



CROWLEY Insights

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The importance of cybersecurity at sea



Reports of maritime cyber events to the U.S. Coast Guard increased

20%

in 2022

Source: [U.S. Coastguard 2022](#)

Advances in technology are rapidly transforming the maritime and logistics business, enabling greater visibility of the supply chain, carbon emissions reductions, and efficiency gains. But as corporate digital systems grow more interconnected and crucial industry intelligence travels around cloud environments at dizzying speeds, the risk of debilitating and costly cyber-attacks is ever present.

The maritime industry is well aware of its vulnerabilities. A survey published in April by the maritime industry classification and advisor firm DNV found that two-thirds of the industry professionals expect some damage to port or cargo handling infrastructure in the near future as a consequence of cyber-attacks. More than half of respondents expect physical harm or loss of life, and 60% see cyber assaults causing ship collisions.

For sure, investments in cybersecurity – be it personnel or technology – are still wanting, and it takes time for a company to build out an effective cyber arsenal to detect threats and defend its networks.

Just under one-third of maritime industry professionals say that insufficient budgets and resources is the biggest cyber-related challenge, according to the DNV survey, and 27% of them cited lack of training and skills among ship crews as the main challenge.

But while the industry plays catch-up, cutting-edge solutions are abundant and quickly evolving to help it foil attacks. In addition, the community of cybersecurity experts, including government agencies, is determined to hone their information sharing strategies.

“Cybersecurity requires a broad team, working together along with the right technology, and communicating for the best outcome,” says Erika Graziuso, chief information officer at Crowley.

“If that doesn’t happen, within a company, within a community, within a country – wrongdoers will continue to win,” she said. “It all comes down to communication, and to sharing, and to paying attention to what we’re doing [as we use technology].” ▶

Indeed, 43% of respondents to the DNV survey said they didn't think the industry is good at sharing information and lessons learned about cybersecurity risks, while 31% were satisfied with the level of information sharing.

ONE FOR ALL AND ALL FOR ONE

Besides encouraging timely information sharing, it is also critical to impart to the whole organization that the security of all systems is everyone's responsibility.

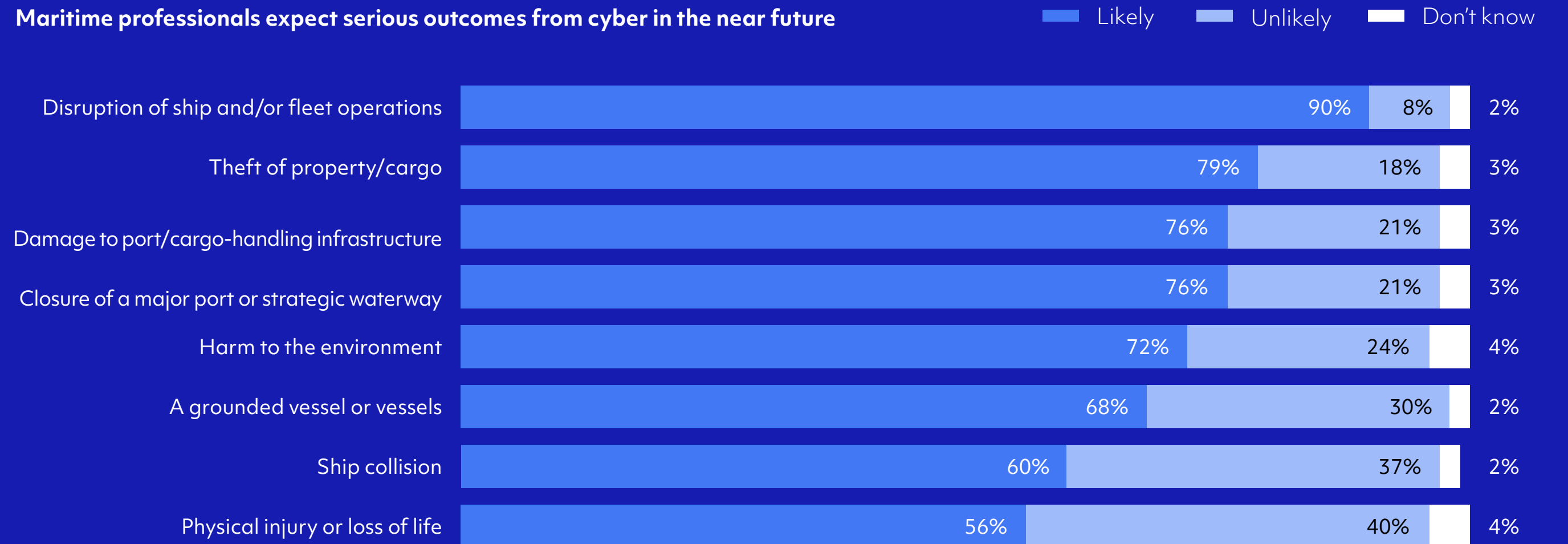
Take the advent of broadband connections on vessels that provides sailors with the joy of being in touch with friends and family, and the convenience of paying bills online while at sea.

Onboard connectivity, provided by satellite link, has become key to enticing a new generation to work as a mariner. But with it comes the challenge of securing these channels to prevent ill-intentioned hackers onto a ship's operating systems.

"For the IT team, managing this risk requires redesigning the architecture of the network environments. In vessels, that means separating the network used for operations from that used by the ship's crew to keep in touch with their family and friends", says Brad Walton, Crowley's vice president of infrastructure and technology. ▶

WHAT DO MARITIME PROFESSIONALS THINK IS LIKELY FROM CYBER-ATTACKS IN THE NEXT TWO YEARS?

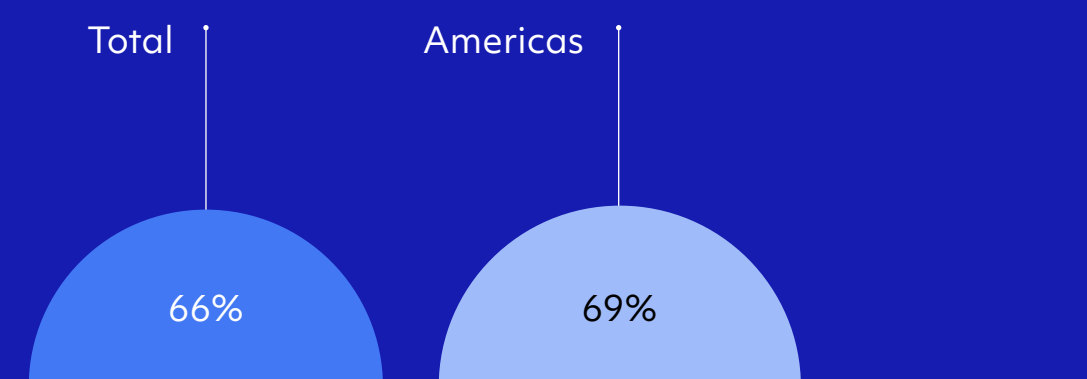
Maritime professionals expect serious outcomes from cyber in the near future



AWARENESS OF THE RISKS IS GROWING FAST

Russia's invasion of Ukraine has increased awareness of the cyber security threat

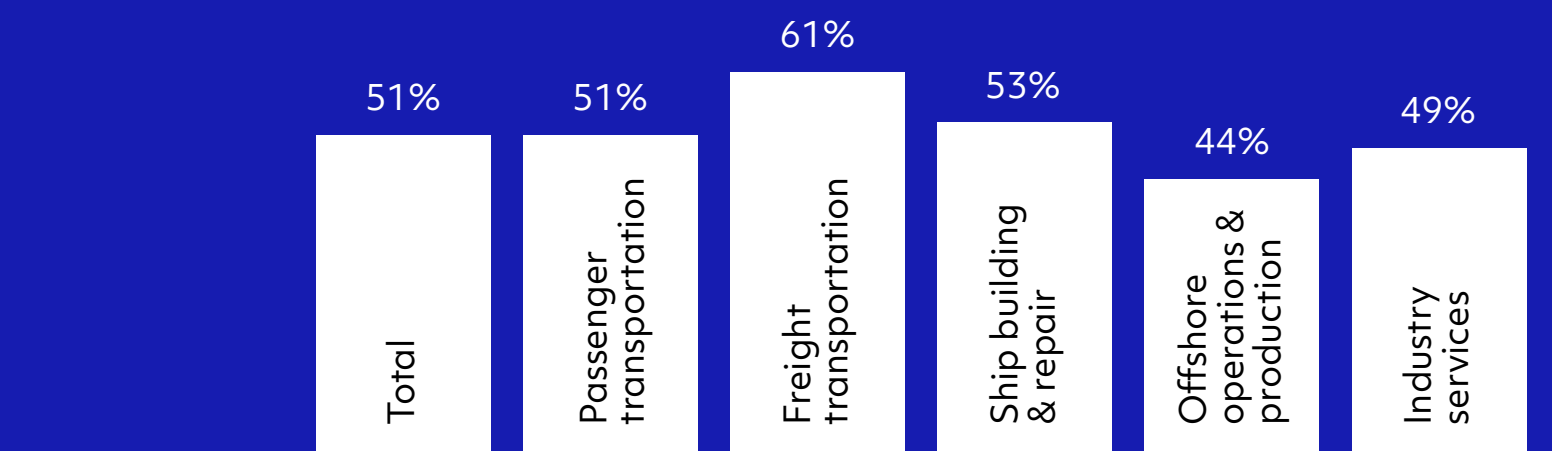
Extent to which respondents agree that the Russian invasion of Ukraine has made the maritime industry more sensitive to the threat of cyber security incidents than it was before

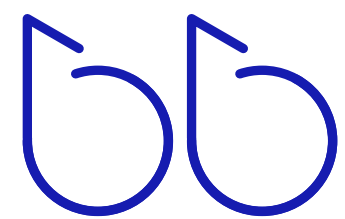


HOWEVER, THE INDUSTRY MUST STILL PRESS AHEAD WITH DIGITALIZATION

Freight transportation is relying more heavily than other sectors on connectivity to enable decarbonization

Extent to which respondents agree that digital technology is a key enabler of their organization's decarbonization activity





Cybersecurity requires a broad team, working together along with the right technology, and communicating for the best outcome

Erika Graziuso,
Chief Information Officer,
Crowley

The inherent complexity of the prevailing technology is such that firewalls and antivirus software are hardly enough to do the job of cyber defense. Business is being conducted through distributed systems, and broad access to data is intrinsic to corporate competitive strategies, so much of the job of data security falls to encryption. That's an area of significant progress, with quantum mathematics emerging as the basis for a new model of data security.

Crowley is deploying a proprietary system called secured encapsulation. It uses a high-end intelligence version of a security information and event management tool that can effectively build baselines and behavioral analytics, and understand expected activities within a network.

The multi-layer system consists of identity access management, data controls and information classification, all processed through superior machine intelligence. It is cloud agnostic and is based on proxy servers that use modern encryption to protect communications.

Increasingly, the physical operations of ships, ports and warehouses rely on software and hardware to manage and

monitor assets and equipment such as sensors, switches, and navigation systems. Shippers want to access real-time information about a vessel's performance, of its turbines and generators, for instance, so high-end encryption is necessary to secure that information as it leaves the vessel.

Again, the trick is to provide enough knowledge and awareness to personnel to empower them to be a part of the safety protocols. After all, human error – intentional or otherwise – is a prevalent risk for technology systems.

Education about cyber risk has to be part of the preparation of captains, mates and ship engineers as well, so they can understand what systems are critical and what needs to be isolated, said Dirk Goehring, director of cybersecurity at Crowley. "That's how they can understand why the rules are there – they are not there to upset anyone or create more work, they are there to help keep you alive."

The education of users cannot rely on scare tactics, though, said Goehring. Crowley uses a protocol by which employees first get threat information, evaluate whether the information is authentic, assess how the threat could impact the environment, and then respond to it, he explained. ▶

“That process creates a mature level of responding to fear – nobody in my team is allowed to post scary warnings [to the company’s users],” he said. IT needs to be able to communicate an emerging threat, explain what they are doing to protect the system as well as the user and their particular business line, and inform what employees can do to protect themselves. “We are always promoting constructive tools.”

RESILIENCY AS WELL AS SAFETY

Cybersecurity systems exist not only to secure operational technology and data systems, but also to ensure that the company continues to run regardless of threats and vulnerabilities.

The hacking of a major software firm’s systems, disclosed in early July, exposed U.S. government data to China-based actors—one example of how even the most sophisticated systems are vulnerable to tireless and well-funded cyber criminals.

Crowley, like most U.S. businesses, is linked to this software company. When the breach was disclosed, the concept of cybersecurity as a team sport was put to the test.



It all comes down to communication, and to sharing, and to paying attention to what we’re doing [as we use technology]

“We have a very rigorous and continuous patch management process, and we also have a very close and open relationship with [Cybersecurity and Infrastructure Security Agency] and the Department of Homeland Security,” said Goehring.

“We work with our government partners regularly, we communicate across industries, so we can be continually monitoring for potential flaws and breaches.”

Open communication is almost a mantra for Goehring, and he walks his talk.

“My team tells me that they appreciate that I lay things out and...then we get together and make it happen.”

Erika Graziuso,
Chief Information Officer,
Crowley



Logistics businesses must future-proof small truckers



96%

of U.S. motor carriers operate 10 or fewer trucks

Source: [American Trucking Associations](#)

Depressed freight rates continue to squeeze small carriers, a trend that could be problematic for the logistics business in the long run. Although paying less for shipments is appealing, shippers would do well to cultivate relationships with smaller carriers and support them through the downturn.

During the pandemic-induced consumption frenzy, truckers were king and had the upper hand in picking loads during most of 2021 and 2022. Shippers, meanwhile, were struggling to find consistent and reliable carriers to move their freight across the U.S. The tables may be turned now, but neither side will benefit from carriers going out of business – when the economy rebounds, a glut could again lead to a spike in rates and feed a vicious cycle.

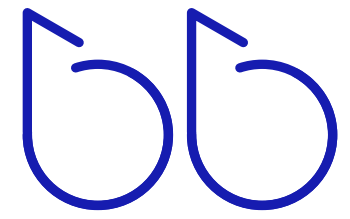
The Cass Truckload Linehaul Index, which measures changes in per-mile rates of both spot and contract freight, fell 14.1%

in June from a year ago. This measure started declining sharply in the final quarter of 2022 and turned negative in January. The index is calculated by Cass Information Systems, a freight audit and payment system that manages \$44 billion in spending annually. Cass sees the freight market nearing a bottom, according to its June monthly report.

If anything, the difficulty in securing freight for shipments in the past two years has highlighted the need to build a strong network of small carriers. After all, nearly 96% of the 750,000 motor carriers that own or lease at least one tractor in the U.S. operate 10 or fewer trucks, according to data compiled by the American Trucking Associations, a national trade association.

Crowley's land transportation services team is implementing a digital database of trucking companies through which small carriers can be identified. As part of the project, the company can connect these carriers with resources to help their businesses perform more profitably and sustainably.

"With a digital platform, we can connect our carriers with freight, but we can also create an ecosystem of partners that we can leverage to get our carriers discounted pricing on all the different things that they need to run their business," said Dennis White, director of digital solutions at Crowley. ▶

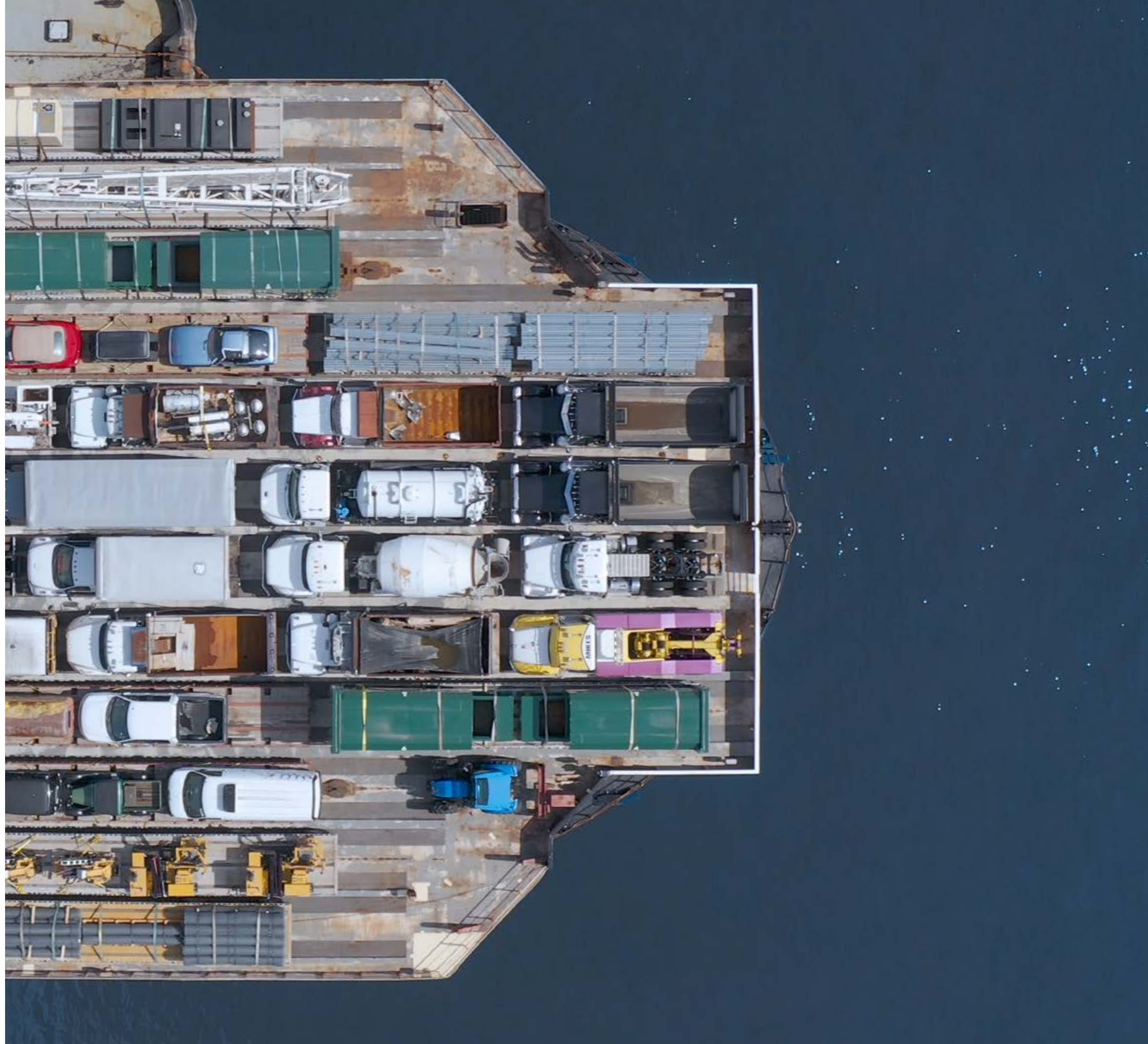


We want to go and find partners we can bring to the table and pass some savings along to our carriers

Dennis White,
Director of Digital Solutions,
Crowley

“Whether it’s discounted tires, discounted fuel, discounted insurance, we want to go and find partners we can bring to the table and pass some savings along to our carriers.”

There are signs that the worst of the downturn is in sight, as retail inventories are declining and economists are observing a soft-landing for the feared post-pandemic recession. By supporting carriers now, Crowley is investing in the long-term livelihood of truckers, as well as future-proofing its logistics operations – a win-win approach for the industry.



Building the maritime workforce of tomorrow



1,800

Shortfall of qualified merchant mariners needed to sustain U.S. military in a prolonged emergency

Source: [U.S. Department of Transportation](#)

Addressing the challenge of recruiting and retaining a new generation of mariners is imperative not only for the health of the U.S. maritime industry, but also for the strength of the global economy and national security.

Shipping and transportation networks are under pressure as fewer people fill essential roles, leading to increased delays, greater risk of accidents due to overwork, and higher costs – all of which are passed on to consumers. This personnel shortage affects both commercial and government shipping sectors as they seek to minimize disruptions in the supply chain and related services.

As such, major shipping companies and the government are super-charging recruiting efforts and spreading the message that a career as a mariner is rewarding and meaningful. The cultural shift emphasizing a work-life balance is ushering changes to the job, including shorter length of deployment,

internet connectivity onboard, and making the work environment even safer, all of which makes the role more attractive to recent graduates.

Alarm bells over the shortage of qualified merchant mariners have been ringing for over a decade, but they got louder during Covid-19 as pressure on the supply chain increased.

During a Congress hearing in May, officials said that if the U.S. needed to sustain its military in a prolonged emergency, it would be short at least 1,800 qualified merchant mariners to transport personnel and goods, assuming all of those fully licensed are available and willing to join the effort.

The Coast Guard, which supports transportation operations in the U.S. waterways and ports, is operating with a shortage of approximately 4,800 members across the entire service and has missed its recruiting targets for the past four fiscal years, according to data presented at the congressional hearing.

The outlook isn't encouraging: The Bureau of Labor Statistics estimates that the number of employed qualified captains, mates and pilots of water vessels rose only slightly from 33,370 in May 2019 to around 35,000 last year. It projects ►

only a modest rise in the number of these workers through 2031, to 37,200 from 36,800 in 2021, not enough to sustain the industry.

The job of a mariner is often arduous and demanding, and the shortage puts those on the job under greater pressure. They often have to work much longer hours with fewer resources, leading to fatigue and decreased morale.

The issue of mariner shortage is front and center for the U.S. maritime industry and the government for a very good reason: waterborne cargo and related activities contribute more than \$500 billion to the economy, and sustain over 10 million jobs, according to the Department of Transportation.

The industry is making a concerted effort to solve the personnel shortage, including offering better benefits, investing in infrastructure to support safe working conditions and increasing operational efficiency, and making innovations to ships for greater comfort while at sea.

HIGHER PAY, BETTER BENEFITS

A positive development for those considering a career as a mariner is higher pay: the mean salary of captains, mates and pilots of water vessels climbed by nearly 20% from pre-pandemic levels to an average of \$104,190 in May last year, according to the most recent data from the U.S. Bureau of Labor Statistics. The jump occurred despite the number of those employed in this category rising slightly in that period.

Large shippers are also bolstering employment perks, including training and support for a mariner's advancement, besides generous work-home rotation, which some view as one of the most appealing features of the job. For instance, a mariner on the Crowley's Florida-Puerto Rico route gets 45 days off after 45 days at sea. For its part, the Coast Guard is offering enhanced parental leave and extending the childcare fee assistance program, besides bulking up its health policy with physical therapy and behavioral health services.

CONNECTIVITY AND SAFETY

Another integral piece of the effort to enhance onboard quality of life for mariners is connectivity.

"There are usually two fast questions we get when we are recruiting: the first one is, does the ship have internet," said Ira Douglas, vice president of labor relations at Crowley. "Salary is obviously an important question, but they also really want to know [for] how long they will be sailing."

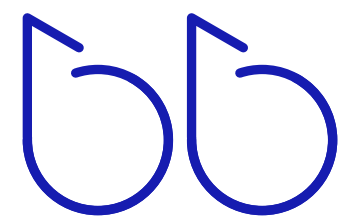
Being able to use the internet to contact family and friends ▶



19%

increase in mean salary of captains, mates and pilots of water vessels from May 2019 to May 2022

Source: [U.S. Bureau of Labor Statistics](https://www.bls.gov)



We are continuing to evolve our culture to be more inclusive, more welcoming, so that the younger generation can view it as an appealing career

Ira Douglas,
Vice President of Labor Relations,
Crowley

and do routine tasks such as banking has become increasingly essential, said Douglas, and is a clear competitive advantage in retaining personnel.

Shipping companies are testing satellite internet services, but these are still very expensive. Crowley is participating in a pilot trial and beginning to roll out high speed internet for all of its vessels over 2023 as the technology advances.

Accessibility to high speed Internet has become a commitment by Crowley, which worked with its mariners and other partners to ensure all vessels will offer enough bandwidth for crew members to connect to the internet. Crowley's project will include technology that provides service nearly all over the globe.

What's more, the industry is taking significant steps to sustain a safe and inclusive workplace.

Crowley runs a series of educational campaigns and training to instill company values and communicate clearly what is acceptable behavior, and to reinforce the importance of a positive and inclusive workplace. It has also implemented

policies and procedures to target sexual assault and harassment on merchant vessels, equivalent to those which have since been mandated by the government.

"We are continuing to evolve our culture to be more inclusive, more welcoming, so that the younger generation can view it as an appealing career," said Douglas. The changing culture is also working as a catalyst to attract more women to the industry.

At Crowley, women mariners account for about 4% of the full-time mariners' workforce, said Douglas, and the trend is positive. In the past six months following targeted recruitment efforts, the number of women mariners at the company rose even though the overall workforce declined, he said.

The industry's decisive response to the cultural shifts around the work environment is testament of its ability to evolve and become ever more sustainable. By providing better benefits, more connectivity and career progression opportunities, shippers are steadfast in their commitment to establishing and enforcing a vibrant, safe, and rewarding work culture for those at sea.

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