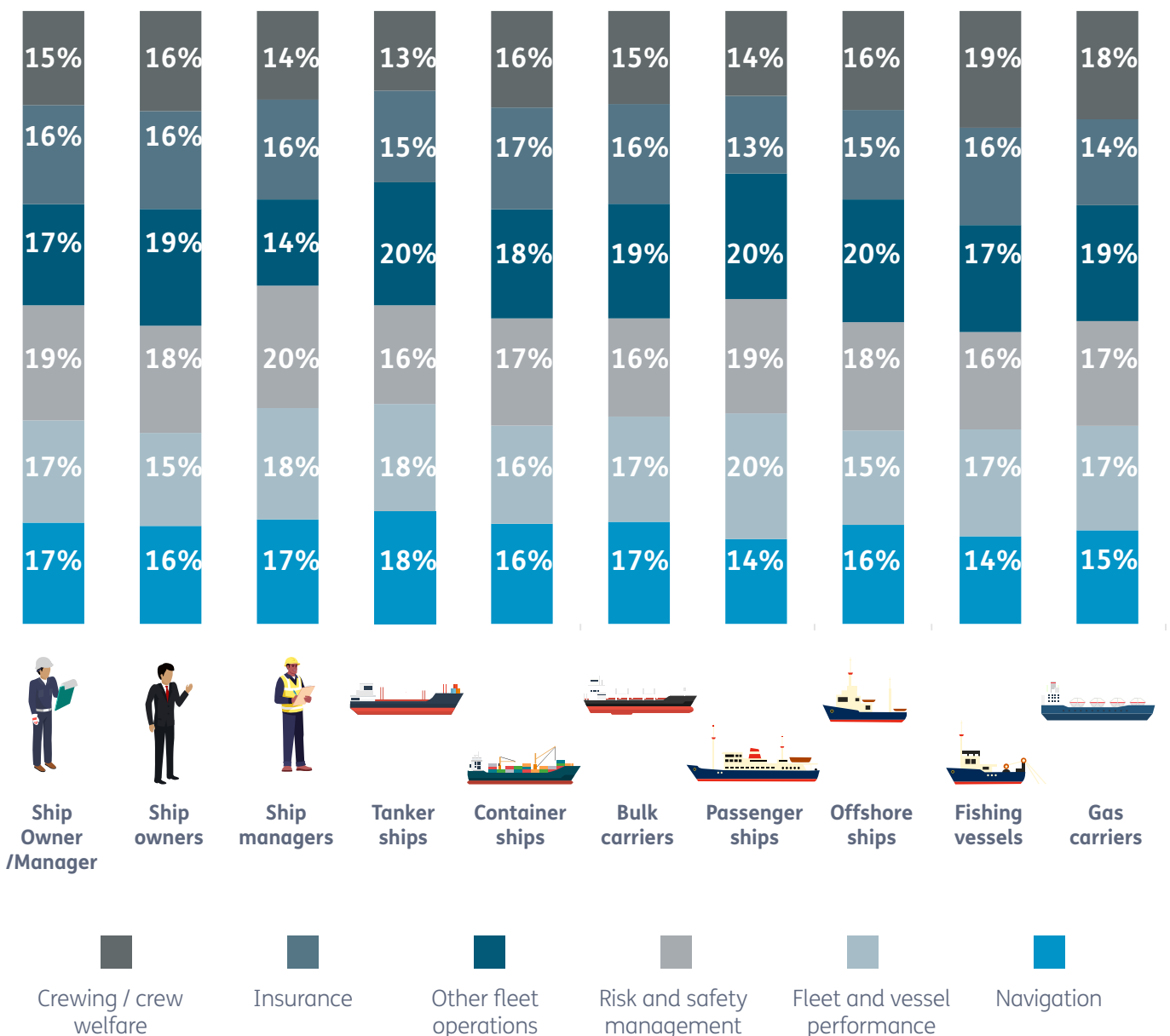
| | Ship Owner /Manager | Ship owners | Ship managers | Tanker ships | Container ships | Bulk carriers | Passenger ships | Offshore ships | Fishing vessels | Gas carriers |
|---|---|---|---|---|---|---|---|---|---|---|
| Crewing / crew welfare | 15% | 16% | 14% | 13% | 16% | 15% | 14% | 16% | 19% | 18% |
| Insurance | 16% | 16% | 16% | 15% | 17% | 16% | 13% | 15% | 16% | 14% |
| Other fleet operations | 17% | 19% | 14% | 20% | 18% | 19% | 20% | 20% | 17% | 19% |
| Risk and safety management | 19% | 18% | 20% | 16% | 17% | 16% | 19% | 18% | 16% | 17% |
| Fleet and vessel performance | 17% | 15% | 18% | 18% | 16% | 17% | 20% | 15% | 17% | 17% |
| Navigation | 17% | 16% | 17% | 18% | 16% | 17% | 14% | 16% | 14% | 15% |

**Legend:** Crewing / crew welfare · Insurance · Other fleet operations · Risk and safety management · Fleet and vessel performance · Navigation

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# Swedish shipowner spins off digital platform to the benefit of the wider shipping industry



**Eric Hånell**
CEO
**Stena Bulk**

Stena Bulk is a major player in tanker and gas shipping, with 35 vessels under ownership and between 70 and 80 vessels under charter at any one time. It has also been a major player in digital technology since 2016, when its IT team created the Orbit digital platform.

The platform was developed to optimise vessel operations and reduce the company's dependency on brokers. Orbit has been so successful that the platform has been spun off as an independent company, OrbitMI.

"OrbitMI is now being sold to other shipowners, and there is great interest from agents and oil companies," says Stena Bulk CEO Eric Hånell.

He believes the platform, which allows Stena to follow the

who only invest in technology when they have to; the mid-level is those who follow everyone else; the highest level is those out in front."

Mr Hånell acknowledges that owners in the highest category have to pay out but they get the benefits of new development.

OrbitMI draws on commercial and technical data to optimise vessel performance and manage energy consumption. Over two years, fuel efficiency has been improved by 20%, translating to 30,000 tonnes of fuel oil saved, and a reduction of $CO_2$ emissions of 100,000 tonnes. Financially that's a saving of $15M.

It allows Stena Bulk to plan and operate its fleet with great attention to detail, and to follow the market and its competitors

tankers and it's a Stena Bulk requirement. "It has been very easy."

The change over five years has been dramatic. In 2015, the tools available were limited. Talk of digital tech was new for everyone, and there was a reluctance to share information.

The biggest challenge was that digital systems were not coordinated, so crews were reporting the same information in many different ways. The

## We try to put ourselves at the forefront of technology, and we are not afraid to share information. You have to get past that hurdle.

movements not only of its own ships but up to 8,000 tankers via their AIS feed, was developed at the right moment.

"There has been a real change of attitude. Everyone now realises you can't be left behind."

He outlines the three levels of shipowner engagement: the lowest level encompasses those

more closely. OrbitMI enables a more sustainable operation while remaining commercially driven.

All Stena Bulk's ships report into the OrbitMI platform, which is integrated into the company's financial system. It has not been difficult to upgrade chartered vessels because, Mr Hånell says, Stena only takes high quality

process was repetitive and time consuming.

"Today, ships must share their AIS data: it's a regulation. A lot of information is open, and we can see what any vessel is doing – including speed and performance," says Mr Hånell.

As a result of the change in understanding and attitude, it has

become harder for shipowners to charter out a ship if they won't share data.

A significant contributory factor to this change of attitude is the openness to new ideas in Sweden and its north European neighbours. Digital technology now drives manufacturing, retail and land transportation, and is embedded in the home.

"Sweden is receptive; it's the culture we are in. We try to put ourselves at the forefront of technology, and we are not afraid to share information. You have to get past that hurdle."

Eric Hånell believes shipping will see further dramatic change over the coming five years. Digital technology will sweep away the need for routine work carried out by ships' crews, while control over systems will become much easier. So, there will inevitably be a reduction in the number of seafarers.

"Efficiency will increase even further with artificial intelligence helping to track down what's not working correctly. We will be pushed into stricter and more accurate reporting by the needs of the environment. And we'll be watching the developments undertaken by shore-side transportation, which moves a lot faster in digital technology than shipping."

This will require new skills across the maritime sector – more high-tech than today. These skills will be required in both the commercial and technical sides, and will be drawn from different backgrounds. "Traditional ship and shore employees won't disappear, but they will have to adapt to new ways of thinking," says Mr Hånell.

Stena Bulk moved its OrbitMI business away from Sweden to New York to sit alongside North America's largest maritime cluster and access the potential of one of the best places to build a technology company. The most critical task for both Stena Bulk and OrbitMI is to help the market understand how the platform delivers what many other platforms aspire to offer.

"OrbitMI is our baby," Eric Hånell concludes. "That's the tool we are using. There was a little slowdown for the coronavirus, but we are up and running again."

# Progressive shipowners embrace digitalisation, but most owners remain on the side-lines

Making digitalisation a reality remains a challenge. However, although it's a relatively new challenge for maritime, it was first addressed in the retail sector 20 years ago.

Shah Irani, now Chief Technology Officer at Hong Kong-headquartered Fleet Management, worked in digital technology at the UK's Tesco and Waitrose retail giants, moving on to Dairy Farm Group in Hong Kong. He believes many of the lessons learned in retail can be transferred to maritime.

There is an increasing call for the development of digital dashboards to enable data to be viewed quickly and easily through a variety of nicely designed visuals.

Mr Irani is unimpressed. "Pretty dashboards are meaningless unless they provide insight to help someone do their job better," he says. "It's not good enough to look good or even look interesting. I need to know how I can use that data." The key is to know how those graphs can improve the work being done.

Joining Tesco as a technology graduate at a moment when the retailer had secured top slot nationally, Mr Irani sat in one-to-one conversations with members of the board "because they felt that digital was strategically the right thing to do."

Fleet Management was itself early in the digital game with its PARIS (Planning and Reporting Infrastructure for Ships) platform, which enables better connection and closer engagement with their managed ships. But investment in the platform failed to keep pace and rivals have moved ahead. Shah Irani's role is to regain the digital initiative.

"We are behind our competitors, although I sense some are investing in digital tech because it sounds sexy or interesting," he comments. "I don't want Fleet to develop digital solutions for the sake of it. It must make a real difference for shipowners, charterers and seafarers."

Rather than just take an old system and copy it, the process begins by asking Fleet's maritime experts what data would be most beneficial to them. "My preference is to understand the context so we can come up with a good solution. That might be achieved from internal resources but where

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necessary, Fleet will partner with the right external digital providers to respond to the challenges.

Mr Irani's team now has a data scientist onboard to offer deeper insight of the technology. Even so, he is keenly aware that development of the new platform, which is soon to be launched, will require a dedicated person from the vessel operations team sitting alongside the technology experts.

"While it's unlikely the maritime people will be fully aware of all the existing capabilities, the digital people won't know why certain data is needed in a particular format.

"It has to be a collaborative effort. This is an essential part of the digital transformation of companies – bridging the gaps between technology and the rest of the company."

Most of the people in Fleet's offices have worked on ships and shouldn't be expected to understand the technology. Together, they are reaching agreement on what can be developed to improve levels of ship performance efficiency, reduce emissions and heighten safety. Owners and charterers require this from vessel managers.

There has been a shift in the industry towards greater digital engagement as owners source and analyse data to provide performance assessments for charterers. Although real-time data is not always available, historic data can still be used to good effect.

"As ship managers, we want to compare ships on specific trades and within fleets to identify why certain ships perform less well than others, and to make recommendations accordingly. Meanwhile, charterers have been using performance data from ships previously chartered to determine future contracts. Usually they accept only the best performers."

## Shah Irani
Chief Technology Officer
**Fleet Management**

*While it's unlikely the maritime people will be fully aware of all the existing capabilities, the digital people won't know why certain data is needed in a particular format. It has to be a collaborative effort*

And while progressive shipowners have embraced digitalisation in maritime by pushing sensor data and trialling new initiatives, the majority are watching, waiting and, as necessary, complying. But it's the least-engaged that require the biggest push.

[Some owners] "pay for a minimum broadband connection that allows email but don't want to invest any further. One-third of our managed fleet has poor connectivity, which makes managing our IT quite difficult." For these ships, transferring data between ship and shore can be cumbersome.

Fleet is advising its owners that regulation mandates a minimum standard to operate with, however some customers haven't grasped the benefits of digitalisation. "This data will allow us to manage your cyber security risk and help us to run your ship better," he urges. The message is proving slow to get across.

In the short term, Shah Irani predicts a gradual shift to the next level of maturity with the widespread acceptance of sensor data, dashboards and trust in data and data models. "I have looked at potential innovation ideas such as Artificial Intelligence," he concludes. "That's a little too far. Our people are not ready for it and the technology is not quite there."●

# SHIP OWNER/MANAGER: VESSELS OWNED/MANAGED

Among those vessel types included in the survey, fleet ownership/management is the largest for tanker ships, followed by bulk carriers and containers.

## Ship Owner/Manager

**Question: How many of the following types of vessel does your organisation own/manage?**

| 42% | 39% | 33% | 17% | 12% | 11% | 2% | 17% |
|---|---|---|---|---|---|---|---|
| Tanker ships | Bulk carriers | Container ships | Gas carriers | Offshore ships | Passenger ships | Fishing vessels | [1]Other |
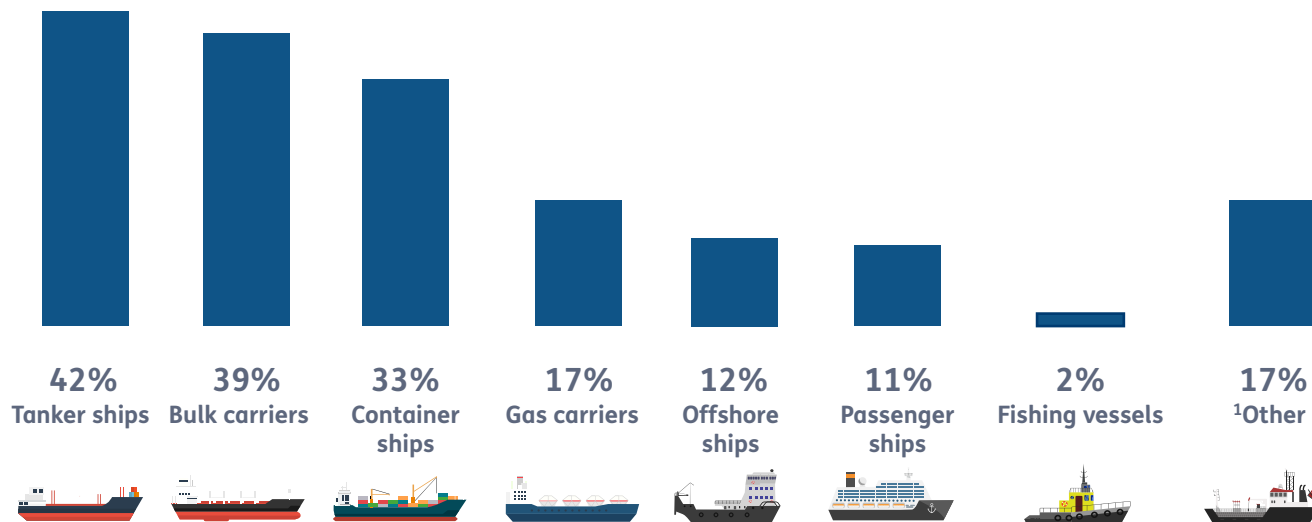
Base: Ship Owners/Managers (N=321). [1]Other includes: Dedicated barges; Fast Security Vessel (FSV); Fpso; Gen. cargo; General Cargo (x2); Harbour tugs; Livestock; LNG FSU; LNGBV; Misc.; MPV (x2); MPV & Ro-ro; Multi purpose ships; PCC (x3); PCTC; Platform Support Vessels; Pleasure; Reefer; Research; Rig; Ro-ro (x4); Ro-ro / Special Purpose; Service vessels; Third Party; Training vessel; Transhippers; Trucks; Tug Boats (x5); Tugboat, agent boat, pontoon, barge, floating crane; Tugs workboats; Tugs/ Dredgers; Under restructuring; yachts (x3).

# SHIP OWNER/MANAGER: CURRENT ROLE

A variety of roles are represented in the sample, most commonly operations (29%).

## Ship Owner/Manager

**Question: Which of the following areas best describes your current role?**

| **29%** | **14%** | **8%** | **7%** | **7%** |
|---------|---------|--------|--------|--------|
| Operations | Technical | Innovation | Safety, Quality & Environmental | Finance |

| **8%** | **2%** | **3%** | **3%** | **3%** | **17%** |
|--------|--------|--------|--------|--------|---------|
| IT | Human Resources & Training | Chartering | Procurement | Crewing | Other[1] |
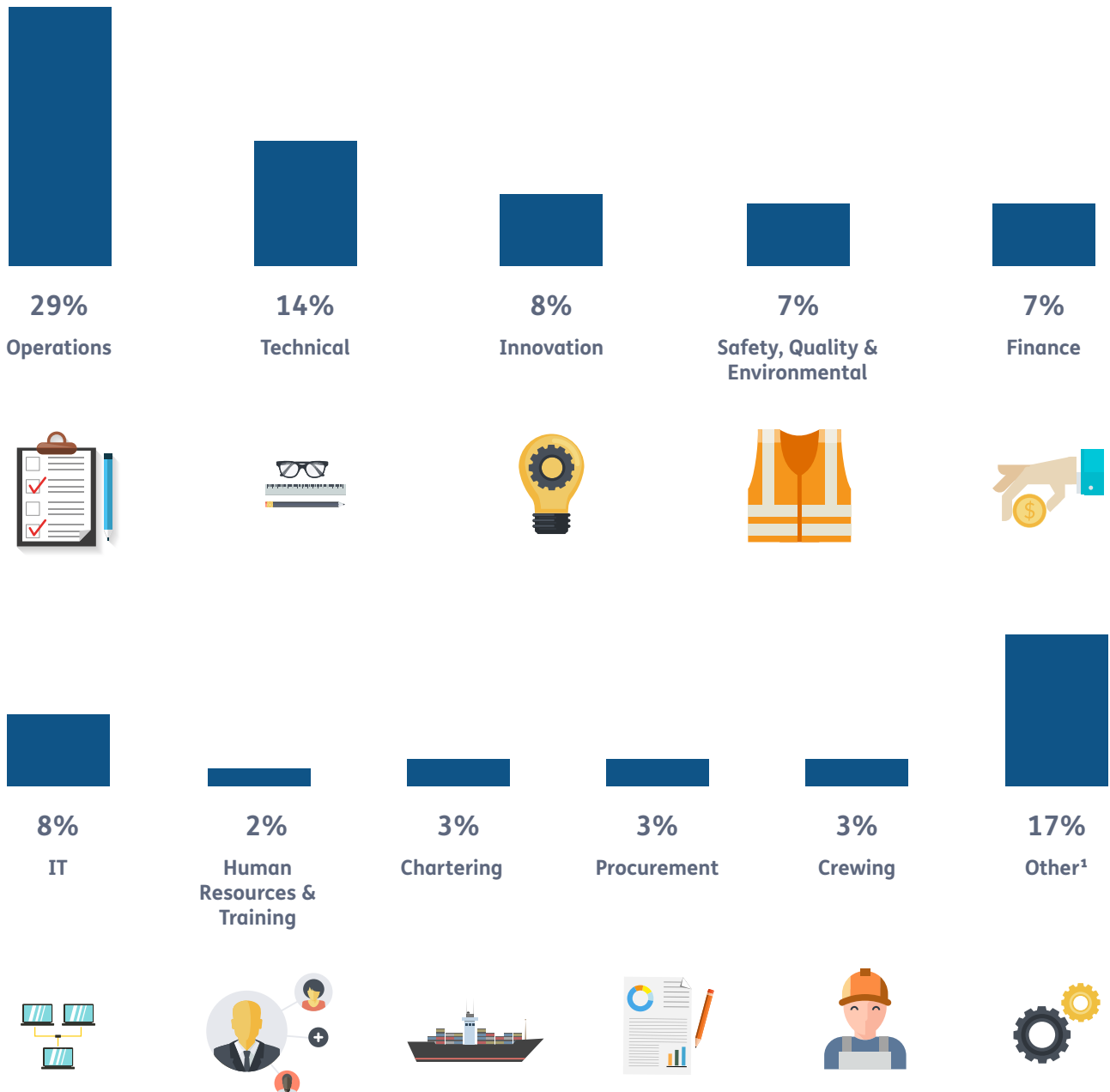
Base: All respondents (n=368). [1]Other includes: Administrative x3; Business Development/Marketing x9; Executive management x23; General Management x10; Healthcare x4; HR, Insurance x2; Legal and compliance x6; MIS; Research and Development x2; Spares.

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# SHIP OWNER/MANAGER:
# OPERATION HEADQUARTERS

Just over half represent companies headquartered in EMEA (60%), while the remaining 40% are divided between APAC (26%) and the Americas (14%).

## Ship Owner/Manager

**Question: In which country is your company currently headquartered?**



| **14%** | **60%** | **26%** |
|---------|---------|---------|
| **Americas** | **EMEA** | **APAC** |
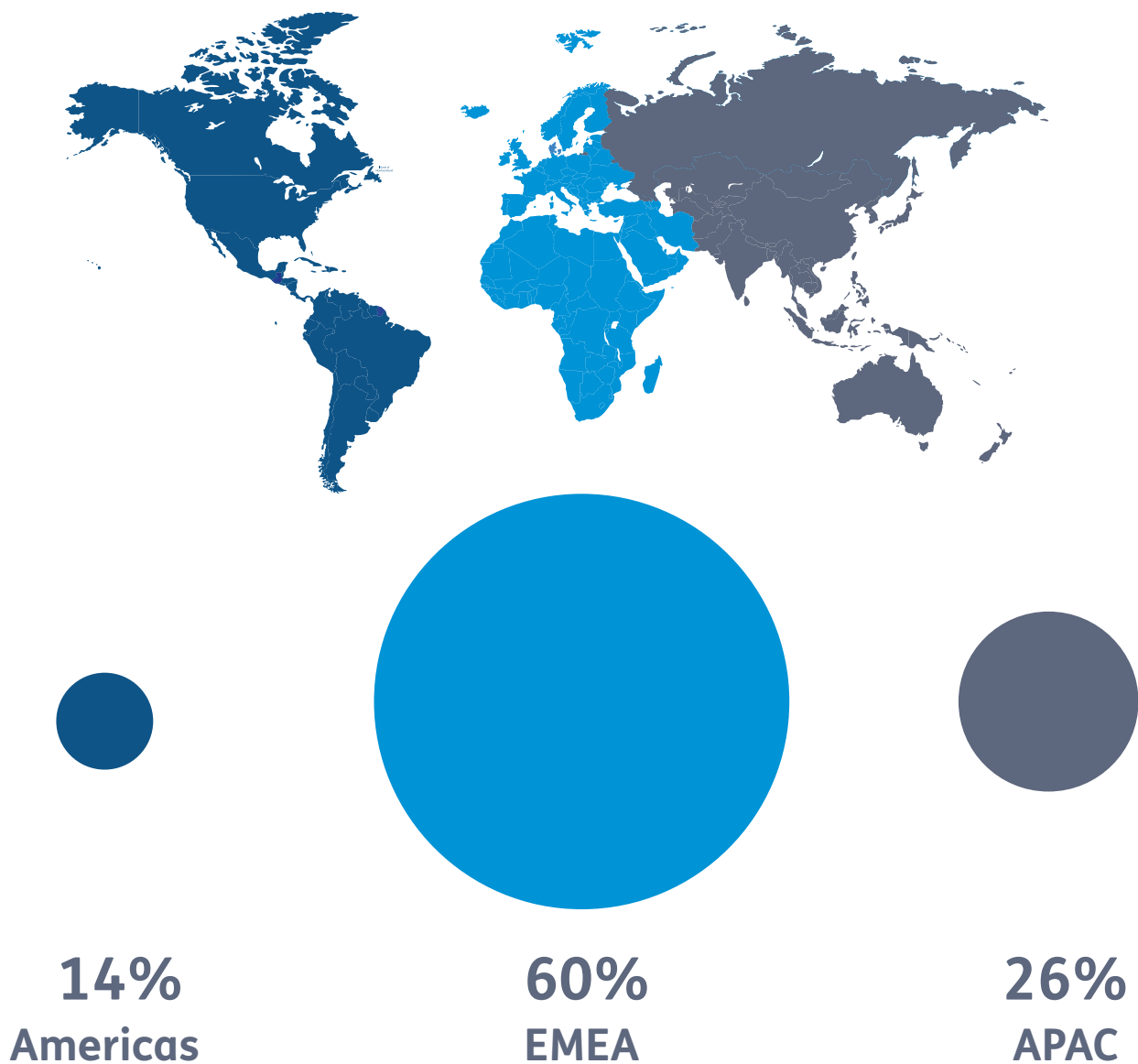
Base: All respondents (n=368).

N.B. - Significant Countries - 12% Greece; 10% USA; 8% UK; 6% Germany; 6% Singapore.

# Critical for modern ships' digital technology to be maintained at highest level



## Imtiaz Shaikh
Chairman
**Tomini Group**

Tomini Shipping owns 13 ships in active trading and recently took delivery of a further two. The company has chartered bulk carriers and tankers for niche trades.

Imtiaz Shaikh, the company's chairman, readily acknowledges the use charterers make of vessel data relating to fuel consumption and performance.

He describes shipping as a business based on a series of indices.

"In the past, every ship was unique to itself: deadweight, speed, consumption. Today it's all standardised. In our sector, there are a thousand ultramaxes that are identical. So, for charterers, the numbers do matter."

Even one extra tonne of consumption means lower charter hire. Shipowners can't hide performance shortcomings as they used to because technology will find them out. "Everybody knows where the ships are, what speed they are doing, and whether they are performing or not.

Charterers analyse this data in minute detail. "There is a 5% margin on prescribed numbers," Mr Shaikh explains, "then there are leeways in respect of weather, currents, etc. The charterer will penalise you if you are out of the agreed range."

There are inevitably slight variations even between identical sister ships from the same year. There is the eternal high consumer and the other ship that always performs well. "It could be the area in which the ship is trading or the weather. There's no rule of thumb. "This makes the settling of disputes a real skill."

Tomini's chartering is handled by partners in Denmark. A daily data record is kept of each ship in case a speed claim is made at the end of a charter. The record also enables Tomini to take advantage of market conditions. A vessel with lower consumption is put onto a voyage charter, with bunkers paid for by the owner, rather than on a time charter, with bunkers paid for by charterers.

"There are a number of criteria that make it mandatory for us to have technically up to date information systems."

The Dubai-based shipowner operates a two-tier fleet. The modern ships are ordered and built to Tomini specifications: the intention is to keep these vessels for their operating life. It's critical to keep the digital technology on these ships to a high level.

There is also a fleet of older vessels Tomini uses to take advantage of market movements. "We bought seven ships in 2016-17 and sold them in 2019. For those ships the technology was not as critical; it didn't justify investing in the best technology on board."

The constant flow of information between Denmark and Dubai is critical. A link is set up between the superintendent responsible for each ship and the individual handling that ship's chartering in Denmark. "It's a constant dialogue. On the internet, all parties have access to the information obtained on a daily basis, so everyone knows their responsibility."

Mr Shaikh's team manages the ships in-house. "To some extent, that's to our detriment – it's all about efficiency, and management has become very specialised. But for me, Tomini is a family business. I'm the fourth generation in shipowning, we have almost 70 years of experience.

"It's critical for me to maintain that long term investment and consistency. As a family we understand shipping to the core."

Imtiaz Shaikh's two sons have

## _Shipowners can't hide performance shortcomings as they used to because technology will find them out_

joined the business, one coming from a shipbroker in London. They have brought the digital natives' understanding of technology. He admits his own understanding of digital tech is not as advanced as his sons'.

"They tell me to improve the communications system, to upgrade the cloud-based ERP (Enterprise Resource Planning) system, invest in the most advanced ECDIS system. Everything to improve performance and communications."

Vessel charterers have become focused on immediate data. "Today they sit at a screen and hedge the risk, either selling or buying futures as the case may be. They minimise the risk, play it safe. In the old days the risks of the venture were very high.●

# Owners and coatings providers collaborate more closely in digital technology

Finding the right hull coating for a vessel's trading pattern can reduce fuel consumption and $CO_2$ emissions by at least 10%, claims Christian Ottosen, who heads the marine division at Hempel, the Copenhagen-headquartered coatings provider.

This is a part, often an overlooked part, of the industry's progress towards increased levels of digitalisation in hull performance management. "We are seeing a much closer collaboration in the value chain with owners and partners," he says.

Digital solutions and detailed analysis of vessel performance data lies at the core of this collaboration.

However, it's not a new initiative. Five years ago, Hempel launched its Systems for Hull and Performance Efficiency (SHAPE) solution. As a first step on the journey, the company's data analysts visit shipowner customers to discuss vessel performance, trading patterns and coatings solutions.

With more than 1,000 ships now under constant monitoring, data already gathered enables useful benchmarking against ships in the same fleet and those operating on the same trade.

As digitalisation has driven a more detailed focus on what data should be gathered, it has also prompted an alteration to the traditional recruitment of chemical engineers by a coating company. Hempel's marine division has taken on a team of naval architects with deep insight into fluid dynamics.

This team works with shipowners to develop the methodology for monitoring. Four naval architects focus solely on this part, enabling the capturing of data. They advise how data can best be collected and analysed.

# "The switch to data-led hull coatings will move very fast in the next five years"

## Christian Ottosen
### Head of Marine Business
## Hempel AS

Even shipowners have now started to recruit their own data experts, Mr Ottosen says.

"The analysts work very closely together. People who understand data should talk with other data experts. They give a kick to further development and the sharing of ideas."

"Part of the discussion revolves around improving the way data is collected and analysed. This should be done at an analyst to analyst level."

Initial data on hull performance is gathered for between six months and a year before drydocking to identify a vessel's actual consumption. That data is sent to Hempel in several ways, including automatic logging or the noon report.

Monitoring over time enables both parties to understand a specific vessel's recent trading patterns and make predictions about future patterns.

"Container ships run on well-known routes: coatings are applied that accommodate both cold northern waters and warmer southern waters. However, for bulk carriers and tankers operating between extremes, or where there are periods spent idling, coatings are required that match this pattern.

"Armed with the likely trading pattern," Christian Ottosen adds, "we can match the right hull coating solution with future trading. Customers might prefer specific coatings for whatever reason, so we sit with them very early on to reach a data sharing agreement. Then we collect the data, analyse it, and report back once a quarter with benchmarking reports."

Because vessel data is commercially sensitive, Hempel's lawyers make Non-Disclosure Agreements with customers' lawyers. Data is never shared between companies. Even benchmarking data has to be generic so that individual ships and companies cannot be identified.

The matching of hull coating with trading pattern to optimise fuel consumption and reduce emissions not only saves shipowners millions of dollars a year but also minimises the ship's carbon footprint. Besides a transition to a reduced-carbon fuel, optimising the hull coating has the largest impact on that footprint, he says.

The choice of the right hull coating would reduce the shipowner's expense of removing biofouling from the hull. "An important part of monitoring is comparing how a vessel performs with how it should perform. A premier self-polishing, anti-fouling coating should stay clean under normal operating conditions. If, however, a vessel has to remain idle for four or five months, an owner might need to clean the hull to activate the self-polishing again.

If selection of the correct hull coating as a result of data analysis can save at least 10% of a ship's fuel consumption, why isn't the message getting across?

Christian Ottosen believes the message is becoming clearer. "There is a trend towards higher performing hull coatings this year. The shipping industry goes in cycles: the balance for owners must be made between investment and operating profit and loss.

"I believe [the switch to data-led hull coatings] will move very fast in the next five years. This will reflect regulations from IMO, the European Union, and so on, and also an increasing commitment from the shipping industry itself."

Hempel invests its R&D resources in developing sustainable coating solutions and has welcomed a closer collaboration with shipowners in digital technology. Christian Ottosen, who has been part of the company's marine and shipping team for the past 10 years, has witnessed the change.

"A hull coating is a win-win: the shipowner saves money and there's a significant impact on the environment. They go hand in hand."

# SHIP OWNER/MANAGER: KEY DRIVERS FOR ADOPTING DIGITAL SOLUTIONS

The primary driver for adopting digital solutions by Ship Owners/Managers is reducing operational costs, creating operational efficiencies ([1]Top 3 Ranking 71%), followed by compliance with regulation and certification requirements ([1]Top 3 Ranking 60%).

**Question: Please select and rank (in order of importance) the key drivers for your organisation in adopting digital solutions. (Select up to 5 key drivers and assign a value/rank from 1 to 5 for each item, where 1 is the most important and 5 is the least important. Value/ranks may not be repeated)**

Top 3 Ranking[1]

| Driver | 1st Rank | 2nd Rank | 3rd Rank | 4th Rank | 5th Rank | Top 3 Ranking[1] |
|---|---|---|---|---|---|---|
| Reducing operational costs, creating operational efficiencies | 30% | 31% | 10% | 13% | 8% | 71% |
| Compliance with regulation and certification requirements | 30% | 12% | 18% | 10% | 10% | 60% |
| Creating better value for customers | 13% | 16% | 16% | 11% | 7% | 45% |
| Improving vessel safety | 14% | 11% | 19% | 17% | 8% | 44% |
| Getting ahead of competition | 3 | 9% | 10% | 13% | 12% | 23% |
| Creating new sources of revenues | 3 | 6% | 8% | 5 | 8% | 18% |
| Supporting crew welfare | 4 | 6% | 7% | 15% | 13% | 16% |
| Own environmental policy | 2 | 3 | 5% | 7% | 12% | 10% |
| Matching what competitors are doing | 3 | 3 | 2 | 7% | | 6% |
| Reducing insurance premiums | 2 | 3 | 3 | 8% | | 3% |

Legend: ■ 1st Rank ■ 2nd Rank ■ 3rd Rank ■ 4th Rank ■ 5th Rank

Base: Ship owners/managers (top 5 answers permitted): (n=261). [1]Top 3 Ranking includes: 1st, 2nd & 3rd.

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# SHIP OWNER/MANAGER: OPERATIONAL COST SAVINGS FROM DIGITAL SOLUTIONS

Approximately 80% of Ship Owner/Manager respondents provided an answer to this question with either a percentage or a currency value; the typical respondent providing a percentage reported an average 11% in cost savings.

**Question: How much are you expecting to save in operating costs over the next 12 months from the adoption of digital solutions?**

## Ship Owner/Manager

**6%**
20% - 29%

**7%**
30% or more

**9%**
None

**30%**
10% - 19%

**19%**
1% - 4%

**30%**
5% - 9%

**7%**
$2.5M - $4.9M

**7%**
$5M - $9.9M

**15%**
$10M or more

**20%**
$1M - $2.49M

**2%**
None

**16%**
Less than $50,000

**8%**
$50,000 - $99,999

**8%**
$500,000 - $999,999

**18%**
$100,000 - $499,999
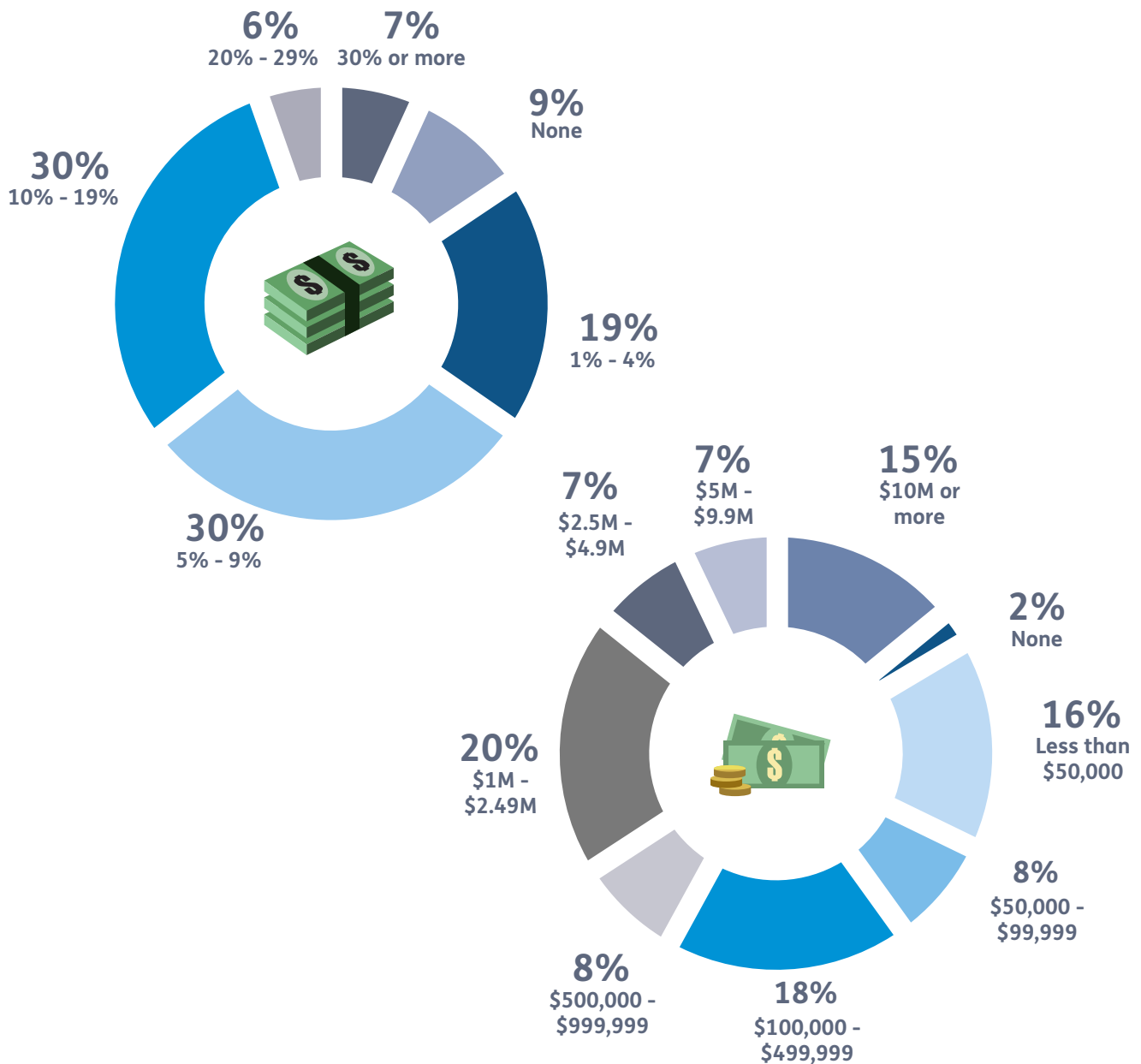
Base: Ship Owner/Manager responses (n=143). Those expressing a % figure (n=54). Those expressing a monetary figure (n=61).

# SHIP OWNER/MANAGER:
## TESTING/DEPLOYING DIGITAL APPLICATIONS – PRESENT & FUTURE

**Question: In which of the following business areas is your organisation presently testing / deploying digital applications, and in which areas are they planning to deploy applications in the future?**

## Digital Applications as Total of All Presently Testing/Deploying[1]

| Fleet & vessel performance | Navigation | Risk & safety management | Other fleet operations | Crewing/ crew welfare | Insurance |
|---|---|---|---|---|---|
| 23% | 21% | 18% | 14% | 18% | 7% |
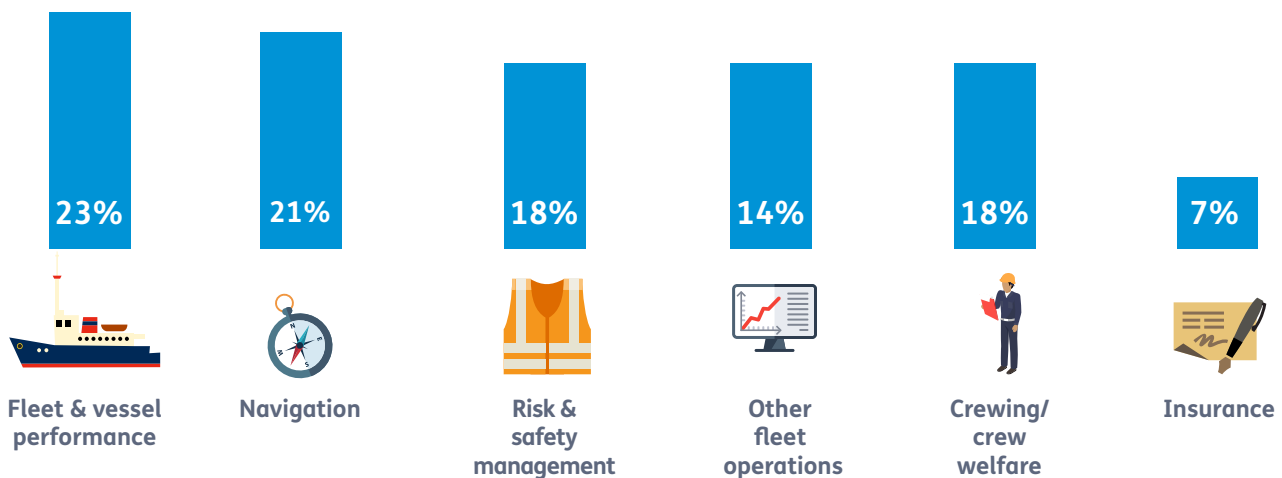
## Digital Applications as Total of All Future Implementation Of Additional / New Applications[1]
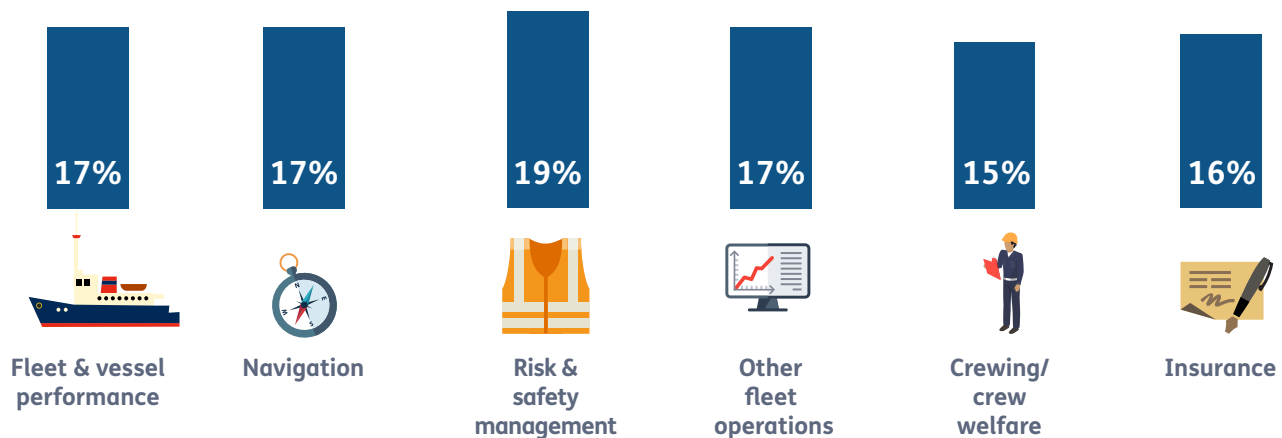
| Fleet & vessel performance | Navigation | Risk & safety management | Other fleet operations | Crewing/ crew welfare | Insurance |
|---|---|---|---|---|---|
| 17% | 17% | 19% | 17% | 15% | 16% |

Base: All respondents - Present testing / deploying; multiple answers permitted (Ship Owner/Manager= 629) / All respondents – Future implementation of additional / new applications; multiple answers permitted (Ship Owner/Manager= 527). [1]N.B. – Calculation: No. of respondent choices per option divided by total no. of choices (n=629 (Ship Owner/Manager - Present) & n=527 (Ship Owner/Manager - Future).

# Digitalisation and a guiding hand towards the autonomous ship

As a master mariner with years of seagoing experience, ABB Marine & Ports Head of Regulatory & Public Affairs Eero Lehtovaara is excited about the impact that digital technologies offer in helping seafarers, raising safety standards, improving efficiency and supporting decision-making both at sea and on shore.

But he is also well aware that the regulatory framework that is required for autonomous operations is lagging behind the innovative technologies developed by ABB and other members of the One Sea alliance, of which he is now Chairman. The 12-member ecosystem includes technology heavyweights such as ABB, Kongsberg, Wärtsilä and Cargotec, as well as maritime satellite service provider Inmarsat..

"We already have the technologies. These have been successfully demonstrated by the sector's digital pioneers over the last three years," says Mr Lehtovaara. "Now we need the regulatory framework both at an international level through the IMO and, for local applications, from flag states. Our ambition is that One Sea will represent automation technology providers as new regulations are drawn up. This is now urgent.

"We also need to be clear what we're talking about," he continues. "There are various levels of autonomy but not everybody understands the differences. As an industry, we must agree the definitions so that One Sea can speak both with authority and with one voice."

Mr Lehtovaara describes a range of achievements in shipping autonomy that are available today through digital technologies. They range from autonomy used in ship operations to support seafarers, improve efficiency and safety, to fully autonomous operation on short repetitive voyages close to shore.

Each one is important in ABB's 'electric, digital, connected' business strategy, Mr Lehtovaara explains. Manned autonomous systems could be adopted in both coastal and deep-sea trades if appropriate regulations were in place. Meanwhile the operation of tugs and service vessels could be supported remotely in a harbour, rather like air traffic control. And fully autonomous vessels could provide transport for short-haul cargo movements or ferry crossings between two fixed points.

"None of these, however, implies that vessels will not be manned," he says. "I don't think it's likely we'll see job losses at sea but I do see that a change in work patterns and functions on board will be required. A fully electric propulsion system, incorporating batteries charged ashore, might not need constant supervision but could be supported remotely or by regular calls from service crews, for example.

"Actually, I think the questions we should be asking are: 'Will we have enough crews to man all ships in the future and how can we ease their workload, improve safety and raise efficiency?' The answer is ... through autonomy in one form or another."

Mr Lehtovaara gives the example of challenges faced by the officer-of-the-watch. Not only must he or she contend with working shifts and periods of boredom, but also with spells on the bridge during which the outlook is impaired by darkness, fog or a violent storm. In



**Capt Eero Lehtovaara**
Head of Regulatory & Public Affairs
**ABB Marine & Ports**

such circumstances, autonomous systems supplementing a ship's radar – including lidar, infrared cameras, ordinary cameras and sensors – could dramatically improve situational awareness, easing workload, stress and strain, and enhancing safety.

ABB's 'Bridge Zero' concept could provide watch-keepers with further support, he suggests. This initiative is based on a combination of digital technology interacting with human cognition and would enable an ocean-going cargo ship to run safely and efficiently without a deck officer on the bridge.

ABB's most recent initiative is the result of collaboration with Keppel Marine and Deepwater Technology involving the retrofitting of a 32m-long harbour tug, enabling it to operate autonomously in the Port of Singapore by the end of 2020. When the project is completed, the tug will be Southeast Asia's first autonomous harbour service vessel.

Mr Lehtovaara's seafaring background equips him to envisage the benefits of autonomous operations more clearly than most. But he is absolutely convinced that the digitalisation drive in shipping must involve strategic collaboration – even between companies which compete fiercely at a commercial level.

That is where the One Sea alliance can play a pivotal role, he observes. It allows technology providers to sit at the top table alongside other mainstream industry associations, offering fully transparent advice and guidance as the regulatory framework is developed.

## *We have the technologies. Now we need regulations*

# Digitalisation adds value to agencies' calling card; relationships

Ship agency is a notoriously fragmented sector of the industry, representing varying degrees of digital sophistication. It has lived through a seismic change in communications technology since the 1970s, from telex to fax and emails, with the rapid increase of cellular/mobile phone usage.

In many ways, observes WaterFront Maritime Services CEO Terry Gidlow, this explosion in communications set ship agency back five years.

"Fifty years ago, the ship agent was core to the industry. Shipowner principals trusted him. Over time, communications technology gave those principals the opportunity to take power back. They could now deal with multiple people and get information for themselves. Relationships were whittled away."

A low point was reached a decade ago when, in order to work at breakeven levels, agencies were forced to jettison all but essential responsibilities such as inward and outward clearances.

"The turnaround has come with the new digital technology available and our use of it," he says. Agencies can collect a lot more data and find new capabilities. "We have been forced to reinvent ourselves and use the technology to add value for customers."

The key for ship agencies is to add value such as saving time in port or saving cost per tonne of cargo. Digital technology, and more recently Covid-19, have acted as a catalyst in changing the way principals look at ship agency. Technology has transformed documentation and the processing of data, developed data science, and optimised the way agents report.

"The core function of an agent is as a purveyor of someone else's data," Mr Gidlow explains. "Instead of just getting more efficient at communicating data, we are able to process it and give our customers actionable data. We offer them optionality. The biggest advantage is being able to create value with the data we collect."

Ship agencies gather every scrap of data around the

## Terry Gidlow
### CEO
## WaterFront Maritime Services

vessel, from before the ship arrives at port. Mr Gidlow doesn't believe there's any data collected that wasn't being collected before, however agents can now process that data in a way they couldn't previously.

"Three years ago, we would have thousands of statements of fact used to make, for example, a laytime calculation; then it was forgotten. Today we can process those statements to extract delays and inefficiencies not discernible to the naked eye."

Part of the job of an agent is to optimise a vessel's turnaround. "If there's a one-hour delay before the draught survey commences – which has been the case for generations – you can now process data across multiple arrivals at multiple ports, you can advise your customers accordingly and work to reduce that delay.

"Owners are looking to save as much time as they can; charterers want to reduce the amount of demurrage. How much non-productive time have you had in these ports over the past year?" he asks.

Further, the agent can look at the data from an environmental angle. Non-productive time is spent burning diesel or gas oil, so a reduction in delay would not only save time and fuel, it would also cut emissions. "We can show the customer the value we are creating and point out their ship's carbon footprint while in the port."

The biggest advantage of digitalisation for the ship agency is the capability to add value for customers and enable closer collaboration. The emergence of blockchain and similar technologies means agencies can start to tackle parts of the business that would previously have been out of bounds.

Terry Gidlow has not invested in a team of in-house data scientists because, he argues, WaterFront is a ship agency with shipping people. A handful of employees have been sent to 20 countries or more to learn the areas of business about which it would be most helpful for the company to gain a deeper understanding. They are now partnering with external data scientists to work out how to use the data available to add value for customers.

"We want to harness the best skills sets available today, which might be very different in two or three years' time," he says. "Even if we are three of four times bigger, I'd still go down this road."

Digitalisation will do less to encourage collaboration among competitive ship agents than it will to bring agencies closer to their principals. The timing of the coronavirus pandemic has come when digital technology is in place. "Covid-19 has forced people to look at new ways of doing things; there is less resistance to change and to taking on new ideas.

Looking ahead, Mr Gidlow has learned that change is constant: technology has made great strides in the past decade and a similar evolution can be certain in the coming decade. However, despite video conferencing becoming ubiquitous, the essence of ship agency – professional relationships – is unlikely to be diminished by digitalisation.●

> *Digitalisation will do less to encourage collaboration among competitive ship agents than it will to bring agencies closer to their principals*

# SHIP OWNER/MANAGER:
## DIGITAL APPLICATION STATUS – NAVIGATION

With navigation applications, Ship Owner/Manager respondents are most likely to have fully deployed weather information ([1]Top 2 box 81%), followed by ECDIS updates ([1]Top 2 box 77%). ECDIS updates has a higher future deployment expectation (next 12 months) for Ship Owner/Manager respondents.

**Question: What is the status of the digital application for navigation across your organisation's fleet?**
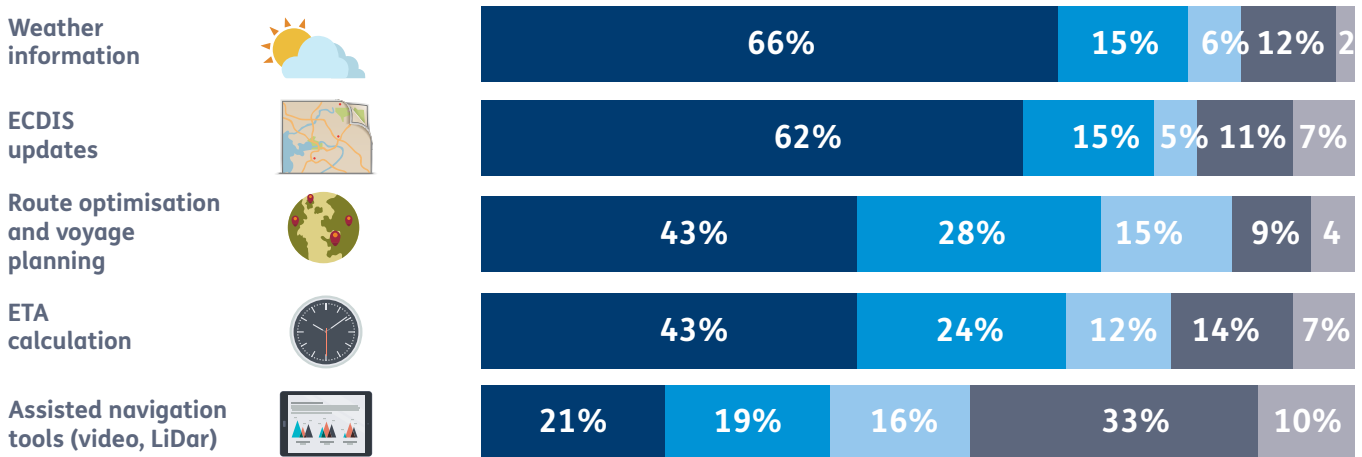
## Current Deployment Status

| | Fully deployed: across fleet | Commercially deployed: limited vessels | Trialled: limited number of vessels | Yet to trial | No Interest |
|---|---|---|---|---|---|
| Weather information | 66% | 15% | 6% | 12% | 2 |
| ECDIS updates | 62% | 15% | 5% | 11% | 7% |
| Route optimisation and voyage planning | 43% | 28% | 15% | 9% | 4 |
| ETA calculation | 43% | 24% | 12% | 14% | 7% |
| Assisted navigation tools (video, LiDar) | 21% | 19% | 16% | 33% | 10% |

Base: Navigation respondents who indicated they are presently testing/deploying applications: Owner/Manager (n=118). [1]Top 2 box: Fully Deployed & Commercially Deployed.

**Question: What additional navigation digital application(s) is your organisation planning to deploy in the future?**

## Additional Planned for Future Deployment

| | Within next 12 months | Within next 24 months | Beyond 24 months | No interest in deploying |
|---|---|---|---|---|
| Weather information | 61% | 18% | 15% | 6% |
| ECDIS updates | 63% | 15% | 12% | 10% |
| Route optimisation and voyage planning | 57% | 22% | 13% | 8% |
| ETA calculation | 48% | 21% | 13% | 18% |
| Assisted navigation tools (video, LiDar) | 43% | 16% | 27% | 14% |

Base: Navigation respondents who indicated they are planning to deploy testing/deploying applications in the future: Owner/Manager (n=62).

Lloyd's List
Maritime intelligence | Informa
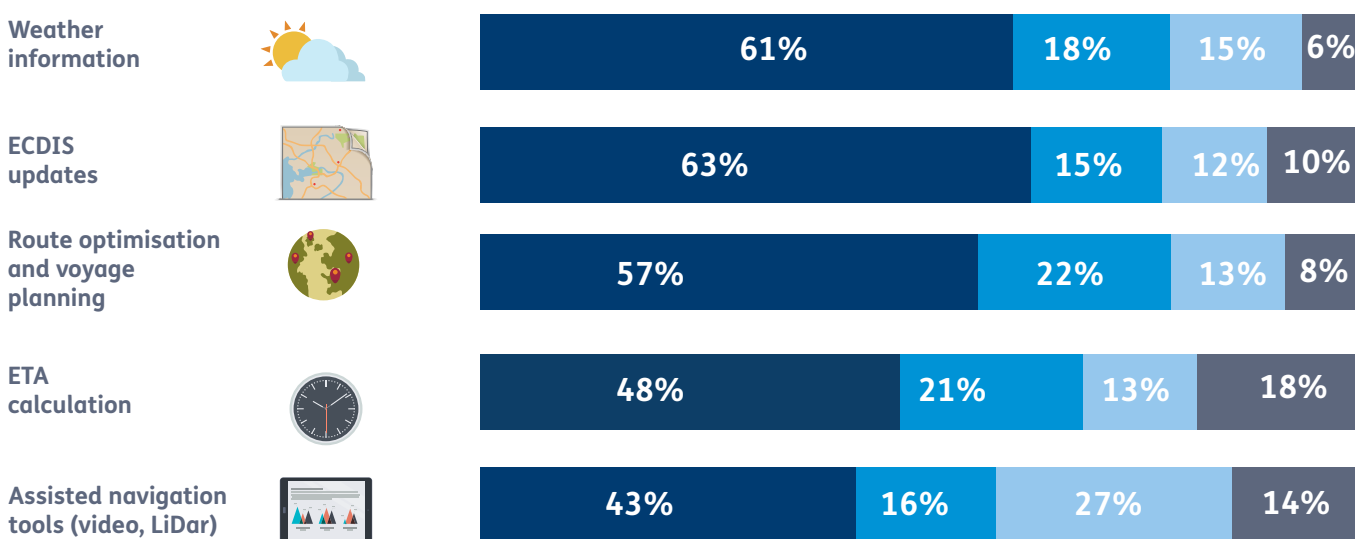
# SHIP OWNER/MANAGER:
## DIGITAL APPLICATION STATUS – FLEET & VESSEL PERFORMANCE

Vessel operations performance monitoring & analysis ([1]Top 2 box 67%) and fuel optimisation, fuel monitoring ([1]Top 2 box 66%) are the fleet and vessel performance digital applications that Ship Owner/Manager respondents are most likely to have deployed.

**Question: What is the status of the digital applications for fleet and vessel performance across your organisation's fleet?**

## Current Deployment Status

| Application | Fully deployed: across fleet | Commercially deployed: limited vessels | Trialled: limited number of vessels | Yet to trial | No Interest |
|---|---|---|---|---|---|
| Fuel optimisation, fuel monitoring | 37% | 29% | 16% | 15% | 2 |
| Vessel operations performance monitoring and analysis | 44% | 23% | 17% | 14% | 2 |
| Emissions monitoring and analysis | 33% | 29% | 17% | 15% | 7% |
| Vessel utilisation optimisation (e.g. demand or freight price forecast) | 20% | 20% | 12% | 25% | 23% |
| Ballast Water management | 28% | 31% | 11% | 24% | 7% |
| Other equipment condition monitoring and analysis | 20% | 29% | 22% | 22% | 7% |
| Engine performance monitoring and analysis | 35% | 26% | 18% | 19% | 2 |
| Cargo tracking and monitoring | 25% | 27% | 9% | 21% | 18% |
| Port call optimisation | 18% | 21% | 15% | 32% | 13% |
| Bunker planning | 27% | 23% | 14% | 21% | 15% |

Base: Fleet and Vessel Performance respondents who indicated they are presently testing/deploying applications: Owner/Manager (n=126).
[1]Top 2 box: Fully Deployed & Commercially Deployed.

Legend:
- Fully deployed: across fleet
- Commercially deployed: limited vessels
- Trialled: limited number of vessels
- Yet to trial
- No Interest

Lloyd's List
Maritime Intelligence | Informa

# SHIP OWNER/MANAGER:
## DIGITAL APPLICATION STATUS – FLEET & VESSEL PERFORMANCE

The fleet and vessel performance digital applications that Ship Owner/Manager respondents are most likely to deploy in future are fuel optimisation, fuel monitoring ([1]Top 2 box 83%) and vessel operations performance monitoring and analysis ([1]Top 2 box 68%).

**Question: What additional fleet and vessel performance digital application(s) is your organisation planning to deploy in the future?**

## Additional Planned for Future Deployment

| Application | Within next 12 months | Within next 24 months | Beyond 24 months | No interest in deploying |
|---|---|---|---|---|
| Fuel optimisation, fuel monitoring | 43% | 40% | 14% | 3 |
| Vessel operations performance monitoring and analysis | 41% | 27% | 28% | 5 |
| Emissions monitoring and analysis | 38% | 29% | 27% | 7% |
| Vessel utilisation optimisation (e.g. demand or freight price forecast) | 37% | 25% | 19% | 19% |
| Ballast Water management | 35% | 28% | 21% | 16% |
| Other equipment condition monitoring and analysis | 33% | 15% | 43% | 9% |
| Engine performance monitoring and analysis | 33% | 34% | 25% | 8% |
| Cargo tracking and monitoring | 33% | 27% | 15% | 25% |
| Port call optimisation | 26% | 32% | 19% | 23% |
| Bunker planning | 25% | 25% | 30% | 20% |
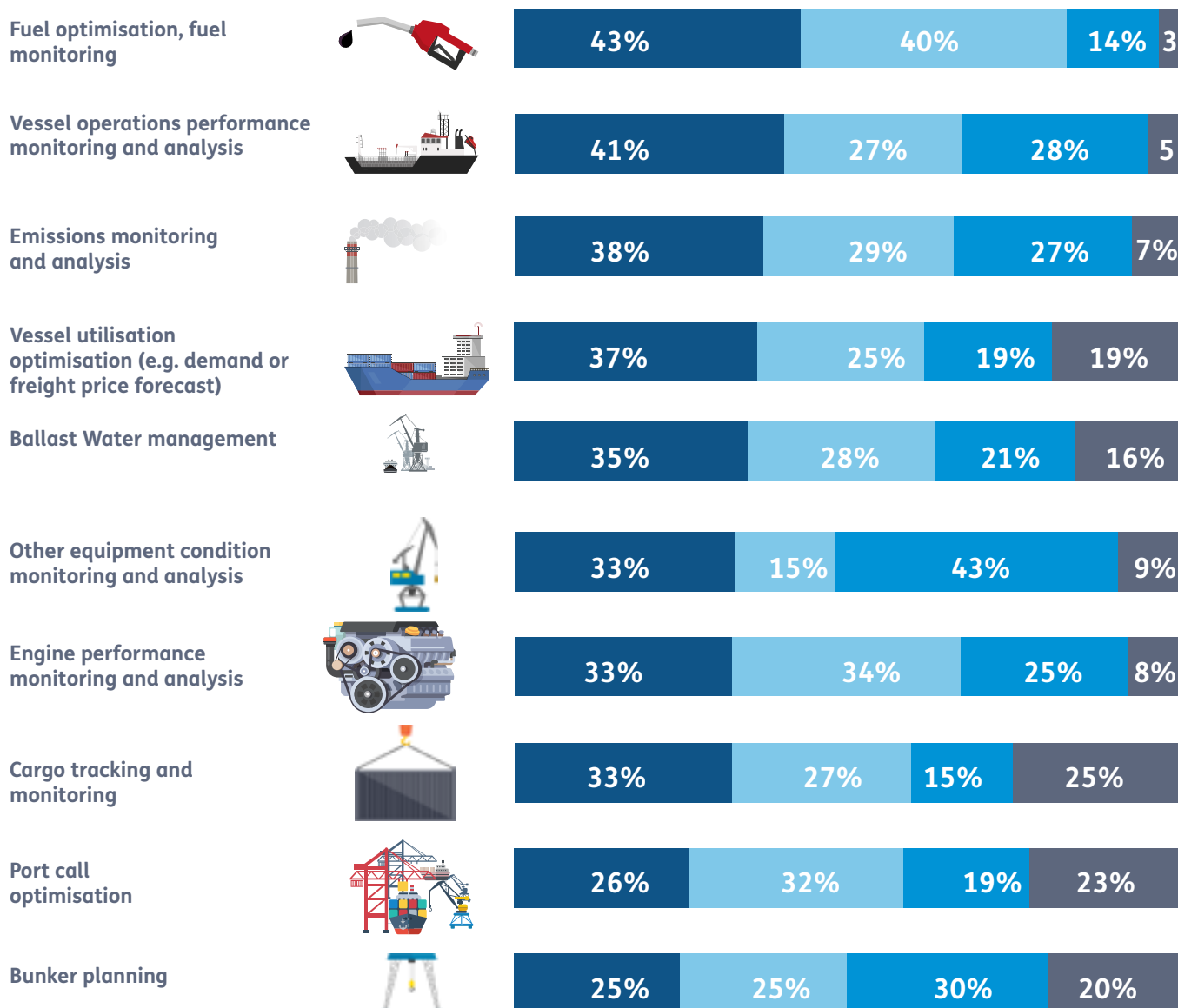
Base: Fleet and vessel performance respondents who indicated they are planning to deploy testing/deploying applications in the future: Owner/Manager (n=65). [1]Top 2 box: Within Next 12 months & Within Next 24 months.
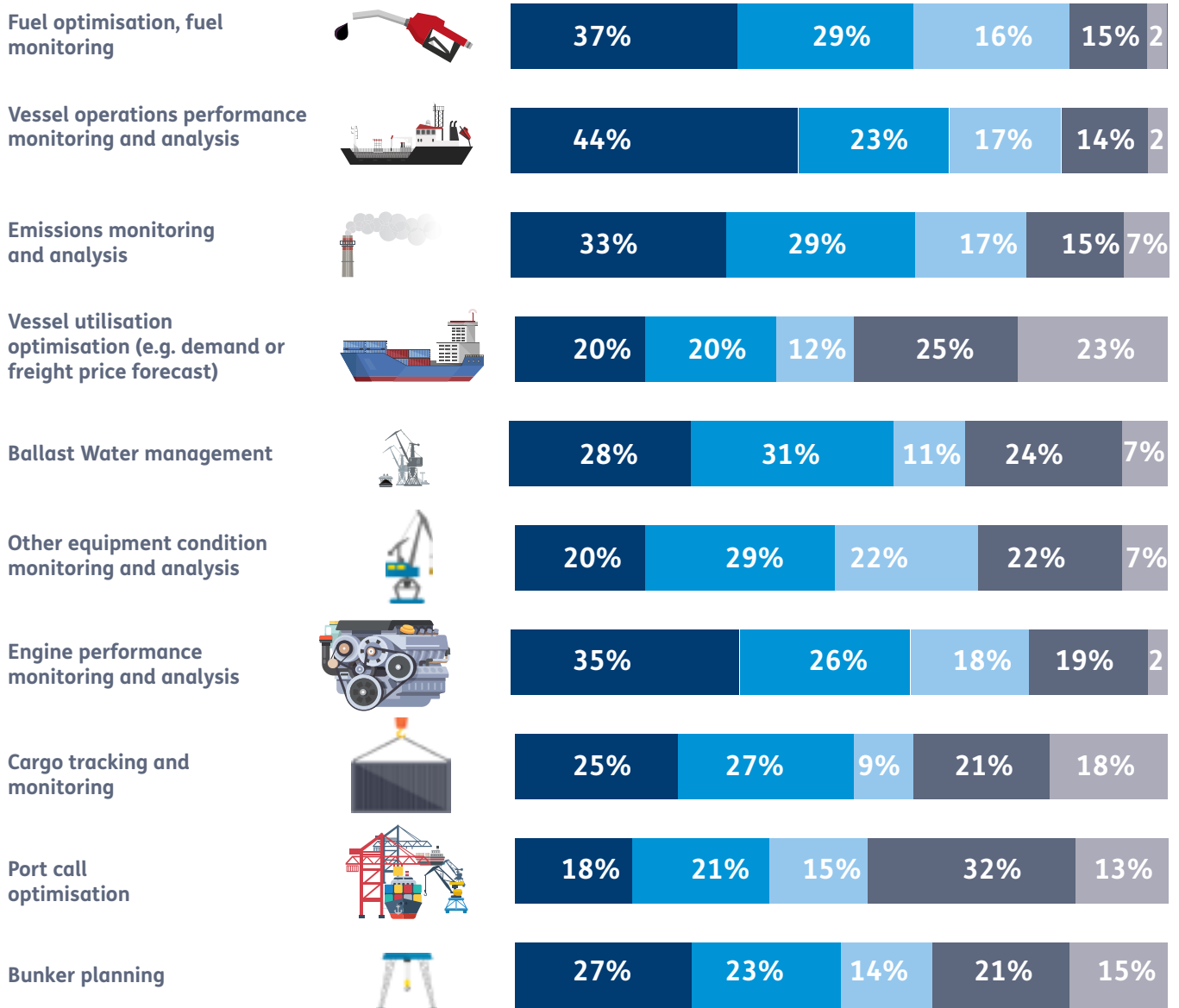
Legend:
- Within next 12 months
- Within next 24 months
- Beyond 24 months
- No interest in deploying

# Breakbulk needs to play catch-up on digitalisation

**Leif-Arne Strømmen**
VP Innovation
**G2Ocean**

Digitalisation in the maritime space has until now focused rather too heavily on vessel performance, fuel consumption, and fleet optimisation, says Leif-Arne Strømmen, VP Innovation at Norwegian ship owner G2Ocean.

He believes the search for digital solutions for the customer journey has been all but ignored.

Mr Strømmen joined the Bergen-based breakbulk vessel owner in 2018 from Kuehne + Nagel, the transport and logistics giant, where he was global head of projects. He says he has brought a greater customer focus to the company and has discovered the breakbulk sector is far behind container shipping and freight forwarding.

A freight forwarder doesn't need to know about fuel performance, he explains. "Before we started work on our new digital platform, we interviewed our largest customers to ask what they expected from G2Ocean. The message was clear: they expect more transparency, more digital solutions, and more automated processes."

The same customers are working closely with container lines and forwarders day after day. They see their partners elsewhere coming up with digital applications and solutions and they expect customer-centric digital solutions from G2Ocean. "We are playing catch-up," he says.

Armed with a better understanding of its customers' digital needs, G2Ocean's developers are now building a digital platform, to be known as MyG2, which is expected to be launched in 4Q20. It will be a digital point of entry for all our customers, where they can handle the entire customer journey from quotation to request and booking, handling the bill of lading process, vessel tracking, and invoicing.

MyG2 was an essential element of a new corporate strategy agreed at the end of 2019 that puts the customer at the centre of the business. "We started planning for MyG2 long before Covid-19. The background was a need to digitalise the way we work, and to streamline many of

our processes which are still done manually." The company's customers – at least the larger and more advanced customers – request the same systems from G2Ocean as they receive from container lines and trucking companies.

"Covid-19 has accelerated this trend. We're not forcing our customers to use it, but most want greater transparency. It's an opportunity to integrate with them even more and to connect their ERP (Enterprise Resource Planning) systems with MyG2, so electronic data can be quickly seen by both parties."

Although only a few months old, the corporate strategy is under revision, not in a major way but in consideration of an accelerated need to align with customers.

"One of the elements is to agree on what kind of people we need, especially regarding data scientists and analysts. It's a work in progress."

The revision is looking even more deeply into digital initiatives and sustainability. "We start with the customers and the market: what kind of customers should we be focusing on and what services

> *Communications with ships when sailing out in the ocean is slow and expensive. Communication is a substantial chunk of the overall IT communications budget. There's massive room for improvement in speed and quality*

should we offer. When we are agreed on these, we need to decide how to design the systems, not the other way around," he stresses.

"Our strategy has nice graphics, in the middle of which are our customers, their needs and requirements. As well as robotics, autonomous handling, sustainability, future fuels, and the normal stuff like safety, quality."

However, there's a concern. Communications with ships when sailing out in the ocean is slow and expensive. In Mr Strømmen's opinion, that's a challenge that has to be addressed quickly.

"There is a great deal that could be improved if connectivity was better. It's still too expensive. Communication with the fleet is a substantial chunk of the overall IT communications budget. There's massive room for improvement in speed and quality."

No doubt the sheer size of the onshore market works in its favour but the gap between the shoreside supply chain and ocean transportation will widen significantly with the widespread adoption of 5G technology.

Looking ahead, Leif-Arne Strømmen envisages a link up of the MyG2 platform with sensor technology on all cargo units moved. That will give visibility from the manufacturing side all the way to final destination. It will enable shipping companies to automate loading and discharge, while giving customers the oversight they are seeking.

"Sensor data can give the exact location of the cargo, humidity and temperature during shipment, and record shocks to valuable cargo. If this technology is used correctly, it could transform production, manufacturing, distribution, and warehousing."

Digitalisation of distribution would also help customers to monitor the environmental impact of their activity. Although this won't be ready in time for the launch of MyG2, it's under development for a later phase.

The caveat is that increased use of sensor and digital technology opens up a vulnerability to cyber-crime. G2Ocean already has two employees working full time on preparing the company's systems in case of cyber-attack. For shipowners moving into the digital space, this has to be high up on the agenda.•

# Telemedicine goes digital in the post-pandemic world

The urgency of dealing with a global outbreak of Coronavirus has catapulted the provision of medical services at sea into the spotlight across the merchant, offshore, cruise and ferry sectors.

The experience of the Diamond Princess and its 3,700 passengers and crew stranded off Japan's coast in the early days of the pandemic sent shockwaves through the industry. Six months on, vessel operators and the specialist healthcare providers serving them were weighing options for adapting to a post-Covid-19 world to help entice passengers back.

Vikand, a healthcare provider with more than 200 cruise vessels from multiple lines on its books, has wasted no time. For Phoenix World Village, a 400-PAX expedition cruise vessel concept with a 6,500 nautical mile range, it worked with Knud E Hansen to develop a design for the most hygienic of ships, to include an air sanitisation system using similar principles to the re-circulators featured on Nasa spacecraft. Reflecting the 'new normal', it features quarantine and isolation zones as well as upgraded medical facilities.

But, with precious few operators considering newbuilding, Vikand CEO Peter Hult believes the most straightforward way of re-establishing customer confidence is through telemedicine, based on easy-to-use apps and reliable satellite broadband.

"It's true that early telemedicine solutions for ships in the 1990s and early 2000s were suitcase-sized, expensive, difficult to install and set-up, and complicated for crew to use in a medical emergency. The concept was sound, but the technology simply wasn't ready for implementation."

According to Hult, however, telemedicine has come of age because of two fundamental technological developments: the emergence of smartphones to which medical sensors can be attached and the arrival of 'plug-and-play' connectivity at sea from Inmarsat.

Vikand's solution is embedded on Inmarsat's servers through the satellite operator's Certified Application

Provider (CAP) programme. This means the link to shore-based medical professionals is always-on. Hult says: "The connection is seamless and always ready, which is crucial; the last thing crew want in a medical emergency is to waste valuable time trying to establish a remote connection."

High levels of interest in video-enabled telemedicine solutions have been especially noticeable among offshore and merchant customers in recent months, says Hult, offered through VIKAND HealthNet™, a service that integrates all aspects of healthcare for vessel owners and operators, with the latest medical technology supported by an experienced maritime medical team connected to crew in real time via satellite services and using limited bandwidth.

Virtual healthcare can take the form of monthly house doctor calls, urgent calls, chronic disease management, crew wellness, medical chest management,

# *Telemedicine is set to become a mainstream maritime technology as part of wider societal change*

**Peter Hult**
CEO
**Vikand**

medical equipment technical support, customised mental health programmes, or via a 24/7 medical emergency support hotline.

Fleet Connect bandwidth only kicks in for the application when the client needs video-enabled telemedicine, rather than having to buy bandwidth on the off-chance that they will want to exploit video at some time during their agreement.

With the pandemic striking shortly after Vikand became a CAP Partner, Inmarsat, Vikand and software developer FrontM also moved fast to launch a free of charge COVID-19 video call service in April 2020. "We've supported crew and passengers on many ships in dire straits, whether at sea or in port – wherever they have been unable to get medical assistance or let people ashore," says Hult.

Telemedicine is set to become a mainstream maritime technology as part of wider societal change, he adds, not least in the ferry context - where the medical officer onboard may have little hands-on experience and may seldom have faced life-or-death situations.

"While ferry operators are less exposed to the virus than cruise lines, both types of shipping company rely heavily on reputation for repeat business," he says. "In these times, the travelling public also needs reassurance that ferry transport is a safe option. We are ready to step in as their urgent care facilitator."

For larger ferry operators, Vikand can also help by liaising with medical facilities at ports on regular routes. In this scenario, it assists in coordinating care until the patient can be transferred ashore. The company is also establishing facilities at major turnaround ports across Europe as part of the EU's Healthy Gateway programme's response to Covid-19.

# SHIP OWNER/MANAGER: DIGITAL APPLICATION STATUS - RISK & SAFETY MANAGEMENT

Ship Owners/Managers choose safety management/incident reporting and cybersecurity as the most commonly deployed risk and safety digital applications across their fleets. Safety management/incident reporting is also the most likely planned deployment in the next year, and over the next two years.

**Question: What is the status of the digital applications for risk and safety management across your organisation's fleet?**
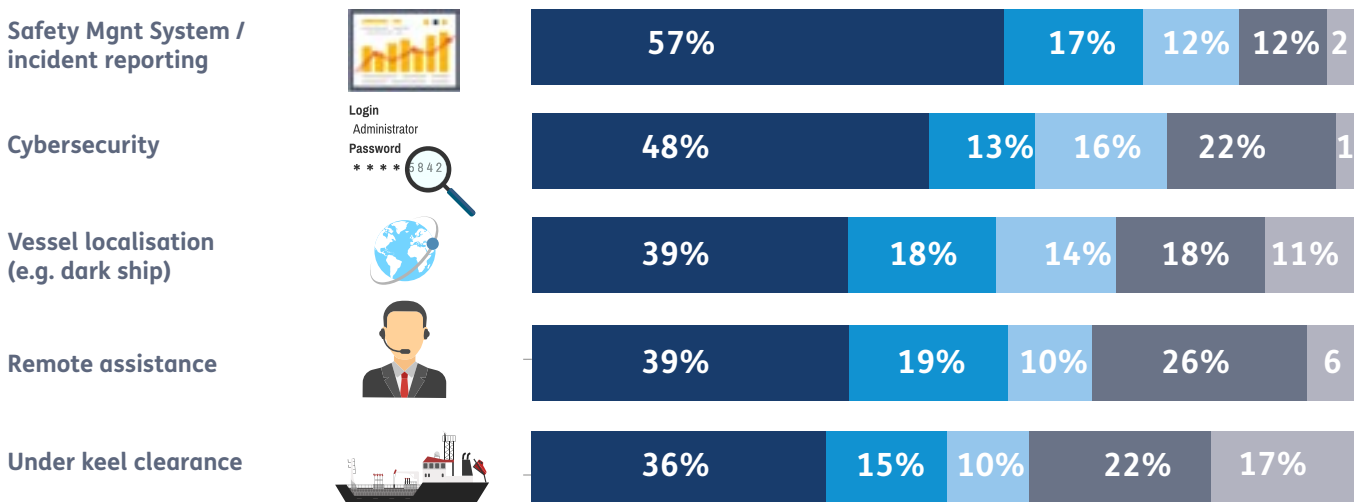
## Current Deployment Status

| | Fully deployed: across fleet | Commercially deployed: limited vessels | Trialed: limited number of vessels | Yet to trial | No Interest |
|---|---|---|---|---|---|
| Safety Mgnt System / incident reporting | 57% | 17% | 12% | 12% | 2 |
| Cybersecurity | 48% | 13% | 16% | 22% | 1 |
| Vessel localisation (e.g. dark ship) | 39% | 18% | 14% | 18% | 11% |
| Remote assistance | 39% | 19% | 10% | 26% | 6 |
| Under keel clearance | 36% | 15% | 10% | 22% | 17% |

Base: Risk and Safety Management respondents who indicated they are presently testing/deploying applications: Owner/Manager (n=94).

**Fully deployed: across fleet** · **Commercially deployed: limited vessels** · **Trialed: limited number of vessels** · **Yet to trial** · **No Interest**

**Question: What additional risk and safety management digital application(s) is your organisation planning to deploy in the future?**

## Additional Planned for Future Deployment

| | Within next 12 months | Within next 24 months | Beyond 24 months | No interest in deploying |
|---|---|---|---|---|
| Safety Mgnt System / incident reporting | 59% | 30% | 10% | 1 |
| Cybersecurity | 55% | 27% | 15% | 3 |
| Vessel localisation (e.g. dark ship) | 45% | 25% | 16% | 14% |
| Remote assistance | 40% | 24% | 27% | 10% |
| Under keel clearance | 33% | 30% | 19% | 19% |

Base: Risk and safety management respondents who indicated they are planning to deploy testing/deploying applications in the future: Owner/Manager (n=71).

**Within next 12 months** · **Within next 24 months** · **Beyond 24 months** · **No interest in deploying**

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# SHIP OWNER/MANAGER:
## DIGITAL APPLICATION STATUS – OTHER FLEET OPERATIONS

Over a third of Ship Owner/Manager respondents have fully deployed all digital applications. Over half of respondents plan additional future deployments of all three other fleet operations applications in the next year.

**Question: What is the status of the digital applications for other fleet operations across your organisation's fleet?**

## Current Deployment Status

| Application | Fully deployed: across fleet | Commercially deployed: limited vessels | Trialled: limited number of vessels | Yet to trial | No Interest |
|---|---|---|---|---|---|
| E-docs sending | 46% | 20% | 15% | 16% | 3 |
| Voice and video conference calls | 38% | 16% | 20% | 22% | 4 |
| Online procurement | 37% | 20% | 14% | 28% | 1 |

Base: Other fleet operations respondents who indicated they are presently testing/deploying applications: Owner/Manager (n=76).

- Fully deployed: across fleet
- Commercially deployed: limited vessels
- Trialled: limited number of vessels
- Yet to trial
- No Interest

**Question: What additional other fleet operations digital applications is your organisation planning to deploy in the future?**

## Additional Planned for Future Deployment

| Application | Within next 12 months | Within next 24 months | Beyond 24 months | No interest in deploying |
|---|---|---|---|---|
| E-docs sending | 57% | 30% | 11% | 2 |
| Voice and video conference calls | 60% | 19% | 13% | 8% |
| Online procurement | 55% | 25% | 13% | 7% |

Base: Other fleet operations respondents who indicated they are planning to deploy testing/deploying applications in the future Owner/Manager (n=63)

- Within next 12 months
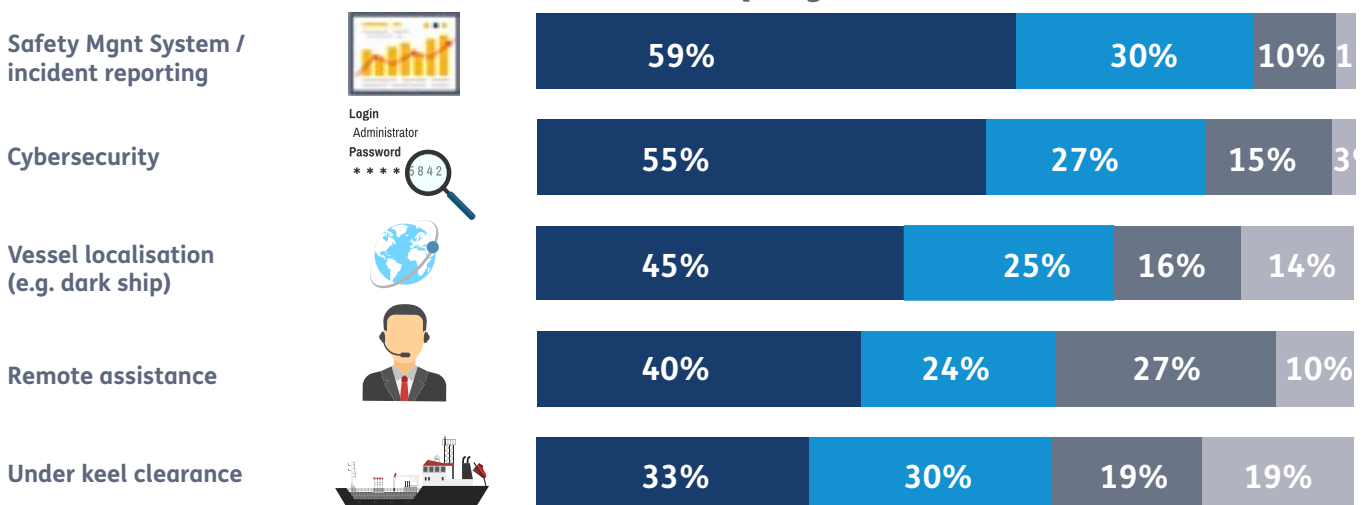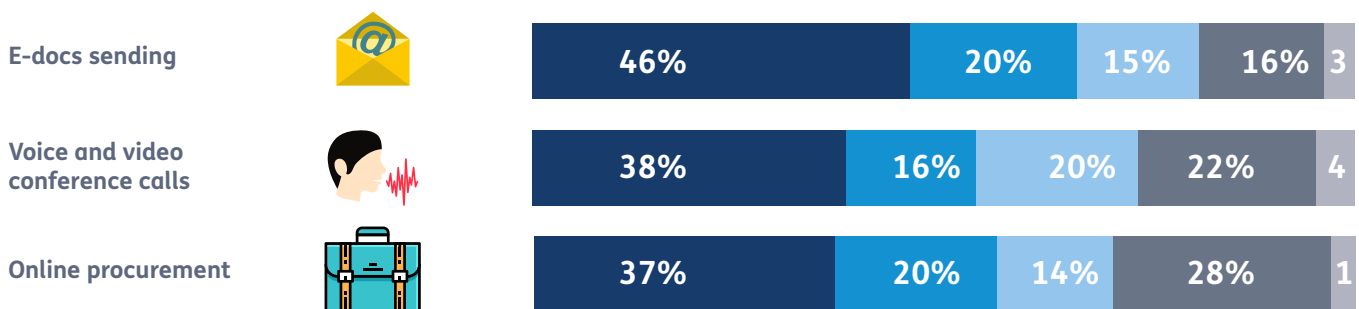- Within next 24 months
- Beyond 24 months
- No interest in deploying

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# SHIP OWNER/MANAGER: DIGITAL APPLICATION STATUS - INSURANCE

Ship Owner/Manager respondents have a high deployment of claim assistance, P&I information support and data analytics across their fleets.

**Question: What is the status of the digital applications for insurance across your organisation's fleet?**

## Current Deployment Status

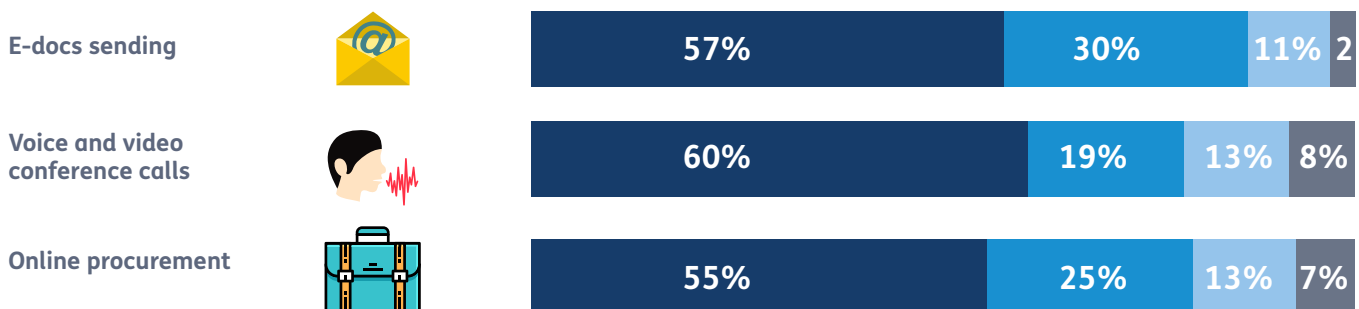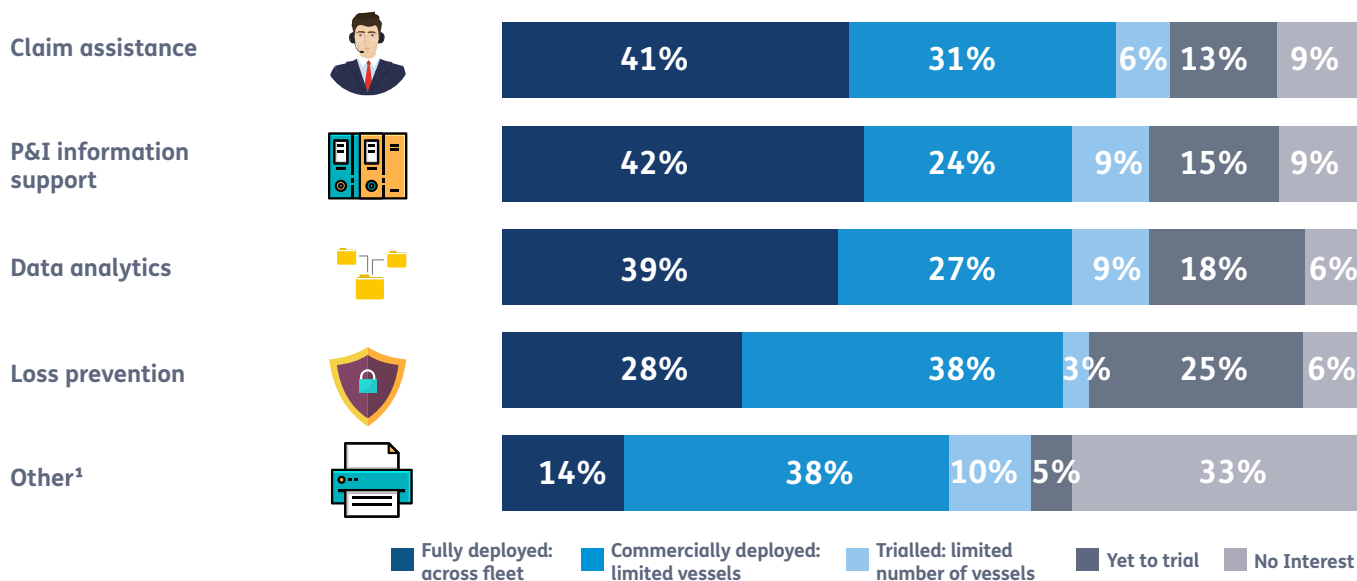| | Fully deployed: across fleet | Commercially deployed: limited vessels | Trialled: limited number of vessels | Yet to trial | No Interest |
|---|---|---|---|---|---|
| Claim assistance | 41% | 31% | 6% | 13% | 9% |
| P&I information support | 42% | 24% | 9% | 15% | 9% |
| Data analytics | 39% | 27% | 9% | 18% | 6% |
| Loss prevention | 28% | 38% | 3% | 25% | 6% |
| Other[1] | 14% | 38% | 10% | 5% | 33% |

Base: Insurance respondents who indicated they are presently testing/deploying applications: Owner/Manager (n=33). [1]Other includes: Special areas; Operations; QNP and PIN RAM.

**Question: What additional insurance application(s) is your organisation planning to deploy in the future?**

## Additional Planned for Future Deployment

| | Within next 12 months | Within next 24 months | Beyond 24 months | No interest in deploying |
|---|---|---|---|---|
| Claim assistance | 41% | 29% | 14% | 16% |
| P&I information support | 45% | 30% | 11% | 13% |
| Data analytics | 41% | 30% | 16% | 13% |
| Loss prevention | 35% | 35% | 20% | 9% |
| Other[1] | 32% | 38% | 14% | 36% |

Base: Insurance Respondents Who Indicated They Are Planning To Deploy Testing/Deploying Applications In The Future: Owner/Manager (n=56).[1]Other includes: Remote Inspection; Training; Maintenance planning.

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# SHIP OWNER/MANAGER:
## DIGITAL APPLICATION STATUS - CREW

Ship Owner/Manager respondents have a high deployment of crew training and planning across their fleets.

**Question: What is the status of the crew digital applications across your organisation's fleet?**

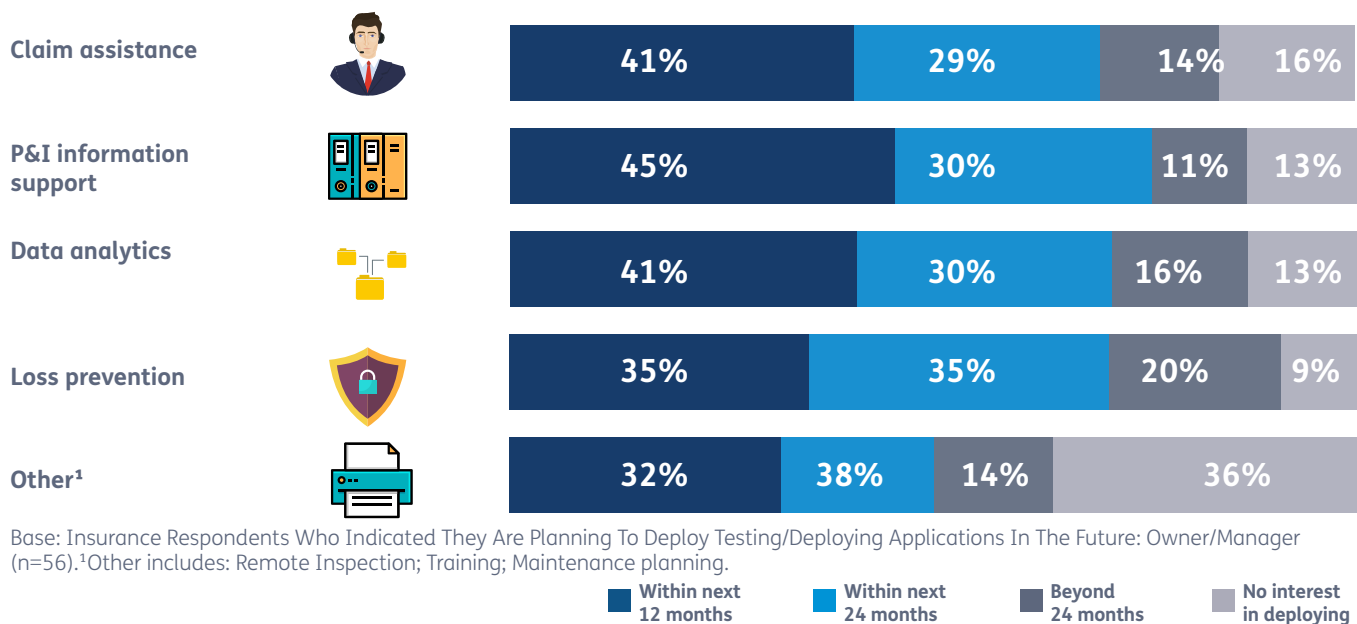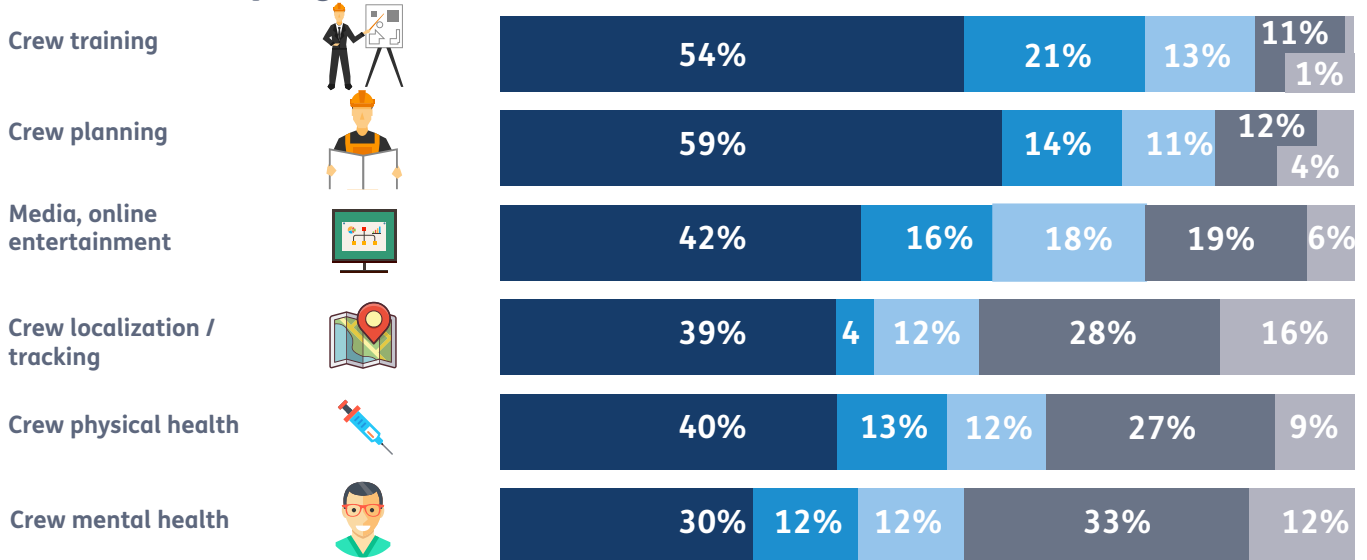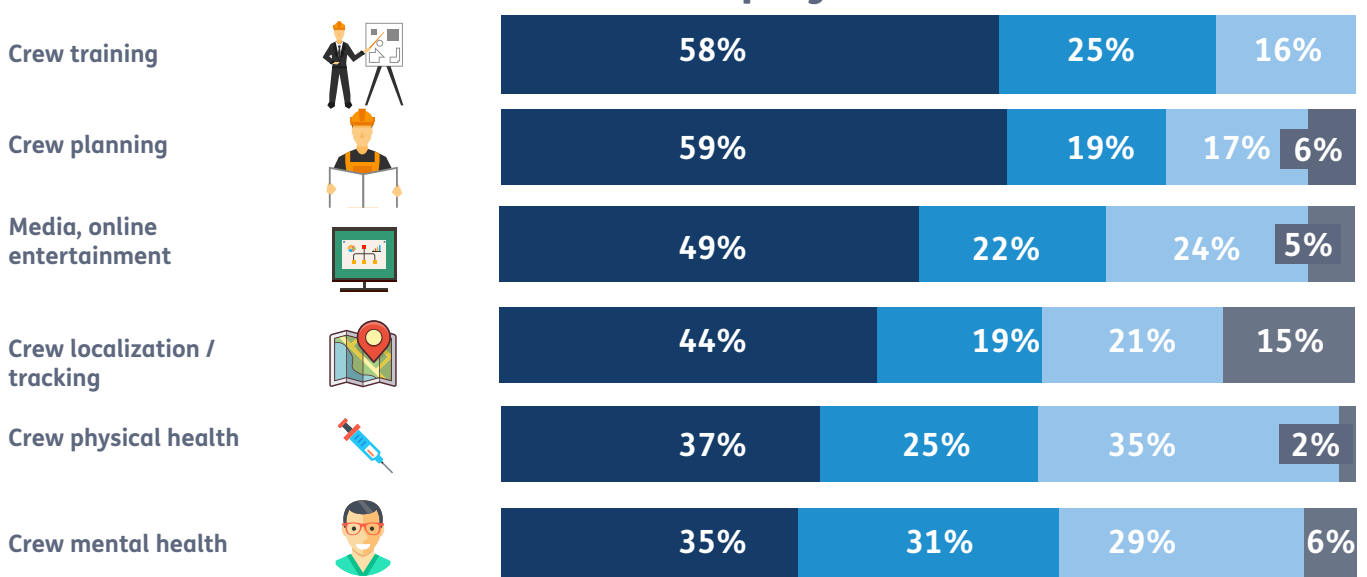## Current Deployment Status

| Application | Fully deployed: across fleet | Commercially deployed: limited vessels | Trialled: limited number of vessels | Yet to trial | No Interest |
|---|---|---|---|---|---|
| Crew training | 54% | 21% | 13% | 11% | 1% |
| Crew planning | 59% | 14% | 11% | 12% | 4% |
| Media, online entertainment | 42% | 16% | 18% | 19% | 6% |
| Crew localization / tracking | 39% | 4 | 12% | 28% | 16% |
| Crew physical health | 40% | 13% | 12% | 27% | 9% |
| Crew mental health | 30% | 12% | 12% | 33% | 12% |

Base: Crew respondents who indicated they are presently testing/deploying applications: Owner/Manager (n=94).

- **Fully deployed: across fleet**
- **Commercially deployed: limited vessels**
- **Trialled: limited number of vessels**
- **Yet to trial**
- **No Interest**

**Question: What additional crew digital application(s) is your organisation planning to deploy in the future?**

## Additional Planned for Future Deployment

| Application | Within next 12 months | Within next 24 months | Beyond 24 months | No interest in deploying |
|---|---|---|---|---|
| Crew training | 58% | 25% | 16% | |
| Crew planning | 59% | 19% | 17% | 6% |
| Media, online entertainment | 49% | 22% | 24% | 5% |
| Crew localization / tracking | 44% | 19% | 21% | 15% |
| Crew physical health | 37% | 25% | 35% | 2% |
| Crew mental health | 35% | 31% | 29% | 6% |

Base: Crew respondents who indicated they are planning to deploy testing/deploying applications in the future: Owner/Manager (n=55).

- **Within next 12 months**
- **Within next 24 months**
- **Beyond 24 months**
- **No interest in deploying**

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# Power of partnership is key to digitalisation

In just 18 months, New York-based and Microsoft venture-funded startup Nautilus Labs has become synonymous with achieving greater efficiency in the maritime industry through software that informs decisions on how best to operate vessels day in, day out.

"When Nautilus started up, the industry was fixated on IMO 2020 and the looming global sulphur cap," says Leigh Jaffe, Nautilus Labs' Director of Corporate Development. "But the days of single issues defining the maritime agenda are numbered.

"The safest – and possibly only – way to navigate multiple challenges whilst ensuring accountability is to make informed decisions based on frequent, reliable, objective data and work in partnerships. Digitalisation ceases to be something 'nice to have' and becomes a commercial imperative to ensure competitive advantage."

Nautilus provides a technology platform for shipping companies that aggregates multiple data sources into a comprehensive fleet profile and applies machine learning and artificial intelligence to achieve lower fuel consumption and greater operational efficiency. However, the company concluded early that having ground-breaking proprietary technology while using only established data such as noon reports could not guarantee success.

"During conversations with our shipowning clients and their (charterer) clients, we are seeing increasing demand for transparency in day-to-day operations and a real advocacy for the way more data helps to make better decisions. There is now huge demand for the digitalisation that unlocks that, and to access high-frequency onboard sensor information."

Nautilus Labs has worked in partnership with Inmarsat to find the interoperable solution it needs to gather data from onboard machinery systems in real-time and place it in the hands of shipowners to make objective decisions to meet commercial and environmental targets.

In contrast to other optimisation packages, Nautilus Labs' algorithms are based on vessel-specific models rather than assumptions based on vessel type. Savings therefore vary depending on vessel type and specific outcome, but one bulker operator looking to optimise generator performance cut costs by around $250,000 per ship per year.

The company joined Inmarsat's Certified Application Provider (CAP) programme soon after the satellite operator launched its Fleet Data service in 2019, in order to streamline the data collection and transmission process.

"It's strongly complementary," says Ms Jaffe. "By reliably taking care of the data dispatch and delivery, it allows us to focus more on data science and improving prediction accuracy for our clients."

Nautilus Labs' customers span nearly all vessel segments, and levels of digital readiness vary considerably. Some are advanced but others run vessels that have little in the way of sensors or supporting infrastructure. For the latter group, Fleet Data is invaluable, says Ms Jaffe.

"It provides a standardised route for connecting not just to the voyage data recorder, but links up with the engine control room, for example, granting the Nautilus platform ready access to, say, fuel flow status." Interoperability – or 'plug-and-play' – is key, since most OEMs use their own technology stack for telemetry and monitoring. Getting them to work in unison is not a job for the fainthearted.

"Fleet Data's ability to handle the infrastructural side of obtaining data from a vessel's various systems and subsystems and then pre-process and seamlessly transmit it to a cloud-based server for access by our APIs is a game-changer. It makes our platform easier to implement, which in turn opens it up to a far wider share of the market."
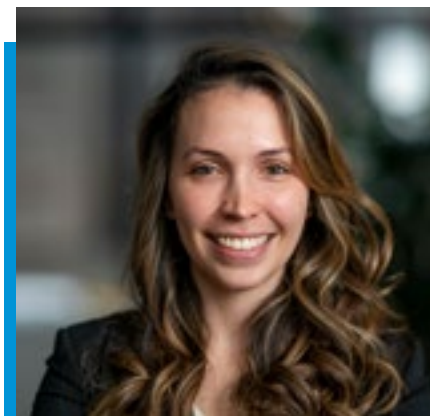


**Leigh Jaffe**
Director of Corporate Development
**Nautilus Labs**

As a centralised repository, Fleet Data also prevents the data duplication – and the possibility of conflicts or inconsistencies – that can result from different applications collecting, processing and storing measurements in their own way. "It may sound rather obvious but it's a concept that until now has been unachievable, and one that has implications on vessel owners' relationships with other stakeholders such as charterers," says Ms Jaffe.

She believes a 'single source of truth' will help usher in a new way of working centred on transparency and accountability. This will neutralise any disputes arising due to misaligned interests and nurture the collaborative relationships needed in the years ahead.

The result is seamless integration between the Nautilus Labs' application and the secure Fleet Data platform, in a solution that is fully scalable, fleet-wide and commercially available on both Fleet Xpress and FleetBroadband.

"More significant from the customer point of view," says Ms Jaffe, "is that it allows ship operators and fleet managers to optimise operations and reduce unnecessary costs whilst negotiating market volatility and plotting a course for improved sustainability." •

*A 'single source of truth' will help usher in a new way of working centred on transparency and accountability, neutralising disputes arising due to misaligned interests*

# The rapid rise of the smart ship requires rules to help shipowners transform

Class societies have moved closer to shipowner customers and maritime authorities over the past five years as talk of digital processes has become more prevalent.

However, as Matthieu de Tugny, Executive Vice-President of Marine & Offshore at Bureau Veritas, says, it was precisely because maritime was seen by BV's senior leadership as more global, more complex, and yet slower to adopt new technology that Marine & Offshore was chosen as the pioneer for digital developments in 2013.

"Amazingly, we were the first to develop [digital solutions], cascading them to other divisions, sharing our best practices by means of client apps, and identifying synergies. We are now trying to coordinate our digital efforts within the group."

The global reach of maritime is critical, as stakeholders in a vessel's ownership, construction, flag, chartering, and supply of essential equipment come from around the world. The complexity of maritime systems also makes digitalisation in this sector a larger challenge. This is why it made sense from a strategic perspective.

"We saw digitalisation of shipping as a priority against other divisions. Shipping is traditionally regarded as slow so it should be the pioneer in modernisation."

The learning curve has been steep. "It took time for us to realise we couldn't run pilot projects by ourselves. The pace of transformation has been so rapid that we have had to build a team of more than 100 IT guys in India to ensure developments can be performed as expected.

> *Digital classification will transform the traditional operating model, especially 3D class, digital twins, and remote and robotic surveys, based on a collaborative platform*

## Matthieu de Tugny
Executive VP, Marine & Offshore
**Bureau Veritas**

"In terms of strategies, implementation, and the use of new technologies, we had to bring in engineers who were more focused on automation and IT solutions, skills we hadn't employed before," he says.

He believes this pool of skills within BV will increase in the future because the development of the smart ship concept will require a different approach.

The smart ship – involving data-centric remote control of ships and cyber notations – is one of two obvious areas of digital development for Bureau Veritas, the other being digital classification. Mr de Tugny believes digital classification will "transform the traditional operating model," especially 3D class, digital twins, and remote and robotic surveys, based on a collaborative platform.

"We think these are clear directions [for class] and we'll need to adapt to them. For the smart ship concept, we have to develop corresponding rules and regulations to aid shipowners and others involved in this transformation."

In the year or two before the coronavirus pandemic outbreak hit, it was thought the transition to digital solutions would take time to mature. However, the rate of acceleration has been so rapid that BV will "definitely be investing in digital classification and the smart ship in 2020 and 2021."

Since 2013, BV has increased its digital engagement with its surveyors through mobile apps, and with online training of superintendents and surveyors. Shipowner customers now have access to the new BVS eAcademy resource, which provides latest amendments of the rules and insight into future fuels and technologies.

BV's experience is that some shipowners are keen to move forward with new technologies, new fuels, and new digital solutions. Others have different priorities, depending on the structure of the company, the market segment they are dealing with, and the type of training they are doing.

The best way to inform the industry about the pace of digital transformation is through the development of proofs of concept. In September this year, BV worked alongside vessel operator SeaOwl and French maritime authorities to carry out demonstrations involving a ship navigating off the French Mediterranean port of Toulon while under the command of a SeaOwl captain at the company's offices southwest of Paris.

Bureau Veritas provided a reference framework and risk analysis, based on its own guidance for autonomous shipping, to develop a means for the French maritime administration to approve the ROSS (Remote Operated Services at Sea) concept as per IMO Maritime Safety Committee direction for alternative designs.

Jean-Baptiste Gillet, Director of Advanced Services for Bureau Veritas, who was present at the demonstration, says the project confirmed the need for thorough risk assessment of the different remotely operated functions, identifying all potential operational scenarios and challenges.

One of the challenges for autonomous ship operators and flag administrations has been to find a way to provide a compliance pathway and ensure confidence in both regulator and the regulated.

"Owners need good examples of digitalisation in action," Matthieu de Tugny explains. "Nobody believed it could be done but it's actually happening. Change might be moving quickly but we all need to see some proof."

The success of the ROSS project will inject further pace into BV's roll out of remote survey centres, now eight worldwide, and it's hoped remote inspection technology – through the use of drones – will accelerate strongly over the next two years.•

# SHIP OWNER/MANAGER:
## DIGITAL SOLUTIONS DEPLOYED & USE OF INSIGHTS

There is a shift in the number of digital solutions to be deployed over the next 2 years time, indicating consolidation and integration of digital solutions. Currently, Ship Owner/Managers top 2 insight uses generated from digital solutions are descriptive and diagnostic analytics and predictive analytics.

**Question: On average, how many digital solutions are currently deployed on each vessel, and how many do you expect to be deployed in two years time?**

**Currently deployed**

| Less than 5 | 5 to 10 | 11 to 30 | More than 30 |
|---|---|---|---|
| 42% | 42% | 13% | 3% |

**Expected to be deployed in 2 years time**

| Less than 5 | 5 to 10 | 11 to 30 | More than 30 |
|---|---|---|---|
| 25% | 38% | 28% | 10% |

Base: Owner/Manager (n=212).

■ Less than 5   ■ 5 to 10   ■ 11 to 30   ■ More than 30
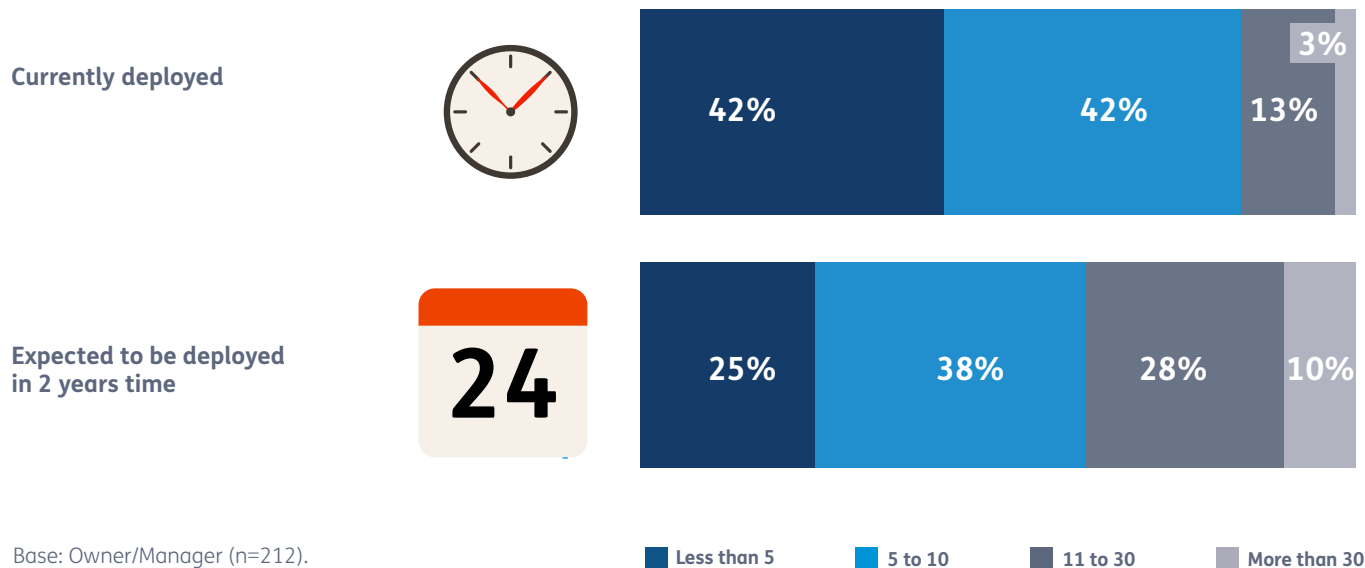
**Question: How do you use the insight generated by digital solutions across your organisation's fleet? (Please select all that apply)**

| | |
|---|---|
| Descriptive and diagnostic analytics | 64% |
| Predictive analytics | 59% |
| Prescriptive analytics | 44% |
| Don't know | 8% |
| Other[1] | 6% |
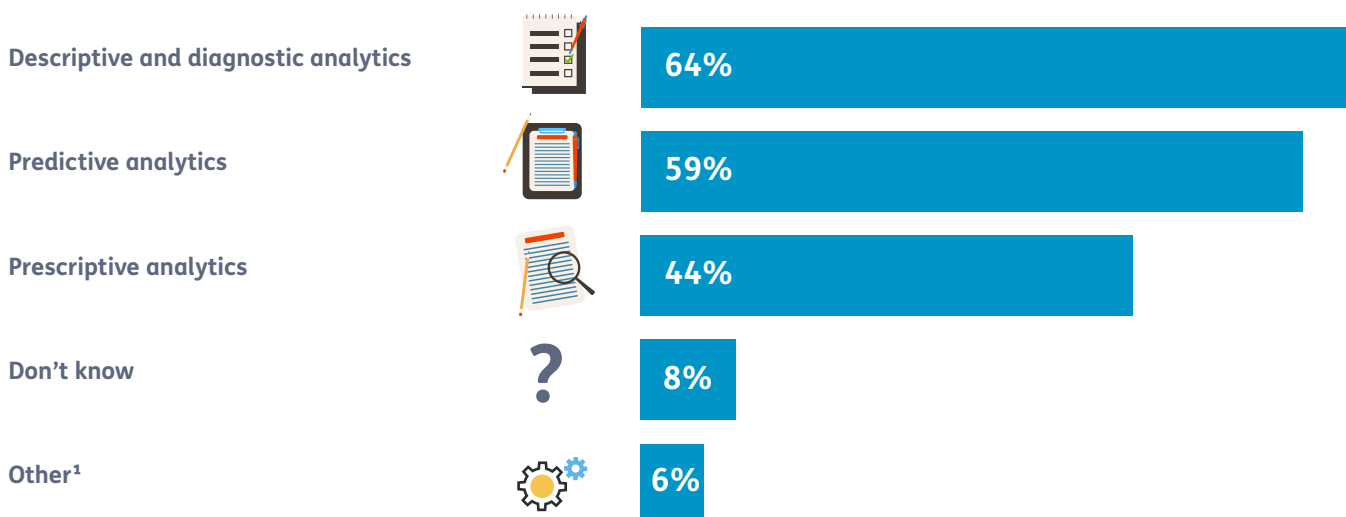
Base (multiple answers permitted): Owner/Manager (n=383) [1]Other includes: Asset Protection, Block Chain, Ai,bots, Data Integration Automation, Environmental Compliance, Marrying Analytics To Required Maintenance Tasks, Medical, Optimisation Of Resources, Our Vessels (We Only Act As Managers) Are Individually Controlled By Owners In These Matters, Performance & Training Needs, To Be Implemented, Therefore Only Planning Stage With Regards To Data Analysis, Use It As A Matter To Create More Money.

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# SHIP OWNER/MANAGER:
## INVESTMENT TO DEPLOY & USE DIGITAL SOLUTIONS

Smaller investment in digital solutions looks to be focused for the next 12 months, with planning of medium level expenditure ($500k - $999k) more likely within a 2 year period and over $1m spending more likely to occur beyond 2 years from now.

**Question: Approximately, how much is your organisation planning to invest to deploy and use digital solutions across its fleet over the next 12 months, 24 months and beyond?**



| | Within the next 12 months | Within the next 24 months | Beyond 24 months |
|---|---|---|---|
| More than $3M | 6% | 15% | 21% |
| $1M to $3M | 19% | 17% | 22% |
| $500K to $999K | 16% | 31% | 19% |
| Less than $500K | 59% | 37% | 39% |

**12** Within the next 12 months

**24** Within the next 24 months

**24+** Beyond 24 months

Legend: ■ Less than $500K  ■ $500K to $999K  ■ $1M to $3M  ■ More than $3M

Base: Owner/Managers: (n=147).

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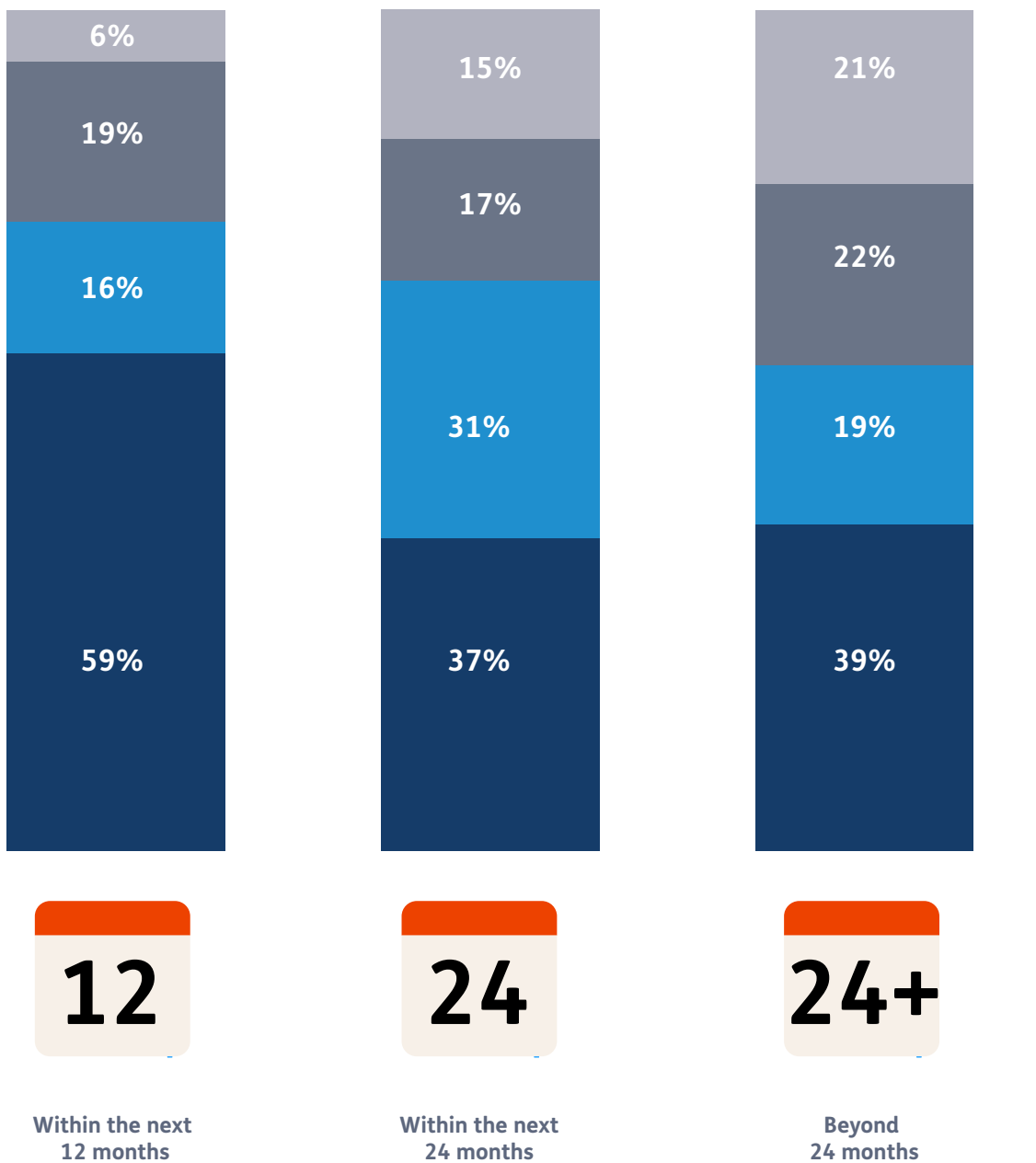
# SHIP OWNER/MANAGER:
## KEY CHALLENGES FOR IMPLEMENTING DIGITAL SOLUTIONS

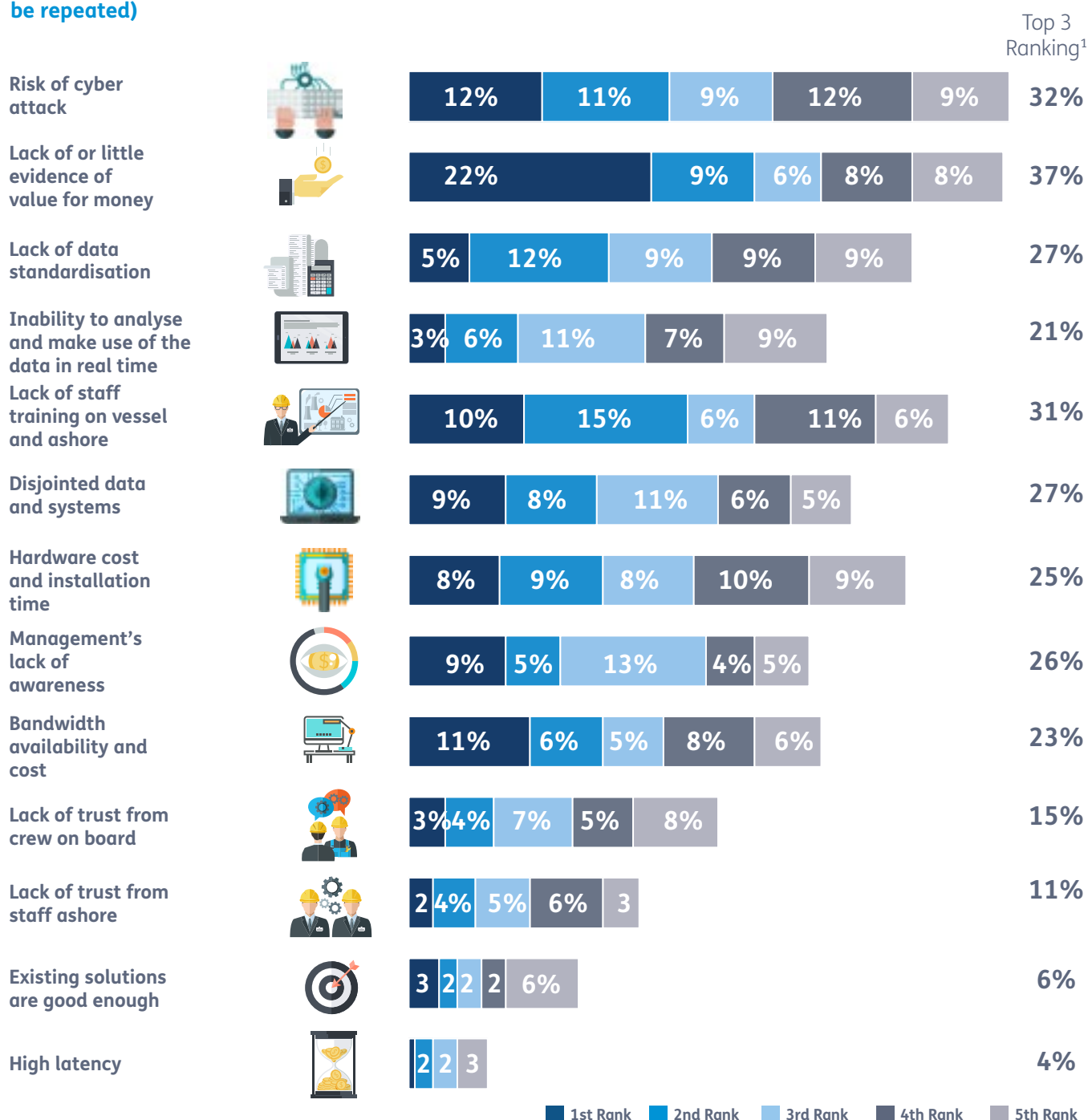The key challenges for Ship Owner/Managers (based on top 3 ranking) in implementing digital solutions on ships were seen to be the questionable value for money, the risk of cyber attack, and lack of staff training.

**Question: Please select and rank (in order of importance) the key challenges your organisation faces in implementing digital solutions on its ships? (Please select up to 5 key challenges and assign a value/rank from 1 to 5 for each item, where 1 is the most important and 5 is the least important. Value/ranks may not be repeated)**

| Challenge | 1st Rank | 2nd Rank | 3rd Rank | 4th Rank | 5th Rank | Top 3 Ranking[1] |
|---|---|---|---|---|---|---|
| Risk of cyber attack | 12% | 11% | 9% | 12% | 9% | 32% |
| Lack of or little evidence of value for money | 22% | 9% | 6% | 8% | 8% | 37% |
| Lack of data standardisation | 5% | 12% | 9% | 9% | 9% | 27% |
| Inability to analyse and make use of the data in real time | 3% | 6% | 11% | 7% | 9% | 21% |
| Lack of staff training on vessel and ashore | 10% | 15% | 6% | 11% | 6% | 31% |
| Disjointed data and systems | 9% | 8% | 11% | 6% | 5% | 27% |
| Hardware cost and installation time | 8% | 9% | 8% | 10% | 9% | 25% |
| Management's lack of awareness | 9% | 5% | 13% | 4% | 5% | 26% |
| Bandwidth availability and cost | 11% | 6% | 5% | 8% | 6% | 23% |
| Lack of trust from crew on board | 3% | 4% | 7% | 5% | 8% | 15% |
| Lack of trust from staff ashore | 2 | 4% | 5% | 6% | 3 | 11% |
| Existing solutions are good enough | 3 | 2 | 2 | 2 | 6% | 6% |
| High latency | 2 | 2 | 3 | | | 4% |

Legend: ■ 1st Rank ■ 2nd Rank ■ 3rd Rank ■ 4th Rank ■ 5th Rank

Base: top 5 answers permitted: Owner/Managers (n=186). [1]Top 3 Ranking includes: 1st, 2nd & 3rd.

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# SHIP OWNER/MANAGER:
## TECHNOLOGY UTILISED TO DELIVER THE LARGEST DIGITALISATION BENEFIT

The technologies that Ship Owner/Managers expected to deliver the largest digitization benefits are big data analytics (51% Top 3 Ranking), followed by IoT (which have higher 1st Rank scores) and AI/machine learning.

**Question:** Please select and rank the enabling technology(ies) you believe will deliver the largest digitalisation benefits? (Please select up to 5 enabling technology(ies) and assign a value/rank from 1 to 5 for each item, where 1 offers the largest digitalisation benefits and 5 offer the least digitalisation benefits. Value/ranks may not be repeated)

Top 3 Ranking[1]

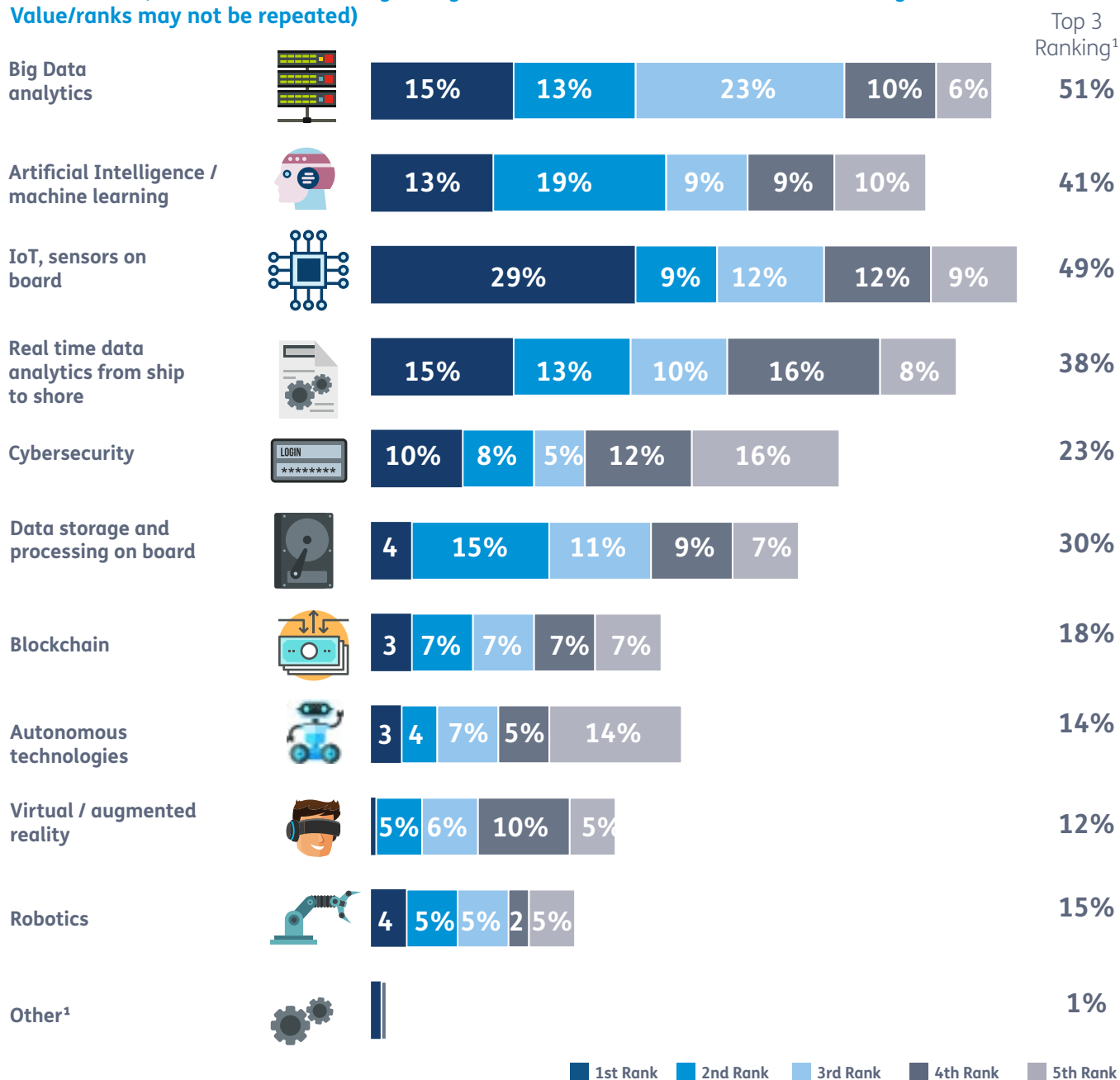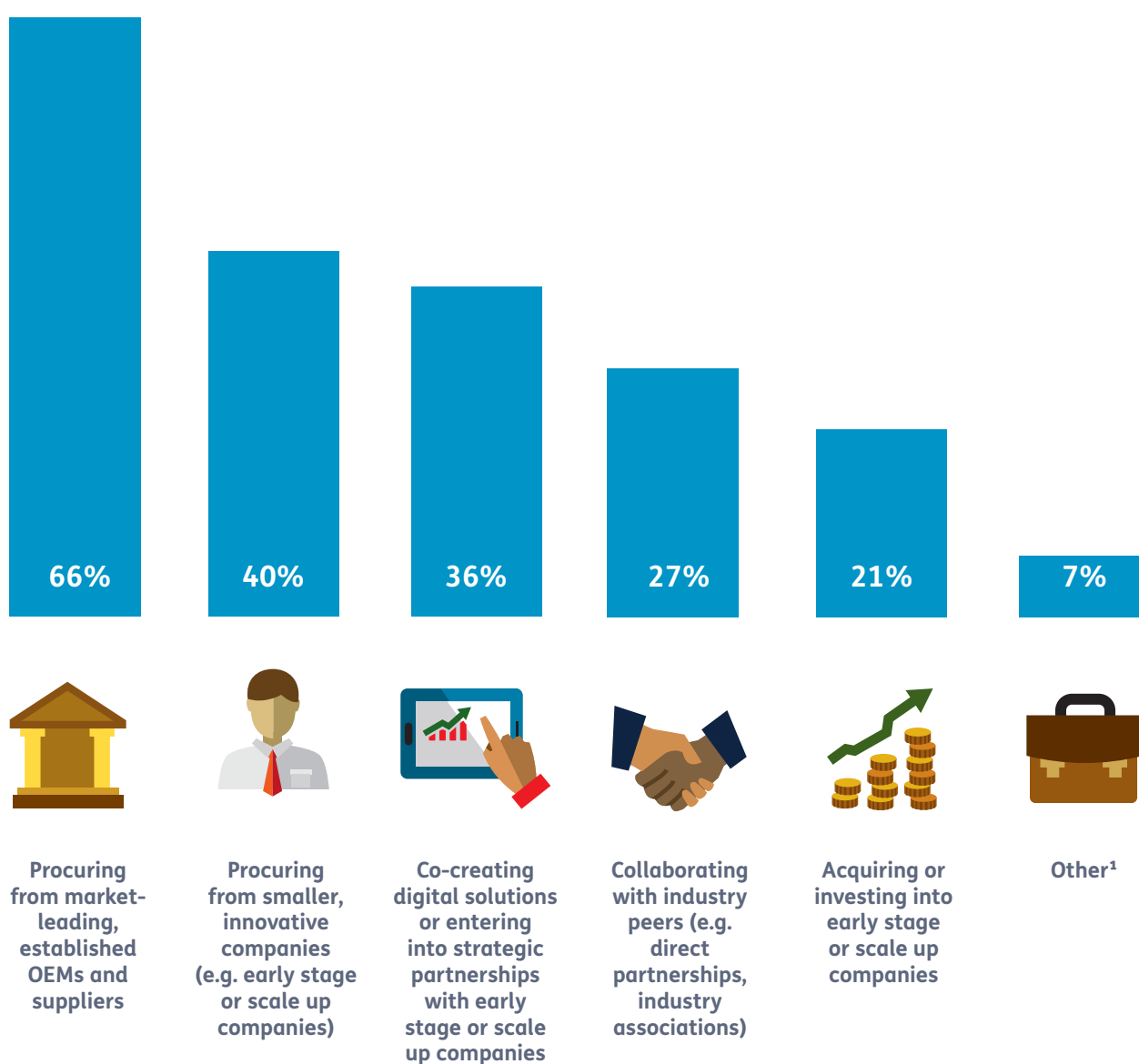| Technology | 1st Rank | 2nd Rank | 3rd Rank | 4th Rank | 5th Rank | Top 3 Ranking[1] |
|---|---|---|---|---|---|---|
| Big Data analytics | 15% | 13% | 23% | 10% | 6% | 51% |
| Artificial Intelligence / machine learning | 13% | 19% | 9% | 9% | 10% | 41% |
| IoT, sensors on board | 29% | 9% | 12% | 12% | 9% | 49% |
| Real time data analytics from ship to shore | 15% | 13% | 10% | 16% | 8% | 38% |
| Cybersecurity | 10% | 8% | 5% | 12% | 16% | 23% |
| Data storage and processing on board | 4 | 15% | 11% | 9% | 7% | 30% |
| Blockchain | 3 | 7% | 7% | 7% | 7% | 18% |
| Autonomous technologies | 3 | 4 | 7% | 5% | 14% | 14% |
| Virtual / augmented reality | | 5% | 6% | 10% | 5% | 12% |
| Robotics | 4 | 5% | 5% | 2 | 5% | 15% |
| Other[1] | | | | | | 1% |

Base: top 5 answers permitted: Owner/Managers (n=186). [1]Top 3 Ranking includes: 1st, 2nd & 3rd.

# SHIP OWNER/MANAGER:
## FINDING AND DEPLOYING DIGITAL SOLUTIONS

Two thirds of Ship Owner/Managers respondents are using existing OEMs and suppliers (66%) to deploy digital solutions, while just over a third are using either smaller, innovative companies (40%), or co-creating digital solutions or entering partnerships with early stage or scale-up companies (36%).

**Question:  How is your organisation attempting to find and deploy digital solutions? (Please select all that apply)**



| 66% | 40% | 36% | 27% | 21% | 7% |
|---|---|---|---|---|---|
| Procuring from market-leading, established OEMs and suppliers | Procuring from smaller, innovative companies (e.g. early stage or scale up companies) | Co-creating digital solutions or entering into strategic partnerships with early stage or scale up companies | Collaborating with industry peers (e.g. direct partnerships, industry associations) | Acquiring or investing into early stage or scale up companies | Other¹ |

Base: (multiple answers permitted): Owner/Manager selections: (n=353). ¹Other Ship Owner/Manager Comments Includes: Case By Case Cost Benefit, Collaborating With Class, In House Development, Long Term Partners, Medical, Own Grunt Work & Ship Manager.

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# SHIP OWNER/MANAGER:
# 'EARLY STAGE' SUPPLIERS OF DIGITAL SOLUTIONS

Nearly half of Ship Owner/Manager respondents not currently working with smaller, innovative companies for digital solutions believe they will be working with such companies in the next year.

**Question:** How likely is your organisation to work with an early stage or scale up company for digital solutions in the next 12 months?

| Very likely | Likely | Unlikely | Don't know |
|:---:|:---:|:---:|:---:|
| 19% | 29% | 34% | 18% |
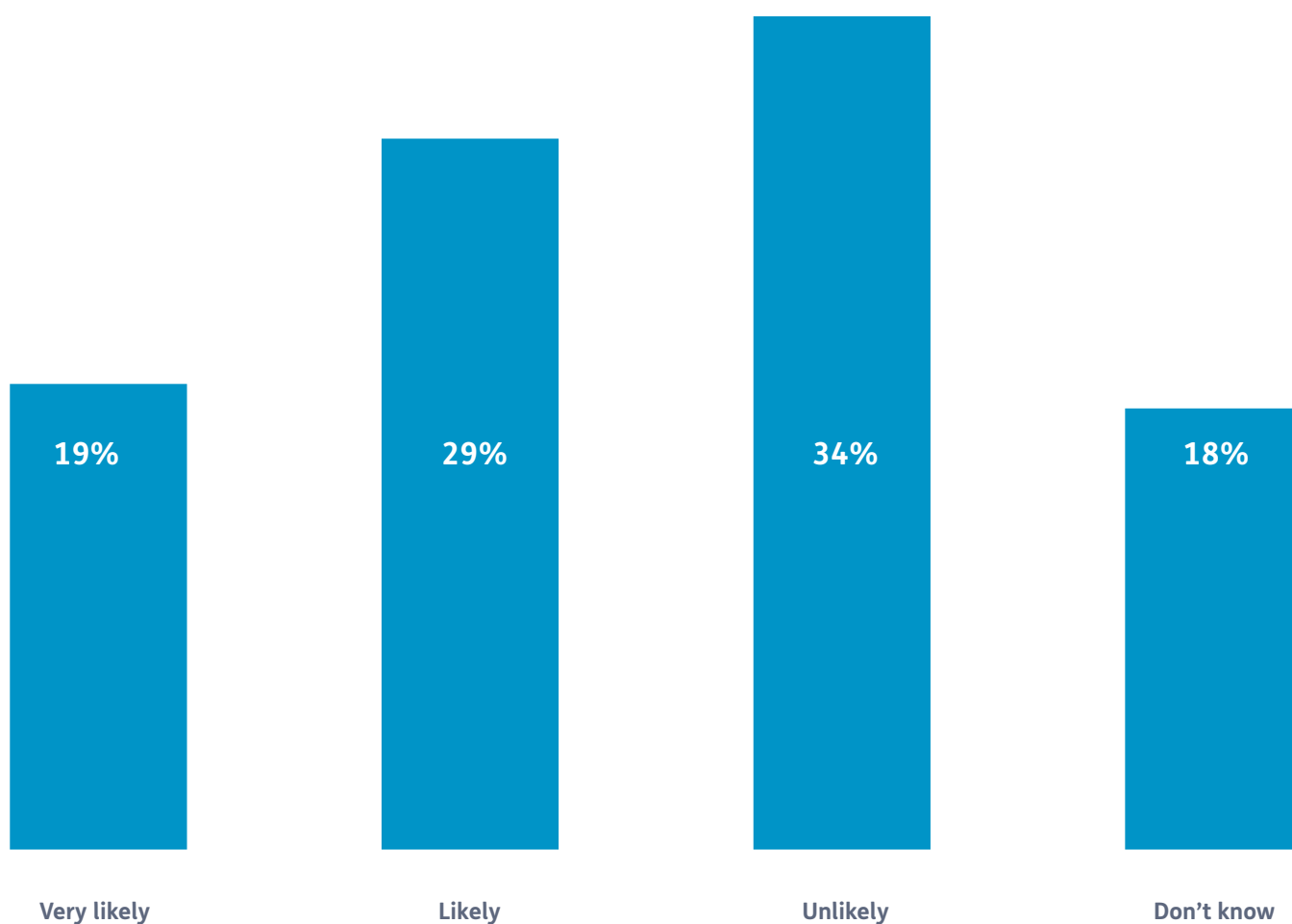
Base: Respondents not currently working with early stage or scale up companies for digital solutions: Owner/Manager selections: (n=62).

# informa engage

**Informa Engage** is the marketing services powerhouse behind Informa's trusted brands. We provide B2B marketers with unrivaled specialist audiences, deep knowledge of vertical markets, sophisticated data and content marketing expertise. Through our deep understanding of our customer's behaviors and changing needs, Informa Engage connects marketers to customers as they move from discovering a problem to identifying features and functionality of a solution to selecting a provider and making a purchase.

**250+**
DATA, INSIGHT & INTELLIGENCE PRODUCTS

**INTELLIGENCE**

**110K+**
ACADEMIC BOOKS & JOURNALS

**KNOWLEDGE**

**1,800+**
EVENTS & EXHIBITIONS

**EVENTS**

**180+**
COUNTRIES WORLDWIDE FUELING A RICH DATABASE

**GLOBAL REACH**

# With reach to 30+ million business decision makers.