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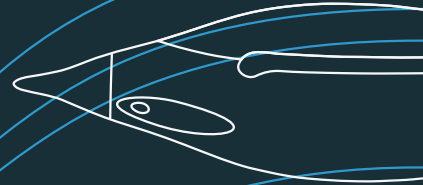
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)) Law of the Sea Tribunal Rules GHG as Marine Pollutants. The International Tribunal for the Law of the Sea has made its first climate-related judgment, providing timely guidance on states' obligations on climate change and an explicit reference to human rights issues, according to the UN. The Hamburg-based tribunal handed down an advisory opinion that made the unprecedented recognition that greenhouse gas (GHG) emissions are a form of marine pollution. The tribunal also underscored that states have obligations under the Law of the Sea, which are additional to those contained in the 2015 Paris Agreement. The tribunal further clarified that states have obligations to protect the marine environment from climate change impacts and ocean acidification, including designing mitigation measures to minimize, to the fullest extent possible, the release of toxic substances into the marine environment and exercising strict due diligence to ensure that non-state actors comply with mitigation measures. In terms of international cooperation, the tribunal underscored states' obligations to prevent climate change-related pollution from affecting other states and the environment beyond national jurisdiction. States' obligations further include joining global efforts to address climate change and assisting developing states, particularly vulnerable ones. The tribunal emphasizes precautionary and ecosystem approaches in the context of states' obligations to conduct environmental and socioeconomic assessments of any activity that may cause climate change-related marine pollution.

)) Supporting UK Market for 'Mini-MASS.' Unmanned Survey Solutions (USS), in close collaboration with Stehr Consulting Ltd., has launched the project: Unlocking the Potential for "Mini-MASS" in U.K. Waters. This initiative, funded by Innovate UK, aims to revolutionize the smaller Marine Autonomous Surface Ship (MASS) market by addressing significant regulatory and certification challenges hindering the widespread adoption of smaller USVs in U.K. waters. The recent updates to the Workboat Code Edition 3 (WBC3) by the Maritime and Coastguard Agency represent a major step forward, incorporating provisions for ROVs. However, WBC3 predominantly focuses on larger, higher-risk vessels within the sub-24-m market, overlooking the unique characteristics and lower risk associated with Mini-MASS. As a result, the current requirements present significant challenges for these smaller vessels, creating a barrier to innovation. This project aims to break down these barriers by providing a comprehensive open-source report and templates that meticulously analyze WBC3 requirements. These analyses will identify requirements that, in the context of demonstrating safety for Mini-MASS, are valid, partially valid and not valid. For requirements in the latter two categories, the project aims to produce generic template safety argument patterns, streamlining the certification process for Mini-MASS vessels and informing future policy development.

)) Safety and Shipping Review 2024. Given that as much as 90 percent of international trade is transported across oceans, maritime safety is critical. Thirty years ago, the global shipping fleet lost about 200 large vessels a year. This total fell to a record low of 26 in 2023, a decline of more than one-third year over year and by 70 percent over the past decade. However, the fact that shipping is increasingly subject to growing volatility and uncertainties from war and geopolitical events, the consequences of climate change, and ongoing risks resulting from the trend for larger vessels means the sector will have its work cut out to maintain this status quo, according to marine insurer Allianz Commercial's Safety and Shipping Review 2024. "Conflicts such as in Gaza and Ukraine are reshaping global shipping, impacting crew and vessel safety, supply chains and infrastructure, and even the environment," said Captain Rahul Khanna, global head of marine risk consulting at Allianz Commercial. "Piracy is on the rise, with a worrying re-emergence off the Horn of Africa. The ongoing disruption caused by drought in the Panama Canal shows how the changing climate is affecting shipping, all at a time when it is having to undertake its most significant challenge, decarbonization." The South China, Indochina, Indonesia and the Philippines maritime region is the global loss hotspot, both over the past year and decade (184 losses). The number of shipping incidents reported globally declined slightly last year, with the British Isles seeing the highest number. The report also notes that in the three years since Russia invaded Ukraine, the gradual tightening of international sanctions on Russian oil and gas exports has contributed to the growth of a sizable "shadow fleet" of tankers comprising 600 to 1,400 vessels. Attacks against shipping in Middle East waters have also severely impacted Suez Canal transits and trade. Ongoing disruption caused by drought in the Panama Canal causes yet more issues for global supply chains. Decarbonization presents various challenges for the industry; for example, the need to develop infrastructure to support vessels using alternative fuels, such as bunkering and maintenance, while at the same time phasing out fossil fuels.

)) Commercial E-Ship Charging Network. NatPower Marine and Peel Ports Group, a major U.K. port operator, have announced plans to establish the first "green shipping corridors" between Ireland and the U.K. The proposed project would see NatPower Marine develop the U.K.'s first commercial electric ship (e-ship) charging network to support electric propulsion and cold ironing (the process of accessing clean power while docked to avoid significant engine pollution while at the port) as part of a network across all eight U.K. and Irish ports operated by Peel Ports Group. More than 3,000 vessels cross the Irish Sea every year, emitting 230,000 tonnes of CO₂. The first Irish Sea routes identified in the proposals include Belfast-Heysham and Dublin-Birkenhead. **ST**

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Sustainability Best Practices For Subsea Cables

What is the carbon footprint of the subsea telecommunications cable network, currently responsible for carrying over 99 percent of all transoceanic internet traffic? How can the sustainability of this network be enhanced? These are the questions that researchers from the SubOptic Foundation's Sustainable Subsea Networks initiative set out to answer in 2021. This past January, they released their findings in the "Report on Best Practices in Subsea Telecommunications Sustainability."

Synthesizing two years of investigation into sustainability initiatives across the subsea cable industry, the report offers a wide-ranging guide to the existing carbon emissions mitigation efforts. This includes initiatives by not only owners and operators of cable systems but also those providing services across the maritime supply chain.

The report was a joint effort, led by an international set of researchers alongside the SubOptic Foundation, a nonprofit organization focused on supporting education and research in the subsea cable industry. It drew from the collaborative work of dozens of companies, including supply, installation, and maintenance companies such as Alcatel Submarine Networks and Orange Marine.

The report found that, while sustainability initiatives vary around the industry, the measurement of greenhouse gas (GHG) emissions was a clear first step toward effective management of carbon emissions. Companies had set climate targets, certified their operations with standards bodies, and acquired green certifications, such as Green Marine Europe. Sustainability has newly become a consideration for cable design. The report also found that energy efficiency initiatives were being undertaken at factories, on cable ships and in cable landing stations. In all of these initiatives, the report emphasizes that there is a need for transparency, intra-industry collaboration and standardization of metrics.

Marine companies have a special place in global telecommunications, as it is the specialized cable ships—equipped with sophisticated technology and highly skilled crew—that survey, lay and repair subsea cables. Compared to other industries, the Best Practices Report observes that the subsea cable industry's marine operators face sustainability constraints in part due to the narrow margins in the sector.

There are, however, many examples of sustainability initiatives on the seas; for instance, the optimization of transit time, since vessels burn less fuel when they run at an optimal speed for energy efficiency. Some companies specifically ask their customers if they would like their vessels to go at a more efficient speed. In cable installation and burial, companies are also considering sustainability when they determine plow depths, cable routes and energy efficiency. The report addresses the need for shore power infrastructure and the approach to new sustainable fuels to enhance sustainability efforts.

One interesting marine technology in development, described in the report, is the possibility of powering subsea cables by ocean waves. Buoys would be located on the surface of the ocean along the cable route and connected to the cable below. Wave motion would be converted into electricity.

Sustainability is increasingly becoming a priority. The Sustainable Subsea Networks research initiative has a dedicated team focusing on the study of maritime metrics and the marine portion of cables' life cycle. We invite you to contact the initiative to learn more and to engage with the industry as it moves toward a more sustainable future: sustainablesubseanetworks@gmail.com. **ST**

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JANUARY

Annual Review & Forecast

****EUROMARITIME 2024**, January 30-February 1, Marseille, France

FEBRUARY

Instrumentation: Measurement, Processing & Analysis

****Oceanology International 2024**, March 12-14, ExCel, London, U.K.

MARCH

Electronic Charting/Vessel Management/ Ports & Harbors/Dredging/Homeland Security

****UDT 2024**, April 9-11, ExCel, London, U.K.

****OCEANS 2024 Singapore**, April 14-18, Singapore

****XPONENTIAL 2024**, April 22-25, San Diego, CA

APRIL

Offshore Technology/Alternative Energy & Ocean Engineering

****Offshore Technology Conference**, May 6-9, Houston, TX

MAY

Communications, Telemetry, Data Processing

JUNE

Seafloor Mapping/Sonar Systems/Vessels

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BONUS INFORMATION

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| • Capital Report | • Marine Renewables | • Ocean Engineering |
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4 EDITORIAL CALENDAR

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Deck Gear, Cable, Connectors, Power Systems & Salvage

****IMAGE 2024**, August 25-30, Houston, TX

AUGUST

Ocean Resources Development & Coastal Zone Management

****OCEANS 2024 Halifax**, September 23-26, Halifax, Canada

SEPTEMBER

Geophysical Exploration/Seafloor Engineering

OCTOBER

Environmental Monitoring, Remote Sensing & Pollution Control

****EURONAVAL 2024**, November 4-7, Paris, France

****CLEAN GULF**, November 18-20, San Antonio, TX

****MAST Australia 2024**, November 19-21, Adelaide, Australia

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Installing Submarine Power Cables

Cable-Laying Vessels Support the Energy Transition

By Karen Bartlett

Cable-laying vessels are operating in deeper waters than ever before.



Submarine cable laying is integral to the offshore wind industry. It is an area that has seen huge growth in recent years due to the transition toward cleaner energy sources and the need for higher speed internet, and has led to a significant demand for more sophisticated cable-laying vessels (CLVs). Consequently, there has been an upturn in cable-laying project management and warranty services provided by specialist companies, such as the Bluestone Group.

Submarine power cables play a crucial role in the world's energy infrastructure by enabling the transmission of renewable energy generated offshore to onshore grids.

As the world transitions to cleaner energy sources, the

strategic importance of these cables is becoming ever more apparent. Offshore renewable energy sources, such as offshore wind farms and tidal energy projects, require submarine cables to transport the generated electricity to onshore grids. As offshore wind energy becomes more common, these cables are essential for transporting the electricity generated by wind turbines to areas with high energy demand.

Submarine cables allow access to remote and untapped energy resources located offshore, such as wave and tidal energy. By connecting these resources to the grid, countries can diversify their energy mix and reduce dependence on fossil fuels. The cables also facilitate international energy trading by connecting the electricity

grids of neighboring countries. This enables the sharing of renewable energy resources across borders, optimizing energy use and fostering cooperation in the global energy market.

Unlike land-based counterparts susceptible to weather-related disruptions, such as rain or snow, underwater cable lines are more resilient. Being situated deep within the ocean, underwater cable lines can be laid continuously over long distances with fewer obstacles than land-based cable lines.

Benefits to the Environment

By enabling the integration of clean energy into the grid, submarine cables contribute to a reduction in greenhouse gas emissions. Unlike traditional fossil fuel-based power generation, which emits significant amounts of carbon dioxide and other pollutants during combustion, offshore renewables harnessed via submarine cables produce electricity without emitting greenhouse gases. This reduction in emissions helps mitigate climate change by lowering the overall carbon footprint of the energy sector.

Submarine cables allow offshore renewable energy projects to be situated far from densely populated areas, where vast expanses of land are not readily available or suitable for large-scale development. This minimizes the need for land-intensive infrastructure associated with conventional power plants, such as coal-fired or natural gas facilities. By utilizing the vast expanse of the ocean for renewable energy generation, submarine cables help preserve terrestrial ecosystems and habitats that would otherwise be disturbed or destroyed by land-based energy developments. This approach supports biodiversity conservation and maintains ecosystem services that are

vital for environmental health and human well-being.

When professionally installed and maintained, submarine cables have minimal direct impact on marine ecosystems. Unlike offshore oil and gas extraction activities, which can lead to habitat destruction, pollution and marine life disturbance, submarine cables for renewable energy transmission typically have low ecological footprints. By facilitating the deployment of offshore wind, wave and tidal energy projects, these cables contribute to the diversification of marine resource use, promoting the transition toward a more sustainable and resilient ocean economy. Additionally, advances in cable design and installation techniques continue to improve the environmental compatibility of submarine cable infrastructure, further minimizing potential impacts on marine life and habitats.

Long-Term Sustainability

Submarine cables play a crucial role in supporting the long-term sustainability of offshore renewable energy development. By providing reliable and efficient transmission pathways for clean electricity from offshore sources to onshore grids, these cables enable the continued growth and expansion of offshore renewable energy projects. This helps reduce dependence on restricted fossil fuels and fosters the transition toward a more sustainable and resilient energy system.

As countries around the world strive to meet their climate targets and transition to a low-carbon future, submarine cables will remain essential components of the offshore renewable energy infrastructure, supporting efforts to achieve environmental sustainability and combat climate change.



Offshore wind farms are one of the application areas for CLVs.

The U.S.'s first utility-scale offshore wind energy project, Vineyard Wind 1, is currently being built 15 mi. off the coast of Massachusetts. The project will generate clean, renewable, affordable energy for more than 400,000 homes and businesses, while eliminating 1.68 million metric tons of carbon dioxide emissions annually: the equivalent of taking 325,000 cars off the road.

Vineyard Wind 1 will comprise an array of 62 wind turbines, spaced 1 nautical mi. apart on an east-west and north-south orientation. The turbines are General Electric Haliade-X turbines, each capable of generating 13 MW of electricity. Electricity generated by the turbines is collected by an offshore substation prior to being transmitted to shore.

Two submarine cables will be installed along a carefully sited route from the offshore substation to the landing point onshore at Covell's Beach in Barnstable. Submarine cables are buried down to 6 ft. below the seafloor using a jet plow. The route was selected after extensive geological surveys of the area to avoid sensitive habitats.

The company behind the project, Vineyard Wind,

says that Vineyard Wind 1 will offer \$3.7 billion in energy-related cost savings over the life of the project.

Technical Advancements in Submarine Cables

The development of high-voltage direct current (HVDC) submarine cables has increased the efficiency and capacity of underwater power transmission. Advancements in cable technology continue to enhance the strategic importance of submarine power cables by enabling longer distances and higher power transmission capabilities.

There have been major advancements in cable technologies over recent years. As the demand for submarine cables continues to grow, they are increasingly being deployed in deeper waters where traditional cable-laying techniques may be impractical. Because subsea cables are being laid at greater depths, they are becoming longer, larger and heavier.

Advances in submarine cable technology, such as the development of cable designs optimized for deep-sea environments and the use of ROVs for cable installation

and maintenance, have enabled cables to be deployed in deeper waters than ever before.

Fiber-optic cables have become the standard for submarine communications due to their ability to transmit data at extremely high speeds over long distances. Advancements in fiber-optic technology have led to increased data transmission capacities, reduced signal loss and improved reliability.

Advances in cable design and installation techniques have improved the reliability of submarine cables, reducing the risk of cable faults and outages. For example, cable manufacturers have developed more robust cable designs capable of withstanding the harsh underwater environment, while improved installation methods, such as dynamic positioning systems for cable-laying ships, have made cable installations more precise and reliable.

Technological advancements have also improved the monitoring and maintenance of submarine cables. Remote monitoring systems equipped with sensors enable operators to detect cable faults and environmental disturbances in real time, resulting in quicker response times to outages and less downtime. Additionally, advancements in ROV technology have made it easier to inspect and repair submarine cables, even at depths that were previously inaccessible.

Custom-Built Cable-Laying Vessels

A CLV is a deep-sea vessel crafted for the specific task

of laying underwater cables across the ocean floor, catering to diverse needs, such as electric power transmission, military operations, telecommunications and more. Notably, in 1866, the illustrious steamship *SS Great Eastern* achieved a milestone by successfully deploying two transatlantic cables, thereby cementing the foundation for future communication between Europe and North America.

There are two types of cable vessels: cable-laying ships and cable repair ships. The former, characterized by their larger size and extensive cable storage drums, focus on the installation of new cables. Meanwhile, cable repair ships, smaller and more agile, specialize in the critical task of fixing or replacing damaged cable sections.

Equipped with an array of sophisticated equipment and systems, CLVs boast features such as carousel systems and essential deck machinery, including A-frames, winches, knuckle-boom cranes and provision cranes, facilitating diverse subsea operations.

In line with technological advancements, the latest generation of cable-laying vessels not only prioritize functional efficiency but also the well-being of crew and visitors by offering spacious working environments and recreational areas. Modern CLVs integrate cutting-edge features, such as dynamic positioning and dynamic tracking systems, ensuring precise navigation along the cable route for seamless underwater cable deployment.

As demand for high-speed internet continues to grow,

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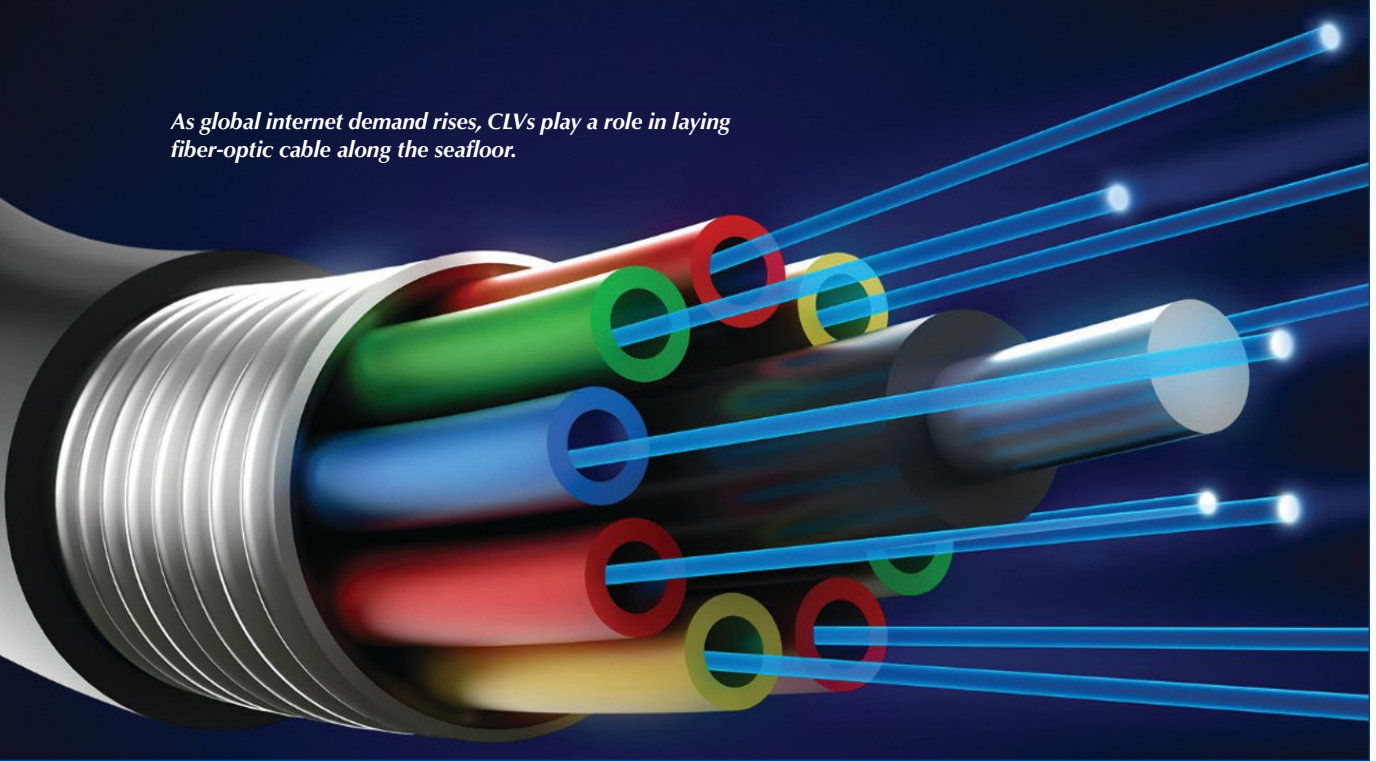
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As global internet demand rises, CLVs play a role in laying fiber-optic cable along the seafloor.



underwater cable-laying vessels are being designed to accommodate larger and faster cables capable of transmitting more data over longer distances. This involves innovations in cable design, as well as improvements in vessel capabilities, such as cable handling systems and installation methods. Vessels with modular designs and versatile capabilities, such as the ability to lay multiple types of cables or perform different tasks simultaneously, are becoming more common.

Cable-laying ships play a critical role in the installation and upkeep of underwater communication and power cables, guaranteeing worldwide connectivity. They feature state-of-the-art technology for precise cable placement, sturdy construction to withstand harsh marine conditions, and dynamic positioning for unparalleled accuracy. With their advanced equipment and streamlined design, cable vessels are indispensable for powering and linking our global community. All these features must be carefully considered during the ship design process and carefully checked during the construction by new building supervision companies, such as the Bluestone Group.

In May this year, Bluestone announced that it had been awarded a major contract to provide plan approval and site supervision for the build of two new-cutting edge CLVs, which are being built by one of the world's leaders in this field. The first vessel, at approximately 190 m long, will be equipped with three carousels and feature advanced cable installation solutions, positioning itself among the highest cable-loading capacity vessels in the market with more than 19,000 tons of cable. It will be operational by the beginning of 2027.

The second vessel, at approximately 167 m in length, will be equipped with carousels for a total cable loading capacity of 10,000 tonnes. The state-of-the-art DP2 positioning, sea-keeping systems and an eight-point mooring

system will enable the ship to meet its operational capabilities in shallow-water cable laying and burial installation, even in harsh environmental conditions. The vessel will be operational by the first half of 2025.

Both vessels will have outstanding green credentials. They will be equipped with high-voltage shore connection systems to power them with clean energy during loading operations, diesel generators suitable for bio-diesel blends, and battery hybrid systems only for the deepwater vessel, due to its specific activity.

Bluestone will deploy two site teams for site supervision, a dedicated plan approval desk with subject matter experts, and project management resources from the head office in Monaco. Plan approval and construction supervision will use the company's proprietary software, which gives owners greater control during the project and improves the way the site team engages with owners and the shipyard on plan approval and field inspections.

Risks and Challenges

Installing submarine cables involves addressing various risks and challenges and marine warranty surveyors play a crucial role in mitigating some of these issues to ensure the successful and sustainable deployment of underwater cable infrastructure. Effective project management, stakeholder engagement, and compliance with regulatory requirements are essential for reducing risks and maximizing the reliability and longevity of submarine cable systems.

Turbines have grown taller, and the distance from wind farms to the shore has increased. Consequently, the cable length required for each wind farm has escalated significantly. The weight of these cables also can be a significant challenge when designing and building specialist vessels.

The harsh marine environment is another significant

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“Submarine power cables play a crucial role in the world’s energy infrastructure by enabling the transmission of renewable energy generated offshore to onshore grids.”

factor to consider as operating in offshore environments exposes vessels to rough seas, extreme weather conditions and corrosive saltwater, necessitating robust construction materials and techniques to ensure durability and longevity. Compliance with international maritime regulations, industry standards, and environmental guidelines also adds complexity to vessel design and construction, requiring thorough knowledge and adherence throughout the process.

The Future of Submarine Cable Laying

As demand for high-speed internet continues to grow, underwater cable-laying vessels may be designed to accommodate larger and faster cables capable of transmitting more data over longer distances. This could involve innovations in cable design, as well as improvements in vessel capabilities, such as cable handling systems and installation methods.

The ability to quickly deploy and reconfigure underwater cable-laying vessels to meet changing market demands and project requirements will be essential in the future. Vessels with modular designs and versatile capabilities, such as the ability to lay multiple types of cables or perform different tasks simultaneously, may become more common.

Advancements in technology and design aimed at improving efficiency, sustainability, and a continued focus on meeting the growing demand for high-speed internet connectivity while minimizing environmental impact will determine future developments in this area. **ST**

Karen Bartlett is account director at Saltwater Stone, a maritime communications company representing some of the world’s leading commercial maritime companies. Its clients’ expertise includes the design of offshore vessels; submarine cable-laying projects (including project planning, supervision and warranty services); cutting-edge vessel technology; and renewable energy. Saltwater Stone’s clients are actively working on sustainable solutions and meeting decarbonization targets.



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Coastal Data Democracy

Uncrewed Vessels Can Streamline Access to Coastal Data

By David Hull • Sander Henriksen

The Bergen-based startup Nordic USV is on a mission to find more sustainable ways of monitoring the coast. Currently, the mobilization of personnel and equipment, plus the charter and transport of a vessel to the survey location means that costs mount up quickly, even just to take basic water samples a few kilometers offshore.

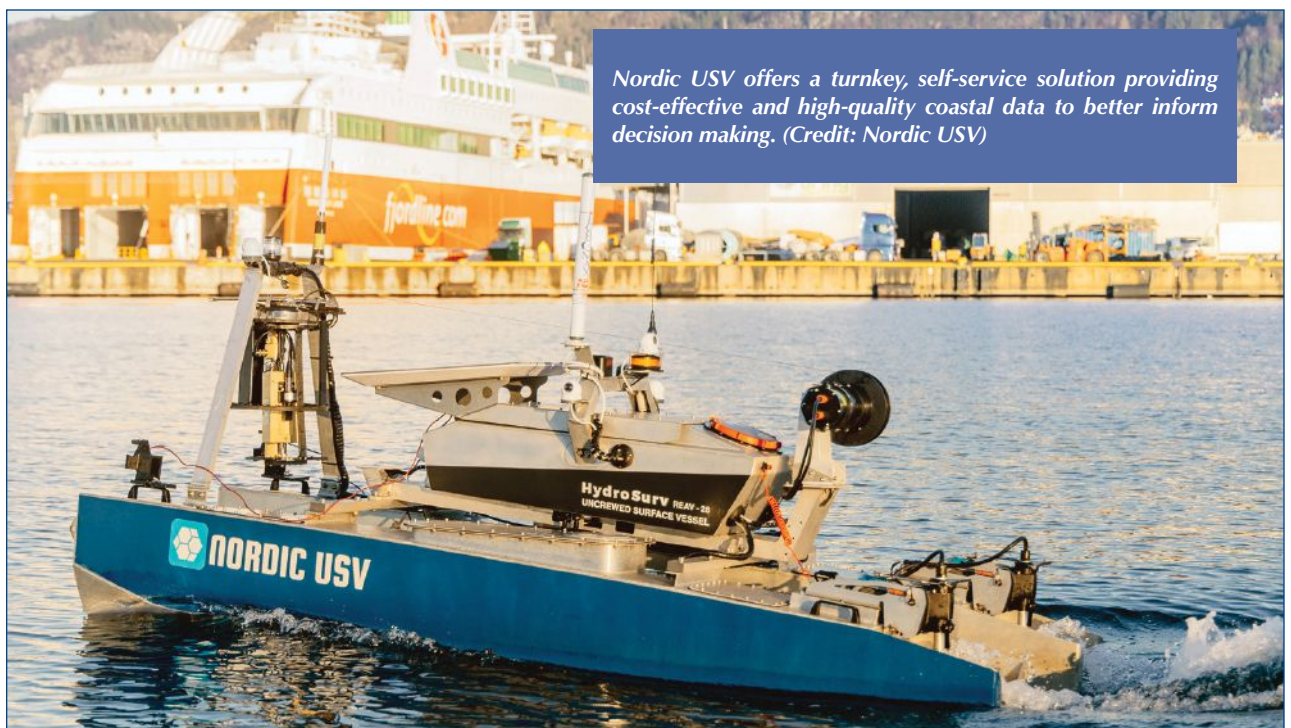
Nordic wants to eliminate cost barriers and develop opportunities to ensure that ocean data and knowledge are accessible to all coastline stakeholders, with minimal environmental impact. It aims to do this by introducing USVs to the mix, as well as automating services and making them easy to use for all coastal stakeholders.

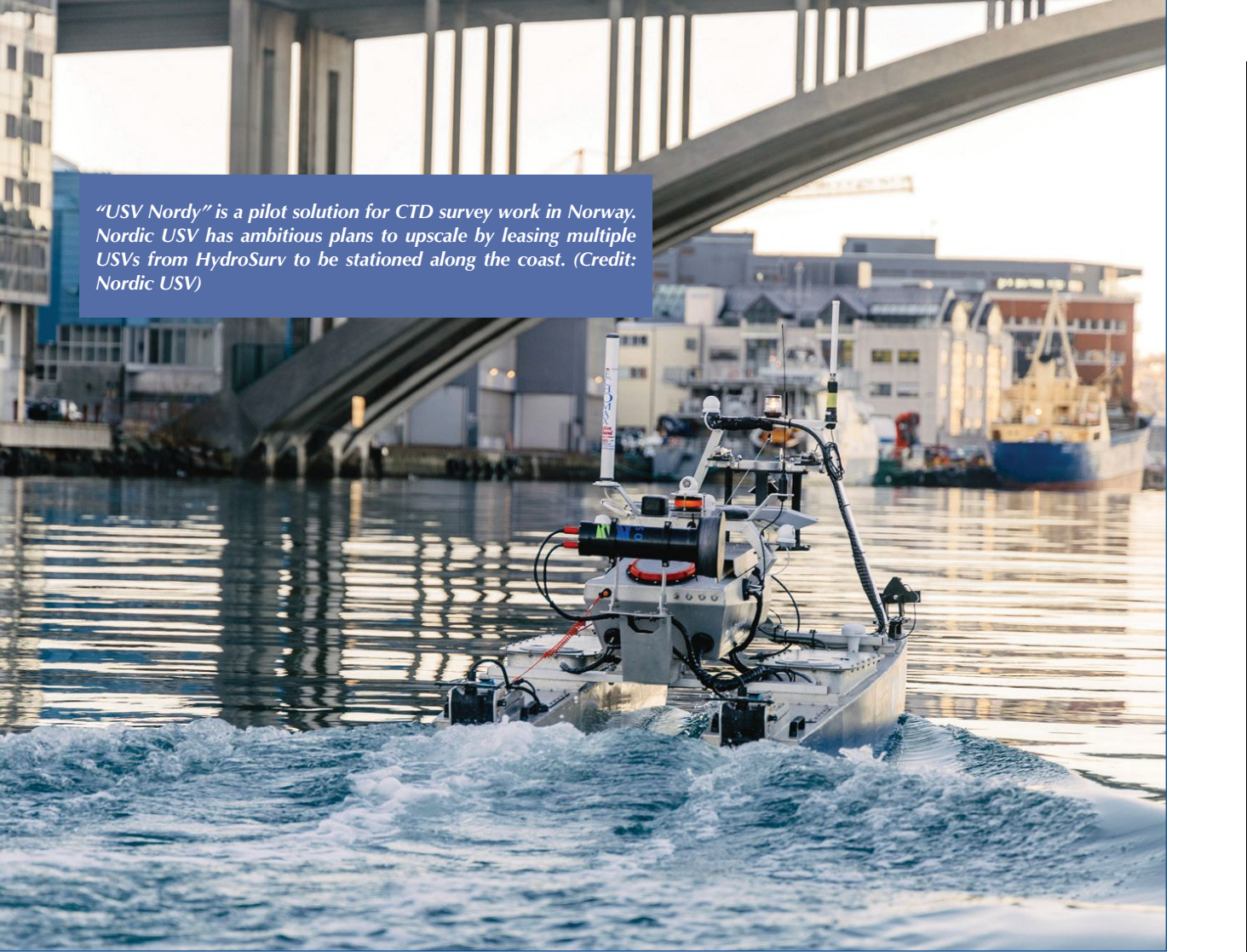
The company is focused on building an operational

business model, developing infrastructure with docking facilities and software solutions aimed at reducing planning time and streamlining the survey booking process. By connecting customers directly to a physical infrastructure through a web browser, this approach ensures that unnecessary intermediaries are eliminated, and the cost and time needed to complete a survey mission are significantly reduced.

Better Data, Better Decisions

In 2020, focusing mainly on UN Sustainable Development Goal 14, “Life below water,” Nordic USV set out to offer a turnkey, self-service solution providing cost-ef-



A small, white, motorized unmanned surface vessel (USV) is shown from a rear-quarter perspective, moving through a harbor. The vessel is equipped with various sensors, antennas, and a winch system. In the background, a large concrete bridge with multiple arches spans the water. Other boats and buildings are visible along the shoreline. The water is calm with some ripples from the vessel's movement.

“USV Nordy” is a pilot solution for CTD survey work in Norway. Nordic USV has ambitious plans to upscale by leasing multiple USVs from HydroSurv to be stationed along the coast. (Credit: Nordic USV)

fective and high-quality coastal data to better inform decision making.

Innovation Norway and the GCE Ocean Technology cluster have been crucial partners in Nordic USV’s development, enabling the company to get started and test the market, as well as enabling connections with larger potential clients.

Nordic USV’s ultimate aim is to build a coastal data infrastructure, using self-charging USVs as monitoring platforms, to democratize coastal data for a broad range of scientific and coastal management communities.

As the industry strives to reach net-zero emissions targets, low-carbon alternatives to traditional marine data collection methods (i.e., crewed survey vessels) are playing a critical role in completing many offshore tasks. USVs are already proven in the offshore sector to ensure a constant data flow in challenging weather and sea states. They act as configurable platforms for a range of payloads, carrying innovative onboard launch and recovery system technology to deploy marine sensors and equipment deep into the ocean for comprehensive measurements and sample collection.

Electric USV with New Winch Technology

After an initial foray into building its own uncrewed

vessel, Nordic USV acquired a 100 percent electric REAV-28 multipurpose USV from Exeter, U.K.-based HydroSurv in November 2023. “USV Nordy” was a modified build specifically for Nordic’s use case, with a CTD cast winch system from OSIL on board.

Operating the USV for winch operations down to 500 m in the Norwegian fjords in varying weather conditions was not without its challenges. However, thanks to HydroSurv’s careful installation of the winch on the 2.8-m vessel, Nordic USV was able to capture high-quality profiles with the CTD sensor while the remote operator closely monitored line tension and depth to maintain steady control. The ability to control the winch speed makes it simpler and safer to use. Typically, the sensor is lowered at a speed of 0.5 m/s to obtain the best profiles, but it is practical to also have the option to winch up to 1 m/s.

The OSIL micro-profiling winch is an extremely compact and programmable direct drive technology designed for integration on floating platforms and USVs. Equipped with a transparent interface for motor control and feedback, it can provide notification of successful docking and zeroing of the winch position in addition to payout readings. The winch is additionally fitted with a level wind reel and an automatic internal brake, en-



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"USV Nordy" was a modified build with a CTD cast winch system from OSIL. (Credit: Nordic USV)

abling effective profiling at depths of up to 500 m.

USV Nordy has a Dynautics vessel control system, including a mission planning application integrated with S57 electronic navigation charts. The REAV-28 is also fitted with a Starlink communications system, providing a high-bandwidth satellite connection.

Nordic USV operates the vessel from a remote operations center (ROC). The USV is remotely deployed and recovered from Nordic's own docking stations, ensuring seamless integration and deployment for efficient, reliable operations.

Nordic USV's proprietary survey planning portal enables users to plan surveys in detail, receive quotes immediately and receive requested data in their browser. Task planning and pricing is automated, allowing the user to requisition precise data quickly and efficiently while minimizing miscommunication.

Customer missions were held front and center in developing this online planning portal, enabling users to share the information they require through an interactive, visual interface. Colleagues can be invited for easier data sharing, and the platform undergoes constant development based on customer feedback.

Scalable DaaS for Ocean Survey

Together, Nordic USV and HydroSurv have successfully demonstrated the capability to remotely dock and

initiate charging for a USV throughout the winter in Norway. The concept has been optimized and is now actively fulfilling commercial missions.

Nordic USV is currently piloting this solution for CTD survey work in Norway and has ambitious plans to significantly scale it up by leasing multiple USVs from HydroSurv to be stationed along the coast. Multiple, self-charging docking stations would see the USV fleet operating on demand, even in challenging weather conditions, to provide a data-as-a-service (DaaS) solution for hydrographic, oceanographic and environmental surveys. **ST**

David Hull is the founder and CEO of HydroSurv Unmanned Survey (UK) Ltd. He is an accomplished entrepreneur working in the field of USVs. In 2019, he founded HydroSurv, a research-informed provider of USV technology focused on impact-led use cases that harness the potential of surface robotic systems. Under Hull's leadership, HydroSurv has delivered more than 67 USV projects, including the design, construction and deployment of 22 USVs for customers in the U.K., Europe, North America and Asia-Pacific.

Sander Henriksen is the founder and CEO of Nordic USV AS. He is a visionary tech entrepreneur, and his company specializes in connecting user-friendly software with USVs for environmental monitoring in marine environments. He founded Nordic USV with the goal to reduce cost and make coastal data accessible for coastline stakeholders. Since acquiring the REAV-28 USV, the company has delivered over 70 different surveys for research, construction and sewage monitoring in the Norwegian fjords.

Reviving Wind Power

The Resurgence of Wind-Powered Cargo Transport

By Gabriella Paulet

Numerous sail cargo projects are emerging across Europe, particularly in France. Neoline stands as a trailblazer in developing vessels with primary wind propulsion. Its first project, the *Neoliner Origin*, scheduled for commissioning mid-2025, represents a significant innovation toward very-low-carbon shipping. About 70 percent of the energy propulsion needed for this vessel will come from wind power, collected by two carbon masts and two foldable sails produced by Chantiers de l'Atlantique in Saint-Nazaire: the Solid Sails. The use of wind coupled with a reduction in the ship's speed (11

instead of 15 kt.) will enable the *Neoliner Origin* to be energy efficient, with a combined expected fuel savings of more than 80 percent.

Genesis

At the heart of the Neoline project lies a profound awareness among its founders, most of whom are maritime professionals, who, based on their experiences, have directly witnessed the significant impact of maritime transport on the environment. This led to a swift determination to develop maritime transport that is as respectful

The Neoliner Origin features Solid Sails riggings that can tilt 70° to reduce air draft from 89 m down to 41.5 m to enable it to pass through most bridges. (Credit: Neoline)



The pilot vessel's planned route.



and reliable as possible. Indeed, the ecological impact of maritime transport represents a significant portion of the total pollution generated on Earth. It is estimated that maritime carbon dioxide emissions account for 3 percent of global emissions resulting from human activity.

The solutions conceived, designed and implemented by the Neoline team aim to be ahead of the environmental standards adopted by the International Maritime Organization (IMO) in 2018, which set a target of 50 percent reduction in CO₂ emissions from the global fleet by 2050. Neoline set out to be ahead of the curve by developing maritime transport that approaches zero emissions as closely as possible.

In a world poised for the energy transition, Neoline envisions offering maritime transport that combines operational relevance with energy efficiency. For this purpose, Neoline developed a sail-powered vessel that is clean, customized and competitive, designed to meet the logistical needs of shippers.

Market Positioning

The development of maritime transport is directly linked to global economic growth and highly dependent on fuel costs, as this component represents about 50 percent of a traditional ship's operating costs.

Neoline adopts an innovative approach by offering



“point-to-point” lines rather than logistic hubs. This strategy offers considerable advantages, including a reduction in pre- and post-delivery for shippers in close proximity, thus generating cost and time savings and further reduced environmental impact. Although this approach entails higher initial costs, the price tag is offset with increasing commercial appeal, thanks to the environmental value-add and its ability to address specific logistical requirements.

The Neoliner Origin

Initially designed by Neoline in 2011, then refined with our naval design partner Mauric and the inputs of Chantiers de l’Atlantique and D-ICE Engineering, the pilot vessel *Neoliner Origin* is a versatile roll-on/roll-off ship with primary sail propulsion and auxiliary diesel-electric propulsion.

With a length of 136 m, balancing operational needs and commercial efficiency, this vessel allows access to the market for so-called “specialized” freight, as well as secondary routes, away from major hubs. Its cargo spaces can carry up to 5,300 tons of cargo (or 1,200 linear meters or 265 TEU). The vessel can load project cargo as well, up to 200 tons, maximum 12-m wide and maximum height of 9.8 m. Cargo areas can also be reconfigured, if necessary, to specialize in car transportation (up to 700 cars). It will also be possible to transport up to 12 passengers.

This ship is the first of a new generation, capable of reducing fuel consumption by up to 70 percent (depending on the chosen route) compared to an equivalent ship at a commercial speed of 11 kt., or by nearly 90 percent compared to an equivalent ship operating at 15 kt. A reduction in operating speed at 11 kt., as planned by Neoline, enables energy reduction by half.

Its auxiliary propulsion of 4,100 kW allows it to reach a speed of 14.5 kt. when necessary, enabling it to adapt to any situation and maintain its schedule even in case of lack of wind.

Neoliner Origin is also equipped with three tunnel thrusters of 450 kW each, allowing for maneuvering in harbors, most of the time without tugs.

Harbor access has also been a major stake during the development of the vessel. Therefore, the Solid Sails riggings can tilt 70° to reduce air draft from 89 m down to 41.5 m and pass through most bridges. Below water, the orientable anti-drift fins, developed by Fouré Lagadec, are fully retractable and allow reduction of water draft from 13 to 5.5 m.

By developing sail-powered ship projects, Neoline bridges the gap between available technologies, zero-emission ambition, operational constraints and commercial objectives. These projects are developed and monitored by Neoline and its partners, from the initial concept to operation, including construction and financing.

With a building cost of more than €60 million, *Neoliner Origin* was financed by a number of public and private actors. The equity shareholders are: CMA CGM, ADEME Investissement, Neoline Développement (the original

company), Corsica Ferries and Louis Hardy SAS. Loans were provided by a consortium of banks, led by CIC bank and including Banque CIC Ouest, BPGO, Banque Palatine and Bpifrance as guarantor. Financing also comes from loans provided by the Banque des Territoires des Pays de la Loire and Pays de la Loire Region.

The pilot ship is a disruptive innovation, both in energy architecture and in the capacity to provide services with unprecedented environmental impact reduction.

The company is also building the operational and commercial framework in which its sailing vessels will operate. This involves identifying the needs of cargo customers, offering them tailored and innovative transport solutions, and securing commitments on terms that allow the emergence of an operational service.

The vessel will also come equipped with a weather routing system, developed by D-ICE Engineering in France. This system will help the crew to identify the optimal route to capitalize on favorable winds during the entire journey.

Pilot Line

In parallel with the development of the pilot vessel, Neoline Développement is setting up the first corresponding transport line offering a largely decarbonized service. This pilot line will connect Saint-Nazaire, France; Saint-Pierre and Miquelon, a French territory; Baltimore, Maryland; and Halifax, Canada. It will be operated by Neoline Armateur. It aims to demonstrate the technical, operational, commercial and financial viability of the solutions designed by Neoline Développement.

Firm transport commitments have already been signed with: Renault Group, Groupe Beneteau, Manitou Group, Jas Hennessy & Co., Groupe Michelin, Clarins, Longchamp, and La Fourcée Dorée. In total, the contracts and letters of intent signed represent nearly 90 percent of the revenue needed for the first ship.

Upcoming Milestones

Construction is currently underway at the RMK Marine shipyard in Turkey. More than half of the steel has been cut, and one-third of the blocks have been manufactured. The sails and masts are being finalized in Brittany and at Chantiers de l’Atlantique in Saint-Nazaire.

The launch of the *Neoliner Origin* is scheduled for December 2024. Its first commission is scheduled for late June 2025.

Meanwhile, the company is currently negotiating the financing and building of a sister ship, to double the frequency of the pilot-line by 2027.

The company Neoline embodies the future of maritime transport, with its commitment to environmentally friendly solutions and its first sail cargo ship scheduled for next year. By combining technological innovation, ecological commitment and commercial vision, Neoline positions itself as a key player in the transition to sustainable and efficient maritime transport. **ST**

Gabriella Paulet is Neoline’s head of communications and PR.

Human-Centered Bridge Design

Improving the Interface Between Humans and Technology

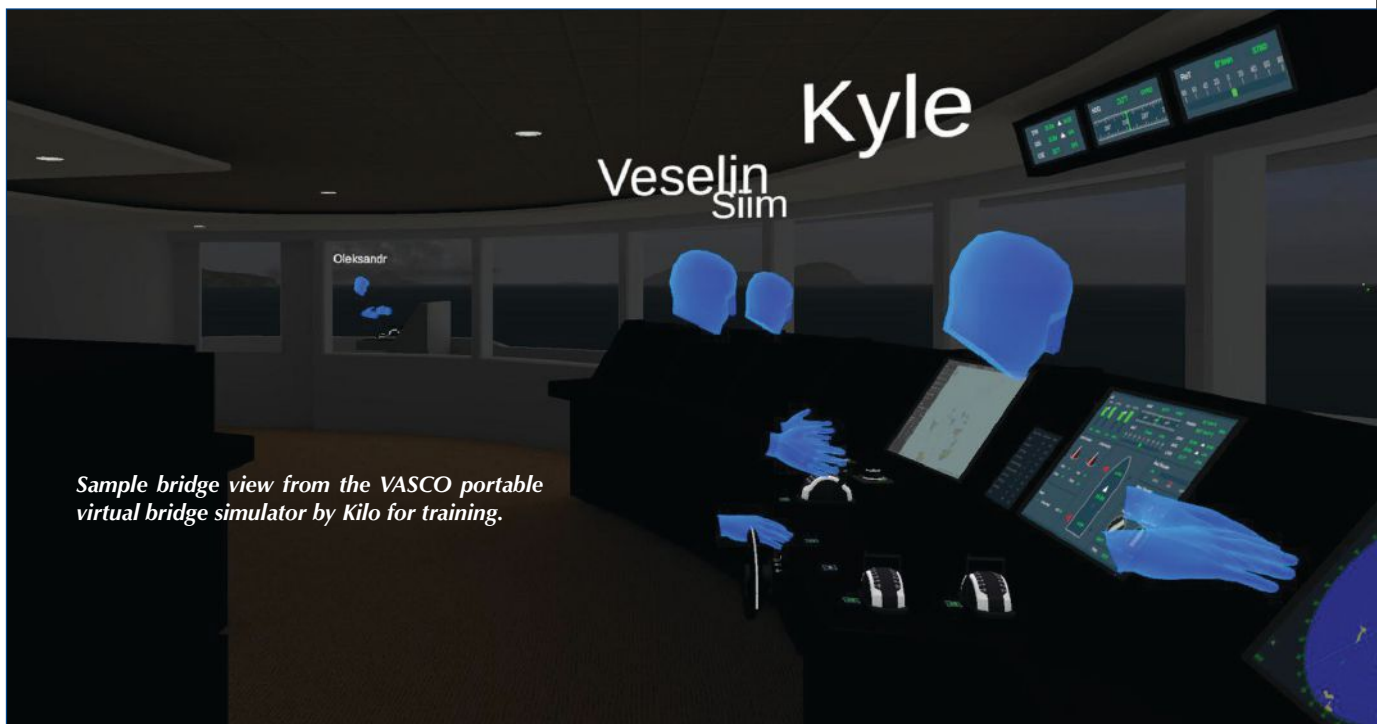
By Vittorio Lippay

In 2019 Allianz Insurance analyzed almost 15,000 marine liability claims between 2011 and 2016, concluding that “human error” is a primary factor in 75 percent of the value of claims; the equivalent of over \$1.6 billion in losses.

A. Maternová and M. Materna of the Žilina University in Slovakia published a paper in 2023 in which they examined reports on accidents investigated between 2015 and 2021 by the U.K. Marine Accident Investigation Branch and by Canada’s Transportation Safety Board for a total of 234 cases. The two researchers applied the Human Factors Analysis and Classification System (HFACS) the U.S. Air Force had first introduced to categorize

human failures in aeronautics. Maternová and Materna found that “human failure” was reported in 86 percent of the accidents, but almost 9 percent of these depended on the physical and technological environment. The inadequate design of the bridge directly caused three accidents.

Brit-Eli Danielsen of the Norwegian University of Science and Technology analyzed in 2022 the investigation reports on 28 major navigation incidents in North Europe over the past decade within the merchant fleets of Denmark, Germany, Norway, and the United Kingdom. Danielsen, who wanted to understand what problems the investigators had identified that directly or indirectly





contributed to the catastrophic events, found that issues in the layout of the bridge were reported on 13 vessels.

“Human error” is an inflection point of systemic failures. The term often obscures a malfunction in the interfacing of humans with technology. The 2017 Comprehensive Review of Recent Surface Force Incidents of the U.S. Navy reports that: “inconsistencies and gaps were found in the configuration control and oversight of bridge navigation systems.”

The ship’s bridge is the primary setting where poor interfacing could lead to worst-case scenarios.

More Technology, More Confusion

Shipping is undergoing a digitalization process. Over decades, technologies of different make and operational philosophies accumulated on a ship’s bridge. The master’s behavior changed from scrutinizing the physical seas to watching graphical interfaces while walking around the bridge. By reducing the attention to the sea surface, this process aggravates the “head up” and “head down” routine of the navigators, which increases physical and mental fatigue.

Depending on ship type, over 30 pieces of equipment can be found on a multi-vendor bridge, for which the seafarer must promptly master operation mode and significance of each technology, often under adverse conditions. An uncoordinated implementation leads to cognitive stress, and an “over-reliance on technology, and the ironies of automation, remain sources of accidents and, in some cases, drive human errors” (Singh, Dalaklis and Baumler, WMU, 2023).

The U.S. Navy recommends a modernization of ship bridges and improvement in “methods for human systems integration.” Claire Pekcan, professor of maritime

applied psychology and senior lecturer at Warsash Maritime Academy in Southampton, noted: “We cannot just put new technologies into old systems without rethinking how we design things. We need to rethink, not just improve, if we are actually going to achieve our goals.”

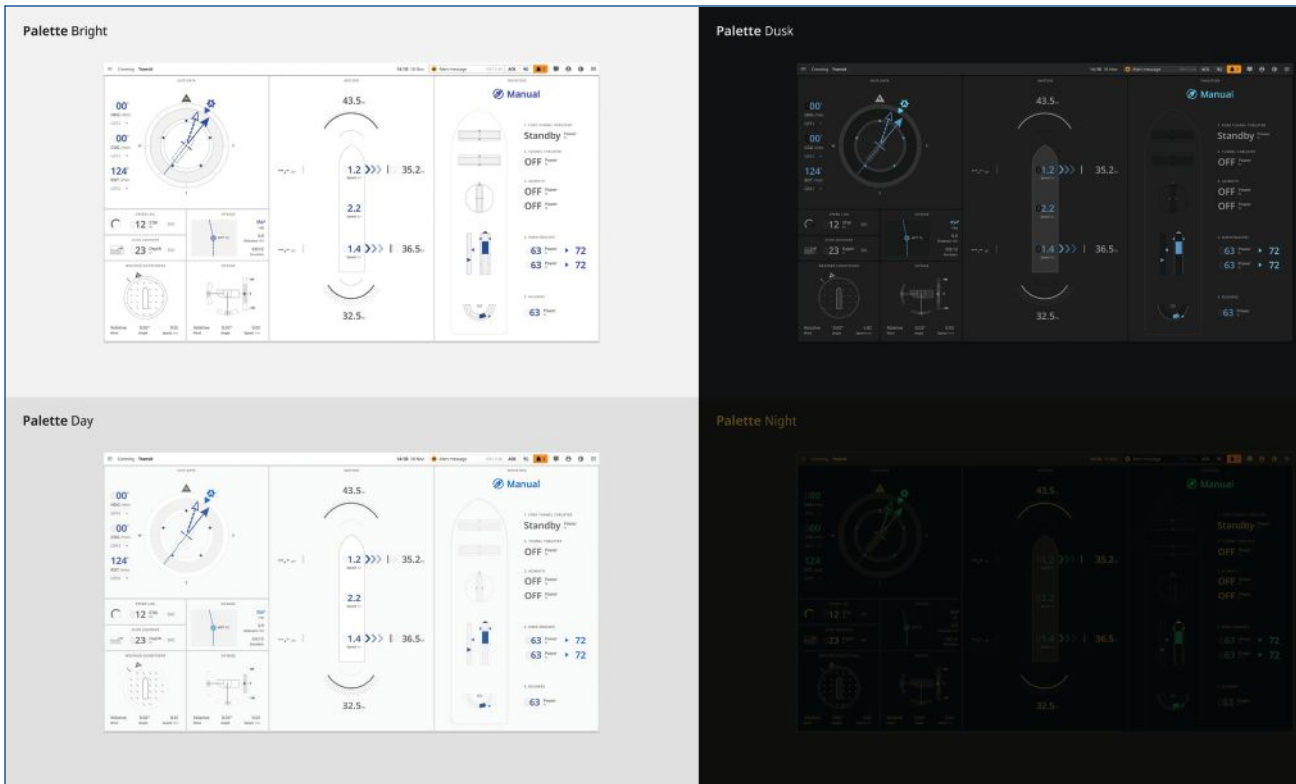
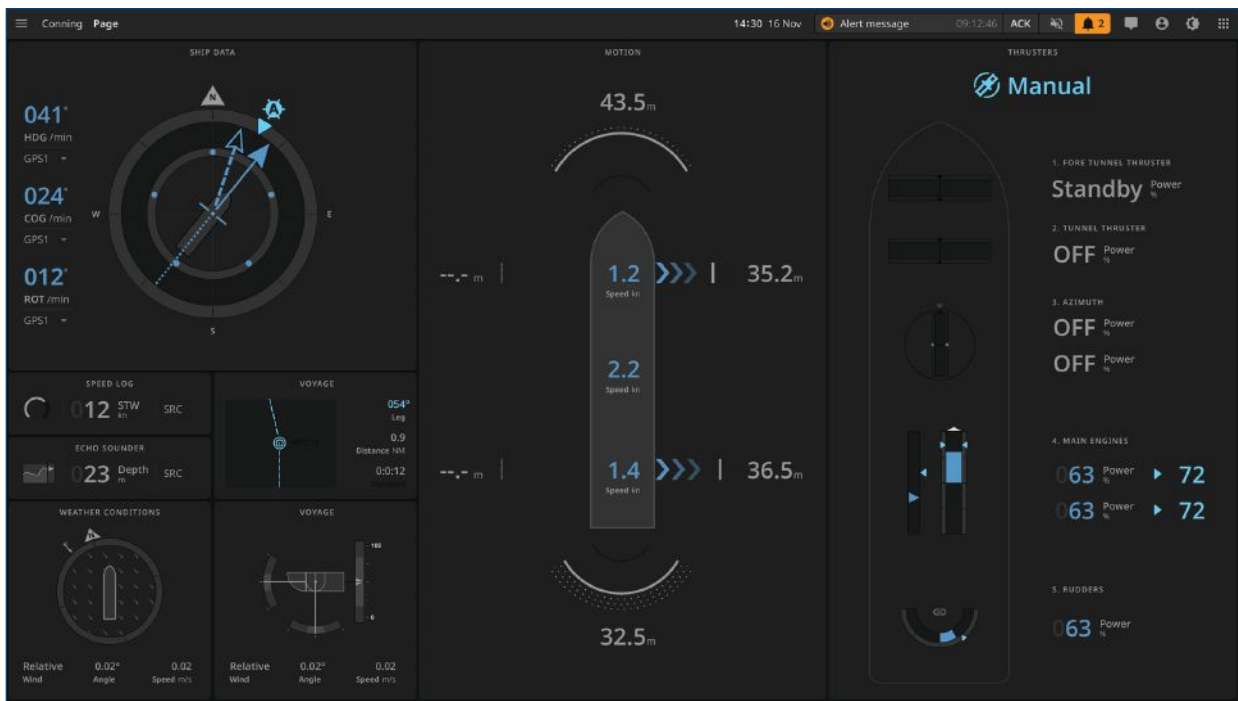
Rethinking the Bridge

Seafarers have little influence on bridge concepts: Decisions are made by stakeholders on shore, whose engineers solve functional problems. Designers, on the other hand, research solutions using a human-centered approach: They see technology as a raw material from which to rethink a suitable workplace for humans.

In 2007, the Norwegian Design Council and the Oslo School of Architecture began a project to improve the interfacing between humans and digital electronics in offshore vessel bridges. The project was later assumed and financed by the Research Council of Norway and Ulstein Power & Control. To understand the demands and requirements of bridge personnel, 12 design researchers spent 1,800 hr. (about 2.5 months) on the bridge of offshore vessels. The researchers’ expertise in design, not in seafaring, enabled them to interpret, improve and innovate what appeared commonplace to mariners.

Kjetil Nordby, a Ph.D. student with managerial experience who was involved in the research, led the final phase of the project, now known as the Ulstein Bridge Vision.

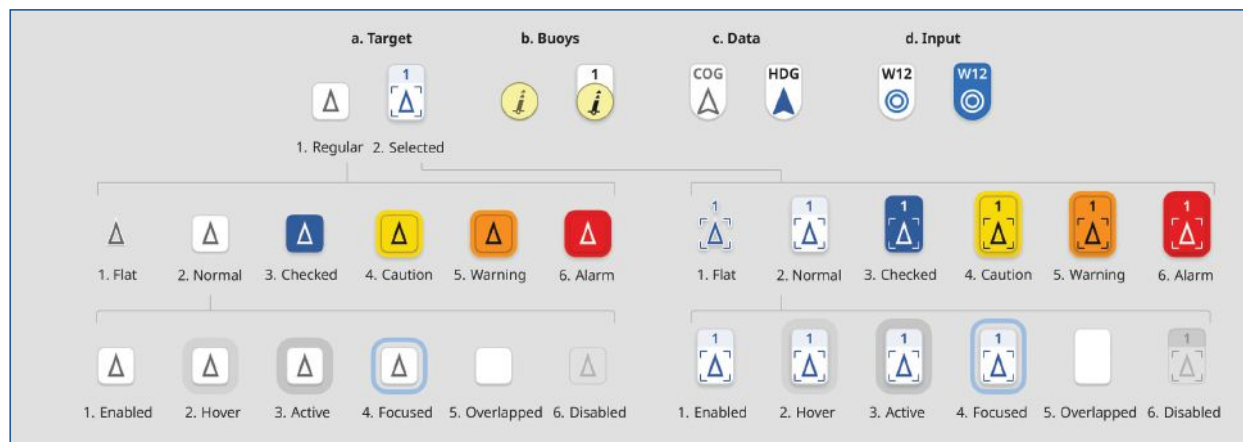
Nordby and his team’s dedicated work triggered new grants for more projects and attracted young researchers and students to create an informal working group within the school that eventually evolved into the official Ocean Industries Concept Lab (OICL) by 2014. OICL works on improving user-centered solutions for advanced work-



(Top) Sample “dusk palette” display. (Credit: OICL) (Bottom) Users can switch between display palettes of “bright,” “day,” “dusk” and “night.” (Credit: OICL)

places in ocean industries. Research grants finance the young team of 12 people, who are mostly in their late 20s. The team members carry out frame projects with industry partners. Students gather user and context data and re-order them for the design tasks at hand.

OICL developed a specific field study method that supports designers of maritime workplaces. In this method, a preliminary evaluation is conducted onshore, followed by field studies at sea to inspire solutions that are then implemented for testing in specifically engineered virtual reality reconstructed operation scenarios (VR-ROS). Invited to remote VR sessions, prospective users (shipmasters and senior officers) experience and comment on the proposed design solutions, which the staff can change while the users are in the virtual space.



(Top) From left to right: Sample screen displays for “day,” “dusk” and “see through,” with data cards above. (Credit: OICL) (Bottom) POI screen buttons. (Credit: OICL)

OpenBridge: Enhancing Sense Making

To humans, sense making consists of comprehending details as a whole to understand a situation that requires a reaction. With an overflow of information in the digital era, sense making implies a process of reinterpretation by the user interfaces (UI), which classify the events in a specific context and associates the available alternatives. User interface consistency improves sense making by enabling the human to have a quicker grasp of situations, and it eases skill transfer between operators sharing an experience. “It is well documented in human-computer interaction research that consistency is an important aspect for reducing human error and increasing user ability to efficiently use digital systems” (Nordby et al, 2019).

To enhance sense making, the National Research Council of Norway and a consortium of 40 private sector partners funded the open-source platform OpenBridge, an OICL project to develop comprehensive maritime design guidelines by incorporating field-specific requirements and regulations, such as COLREGS. Now in use in industry and research projects worldwide, the platform is in its fifth release.

For shipowners, the advantages lie in the freedom of an open ship bridge with modular applications, to which they add proprietary interfaces and new applications as they become available, without altering the overall bridge structure. Further, the interchangeable interfacing of the bridges within the same fleet cuts the expense of training time drastically.

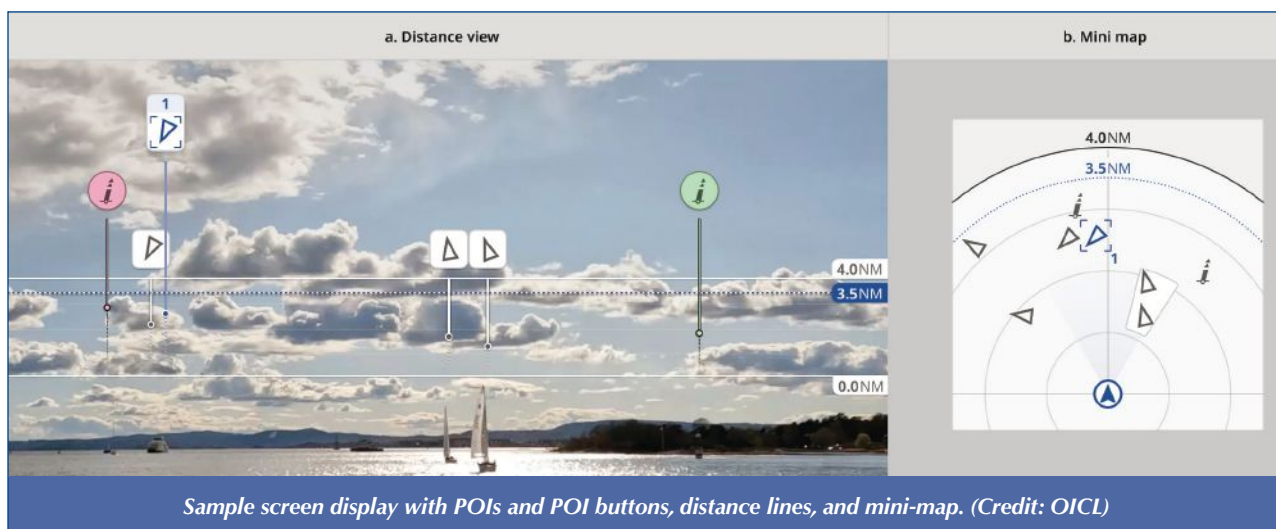
The modular design enhances sense making for a more rational interaction with the instrumentation and controls on the bridge; cuts the time spent on instrument consultation; and provides improved situational awareness and better-informed reactions to navigation events.

A bridge designed consistently to standard concepts greatly reduces fatigue by rationalizing context experience: Components that are familiar to users enable them to concentrate their minds on navigation tasks, instead of studying how the system works and what the graphics mean. Distinct levels of consistency in OpenBridge include details such as palettes, typography and UI components.

Watchstanders often complain that screens cannot be seen well under intense sunlight, and these same screens hamper sea visibility at night. In OpenBridge, four palette settings are available for the interfaces: bright, day, dusk and night, thus following the 2018 ABS bridge guideline on minimizing reflections and reducing the contrast between the bridge’s interior and exterior. Colors are used to direct attention.

For typography, a limited set of text is available in OpenBridge, where different text styles are chosen for specific interface functions. The limited choice of type-sets simplifies the use of typography, which is selected to improve navigation by separating elements clearly and reducing clutter while enabling quick location of information: headings, labels and text. Eventually, users can familiarize with standardized typography, leading to consistency with other OpenBridge-friendly interfaces. Again, this overshoots the 2018 ABS guidelines.

Components, as buttons, may differ significantly between the graphical interfaces of various equipment. Shape, color and dimension standards lead to an accelerated reaction time.



Sample screen display with POIs and POI buttons, distance lines, and mini-map. (Credit: OICL)

OpenAR: Cutting 'Head Down' Time

The task of augmented reality (AR) is to reconcile information from electronic sources, such as radars, ECDIS or AIS, with what is perceived by the officer of the watch (OOW) from the sea surface. AR provides a unified picture that can be supplied to navigators either on a single screen or on a head-mounted display (HMD), thus improving situational awareness. A recent U.S. Navy report indicates AR as "a necessity in the ever more complicated domain of surface warfare operations."

OICL addresses this problem by proposing a user-friendly AR system designed within the OpenBridge frame in which a distinctive feature is the "point of interest" (POI), a new system class that facilitates vessel navigation. POIs were introduced in the Arctic navigation program SEDNA (*Sea Technology*, March 2023). Nordby et al, 2024, define POI as "a technology that enables the visual connection of data sets to stationary or moving objects in the physical world," such as ships, buoys and landmarks. Considering, however, the amount of information now delivered by sensors, what constitutes a POI to include and display on a UI also depends on the type of ship, its position, intentions, and operational tasks.

Besides indicating the existence of an object relevant to navigation, POIs also display further information that may derive from multiple sources, if required. The POI system cuts down the need to consult on different equipment and, more importantly, the time and effort spent in coordinating information on targets.

In the OpenBridge AR guideline, screen buttons represent POIs: Square buttons show moving targets as ships and aircraft, while round ones stand for navigation targets, such as buoys and lighthouses. In accordance with current radar and ECDIS standards, targets can be selected and highlighted on the UI. Specific icons indicate which sensor tracks what target: radar, AIS, VIS/IR camera, etc. There are button states for each POI component to indicate whether it is active, interactive or not active ("checked", "normal" and "flat," respectively). Button sizes are adjustable to fit the specific user interface: screens or HMD. On request, a flyout menu reports further data on a POI and provides an option to select

or deselect the target accordingly. As an option, distances between targets are detailed. Range rulers consistent with the variable range maker and the electronic bearing line used in radar operations can be inserted to measure POIs' positions. To prevent cognitive overload, the system displays a graded level of information: no data, important data only or all available data.

HMD

According to the U.S. Navy, all bridge data can be centralized on a head-mounted display using AR. The HMD allows an immediate association of what is perceived by looking at the sea alongside sensor data. If all officers on bridge wear a headset, the level of awareness being the same, the team's overall situational awareness increases. The new routine, with head down time cut to a minimum, also favors a mental model sharing that matters in a military context.

The input technologies for headsets comprise gesture and eye tracking or gazing. OICL found that the current scale, e.g., the button dimensions designed above, appear suitable for a gazing input model. For tapping interactions, a larger button format might be necessary.

Basing on sea and laboratory experiences, Nordby thinks that screens are going to dominate for some time, while goggles will be reserved to support lookouts. Nordby advocates the production of headsets specifically adapted for marine contexts.

The first products using elements of OpenAR have reached the market, and many more are on the way; for instance, the maritime smartWINDOW by APPRISIFY in Germany, with an innovative user interface. While OICL was not involved with this product, it shows the inspirational power of the laboratory's open-source vision.

OpenBridge solutions will improve the quality of bridge work, increasing safety for people and cargo. **ST**

Vittorio Lippay is a member of the Institute of Chartered Shipbrokers and the Institute of Physics.

Shaping a Global Plastics Treaty

The Role of Science in Pollution Policy

By Andra Janieks • Dr. Lisa Erdle • Dr. Marcus Eriksen

As the world grapples with the escalating plastic pollution crisis, the fourth Intergovernmental Negotiating Committee (INC-4) meeting for a Global Plastics Treaty earlier this year marked a pivotal moment in the quest for a healthier planet—for people and the environment. Delegates from 175 countries met in Ottawa, Canada, alongside NGOs, scientists and industry lobbyists to shape this landmark treaty.

Ottawa's iconic Shaw Centre became a bustling hub for the plastics conversation. Break Free From Plastic, indigenous peoples, and frontline communities led the March to End the Plastic Era, while the plastics industry held signs and drove trucks promoting the “benefits” of single-use plastic. Artist Ben Von Wong's Giant Plastic Tap served as a focal point, a stark visual looming in front of negotiations as a constant reminder of the plastic that continues to flow into the oceans and on land.

Leading with Science

Scientists play a critical role in the UN Plastics Treaty negotiations as the objective referee in the process, providing evidence-based perspectives. By leading with science, we have an opportunity to turn off the plastics tap and pave the way for a healthier, thriving future for humanity and the planet.

The 5 Gyres Institute played a unique role in the negotiations. Our goal is to



Researchers from the 5 Gyres Institute at INC-4 in Ottawa, Canada. (Credit: 5 Gyres Institute)



scientists on the ground offered summaries and interpretations of scientific knowledge to delegates, and intervened during the treaty debates when scientific information was lacking or misinterpreted.

Research on the impact of plastic and plastic pollution has grown in recent years, and alongside our colleagues, 5 Gyres contributes new knowledge to the scientific literature. Our updated global estimate of marine plastic pollution counted more than 170 trillion plastic particles afloat on the ocean's surface. Patricia Villarrubia-Gómez of the Stockholm Resilience Centre, whose research focuses on the global challenge of plastic pollution using a social-ecological systems approach, warned we are outside the safe planetary boundary for pollutants, including plastics. In the middle of INC-4, a paper co-published by the 5 Gyres Institute, Break Free From Plastic and 12 universities, confirmed a direct correlation between plastic production and plastic pollution.

The science is clear. The Scientists' Coalition agrees that an effective Global Plastics Treaty should: include production reduction targets that are time-bound and legally binding; represent a full life-cycle approach, starting with extraction and production; establish criteria to determine essential uses of plastics (i.e., medical, technology) and develop sector-specific strategies; establish criteria to ensure that remaining plastics are safer and more sustainable via chemical simplification and design standards; prioritize reduction and reuse systems over recycling; and recognize the global nature of the plastics value chain (extraction, production, trade, waste) and the transboundary nature of plastic pollution.

Insider Insights from INC-4

5 Gyres' researchers Dr. Marcus Eriksen and Dr. Lisa Erdle (two of the authors of this article), joined INC-4 as delegates to observe negotiations among member states, attend side events, and serve as a scientific resource for decision makers.

Several countries are taking the threats of plastic pollution seriously, forming the High-Ambition Coalition. These 66 countries favor majority voting, legally binding measures, production caps, design standards, and transparency in production and waste management.

On the other end of the spectrum, the Like-Minded Countries advocate for consensus voting, voluntary participation, no production caps, an emphasis on waste management and recycling, and no chemical disclosures. This group comprises primarily oil-producing countries, including China, Russia and Saudi Arabia.

The Pacific Small Island Developing States (PSIDS), faced with the unique issue of plastic from the global waste trade dumped in their countries, share a unified message about the burden of cost to remove and manage waste. Other groups include the European Union, Group



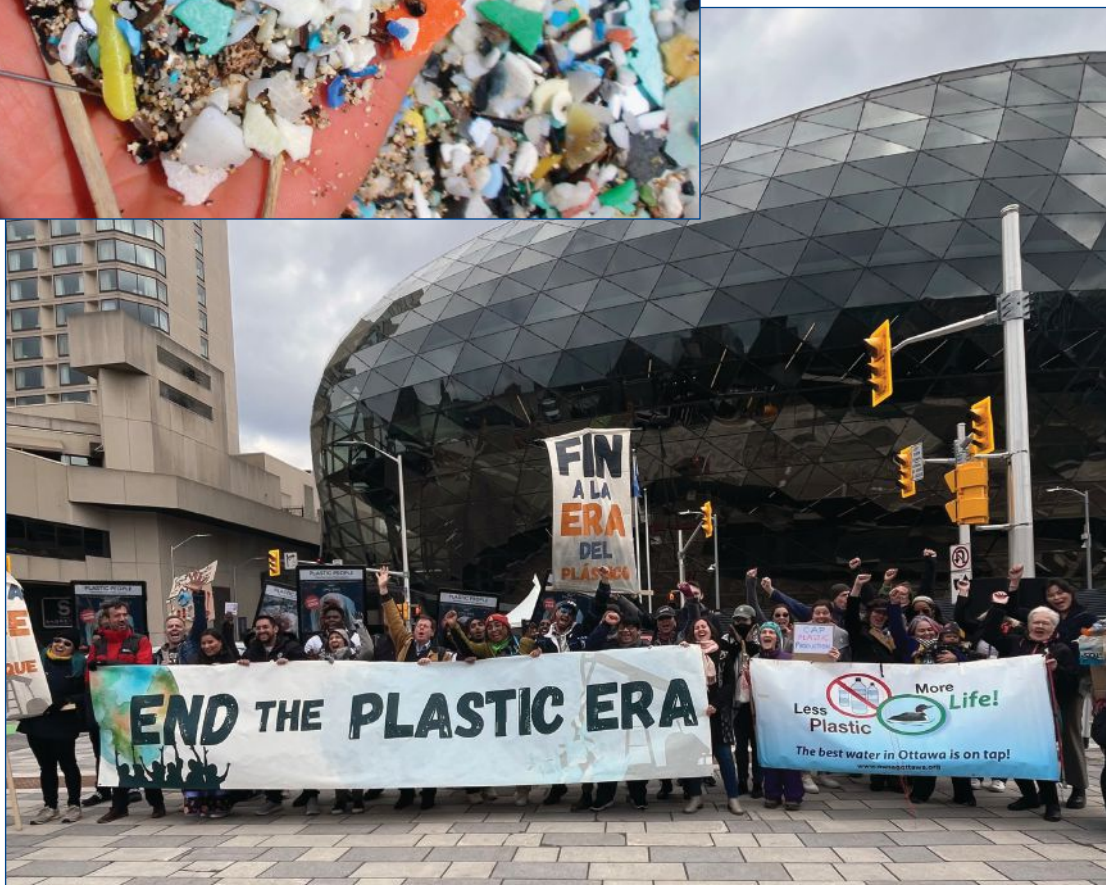
(Top) Dr. Marcus Eriksen trawling for plastics in the North Atlantic Ocean. (Credit: 5 Gyres Institute) (Bottom) A sample of plastic pollution from trawling in the Hudson River, New York. (Credit: 5 Gyres Institute)

serve as an honest broker, bridging the gap between industry, research and policy, to offer fact-based and vetted solutions. As observers of the Scientists' Coalition for an Effective Plastics Treaty, our researchers contributed to guiding delegates in negotiating a strong treaty grounded in the latest science.

The Scientists' Coalition is a network of 350 scientific and technical experts from 60 countries that supports decision makers leading up to and during treaty negotiations. During negotiations at INC-4, a team of dedicated



(Top) A handful of plastic at Kamilo Beach, Hawaii. (Credit: 5 Gyres Institute) (Bottom) Activists at INC-4 in Ottawa, Canada. (Credit: 5 Gyres Institute)



of Latin America and Caribbean Countries (GRULAC), and African Region (except Egypt).

The United States hasn't formally aligned with any of the groups.

The influence of the fossil fuel industry at INC-4 was apparent. An analysis of INC-4 participants showed that 196 lobbyists for the fossil fuel, petrochemical and plastics industries were registered, outnumbering each member state delegation, the present members of the Scientists' Coalition, and the Indigenous Peoples Caucus.

What's Next?

The fifth and final negotiating session is set to take place in Busan, South Korea, in November 2024. Crucial intersessional work will occur leading up to INC-5, and

we anticipate delay tactics and obstacles from industry and low-ambition delegations.

While the effort is far from over, the world has a once-in-a-generation opportunity to turn off the plastics tap and pave the way for a healthier, thriving future for people and the planet. By leading with science, we can finalize a strong, legally binding agreement that ends plastic pollution. 5 Gyres will continue doing research and sharing our work to make this vision a reality. **ST**

Andra Janieks is the marketing director of the 5 Gyres Institute.

Dr. Lisa Erdle is the director of science and innovation at the 5 Gyres Institute.

Dr. Marcus Eriksen is the executive director of the 5 Gyres Institute.

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Interagency Cooperation to Advance Renewable Energy

To strengthen interagency cooperation in the advancement of safe and environmentally sustainable non-mineral (renewable) energy development, including offshore wind, on the U.S. Outer Continental Shelf (OCS), the U.S. Coast Guard (USCG) has signed a memorandum of understanding (MOU) with two Department of the Interior bureaus: the Bureau of Safety and Environmental Enforcement (BSEE) and the Bureau of Ocean Energy Management (BOEM).

The MOU calls for USCG, BSEE and BOEM to: coordinate on regulatory and policy development to promote consistency of regulations and policies where shared responsibilities exist; strengthen communication and cooperation through information sharing, collaboration, synchronizing of information, and adoption of similar terminology, codes and standards, for clarity and consistency; exchange services and personnel to support mutual work objectives when possible, allowing the agencies to leverage resources and expertise (the MOU does not obligate funds or staffing); and develop and implement additional memoranda of agreement under the MOU to provide specific guidance on each agency's role and shared responsibilities for regulating various OCS activities and facilities.

Interior Department Streamlines Offshore Wind Regulations

BOEM and BSEE have finalized updated regulations for renewable energy development on the U.S. OCS. The final rule increases certainty and reduces the costs associated with the deployment of offshore wind projects by modernizing regulations, streamlining overly complex processes and removing unnecessary ones, clarifying ambiguous regulatory provisions, and enhancing compliance requirements. BOEM and BSEE have complementary obligations in implementing the offshore wind program.

Over the next 20 years, the final rule is expected to result in cost savings of \$1.9 billion to the offshore wind industry, savings that can be passed onto consumers and used to invest in additional job-creating clean energy projects.

This final rule also includes a process to regularly update a five-year offshore wind leasing schedule. The latest five-year offshore wind leasing schedule includes up to 12 potential offshore wind energy lease sales through 2028.

Among its provisions, the final rule: eliminates unnecessary requirements for the deployment of meteorological buoys; increases survey flexibility; improves the facility design, fabrication, and installation certification and verification process; establishes a public renewable energy leasing schedule; reforms BOEM's renewable energy auction regulations; tailors financial assurance requirements and instruments; clarifies safety management

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system regulations; and clarifies and strengthens oversight of critical safety systems and equipment.

Funding to Improve Weather Forecasts

The U.S. Department of Commerce and NOAA have announced \$6.6 million in recommended funding to establish a multi-university Data Assimilation Consortium to improve weather forecasts with enhanced numerical prediction. This investment will support six institutions under the new Consortium for Advanced Data Assimilation Research and Education. It will use the Unified Forecast System of community-based Earth modeling.

Low-Cost Tech for Deep Exploration

NOAA and the nonprofit Ocean Discovery League (ODL) have signed an agreement to accelerate deep-ocean exploration through the development of low-cost tools and technologies, such as deep-sea cameras, that give greater, more equitable access to broader public and scientific communities to explore the deep ocean.

NOAA and ODL will: develop targeted and strategic deep-sea locations of mutual importance for future expeditions; develop and implement low-cost, deep-sea technologies required to increase access to ocean exploration, including deep submergence systems and telepresence technologies; develop joint outreach and education opportunities to broaden and diversify the community of deep-ocean explorers; design technology

and training initiatives to promote inclusion, accessibility and equity in deep-sea exploration; and increase NOAA and ODL training and education programs, career-building experiences, and research capabilities for current and future ocean explorers.

Research on Offshore Wind in GOM

BOEM has made available two new studies on offshore wind energy in the Gulf of Mexico (GOM). The U.S. Department of Energy's National Renewable Energy Laboratory (NREL), NOAA's National Centers for Coastal Ocean Science, Applied Research Associates Inc. and CSS Inc. collaborated on these studies, funded through an interagency agreement between NREL and BOEM.

The first study, "Gulf of Mexico Offshore Wind Energy Hurricane Risk Assessment," analyzed hurricane risk to wind turbines operating in the Gulf of Mexico. This study concluded that, as a minimum, an International Electrotechnical Commission (IEC) "Typhoon Class" wind turbine is needed for the design of offshore wind turbines in more hurricane-prone areas, such as the Gulf of Mexico.

The second study, "Assessment of Offshore Wind Energy Opportunities and Challenges in the U.S. Gulf of Mexico," discusses opportunities and challenges for offshore wind energy development in the Gulf. The results indicate that offshore wind energy is a viable clean energy option that can help the region achieve U.S. carbon neutrality goals by 2050. **ST**



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China's Energy Transition

According to DNV's Energy Transition Outlook China, the country is establishing itself as a green energy leader with an unrivaled build out of renewable energy and export of renewable technology. On the other hand, DNV forecasts fossil fuels will still account for 40 percent of China's energy mix in 2050.

Strong policy support is reflected by the rapid uptake of green technologies. China, already a leader in renewable energy investments, will more than quintuple renewable energy installations by 2050. By midcentury it will comfortably be the world's largest wind market. There is potential for China to push further to reduce its reliance on fossil fuels and bring the country closer to net-zero emissions by 2050.

From a position where, in 2023, China was responsible for a third of the world's energy-related CO₂ emissions, by 2050 that share will have reduced to a fifth. In absolute terms, China's emissions will reduce by 70 percent, toward its target of carbon neutrality by 2060.

Training for Sustainable Fuels

Maersk Training and Green Marine have partnered to establish "Maersk Training powered by Green Marine." This collaboration aims to become the leading provider of training solutions for the transition to sustainable maritime fuels, with an initial focus on methanol.

The comprehensive training portfolio will encompass technical training, safety procedures and best practices for energy-efficient operations. The training will be delivered through immersive simulations, online modules and instructor-led courses, ensuring accessibility for seafarers of all experience levels.

Fugro on Path to Net Zero

Fugro's near- and long-term science-based emissions reduction targets have been approved by the Science Based Targets initiative (SBTi), a collaboration between the CDP, the United Nations Global Compact, World Resources Institute and the World Wide Fund for Nature. Fugro's net-zero target spans all three emission scopes,

ultimately striving to achieve net-zero greenhouse gas (GHG) emissions across the value chain by 2050.

Fugro's science-based targets include, among others, an absolute near-term reduction target for scope 1 and 2 of 55 percent by 2033 compared to 2022, and an engagement commitment to ensure that 60 percent of its suppliers by spend will set SBTs by 2028.

Scottish Terminal Upgrade

LDD, an Acteon brand, was awarded a contract by George Leslie to perform piling works on the Kennacraig ferry terminal in Scotland.

LDD is supplying reverse circulation drilling services to George Leslie to construct a new sheet pile quay wall at Kennacraig. The project is being undertaken in challenging ground conditions, with hardness ranging from 90 to 150 MPa. Kennacraig is an existing operational ferry terminal, and the piling works will upgrade the port infrastructure to facilitate the use of new vessels. The improvements are part of the New Islay Vessel Enabling Works project spanning the three sites of Port Ellen, Kennacraig and Port Askaig.

The drilling work started in January 2024 and is expected to be completed in September this year.

Vessel Safety Collaboration

Interunity Group, a Greek-based maritime service provider, has expanded its partnership with ShipIn Systems following a highly successful pilot program. The collaboration between Interunity Group and ShipIn has demonstrated significant improvements in operational efficiency, safety, and cost-effectiveness, leading the group to proceed with a full fleet deployment.

A key driver behind the decision was FleetVision's ability to provide objective measures of vessel safety performance through easy-to-understand trend charts supported by visual and contextual data. These insights have empowered both onboard crew and shore management teams to implement improvements almost immediately.

The Value of E-Methanol

Using tools it has developed to manage Ahti Pool, the world's first FuelEU Maritime compliance pool, Ahti has calculated that the use of one e-methanol vessel on voyages within the European Union's waters is equivalent to



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making 70 vessels using heavy fuel oil (HFO) compliant under the FuelEU Maritime regime. By comparison, under FuelEU, an LNG vessel with a low-speed engine is equivalent to making only five HFO-fueled ships compliant.

Moreover, by adding 1 to 1.5 percent e-methanol and pooling, operational fuel costs will decrease under FuelEU Maritime, compared to burning straight HFO and paying penalties.

Ahti has further calculated that FuelEU Maritime will create an alternative fuel market value in European shipping that will be greater than the fossil fuel market value by 2040.

Tristar Eships Decarbonize

Wärtsilä's Decarbonisation Services have been chosen to support Tristar Eships, the maritime logistics division of the Dubai-based Tristar Group. The services will initially be applied to two tankers and are tailored to create a significant reduction in their carbon emissions. The analysis to be undertaken for the vessels includes Wärtsilä's EnergoFlow, EnergoProFin, optimized propeller, shaft generator and the capability to operate on biofuel.

Progress on Scottish Ferry

Following the successful launch of its sister vessel *MV Isle of Islay* in March this year, *MV Loch Indaal* has moved from the slipway into the water at Cemre Marin Endustri shipyard in Yalova, Turkey. This marks another milestone for the project. The ferry, which will serve Islay and Jura, is set to be delivered in February 2025. Following transit from Turkey, it will undergo crew familiarization and local operational trials before it enters service.

Unique Group Acquisition

Unique Group has acquired subsea technology and equipment manufacturer Subsea Innovation, based in Darlington, U.K., and previously part of Tekmar Group plc.

Headquartered in the United Arab Emirates, Unique Group has a global workforce of more than 600 employees in 18 locations. The company specializes in technology for survey, diving and life support, buoyancy and water weights, USVs, and lifting and mooring solutions.

This new acquisition transforms the U.K. into a major

engineering hub for Unique Group, complementing existing manufacturing locations in South Africa, the Middle East and the Isle of Wight, U.K.

New Maritime Consultancy

The Maritime IQ consultancy has launched operations from its headquarters in Christchurch, New Zealand. MIQ brings together an international network of seasoned maritime consultants, each boasting decades of in-depth experience across a range of maritime domains. The company's expertise spans vessel design, port safety and security, valuations, marine insurance coverage and negotiations, risk assessment, business development and marketing, and marine project management.

Patrol Boat for Northern Australia

Dongara Marine has handed over a fast patrol boat for law enforcement personnel in Australia's Northern Territory. *PV Deutrom* was purpose designed, built, and equipped for police operations requiring very high speed and the ability to carry multiple personnel. Dongara Marine also supplied a custom heavy-duty aluminum trailer to enable the vessel to be used throughout the territory's diverse and often remote maritime landscape.

Emissions Data Sharing

ClassNK has partnered with StormGeo for seamless sharing and verification of emissions data to meet the requirements of their shared clients. Shipping companies that use StormGeo's s-Insight platform will be able to share their validated emissions data to the ClassNK MRV Portal via API for a seamless verification process. This enables shipping companies to maximize their reporting accuracy and accelerate their decarbonization strategy.

Investments in Harbor Lab

Harbor Lab, a maritime software company modernizing accounting practices for the \$14 trillion shipping industry, has raised a \$16 million Series A funding round, led by European VC Atomico. With participation from existing investors Notion Capital, Venture Friends, SpeedInvest and The Dock, and new investors Endeavor Catalyst and maritime VC TMV, the round takes total funding for the Greek startup to some \$22.5 million. Atomico Partner Ben Blume will join the board. **ST**



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AI Fish Monitoring



HydroAI combines high-resolution video cameras with AI-powered, cloud-based software to automatically provide accurate real-time fish counts and species identification in and around hydropower plants. The HydroAI cameras integrate easily with existing fish passage infrastructure to capture images of fish around the clock. The AI-powered software uses machine learning to autonomously count and identify fish with a high degree of accuracy. Operators can ensure that fish pass safely through dam infrastructure. Innovasea Systems Inc.

Route Correction

WACDAS (WAVE Climate Data Aggregation for Ships) calculates the route correction factors necessary for utilizing the approved lashing software compatible with the class notation "Container Stowage and Securing Arrangement with Service on Specific Sea Routes (CSSA-RS)" as per the guidelines (Edition 3.0 or later). This tool, accessible through a web browser, enables onboard calculation, thereby facilitating the optimal container stacking based on the individual vessel routes and seasons. ClassNK.

X-Band Radar

Pathfinder has achieved type approval, issued by the TÜV SÜD BAPT certification body. The

IMO-compliant, solid state radar system has been confirmed as compliant with the Marine Equipment Directive for Shipborne Radar Equipment CAT 2 and CAT 3. Ideal for vessels up to 10,000 tons, Pathfinder is powered by a fanless, 6-ft., low-profile open-array antenna. Raymarine.

Radar as a Service

This business model provides Raymarine's Pathfinder solid state IMO X-Band radar system on a subscription basis. Shipping companies can reduce the burden of maintaining and updating essential navigation equipment. This model offers clients a lifetime warranty for Pathfinder remote maintenance, status monitoring, service direct to device, software and hardware upgrades, connectivity costs, archiving radar logs onshore, and all spare parts. ChartWorld GmbH.

Integrated Boat OS



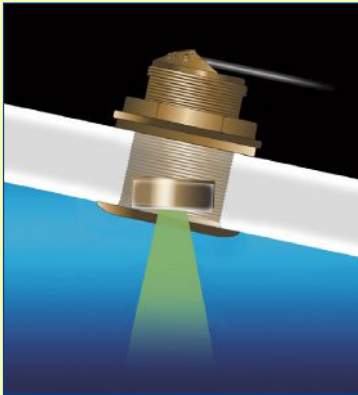
Zora 2.0 is an operating system that brings once-exclusive yacht technology to the fingertips of every boat owner. The OS can be configured according to the user's requirements. This open protocol system integrates all navigation instruments, systems, controls and applications. iNav4U.

Compact Courtesy Light

CL10 features up to 250 lumens of RGBW light in a unique design that provides multiple mounting possibilities. Because it's IP67 submersible, the compact fixture can be installed above or below decks. CL10 can brighten countless onboard ar-

eas. At only 10.12 x 1.01 x 0.63 in., the low-profile unit easily tucks into small, out-of-the-way spaces. Shadow-Caster Inc.

Thru-Hull Transducer



The Chirp-ready B175 Medium Ultra-Wide (MW) Tilted Element Thru-hull transducer uses medium frequency (60-100 kHz) with an ultrawide beamwidth ranging from 57-73° port-starboard to 16° average fore-aft. Maximum coverage under the boat is achieved, serving anglers who target pelagic species in the upper water column. Airmar Technology Corp.

Multiparameter CTD

HydroCAT-EP V2 is suitable for moored applications and features pumped flow technology, high data accuracy, and autonomous capability. The base of this CTD is the field-proven MicroCAT (SBE 37), to which a host of integrated sensors

has been added to provide users with a robust sampling platform in a compact, self-contained package. It is designed for long-term deployment in biologically rich environments. Sea-Bird Scientific.

Mass Flowmeter

OPTIMASS 1400 Coriolis reliably measures mass and volume flow, density, and temperature for fuel consumption monitoring of MGO, MDO and other liquids. Highly versatile, it is an ideal solution for a range of general ship fuel applications. KROHNE Inc.

Flow, Pressure Measurement

Portasonic PRO streamlines accurate liquid flow rates measurement and internal pipe pressure calculation, ensuring safety, efficiency and optimal performance. Users can capture and store millions of flow and pressure data points for a maximum pipe diameter of 750 mm. Heat flow rate calculation is simple to achieve with user-inputted inlet/outlet temperatures. The extensive database includes 15+ pipe materials and fluid types. Coltraco Ltd.

Subsea Connectivity

The customizable EMO Omni multiplexer meets the evolving needs of underwater operations. Built on the EMO and NEXUS platforms, the new HD fiber-optic video and multi-beam multiplexer has applications in offshore energy, naval projects,

ocean science, marine research, and environmental monitoring. MacArtney Underwater Technology.

Submersible Surveillance Array

Vigilus comprises acoustically meshed environmental sensor nodes for underwater monitoring and security. The nodes, strategically positioned on the seafloor multiple kilometers apart from one another, form an interconnected network of listening stations that act as an underwater "trip wire." The nodes boast a compact, cable-less design, facilitating effortless deployment from small watercraft or covertly via a large UUV, even in challenging environments, such as beneath ice sheets. Cellula Robotics Ltd.

IoT Wireless Platform

EM-2 enables IoT sensor data and control from above the surface to below. The platform interfaces to many common underwater sensors to wirelessly communicate data from under the water to above the surface or directly on land. EM-2 uses electromagnetic fields to pass data through water, ice, concrete and rock to overcome the limitations of traditional wireless technologies. EM-2 can be interconnected with ANB's advanced sensor technology for a comprehensive monitoring system in remote, challenging environments. CSignum Ltd. **ST**

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Fully Electric Tug for Antwerp

Damen Shipyards Group has launched the second of its fully electric RSD-E Tugs 2513 at Damen Song Cam Shipyard. The tug is intended for the Port of Antwerp-Bruges, together with five conventional RSD Tugs 2513. When delivered later this year, it will be the first fully electric tug to operate in European waters.

The Port of Antwerp-Bruges was one of the first to operate a conventional RSD Tug 2513 following Damen's release of the vessel into the market in 2018. It was the success of this vessel that led to the Port of Antwerp-Bruges' latest order with Damen, as it seeks to increase sustainability.

The Belgian port, one of the busiest in Europe, is committed to becoming carbon neutral by 2050. This six-vessel order with Damen

is representative of this commitment. Each of the vessels in the order is in full compliance with IMO Tier III regulations, with the RSD-E Tug 2513 able to operate with zero emissions. The RSD-E Tug 2513 can perform at least two towage operations on a single charge and can be fully recharged in just 2 hr.

AI for Vessel Routing

DeepSea Technologies, an AI-led maritime technology company and energy efficiency specialist, has completed a project supported by the EEA grants under the Business Innovation Greece program to develop an accessible AI solution for vessel performance routing. Working with G2 Ocean, a bulk shipping operator, and SINTEF, an independent research organization, DeepSea has run trials to develop a novel AI software solution that uses AIS

and noon report data, together with high-frequency data from other vessels, to unlock voyage optimization.

Improvements in operational efficiency through optimized navigation help operators to reduce fuel consumption and lower emissions. However, few companies in the shipping industry have the data collection systems in place to support data-driven improvements.

DeepSea's AI-based solution uses the data available to every shipowner, AIS data and noon reports, to unlock the benefits of performance routing. This approach is called "transfer learning" and allows high-frequency data models from hundreds of vessels already in DeepSea's databases to be transferred over to low-frequency data vessels of the same type and further adapted to available data.

The new software solution, Pythia Augment, has been applied to the bulk market for this project and has widespread applications for all types of vessels.

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Kongsberg Achieves Milestone In Maritime Digital Solutions

Kongsberg Digital has become the first industry player to receive the IACS UR E27 approval from DNV. Additionally, Kongsberg Digital has successfully completed the first renewal of the D-INF type approval for Vessel Insight, including Cybersecurity level SP1. This achievement certifies Vessel Insight for installation on all main class and D-INF(G) vessels classed by DNV, ensuring compliance with DNV Cybersecurity Profile Level 1 (SP1) and IACS UR E27.

For the maritime industry to accelerate digitalization and decarbonization, access and sharing of reliable data collected from on-board components and systems are vital. Lack of standardization and trust in data transfer and security protocols remain challenges.

In a milestone for the industry, Kongsberg Digital's Vessel Insight, the DNV type-approved vessel-to-cloud data collection system, is the first data collection solution to achieve approval for the upcoming mandatory IACS UR E27 "Cyber Resilience of On-Board Systems and Equipment" requirements. The IACS UR E27 is becoming mandatory for classed vessels contracted for construction on or after July 1, 2024 and brings the industry forward in terms of ensuring cybersecurity for solutions to address digitalization needs, which encompass efficiency, compliance and environmental scenarios.

Data Sharing via Digital Twins

Successful completion has been achieved in Japan of the early phases of a cross-industry project to create a secure data-sharing framework between shipyards and shipowners to advance the use of digital twins throughout a ship's life cycle. The project, which aims to enable the use of a vessel's unique design data to optimize efficiency and safety at sea, as well as the sharing of operational data to inform new designs, brings together shipowners NYK Group company MTI Co. Ltd., Mitsui O.S.K. Lines Ltd. (MOL) and Marubeni Corp.; shipbuilders

Imabari Shipbuilding, Japan Marine United Corp. and Usuki Shipyard; software and data services provider NAPA; and classification society ClassNK. Initial results confirm the feasibility of increased data sharing between shipyards, shipowners, ship managers and charterers, among other stakeholders.

The first two phases of the project identified over 30 potential use cases where the data and 3D mod-

els used to design the ship can be shared securely and used to create a vessel-specific digital twin to improve operational efficiency and safety throughout its life cycle.

The next phase will develop a platform to share the 3D models in a secure and access-controlled digital environment, plus new business models. This could create a new revenue stream for shipyards and solution providers. **ST**

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Progress on Olympic CSOVs

The construction service operation vessel (CSOV) *Olympic Boreas* has been launched from the dock hall at Ulstein Verft, Norway. The vessel is based on the novel TWIN X-STERN “four-wheel-drive” solution for the seas.

The *Olympic Boreas* is the first of two sister vessels for Olympic. As CSOVs, these vessels will assist offshore energy construction projects and service assignments.

The general outfitting work, which consists of accommodation work, electrical installations, piping and mechanical installations, and other tasks, is well underway. The external paintwork was completed while the vessel was located inside the controlled environment of Ulstein’s dock hall. The commissioning stage of the project has begun.

The contract between Olympic

and Ulstein was signed in 2022 and includes the construction of two CSOVs at Ulstein Verft. The hulls are built by the Crist yard in Poland. The vessels are powered by diesel-electric propulsion with variable speed and large battery energy storage systems. Ulstein Power & Control has been contracted to deliver an extended power and automation package, including a large battery supply.

The vessels are based on the Ulstein SX222 design from Ulstein Design & Solutions AS.

They have a length of 89.6 m and a beam of 19.2 m, and they accommodate 126 people in 91 cabins, all with daylight.

The hull shape and hybrid propulsion system will ensure high performance and sea-keeping and substantially reduced environmental footprint.

Brevity-Class CTV

Chartwell Marine has announced that a new Chartwell *Brevity*-class crew transfer vessel (CTV) has entered build at the Diverse Marine shipyard in Cowes, U.K., becoming the latest in Chartwell’s growing pipeline of new vessel builds to supply the global offshore wind market.

This latest *Brevity*-class CTV is one of three Chartwell-designed “stock” boats to be constructed by Diverse Marine as part of a unique finance and lease program, which aims to give vessel operators the certainty to invest in their fleets ahead of the next phase of European offshore wind expansion. It is scheduled for completion in the fourth quarter of 2024, to be joined by its sister vessels in the second quarter of 2025 and the third quarter of 2025, respectively.

Demand for proven, low-emission offshore wind vessels to support construction and operations across Europe, the U.S. and Asia has never been higher, according to

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Chartwell Marine. Finding routes to enable investment into newbuilds at regional shipyards will be essential to meet this increasingly urgent requirement, while ensuring that the economic benefits of offshore wind expansion are felt on a local level, the company said.

The *Brevity*-class can accommodate up to 32 personnel, with a range of crew configurations to allow for flexible space planning and enhanced comfort for longer periods spent offshore.

Another *Brevity*-class vessel is currently in build at the Manor Marine shipyard in Portland, Dorset, U.K. and is due to enter operations as part of Manor Renewable Energy's OPUS offshore wind fleet this summer.

DNV Rolls Out New Rules

DNV's new rules and standards for the offshore industry will publish in July and enter into force January 1, 2025. The new DNV rules, which incorporate industry feedback, cover several segments, including underwater systems and installations, offshore units, diving systems, structural design, and drilling systems.

Highlights from the new rules and standards include: addition of the new service notation for floating spaceports, which covers the requirements for units and installations intended for launch and/or recovery of spacecraft; a significant update to the diving systems standard (DNV-OS-E402) to simplify its use and align it with the International Maritime Organization diving code; consolidation of the rules covering remotely operated and autonomous underwater systems; reworking of the structural design standards (DNV-OS-C101, DNV-OS-C102, DNV-OS-C103 and DNV-OS-C104) to enhance ease of use and clarity; cyber secure notation added as mandatory for offshore units in line with the International Association of Classification Societies' unified requirements; and new fish welfare and ocean health class notations for floating fish farms.

DNV aims to ensure the rule set remains up to date and easy to work with. Every revision optimizes the

structure of the rules, for example, by eliminating redundancies. DNV invests heavily in digital tools to enable smooth processes for designers and yards.

ASL Joins Forces with Edgewise

ASL Environmental Sciences Inc. and Edgewise Environmental Consultancy Ltd. have partnered to offer the North American offshore marine energy sector a comprehensive

full-service team of ocean specialists, with a cumulative 60-plus years of ocean experience and extensive on-water experience on all three of Canada's coastlines.

Services include: comprehensive physical oceanography studies; sea ice studies; biological oceanography studies; marine mammal and seabird observation; passive acoustic monitoring; and environmental training. **ST**



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Indonesia Submarine Program

Indonesia has chosen Naval Group and PT PAL for its submarine program. The two companies joined forces through a strategic partnership agreement. Their joint contract includes the delivery of two Scorpène Evolved Full LiB submarines that will be built in Indonesia within PT PAL shipyard and with know-how and technology from Naval Group.

Surveillance Systems for Australian Frigates

UK surveillance specialist Chess Dynamics has been awarded a contract by BAE Systems Maritime Australia to supply its SeaEagle FCEO surveillance systems for the first batch of the Royal Australian Navy's (RAN) *Hunter*-class frigates.

The system will provide the RAN with a state-of-the-art surveillance capability for the detection, tracking, and identification of surface and air targets as part of the *Hunter*-Class Frigate Program. The highly accurate tracking data are expected to enable passive targeting for the weapon systems, reducing overall operator burden.

The SeaEagle FCEO is equipped with an advanced daylight camera, a high-resolution infrared camera, and an eye-safe laser range finder. It also features a sophisti-

cated software suite that provides a comprehensive picture of the maritime environment.

Overhaul of US Aircraft Carrier

HII's Newport News Shipbuilding division has completed the dry dock portion of the refueling and complex overhaul (RCOH) of the *Nimitz*-class aircraft carrier USS *John C. Stennis* (CVN-74).

Following the recent flooding of more than 100 million gallons of water into the dry dock, USS *John C. Stennis* was successfully moved to an outfitting berth at the shipyard, where the remainder of the RCOH work and testing will be completed.

Once the RCOH is complete, USS *John C. Stennis* will be equipped to operate in the fleet for the second half of its 50-year expected service life.

Submarine Emergency System for Spanish Navy

Phoenix has been contracted by the Spanish Navy to provide a Submarine Emergency Ventilation and Decompression System (SEVDS).

SEVDS is a rapidly transportable (via air, land and sea) system that provides breathing air to disabled submarines to extend life on board while awaiting rescue and, if necessary, can be used to reduce internal submarine pressure to reduce hyperbaric risks to surviving personnel. SEVDS is capable to a depth of 600 m (2,000 ft.) and can be connected to the submarine by divers or ROV.

US Navy Partners with Academia

The U.S. Office of Naval Research is tapping academic expertise at the University of Michigan to solve current and future problems via the \$14.5 million Center for Naval Research and Education. The center will also help train an engineering research community familiar with naval and marine applications.

The strengthened partnership will help prepare naval engineers for the challenges imposed by rapidly changing marine environments and maritime technology. To tackle these challenges, the center will build multidisciplinary teams focused on research topics such as: studying how films of algae and bacteria impact vessel performance and how to prevent resulting performance issues; discovering ways to make vessels move more quietly through water; harnessing energy from waves; understanding flow-induced damage to design tougher hull materials; and discovering ways to provide more control over vessel drag and maneuverability, such as morphable skin and highly water-repellent surfaces.

ROVs for US Navy MESR

VideoRay LLC has been awarded a \$92.6 million five-year contract for the continuous production, sustainment and development of the MK20 Defender ROV platform for the U.S. Navy's Maritime Expeditionary Standoff Response (MESR). This contract provides access to VideoRay's Mission Specialist family of underwater robotics systems to support the Navy's Explosive Ordnance Disposal Underwater Response Vehicle program and the MESR program of record. **ST**

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environmental monitoring

Proactive Coastal Planning

Without intervention, two-thirds of Southern California's beaches will be inundated by 2100, according to the U.S. Geological Survey, as a result of stronger storms, bluff erosion and sea level rise. Charles Lester, director of UC Santa Barbara's Ocean & Coastal Policy Center, is leading a team of researchers from five institutions and organizations to develop the California Beach Resiliency Plan. Their work will be supported by a \$2.1 million grant from the Ocean Protection Council, a state government agency tasked with safeguarding California's coast through funding research, policy and management. The effort will produce concrete guidance for beach resiliency from the community level up to the state level, covering the entire California coast.

This project has three components. The first comprises snapshot assessments of beaches at the county level, including ecology, geography and social value. The second component is decision guidance: a framework for helping local communities make decisions about how to interpret all this information and which interventions to consider. The third facet encompasses state-level recommendations to inform broader strategies and actions.

The project's guiding principle is to approach coastal resilience from a proactive mindset to help people navigate problems before they become disasters.

Back in 1972, under Governor Ronald Reagan, California created a proactive Comprehensive Ocean Area Plan, which included a call for managing beach erosion.

Democratizing Data Access

ASL has joined the developer community at Bristlemouth, an initiative aimed at democratizing marine data access and connectivity through a full-stack physical connectivity standard. The Bristlemouth open standard is a new design of a two-wire connector that is akin to an ocean USB. This connector,

which is designed to withstand rugged deep-ocean and coastal environments, enables high-power and low-latency data transfer among cabled underwater instruments.

As members of the Bristlemouth Pioneer program, ASL is working on integrating its AZFP with SOFAR's spotter buoy, enabling real-time data transfer from a single-frequency echosounder over cellular/Iridium networks.

The plug-and-play nature of this connector will allow simple integration of the AZFP with other important oceanographic sensors for a more holistic picture of the marine environment. Hosting the data on a flexible web portal will enable the application of real-time analytics, including statistical measures of backscatter and newly developed deep-learning tools for the detection of anomalies, targets, and boundaries. This advancement is a critical step toward increased data access and broader integration of acoustic data in marine monitoring and decision making.

Studying Waves to Protect Mekong Delta

The Mekong Delta in Vietnam is home to more than 20 million people and is a globally important agricultural area. Researchers are using advanced wave measurement devices from Nortek to validate ocean models and provide accurate data for the development of coastal erosion defenses.

Coastal protection is essential for staving off rising sea levels, protecting the coast from erosion caused by powerful waves during the monsoon season, and minimizing seawater intrusion. Barriers such as wooden fences and concrete breakwaters haven't proven adequate.

To find a more effective solution, Jonas Bauer, a Ph.D. student at the Karlsruhe Institute of Technology (KIT), and colleagues from KIT have joined forces with Vietnamese institutions to better understand the sea and coast at the very southern end of the Mekong Delta. Ocean mod-

els help predict how different coastal defense measures could perform when faced with storms. To ensure the models' predictions are accurate, they must be validated and calibrated against real-world measurements. Using a combination of Signature and AWAC ADCPs to measure the movement and dynamics of waves as they travel toward the coast during the monsoon season, the researchers verified the accuracy of two different ocean models and assessed their limitations.

With verifications from the in-situ measurements and model limitations known, the researchers can be more confident in using the models to predict the behavior of waves as they move toward the coast under different scenarios. This will enable exploration of various coastal protection options to slow the erosion of the Mekong Delta's coastline.

Trace Oxygen Found in OMZ

Using a mini trace analyzer in-situ logger, or mTail, an international team of scientists on a Schmidt Ocean Institute expedition has found sporadic pockets of water with trace amounts of oxygen in an area of the Southeast Pacific where oxygen has historically been below the limit of detection.

The discovery revises the understanding of microbes and nutrient cycling in the Oxygen Minimum Zone (OMZ), at 100- to 1,000-m depth.

Drs. Morten Larsen and Bo Thamdrup of the University of Southern Denmark developed the mTail alongside Dr. Laura Bristow of the University of Gothenburg, Sweden.

When oxygen is unavailable, microbes use molecules such as ammonia and nitrate for energy, releasing nitrous oxide as a byproduct—a greenhouse gas 245 times more potent than carbon dioxide.

When trace oxygen exists, it supplies the microbial community with small but significant amounts of oxygen, which can impact the turnover of greenhouse gases in these systems, reshaping our conceptual understanding of how the OMZ works. **ST**

contracts

Echandia, Solna, Sweden, has received an order for the conversion of MS *Hamlet* from fossil fuel dependency to full electrical operation. Öresundslinjen.

Wärtsilä, Helsinki, Finland, will supply the Wärtsilä 25 engine for a new 44-m-long stern trawler. The vessel is the first of three new vessels to be built for the Faroe Islands. Vardin.

Rolls-Royce, Friedrichshafen, Germany, has signed a memorandum of understanding in Singapore to strengthen a partnership to enable clean, energy-efficient sailings for a fleet of 11 ferries, equipped with mtu Series 2000 engines. Majestic Fast Ferry Pte Ltd.

TechnipFMC, London, U.K., has been awarded a contract in Australia to design, manufacture, and install the subsea production system, flexible pipe, and umbilicals for the Xena Infill well (XNA03) to support ongoing production from the Pluto LNG Project. The award follows an integrated front-end engineering design study. Woodside Energy.

Ocean Technologies Group (OTG), London, U.K., has signed an agreement with the global network for women in shipping to offer a suite of OTG e-learning resources for career advancement. WISTA International.

Auramarine, Turku, Finland, a provider of fuel supply systems for the marine, power and process industries, has signed a representative agreement with a South Korean marine equipment and services provider. Specs Corp. Ltd.

HII, Newport News, Virginia, has signed an agreement to collaborate on priority solutions for HII's defense and intelligence customers, such as digital shipyard transformation, next-generation seapower capabilities, warfighter training readiness, commercial space initiatives, and more. Amazon Web Services.

Lloyd's Register, London, U.K., has signed a memorandum of understanding to act as a trusted adviser to support a company's energy transition journey with new energy efficiency and emissions reduction technology. Shandong Marine Group.

Greensea IQ, Richmond, Vermont, has made a five-year agreement to expand each company's service offerings by integrating their expertise in underwater hull cleaning technologies and services across the marine industry. Seaward Marine Services.

Kongsberg Digital, Horten, Norway, will deliver K-Sim simulator systems to a specialist maritime training academy based in Genova, Italy. Fondazione Accademia Italiana della Marina Mercantile. **ST**

September 16-20—Marine Electronics Conference & Expo, Providence, Rhode Island. <https://expo.nmea.org>.

September 17-19—South America Offshore Wind, Rio de Janeiro, Brazil.

September 23-26—OCEANS 2024 Halifax, Halifax, Canada. <https://halifax24.oceansconference.org>.

OCTOBER

October 2-3—Sustainable Marine Fuel Fest, Porto, Portugal. <https://ship.energy/events/smf-fest-2024>.

October 7-10—Marine Imaging Workshop, Monterey, California. <https://miw2024.org>.

NOVEMBER

November 4-7—EURONAVAL, Paris-Nord Villepinte, France. www.euronaval.fr.

November 7-10—Europort, Rotterdam, Netherlands. www.europort.nl.

November 12-14—International WorkBoat Show, New Orleans, Louisiana. www.workboatshow.com.

November 19-21—Marine Renewables Canada Conference, Halifax, Canada. <https://marinerenewablesconference.ca>.

November 19-21—MAST Australia, Adelaide, Australia. mastconfex.org.

November 20-21—Decarbonisation in Shipping Europe, Hamburg, Germany. www.wplgroup.com/aci/event/decarbonisation-shipping-europe.

2025

JANUARY

January 15-17—Floating Wind Solutions, Houston, Texas. <https://floatingwindsolutions.com>.

For more industry meetings, visit sea-technology.com/meetings. **ST**

meetings

AUGUST

August 7—NOIA ESG Workshop, Houston, Texas. www.noia.org.

August 15—Offshore Wind Supply Chain Forum, Halifax, Canada. <https://marinerenewables.ca/event/offshore-wind-supply-chain-forum-summer-social-august-15-2024-halifax-nova-scotia>.

August 26-29—SEG/AAPG IMAGE, Houston, Texas. www.imageevent.org.

SEPTEMBER

September 11-12—Maritime Salvage & Casualty Response, London, U.K. www.wplgroup.com/aci/event/maritime-salvage-casualty-response.

September 11-12—Oil Spill India, New Delhi, India. <https://oilspillindia.org>.

September 16-19—Fleet Maintenance & Modernization Symposium, Virginia Beach, Virginia. www.navalengineers.org/Symposia/FMMS2024.

The Global Problem of Piracy Rises from Instability on Land—Francis A. Galgano

Francis A. Galgano is an associate professor at Villanova University, focusing on environmental security, the geography of global security and military geography. He is the editor of *"The Environment–Conflict Nexus: Climate Change and the Emergent National Security Landscape"* (Springer, 2019) and author of *"Hostis Humani Generis: Pirates and Global Maritime Commerce"* (Research in Globalization, 2023).



Maritime piracy is a unique form of transnational crime and has been a persistent threat to commerce and crew safety since the time of the Romans, who named them *"hostis humani generi,"* or "enemies of the human race." Piracy has since endured for more than 30 centuries. Nevertheless, for most people, pirates are the subject of movies and novels. They did not capture public attention until the surge in Somali piracy in the 2000s.

In November 2008, Somali pirates hijacked the MV *Sirius Star*, a Saudi Arabian super tanker, while it was underway some 450 nautical mi. off the coast of Kenya. The vessel was eventually released for a \$3 million ransom. It brought into international focus a more violent form of piracy: the seizure of ships and crew for ransom.

The *Sirius Star* and hundreds of similar incidents accentuate the complicated and detrimental nature of maritime piracy. Their crimes are unique on the global security landscape because they take place on the high seas, beyond the legal jurisdiction of sovereign states or international judicial bodies. Furthermore, the nature of contemporary global maritime commerce means that pirates do not necessarily threaten the sovereignty or commercial assets of any given state; rather, their attacks are costly to individual shipping companies. Con-

sequently, international responses have been sluggish and fragmented.

Investigating trends in maritime piracy is an important exercise because of the consequences—between 75 and 90 percent of global trade is transported on ships. In a globalized and interdependent world, the economic and security implications of maritime piracy are far reaching. Events in Somalia demonstrated that a relatively small band of pirates can constitute enough of a menace to disrupt a major shipping lane. This problem was once again demonstrated in November 2023 when Houthi rebels began attacking international shipping in the sea lanes adjacent to Yemen.

Pirate activities are expanding in geographic scope, and the level of violence against ship's crew is escalating. Moreover, the first and second order costs absorbed by the global economy are considerable. The World Bank estimates that Somali pirates cost the global economy about \$18 billion between 2006 and 2013. Globally, pirate attacks have continued to add a 10-fold increase in maritime cargo, insurance and security costs.

Data from the International Maritime Bureau (IMB) indicate that between 1991 and 2023, attacks are highly concentrated in four regions: South and Southeast Asia, East Africa, and the Gulf of Guinea. Eighty-three percent of the world's 8,231 attacks have taken place in these four regions, which house the most important shipping lanes.

The most problematic region is Southeast Asia, where 41 percent of all pirate attacks have occurred from 1991 to 2023. The waters surrounding Indonesia are particularly troublesome. Nearly one in four pirate attacks take place there, including in the Malacca and Singapore Straits.

This concentration of pirate activity results from an unfortunate

amalgamation of geography and the core issues that enable piracy worldwide: ineffective governance, a lack of security capacity, poor regional coordination of prevention efforts, and economic marginalization. The global economy is affected because tens of thousands of merchant vessels traverse these waters. Their cargo is an integral component of the global economy, representing about one-third of the world's maritime global commerce.

Why are pirate attacks so highly concentrated in these four regions? The central problem in these places, and others where piracy is endemic, is a matter of governance. As author Robert Kaplan notes, piracy at sea rises from instability on land. Pirates can act with near impunity at sea when governments on land lack the security apparatus and political will to suppress their activities.

This was made very clear last fall when the Houthi rebels, based in northwestern Yemen, began attacking ships in the sea lanes of the Red Sea, Bab el-Mandeb and Gulf of Aden. Yemen is among the most poorly governed states in the world, and the Houthi have established an autonomous area beyond the control of the sovereign state. In Yemen, as in historical examples, international naval forces had to act to protect commercial shipping and keep open an essential sea lane.

But naval actions that are effective in the short term are not a panacea. In the last two decades, shipping companies have become somewhat more successful at combating pirates with hard and soft solutions: adding armed guards to ships, improved shipboard defenses, better cooperation and coordination with international agencies, and avoiding the most dangerous shipping lanes (which is costly). For a long-term solution, political instability and economic marginalization must be resolved, with international cooperation. **ST**

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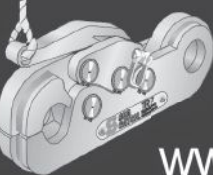
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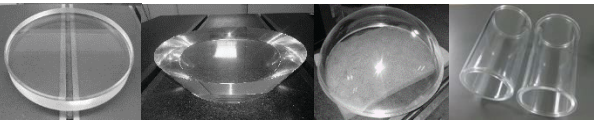
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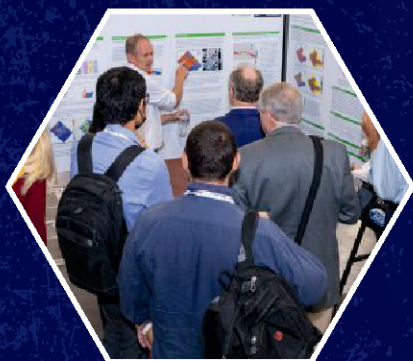




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